A Functional Perspective of Financial Intermediation

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New financial product designs, improved computer and telecommunications technology, and advances in the theory of finance have led to dramatic and rapid changes in the structure of global financial markets and institutions. This paper offers a functional perspective as the conceptual framework for analyzing the dynamics of institutional changes in financial intermediation and uses a series of examples to illustrate the range of institutional change that is likely to occur. These examples are used to frame the managerial issues surrounding the production process for intermediaries and to discuss the regulatory process for those intermediaries.

There are two fundamentally different frames of reference for analysis of financial intermediation. One perspective takes as given the existing institutional structure of financial intermediaries and views the objective of public policy as helping the institutions currently in place to survive and flourish. Framed in terms of the banks, or the insurance companies, private-sector managerial objectives are similarly posed in terms of what can be done to make those institutions perform their particular intermediation services more efficiently and profitably.

An alternative to the institutional perspective—one I take here—is the functional perspective. The functional perspective takes as given the economic functions performed by financial intermediaries and asks what is the best institutional structure to perform those functions. In contrast to the institutional perspective, this functional perspective does not posit that existing institutions, whether operating or regulatory, will necessarily be preserved. Instead, its structure rests on two basic premises: 1) financial functions are more stable than financial institutions—that is, functions change less over time and vary less across geopolitical boundaries; and 2) competition will cause the changes in institutional structure to evolve toward greater efficiency in the performance of the financial system.

How would one go about designing a completely new financial system for a country? This question is, of course, no longer a matter of only academic interest. Policymakers around the world are working on fundamental changes to the financial systems of their countries. Changing the financial system in the former Communist countries of Eastern Europe is a major part of a general restructuring of their entire economic system from one based on central planning and government ownership of business to one based on free markets and private ownership. The functional perspective on intermediation can be particularly useful in institutional design in such cases.

In building a financial system from scratch, one understandably begins by defining its central role. The primary function of any financial system is to facilitate the allocation and deployment of economic resources, both spatially and temporally, in an uncertain environment.

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

Function 1: A financial system provides a payments system for the exchange of goods and services.

Function 2: A financial system provides a mechanism for the pooling of funds to undertake large-scale indivisible enterprise.

Function 3: A financial system provides a way to transfer economic resources through time and across geographic regions and industries.

Function 4: A financial system provides a way to manage uncertainty and control risk.

Function 5: A financial system provides price information that helps coordinate decentralized decision-making in various sectors of the economy.

Function 6: A financial system provides a way to deal with the asymmetric-information and incentive problems when one party to a financial transaction has information that the other party does not.

Creditworthiness or default risk is a critical issue for all business firms—and for households as well. However, for financial intermediaries with principal businesses that involve issuing contingent-payment contracts to their customers, creditworthiness is the central financial issue. The prospect of a future default by an intermediary on contracts to its customers can significantly reduce the ex ante efficiency of those contracts and thereby substantially reduce the effectiveness of the main economic function served by the intermediary. In contrast, the possibility of default on investor-held debt of a typical business firm may have little or no impact on the effectiveness of that firm in serving its principal economic function. To distinguish between those two situations, the difference between the “customers” and “investors” of the firm is developed as a core concept in Section III.

That many of the important businesses run by financial intermediaries are considerably more “credit-sensitive” than most of those run by non-financial firms is a critical element that distinguishes the important design and management issues for an intermediary from those of a typical business firm. Thus, risk management is almost always an activity of first-order importance to the efficient operation of an intermediary but, in general, need not be so for business firms. Similarly, acquiring or issuing guarantees of financial performance is an operating activity of first importance for intermediaries but only a specialized transaction for most business firms.

For a variety of reasons—including differences in size, complexity, and available technology, as well as differences in political, cultural, and historical backgrounds—the most efficient institutional structure for fulfilling the functions of the financial system generally changes over time and differs across geopolitical subdivisions. Moreover, even when the corporate identities of institutions are the same, the functions they perform often differ dramatically. For example, banks in the United States in 1995 are very different from what they were in 1925 or in 1955, just as they are very different from the institutions called banks in Germany or the United Kingdom today. The financial markets in New York, London, or Tokyo today are different from what they were as recently as 1980—before the widespread introduction of trading in fixed-income and stock-index futures, options, and swap contracts.

In contrast, the basic functions of a financial system are essentially the same in all economies—past and present, East and West. And because the functions of the financial system are far more stable than the identity and structure of the institutions performing them, a functional perspective provides a more reliable and enduring frame of reference than an institutional one, especially in a financial environment characterized by rapid changes. Given the considerable institutional diversity across national borders, a functional perspective is more readily adaptable to a global setting for the financial system. Indeed, with the current rate of technological advance and integration of world financial markets, this approach may prove especially useful in predicting the future direction of financial innovation, changes in financial markets and intermediaries, and the places for regulatory bottlenecks.

With this general background on the functional perspective, we turn now to the dynamics of institutional change.

I. On the Future of Financial Intermediaries: Dynamics of Institutional Change

One need only consider financial innovation over the past 20 years to underscore the point that while the functions...
of the financial system are stable, the ways in which they are performed are not. Those two decades have seen revolutionary changes in the structure of the world’s financial markets and institutions and in our understanding of how to use them to provide households and firms with new investment opportunities and ways of managing risk. For a brief sampling, consider round-the-clock trading from Tokyo-to-London-to-New York, financial futures, swaps, exchange-traded options, mortgage-backed securities, "junk" bonds, shelf-registration, electric funds transfer and security trading, automated teller machines, NOW accounts, asset-based financing, LBO, MBO, and all the other acronymic approaches to corporate restructuring. Those changes in the structure of the financial system came about in part because of a wide array of newly designed securities, in part because of the advances in computer and telecommunications technology that made possible the implementation of large-volume trading strategies in these diverse securities, and in part because of important advances in the theory of finance. Each of these has contributed to vastly reduced costs of financial transactions.

Greatly reduced trading costs would be expected to cause transaction volume in financial markets to rise substantially, which it has. But, these reductions in costs more generally have contributed to an even greater expansion in markets through the process of "commodization" in which financial markets replace financial intermediaries as the institutional structure for performing certain functions. In terms of an "extended" Ross (1989) classification of financial institutions (see Table 1), there appears to be a secular pattern away from opaque institutions toward transparent institutions. By way of examples, the development of liquid markets for money instruments, such as commercial paper, allowed the money-market mutual fund ("transparent institution") to make major inroads as a substitute institutional structure for bank and thrift ("opaque institutions") demand deposits. Financial futures on equities’ indices are an efficient alternative to market- and sector-index mutual funds. 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 who had historically depended on banks as their source of debt financing. Similarly, 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 entry possible by agent-type institutions (e.g., investment banks and mortgage brokers) to compete with traditional principal-type intermediaries for the origination and servicing fees on loans and mortgages.

The process of "securitization" is essentially the removal of (non-traded) assets from a financial intermediary’s balance sheet by packaging them in a convenient form and selling the packaged securities in a financial market. This process of reducing the total size of assets or "footings" of intermediaries and transferring them to markets is already widespread for mortgages, auto loans, credit-card receivables, and leases on consumer and producer durables. Now established as a legitimate process, its application to other types of intermediary assets is likely to move forward even more rapidly than in the past. As a last example, consider a case that has not as yet happened, but could: an options alternative to municipal-bond insurance. In the United States, there are specialized insurance companies that sell insurance guaranteeing interest and principal payments on municipal bonds against default by the issuer. The policies are typically sold to the issuer municipality, which "attaches" them to the bonds to give them an AAA credit rating. Consider as

Table 1. Classification of Financial Institutions

<table>
<thead>
<tr>
<th></th>
<th>Transparent</th>
<th>Translucent</th>
<th>Opaque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Govt. Bond Market</td>
<td>Stock Market</td>
<td>Futures &amp; Options Markets</td>
<td>Unit Trusts</td>
</tr>
</tbody>
</table>

As Miller (1992, p. 4) describes it, "No 20-year period in financial history has witnessed an even remotely comparable burst of innovative activity." 3

Perhaps in no other branch of economics has the implementation of theory into real-world practice been as rapid as for finance theory and the financial-services industry over this period. See Bernstein (1992) for an in-depth description of this interplay between theory and practice in bringing about some of the major innovations of the last few decades.

4For example, the trading volume on the New York Stock Exchange runs about 150-200 million shares a day, which is 12-15 times the volume of 20 years ago. The Exchange claims to have the technology to handle a 1-billion share day. Note: These figures overstate the increase in transaction capacity because the number of shares traded per transaction has increased significantly over this period.

5See Cushman (1993) on the possibility of creating a national market for mid-market corporate bank loans. For a comprehensive discussion of the implementation of asset securitization, see Norton and Spellman (1991), Zweig (1989), and the entire Fall 1988 issue of Journal of Applied Corporate Finance.
a competing alternative that an options exchange creates a market for put options on municipal bonds. Investors could then achieve the same loss protection by buying an “uninsured” municipal bond and a put option on that bond.7 Note that both structures serve the same function for investors—protection against loss from default. However, the institutions are entirely different—an options exchange is not an insurance company, and most exchanges are not even intermediaries.8 Furthermore, the put option traded on the exchange is a fundamentally different product from the insurance guarantee. Nevertheless, although the products and the institutions that provide them are quite different, the economic function they serve is the same.

This is hardly the place for a cost-benefit analysis of those competing ways for performing the specialized function of municipal-bond default guarantees. To make the point on inter-institutional competition, it suffices to say that the “unbundling” of the down-side protection9 and the possibility that an options exchange with mark-to-market collateral and a clearing corporation could be a “better credit” than an insurance company provide important potential reasons why issuers and investors might prefer the financial-market structure for guaranteeing the performance of the bonds over the intermediary one.

As these examples indicate, intermediaries and markets compete to be the provider of financial products. Improving technology and the continuing decline in transactions costs has added to the intensity of that competition. Inspection of Finnerty’s (1988 and 1992) extensive histories of innovative financial products suggests a pattern in which products offered initially by intermediaries ultimately move to markets. This temporal pattern may seem to imply that financial intermediaries (especially, opaque ones such as banks) are declining in importance and are being superseded institutionally by financial markets.10 Perhaps. However, exclusive focus on the time path of individual products can lead to biased forecasts, not only with respect to the apparent secular decline in the importance of intermediation, but with respect to the general structural relations between financial markets and intermediaries.

Financial markets, as we know, 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. As we also know, intermediaries are better suited for low-volume products. Some of these products will always have low volume either because they are highly customized or because of fundamental information asymmetries. Others, however, have low volume only because they are new. Among those, the “successes” are expected to migrate from intermediaries to markets. That is, once they are “seasoned,” and perhaps after some information asymmetries are resolved, those products are structured to trade in a market. Just as venture-capital intermediaries that provide financing for start-up firms expect to lose their successful customers to capital-market sources of funding, so do the intermediaries that create new financial products.

Especially in periods with a high intensity of financial innovation, there is a large volume of new products created, and therefore, one expects a large number of instances of product migration from intermediaries to markets. Following the time path of individual products can thus lead to the belief that as technology continues to evolve, trading markets for standardized instruments, such as securitized loans, will ultimately replace financial intermediaries, such as banks. For intermediaries that are rigidly attached to a specific product or class of products that may indeed be the case but not for intermediation generally. Intermediaries, in addition to their manifest function of offering custom products and services, serve an important latent function of creating and testing new products as a part of the general financial-innovation process.

This dynamic product-development interaction between intermediaries and markets can be interpreted as part of a “financial-innovation spiral” pushing the financial system toward an idealized target of full efficiency.11 That is, 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 dominant source of external finance in all countries” (p. 313). See also Gorton and Pennacchi (1992) on the changing institutional structure for serving the depository and lending functions.

7With 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. However, 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.

8For example, the New York Stock Exchange. However, options (and futures) exchanges do provide credit intermediation services because they guarantee contract performance for the life of the contract through their clearing facilities.

9That is, to give each individual investor the choice whether to purchase the particular municipal bonds with or without default insurance and to give the issuer a way to price-discriminate among investors with differing assessments of default risk.

10This proposition is focused on the change, not the level, of relative importance between intermediaries and markets. It is thus consistent with Keeley (1990) who reports that bank stocks have been losing market value for the past 20 years and Mayer (1990) who observes that “Banks are the dominant source of external finance in all countries” (p. 313). See also Gorton and Pennacchi (1992) on the changing institutional structure for serving the depository and lending functions.

creation of new custom-designed financial products that improve “market completeness.” To hedge their exposures on those products, the producers, financial intermediaries, trade in these new markets and volume expands; increased volume reduces marginal transaction 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.

For an example, consider 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-contracted 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 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 “pure 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.

For a second example, consider the financial function of providing a well-diversified portfolio of equities for individual investors. At one time, this function was best served by buying shares on a stock exchange. However, transactions and monitoring costs as well as problems of indivisibilities significantly limited the number of companies that could be held in almost any investor’s portfolio. The innovation of pooling intermediaries, such as mutual funds, greatly reduced those costs, provided for almost perfect divisibility, and thereby allowed individual investors to achieve vastly better diversified portfolios, such as the 500-stock, market-value weighted portfolio of the Standard and Poor’s 500 Index. Subsequently, futures contracts were created on various stock indexes, both domestic and foreign. These exchange-traded contracts further reduced costs, improved domestic diversification, and provided expanded opportunities for international diversification. Moreover, these contracts gave the investor greater flexibility for selecting leverage and controlling risk. In particular, index futures made feasible the creation of exchange-traded options on diversified portfolios. Recent further innovations that serve the diversification function have intermediaries using equity-return swaps to create custom contracts with individual specification of the stock index, the investment time horizon, and even the currency mix for payments. Thus, the institutional providers of the stock-diversification function for households were markets; then intermediaries; then markets again; and then intermediaries again.

As these examples suggest, following the time path of a particular financial function instead of a product leads to our identifying a very different pattern of competition between intermediaries and markets. Instead of a secular trend away from intermediaries towards markets, it is seen as more cyclical—moving back and forth between the two. Table 2 illustrates the generic time pattern for the institutional providers of a given financial function to households and nonfinancial firms. In this hypothetical example, households are served initially (at Time 0) by intermediaries using Product #1. In the next period, Product #1 migrates to a market, and households are now served by that market. With the opportunity to trade Product #1 in a market, intermediaries can then innovate to create a new product that better performs for households and firms than the function provided by Product #1. Hence, with the introduction of Product #2 at Time 2, households and nonfinancial firms are once again served by intermediaries. Following the pattern of the financial-innovation spiral, the process repeats itself with Product #2 migrating to a market, the subsequent creation of Product #3 and so on. Thus, although products tend to move secularly from intermediaries to markets, the providers of a given function tend to oscillate according to the product-migration and development cycle.

It is evident from further inspection of this dynamic interaction that intermediaries help markets grow by creating the products that form the basis for new markets and by

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13See, for example, Antilla (1992) on the Chicago Mercantile Exchange.

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14As in the Eurodollar futures/swap example, the availability of index futures and options markets allows intermediaries to better hedge their exposures on the products they create.
15See Perold (1992) for a detailed case study on enhanced index equity products. As shown there, contracts are also tailored to individual tax and regulatory circumstances. Litzenberger (1992) discusses such tailoring for fixed-income products.
Table 2. Institutional Dynamics for the Providers of a Specific Financial Function to Households and Non-Financial Firms: Intermediaries versus Markets

<table>
<thead>
<tr>
<th>Product #1</th>
<th>TIME 0</th>
<th>TIME 1</th>
<th>TIME 2</th>
<th>TIME 3</th>
<th>TIME 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Producer</td>
<td>INT</td>
<td>MKT</td>
<td>MKT</td>
<td>MKT</td>
<td>MKT</td>
</tr>
<tr>
<td>Customer</td>
<td>HH/F</td>
<td>HH/F</td>
<td>INT</td>
<td>INT</td>
<td>INT</td>
</tr>
<tr>
<td>Product #2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Producer</td>
<td>INT</td>
<td>MKT</td>
<td>MKT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer</td>
<td>HH/F</td>
<td>HH/F</td>
<td>INT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product #3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Producer</td>
<td></td>
<td></td>
<td>INT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer</td>
<td></td>
<td></td>
<td>HH/F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Producers Serving HH/F INT MKT INT

HH/F = Households and Non-Financial Firms
INT = Financial Intermediaries
MKT = Financial Markets

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. In sum, financial markets and intermediaries are surely competing institutions when viewed from the static perspective of a particular product activity. However, when viewed from the dynamic perspective of the evolving financial system, the two are just as surely complementary institutions, each reinforcing and improving the other in the performance of their functions.

II. Financial Engineering and the Production Process for Financial Intermediaries

Financial engineering is the means for implementing financial innovation. It is a systematic approach used by financial-service firms to find better solutions to specific financial problems of their customers. The process of financial engineering for intermediaries can be usefully broken down into five steps:

1. **Diagnosis**: identifying the nature and source of the problem.
2. **Analysis**: finding the best solution to the problem in light of the current state of regulation, technology, and finance theory. The best-solution design is typically a new financial instrument (or set of instruments), but it can also be an entirely new financial intermediary.
3. **Production**: producing the new instrument either by underwriting both sides of the transaction (agent) or by synthesizing it through a dynamic trading strategy (principal), or by a combination of both.
4. **Pricing**: determining the cost of production and profit margin.
5. **Customization**: further tailoring the instrument to the specific needs of each customer. In most cases, the problem addressed is relevant to more than one client. A cost-benefit tradeoff is considered in deciding whether to make detail changes to fit each individual more precisely.

The changes in finance theory and computer technology in the last decade and the transaction-cost-reducing effect of the financial-innovation spiral have had their greatest impact on the production part of intermediaries’ financial engineering process. To model the production process for a generic intermediary, I consider two polar models, the “underwriting” and the “synthesizing” models, recognizing that most real-world intermediaries pursue combinations of the two. Instead of developing these basic approaches to
production in the abstract, I present them in the context of a simple, hypothetical example.¹⁶

Suppose that as a result of taking the diagnosis and analysis steps in the financial engineering process, an intermediary determines that a customer’s problem would be best solved if it could own the economic equivalent of 1,000 shares of XYZ Corporation and have the value of the position insured so that at the end of two years, it has a minimum value of $100,000 ($100/share), which is also the current value of the stock. Thus, one “unit” of this “insured-equity” product has a contingent payoff structure equal to the maximum of the stock price or $100 per share at its maturity date in two years.¹⁷

Suppose further that the intermediary knows that XYZ stock will sell for either $90 or $115 a share in a year’s time. If the former occurs, then the stock will either decline further to $70 a share or rebound to $110 at the end of Year 2. If, instead the stock is $115 at the end of the first year, then it will sell for either $90 or $140 at the end of the second year. The intermediary also knows that XYZ will pay no dividends during this time. A tree diagram of the process is presented in Figure 1. The riskless interest rate is constant over time at 5% per year.

One approach to producing the product is to create a unit trust (call it “XYZ Trust”) with assets of 1,000 shares of XYZ and two-year U.S. Treasury bills with a face value of $100,000. The trust has two classes of liabilities: Class A and Class B. Class A is entitled to receive at the end of Year 2 either 1,000 shares of XYZ or $100,000, whichever its owner prefers. During the interim period, the Class A holder receives all cash dividends paid on the XYZ shares and dictates how the shares in the trust are voted. Class B is a “residual” security that receives whatever assets remain in the Trust, after the Class A claim has been met.¹⁸

Based on the intermediary’s knowledge of the price process for XYZ, the contingent payoffs to the Trust and each of its liabilities are displayed in Table 3. By inspection of that table, the Class A instrument has the identical payoff pattern to the insured-equity product. However, the structure of the Trust guarantees that the promised payments can be made without making any distributional assumptions about XYZ, because the UST bills are sufficient to meet the minimal $100,000 payment even if the XYZ shares become worthless. Thus, once the Trust is created, the intermediary can meet its customer’s objective by selling it the Class A instrument without having to convince the customer to agree with its stock-return assessments on XYZ.

The cost of funding the Trust is $190,700 (=$100,000 for 1,000 shares of XYZ plus $90,700 for $100,000 face value of two-year UST bills discounted at 5% per year). Thus, to make a profit, the intermediary must receive at least $190,700 from the sale of the Class A and Class B units plus cover any other expenses of forming the Trust. The intermediary may have to commit some capital to fund the Trust while it is selling the units, but once they are sold, the intermediary has neither capital nor risk exposure to the transaction.

This approach is essentially a (“buyer-driven”) underwriting activity, and it emphasizes marketing or distribution skills. As with underwriting in general, the intermediary is positioned more like an agent than a principal to the transaction. In terms of product creation, it exemplifies

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¹⁷This product is equivalent to a “protective-put” option strategy where the investor buys the stock and a put option on the stock. Chase Manhattan Bank, which issues the product based on the Standard & Poor’s 500 Stock Index in the U.S., calls it a “market-index certificate of deposit.” Swiss Bank Corporation uses the name “guarantee-return-on-investment securities” (GROIS), and Merrill Lynch calls its version “Market Index Target Term Securities” (MITTS). Leland, O’Brien, and Rubinstein offer the “Super Trust” and “Super Shares.”

¹⁸Although the example focuses on an equity product, this approach is widely used to produce tailored fixed-income products, often with many more than just two classes of liabilities. Indeed, the “residual” security always is called the “Class Z” security even if there are fewer than 25 other classes. Characteristics of the Class A security are designed to meet specific duration, credit-risk, regulatory, and tax clienteles. Examples are collateralized mortgage obligations (CMOs) and collateralized bond obligations (CBOs) that use mortgages, bonds, and other fixed-income assets in the trust.
the Ross (1989) "marketing" theory of intermediation. The unit trust used as the intermediation vehicle is a transparent institution. No sophisticated stock-evaluation or trading skills are needed, since operating the Trust requires only a one-time purchase of 1,000 shares of XYZ and $100,000 face value of UST bills. And knowledge of the stock-price return distribution (as in Figure 1) is also not needed.

Because the structure of the Class A units is derived as a direct solution to a specific problem faced by an identified (class of) customer, one expects that the placement of those units is a relatively "easy" sale. However, to create the desired equity-insurance product in this fashion, it is also necessary to sell the Class B units. Because they are the residual claims, their payoff structure is not explicitly designed to fit any particular investor group's "desired habitat." Thus, these units must be sold on the basis of price (i.e., as an investment "bargain") and not on the basis of convenience or performance in meeting some explicit customer objective. Therefore, to be successful, the intermediary must charge a sufficient price "premium" (over cost) on the Class A units to offset the price "discount" on the Class B units necessary to induce "bargain-hunting" investors to buy them.

It is evident that an intermediary with a larger number of contacts with price-sensitive investors is more likely to find those who will pay a higher price for the deal. Customers are always looking for "good" products, and financial product designs cannot be patented. The least-cost producer of these products is therefore likely to have an important advantage. Hence, to intermediaries that produce products by this "underwriting" approach, a "fat" Rolodex file containing names of "bargain-investor" contacts may be more valuable than one of corresponding size filled instead with "customer" names.

An alternative to this "Rolodex" method of production through underwriting is for the intermediary to act as a principal and issue the desired insured-equity product directly to the customer as a contractual obligation of the intermediary (instead of a separate trust). In principle, the intermediary could do so by buying the same combination of XYZ stock and UST bill assets held in the Trust in the underwriting approach and finance the difference between the cost of those assets and the proceeds from sale of the insured-equity product with equity capital. This strategy would be almost equivalent to the intermediary creating the Trust and buying the Class B piece itself. However, as we know from the work of Grossman and Hart (1982), Jensen (1986), and others, there are potentially significant agency and tax costs associated with the equity capital of firms. Those "dead-weight" costs make equity finance "expensive" and thereby limit the amount of equity that a value-maximizing intermediary would optimally issue. Hence, this simple way of combining the underwriting intermediary with its bargain-hunting investors may not be efficient.

An alternative that potentially "economizes" on the amount of capital required is the "synthesizing" or "dynamic-trading" approach to production. It substitutes a strong trading facility for a strong distribution system, and it relies on the power of modern computer technology and highly-skilled personnel, trained in advanced methods of estimation and contingent-claims pricing. With its

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Table 3. Contingent Payoffs at Year 2

<table>
<thead>
<tr>
<th>XYZ Stock Price ($)</th>
<th>&quot;Class A&quot; Insured Equity ($)</th>
<th>&quot;Class B&quot; Residual Claim ($)</th>
<th>XYZ Trust ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>100,000</td>
<td>70,000</td>
<td>170,000</td>
</tr>
<tr>
<td>90</td>
<td>100,000</td>
<td>90,000</td>
<td>190,000</td>
</tr>
<tr>
<td>110</td>
<td>110,000</td>
<td>100,000</td>
<td>210,000</td>
</tr>
<tr>
<td>140</td>
<td>140,000</td>
<td>100,000</td>
<td>240,000</td>
</tr>
</tbody>
</table>

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19In a buyout or takeover with major revisions of a firm's capital structure, the residual non-equity securities issued are often called "cram-downs," reflecting the lack of a natural investor-demand for their pattern of payoffs. The payoffs to the Class B units here happen to have the same structure as a two-year, zero-coupon "junk" bond (see Merton 1990, pp. 272-285).

20Such an intermediary would also have the opportunity to "spread" the trades out with a lower quantity (and possibly higher price) per investor.

21There are some potentially important credit-risk differences between the two, depending on details of the structuring.

22Otherwise, as we discuss in more detail in the next section, intermediaries with liability obligations to its customers would optimally guarantee performance on those obligations by holding huge positions in liquid assets financed entirely by equity capital.

23From the descriptions in Loomis (1992), Picker (1992), and Sanford (1993), it appears that Bankers Trust Company provides a real-world example of this approach to production. See Overdahl and Schachter (1995) on the legal risks of this approach.
reliance on trading, the synthesizing approach to production benefits disproportionately from the financial-innovation spiral discussed in Section I.

There is an enormous academic and practitioner literature on the mathematics and economics of contingent-claims pricing and dynamic replication. There is no need to develop it once again here. It is enough to describe the principles and then illustrate the process for my hypothetical example.

The process of implementation is as follows: Once the specification of the terms of the customer liability to be issued is determined by the capital-markets or corporate-finance group of the intermediary, the quantitative-analysis group uses contingent-claims analysis to design a dynamic trading strategy in securities to synthesize (replicate) the payoff structure of the customer obligation in the least-cost way. In the trading operations (often called a “trading desk”) of the intermediary, a “dedicated” portfolio is established with an initial investment equal to the minimum amount necessary to ensure full implementation of the strategy with no further capital infusions. The trading strategy is dynamic in the sense that it typically calls for the composition of the portfolio to be revised in response to changes in security prices and the passage of time. The trading desk is charged with implementation of the strategy.

Table 4 illustrates the trading process for this hypothetical example with the return dynamics of XYZ stock described in Figure 1. This cookbook-like prescription calls for an initial investment in XYZ stock and UST bills of $106,315. If the price of XYZ rises, more shares are purchased by selling bills, and if it falls, the share position is reduced, and the proceeds are placed in bills. At Year 2, the value of the portfolio is equal to the maximum of the value of 1,000 shares of XYZ or $100,000. Hence, the portfolio exactly replicates the contractual payoffs that the intermediary has promised to its customer. Since the portfolio never requires a further infusion of capital, the initial investment of $106,315 to fund the portfolio is the production cost to the intermediary for the product.

The process of synthesizing customer financial contracts and securities is for financial intermediaries what the assembly-line production process is for the manufacturing sector. The trading-strategy rules are the “blueprints” for production. The traded securities (XYZ shares and UST bills) used in the portfolio are the raw “inputs” applied in prescribed combinations over time to create a “finished” product or “output,” which is a complete set of contingent payments matched to the ones promised on the customer’s contract.

Compared with the underwriting approach to production, the synthesizing approach appears to have several advantages: It makes the part of the transaction seen by the customer easier for the customer because the intermediary simply issues the contract without requiring the intervening element of the trust as “another institution” involved in the transaction. The synthesizing method is considerably more efficient for an intermediary that specializes in unique or “one-off” contracts. Essentially, any contract with payoffs that depend on the price of XYZ stock can be produced by the same type of process described in Table 4. Only the mixing rules for adjusting the stock-bills positions are changed. Thus, by analogy with numerically controlled machines on a physical assembly line, the intermediary need only change the “dials” (mixing rules) to have the same line produce a different output. This approach thus offers the opportunity to create custom-tailored financial products at a (“assembly-line”) standard-product level of cost. Another advantage to the intermediary operating as a principal is the opportunity to “net” its transactions. Thus, an intermediary that offers a wide variety of customer contracts, each contingent in different ways on the price path of XYZ stock, can run a single replicating portfolio in XYZ stock and bills that hedges the net (aggregate of all customer exposures) contingent payouts.

All this does not imply that the synthesizing approach dominates the underwriting one. Compensation for highly-skilled technical and trading employees and the high cost of the supporting technology (e.g., super computers) can make the cost of running the synthesizing production system greater than the underwriting system. Moreover, as principal, the intermediary (its employees and shareholders) bears the risk of errors in production: These errors range from a clerk punching in 11 million shares rather than dollars in translating the model prescriptions into orders for execution to fundamental

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24 See Merton (1992b) for a recent and extensive bibliography.
25 There are often multiple ways to implement the strategy that are equivalent in a frictionless environment, but when transactions costs including market impact from trading, taxes, regulation, and modeling error are taken into account, they are no longer equivalent. The offset of customer exposures by netting of the intermediary’s positions and hedging only the systematic components of the portfolio risks for the intermediary may also be optimal when there are costs. See Merton (1989, pp. 242-247 and 1992b, pp. 450-457) for further discussion of those issues.
26 The derivation of the synthesizing trading rules for the particular example here is presented in Merton (1992b, pp. 337-341; 438-439).
27 See Merton, op. cit., for the trading rules for a general payoff function when the dynamics for XYZ stock are as in Figure 1 here.
28 As reported in the press, this actually happened in the case of stock-index arbitrage activities at Salomon Brothers in March 1992.
flaws in the assumptions of the model itself (e.g., suppose at the end of Year 2, XYZ shares are selling for $50 or $170 a share, despite these being “impossible” events according to the model description of the process in Table 3).

Perhaps the most important issue surrounding the effectiveness of an intermediary acting as principal is customer perception of the intermediary as a credit risk. This is the topic of Section III, and so, I only note here that a key factor in assessing the relative costs of the synthesizing and underwriting approaches is the amount and cost of “assurance” or “risk” capital required by each to eliminate customer concern about contract performance by the intermediary.

In constructing the Trust in my hypothetical example, a total of $190,700 was required to purchase the funding assets. If the $106,315 production cost by synthesis is the marginal cost of producing the Class A units for the Trust, it follows that the cost of producing the Class B units is $84,385 ($190,700 - $106,315). In the presence of competition among intermediaries, it is reasonable to expect that the prices received from issuing those securities will not differ greatly from their respective marginal costs.

Once the Trust is funded, customer holders of the Class A units can be absolutely assured of having the contractual obligations of the Trust met. So the amount of capital required to provide this assurance is $84,385. Hence, about 44% of the total funds to be raised by the intermediary to create the Trust must come from the “residual” piece sold to price-sensitive investors. As already discussed, placing the residual piece is the “difficult” sale and the size of the discount required on the Class B units clearly can have a first-order impact on the profitability of the deal.

In contrast, an intermediary selecting the synthesizing approach only needs $106,315 to fund the internal production portfolio. If the insured-equity product is sold at above production cost, then the cash flow from sales to customers would seem to rule out the need for the intermediary to raise additional capital. However, this conclusion implicitly assumes: 1) that customers know and agree with the intermediary’s assessment for the XYZ stock-price process in Figure 1; 2) that customers believe the intermediary can and will undertake the dynamic strategies described in Table 4; and 3) that customers believe that the other activities of the intermediary will not lead to liens on the assets of the replicating portfolio by other claimholders of the intermediary. These three assumptions are not, of course, robust, especially for an opaque institution. Therefore, principal-type intermediaries will in general have to raise additional assurance capital to provide the functional equivalent of the Class B units in the agent-underwriting alternative. Which of the two (or some combination) is the more efficient production process will depend on the detailed structure of the transactions and the nature of asymmetric-information and agency costs.30

III. Risk Control: A Major Managerial Issue for Financial Intermediaries

Section I concluded that financial intermediaries are the main functional providers of the “most-finished” type of financial products and that technology and competition are constantly driving those products toward ever greater customization. Section II concluded that between the two basic approaches to production, the synthesizing one (with the intermediary as principal) is generally superior for custom contracting, provided that the intermediary can find a cost-effective way to assure its customers of its ability to meet its contractual obligations. This section specifically addresses the issue of creditworthiness and risk control at the level of the firm.

Credit risk or more precisely the prospect of contract default by a firm is, of course, a concern to all transactors with that firm, whatever its business. However, unlike most firms, the efficiency of the central business activities of many financial intermediaries depends critically on their customer liabilities being default-free.

The focus of analysis here is on intermediaries that serve their principal function by issuing liabilities of a certain type to customers and manage their assets to facilitate this principal function. A straightforward example is a property and casualty insurance company that issues customized insurance contracts to its policyholders and invests almost exclusively in securities traded in the capital markets. A more subtle but major example is an organized derivative-security exchange. Some classify such exchanges as financial markets, not intermediaries. However, unlike a typical stock or bond exchange, the financial futures and

30In the real-world versions of our insured-equity example cited in footnote 17, the banks and Merrill Lynch used the principal approach, and Super Trust of Leland, O'Brien, and Rubinstein (LOR) selected the underwriting one. In the 1980s, LOR, in creating its “portfolio-insurance” version of the insured-equity product, chose a hybrid of these two approaches in which it managed a replication portfolio but as agent (not as principal) for its customers. As a concrete illustration of the complementary relation between markets and intermediaries, the existence of futures and options markets for trading the Standard & Poor’s 500 Stock Index greatly facilitated the real-world production process for all these firms.
Table 4. Production Technology and Production Cost for Insured-Equity Instrument: Dynamic Rules for Replication

<table>
<thead>
<tr>
<th>Year</th>
<th>Value Before</th>
<th>Value After</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>At Year 0</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

| **At Year 1** |  |  |  |

<table>
<thead>
<tr>
<th>If XYZ share price is $90: Sell 454 shares @ $90/share</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Before</td>
<td>$63,360</td>
<td>704 shares XYZ @ $90</td>
<td>$63,360</td>
</tr>
<tr>
<td>Value Before</td>
<td>$37,711</td>
<td>Cash and Interest</td>
<td>$37,711</td>
</tr>
<tr>
<td>Value Before</td>
<td>$101,071</td>
<td></td>
<td>$101,071</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If XYZ share price is $115: Buy 96 shares @ $115/share</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Before</td>
<td>$80,960</td>
<td>704 shares XYZ @ $115</td>
<td>$80,960</td>
</tr>
<tr>
<td>Value Before</td>
<td>$37,711</td>
<td>Cash and Interest</td>
<td>$37,711</td>
</tr>
<tr>
<td>Value Before</td>
<td>$118,671</td>
<td></td>
<td>$118,671</td>
</tr>
</tbody>
</table>

| **At Year 2** |  |  |  |

| If share price of XYZ was $90 at Year 1 and, |  |  |  |

<table>
<thead>
<tr>
<th>If share price of XYZ is $70:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Before</td>
<td>$17,500</td>
<td>250 shares of XYZ @ $70/share</td>
<td>$17,500</td>
</tr>
<tr>
<td>Value Before</td>
<td>$82,500</td>
<td>Cash and Interest</td>
<td>$82,500</td>
</tr>
<tr>
<td>Value Before</td>
<td>$100,000</td>
<td>Value of Portfolio ($100/share XYZ)</td>
<td>$100,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If share price of XYZ is $100:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Before</td>
<td>$27,500</td>
<td>250 shares of XYZ @ $110/share</td>
<td>$27,500</td>
</tr>
<tr>
<td>Value Before</td>
<td>$82,500</td>
<td>Cash and Interest</td>
<td>$82,500</td>
</tr>
<tr>
<td>Value Before</td>
<td>$110,000</td>
<td>Value of Portfolio ($110/share XYZ)</td>
<td>$110,000</td>
</tr>
</tbody>
</table>

| If share price of XYZ was $115 at Year 1 and, |  |  |  |

<table>
<thead>
<tr>
<th>If share price of XYZ is $90:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Before</td>
<td>$72,000</td>
<td>800 shares of XYZ @ $90/share</td>
<td>$72,000</td>
</tr>
<tr>
<td>Value Before</td>
<td>$28,000</td>
<td>Cash and Interest</td>
<td>$28,000</td>
</tr>
<tr>
<td>Value Before</td>
<td>$100,000</td>
<td>Value of Portfolio ($90/share XYZ)</td>
<td>$100,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If share price of XYZ is $140:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Before</td>
<td>$112,000</td>
<td>800 shares of XYZ @ $140/share</td>
<td>$112,000</td>
</tr>
<tr>
<td>Value Before</td>
<td>$28,000</td>
<td>Cash and Interest</td>
<td>$28,000</td>
</tr>
<tr>
<td>Value Before</td>
<td>$140,000</td>
<td>Value of Portfolio ($140/share XYZ)</td>
<td>$140,000</td>
</tr>
</tbody>
</table>
options exchanges serve the fundamental intermediation function of guaranteeing the performance of contracts traded on their exchanges. Buyers and sellers of those contracts have the clearing corporation of the exchange—not each other—as their respective counterparty. Thus, the exchange issues liabilities to both classes of its customers. It would vastly reduce the efficiency of the derivative-security markets if their customers had to "diversify" against contract-default risk by spreading their otherwise homogeneous transactions across a large number of different exchanges. It is therefore absolutely essential that the clearing corporation of such exchanges have the highest credit-standing with its customers.

To see why creditworthiness is a much larger issue for intermediaries than for firms in general, it is helpful to draw a formal distinction between the "customers" and the "investors" of the firm. Calling attention to the distinction between customers and investors of nonfinancial firms is rarely necessary because it is generally obvious. Few would confuse the customer who buys a car from an automobile firm with the shareholder, lender, or other investor who buys its securities. Similarly, no one would confuse a customer who charges money at a bank or takes out a loan from it with an investor who owns shares in the bank. But, the customers of many types of intermediaries receive a promise of services in the future in return for payments to the firms now. Financial services of this type such as life insurance and retirement annuities usually involve payments to the customer of specified amounts of money, contingent on events and the passage of time. Those promised future services are liabilities of the firm, both economically and in the accounting sense. Since investors in the firm also hold its liabilities, the distinctions between customers and investors is not always so clear for such intermediaries.

The distinction between customers and investors can however be made. Customers who hold the intermediary's liabilities are identified by their strict preference to have the payoffs on their contracts as insensitive as possible to the fortunes of the intermediary itself. For example, the function served by a life insurance policy is to provide its beneficiaries with a specified cash payment in the event of the insured party's death. That function is less efficiently performed if the contract calls instead for the death benefit to be paid in the joint event that the insured party dies and the insurance company is solvent. Even if the insurance company offers an actuarially fair reduction in the price of the insurance to reflect the risk of insolvency, a risk-averse customer would prefer the policy with the least default risk. Indeed, on introspection, I doubt that many real-world customers would consciously agree to accept non-trivial default risk on a $200,000 life insurance policy in return for a large reduction in the annual premium, say from $400 to $300. Such results obtain even in theoretical models in which the customer has all of the relevant information necessary to assess the default risk of the insurer.

The theoretical counterarguments against this distinction assert that the customer may be able to eliminate the effect of this default risk either by trading in the securities of the life insurance company ("hedging") or by entering into a large number of tiny insurance contracts with many different companies ("diversification"). Such a case can perhaps be made for frictionless, complete-market economies. But, the very economic role of the intermediary is to service those entities (its customers) who cannot trade efficiently and who cannot enter contracts costlessly. A major rationale for the existence of intermediaries is to reduce the costs that households and firms would otherwise incur to manage risks directly by transacting in the financial markets.

By contrast, investors in the liabilities issued by an intermediary (e.g., its stocks or bonds) understand that their returns may be affected by its profits and losses. Indeed, their function (as with the Class B holders in the hypothetical example of Section II) is to allow the intermediary to better serve its customers by shifting the burden of the risk-bearing and resource commitment from customers to investors. The investors of course expect to be compensated for this service by an appropriate expected return. The resulting increase in efficiency of customer contracts from this shift in risk-bearing makes customers better off. Note that although the functional roles of "customers" and "investors" are distinct, the same individual or firm can be both a customer of and an investor in a particular intermediary. Thus, I can both buy an insurance policy from a particular insurance company and also hold its shares as part of my investment portfolio.

31The customer-investor distinction was first made in Merton (1989) to establish the importance of risk management for financial institutions. The discussion here is taken largely and often verbatim from Merton and Bodie (1992, Section II).
32An economy with pure Arrow-Debreu securities provides a formal example of this general point. It is well-known that a complete set of such securities permits Pareto-efficient allocations. If, however, the payoffs on such securities were also contingent on the solvency of the issuer of the securities, then they would lose their efficiency. See Merton (1989, pp. 252-253 and 1992b, pp. 450-1; 463-7) for a more complete discussion of this point.
33In most real-world cases, the customers do not have the relevant information, and this fact a fortiori makes the potential welfare loss from customer-contract default even greater.
The distinction between an investor-held and a customer-held liability claim is not unique to financial intermediaries. For example, a customer who buys a warranty on a new car from an automobile manufacturer wants the repairs paid for in the event that the car is defective. In fact, the customer’s contract pays for repairs in the joint event that the car is defective and the automobile manufacturer is financially solvent. If given a choice, customers would prefer not to accept additional default risk in return for an actuarially fair reduction in the cost of the warranty. Much the same point can be made about the implicit contract with customers to ensure that spare parts are available in the future for repairs. Although it can become quite significant for a financially distressed firm, default risk is probably a secondary consideration for most customers of an automobile manufacturer. In contrast, because of the substantial size and long duration of many financial contracts, such as annuities and life insurance, default risk is a first-order issue for customers of financial intermediaries. Thus, the success of a financial intermediary depends not only on charging adequate prices to cover its production costs but also on providing adequate assurances to its customers that promised payments will be made.

In sum, customers in general are likely to know less about the firm’s business prospects than its investors. However, the larger cost of customers instead of investors bearing default risk of the firm is not simply a consequence of customers being less well-informed than investors. The "wedge" of additional cost between customers and investors is primarily the result of customers “internalizing” risks of the firm that investors can eliminate by diversification. That is, the efficiency of customer contracts is diminished if they are exposed to default. The term “credit-sensitive” is used to describe the businesses of an intermediary that are significantly affected by changes in customer perception of the credit standing of the intermediary. Business activities that require customers to hold contractual liabilities of the intermediary tend to be credit-sensitive. Controlling contract default is inexorably connected with risk management of the intermediary. Freeman (1993) provides an excellent survey article on the increasingly key role of risk management in international banking practice. Rawls and Smithson (1990) give a compact discussion of risk management as a strategic tool for firms generally. See also Froot, Scharfstein, and Stein (1993) and Hindy (1995).

There are essentially three ways for an intermediary with credit-sensitive activities to provide assurances against default risk to the customers who hold its liabilities: 1) By hedging: the firm holds assets that have payouts that “match” those promised on its contractual liabilities, and it chooses a "transparent" structure so that customers can easily verify that such a matching policy is being followed. 2) By insuring: the firm acquires guarantees of its customer liabilities from a AAA-credit-rated private-sector or government third party. The providing of such guarantees is a large financial-intermediation business, which is itself quite credit-sensitive. 3) By capital cushions: the firm raises additional capital beyond that required for the funding of the physical investments and working capital needed to run the intermediary. Included in this category is the common practice of collateralizing contract performance, as for example, with repurchase agreements, futures contracts, and broker margin loans. The distinction between the collateral approach and hedging is that the collateral assets are not chosen to match the promised payment obligation on the contract. Assurance capital typically takes the form of equity although debt that is subordinated to customer contractual claims can sometimes be used. Equity capital costs can be high because of both its tax disadvantage and the agency costs between corporate insiders and external equityholders.

Agency costs are the principal economic dead-weight costs to the intermediary for any of the three ways used to provide assurance of performance on customer contracts. In Merton (1993, Section 6), a hypothetical example is used to illustrate the impact of these costs on optimal managerial decisions in intermediaries. That same analysis shows that a passive attempt at diversification or retention of a business that does not benefit from either the integrated or opaque structure of the intermediary reduces the value of the intermediary.

34 Some intermediaries serve their main function by buying assets of a certain type from customers. They issue liabilities only to investors to facilitate the performance of that main function. For example, consumer finance companies in the United States serve the primary purpose of making loans to their customers, and they raise all of the money that they lend by issuing securities to investors. There is no first-order customer concern about such intermediaries’ credit risk because the customer owes the intermediary. However, when there are initial costs to the borrower in establishing a relationship with a lending intermediary, then even these customers will exhibit credit-sensitivity (see Selz, 1992). Intermediaries, such as commercial banks and thrifts in the United States, that service customers on both sides of their balance sheets, are credit-sensitive.

35 "Transparent" is used here in the sense of Ross (1989), as illustrated in Table 1. Mutual funds and unit trusts are prime examples of transparent intermediaries that address customer concerns about contract performance by matching assets and liabilities.

36 See Merton and Bodie (1992) for an in-depth analysis of the management of the guarantee business, for both private-sector and government providers. Coxxin (1993) offers an impulse-control model that quantifies the optimal management of the guarantee business.

37 This result is consistent with the Ross (1989) model of financial innovation and intermediation.
A key requirement for the success of any financial intermediary is its ability to control both the actual and perceived default risk of its customer-held liabilities. Greater customer demand for service and greater complexity of products will intensify the attention given to this issue in the future.\(^3\) One implication is that the internal finance function of financial intermediaries are likely to be expanded to cover not only the increased working capital needs of the firm but also the management of its counterparty credit exposure. Further development of this theme is far beyond the range of this paper. But perhaps the brief discussion here will serve to focus attention and stimulate further research on these issues of first-order importance to intermediaries involved in credit-sensitive activities.

**IV. Government Regulation and Financial Intermediation\(^3\)**

Promoting competition, ensuring market integrity, including systematic or macro credit-risk protections, and managing “public-good”-type externalities cover the broad potential roles for regulation and other government activities in improving the economic performance of financial intermediaries.

There are five categories to classify the paths by which government affects financial intermediation: first, as a market participant following the same rules for action as other private-sector transactors, such as with open-market operations; second, as an industry competitor or benefactor of innovation, by supporting development or directly creating new financial products or markets, such as securitized mortgages, index-linked bonds, or all-savers accounts; third, as both legislator and enforcer, setting rules and restrictions on financial intermediaries and markets, such as minimum-capital rules, asset restrictions, disclosure requirements, margin limits, circuit breakers, and patents on products; fourth, as a negotiator when representing its domestic constituents in dealings with other sovereigns that involve financial intermediaries or markets; fifth, as an unwitting intervenor who changes general resource allocations, transfers of wealth among private-party participants in intermediation, and transfers of wealth from taxpayers to financial intermediaries.

As stated at the outset, financial innovation is the engine driving the financial system toward its goal of greater economic efficiency. Innovation in financial intermediation improves efficiency by completing markets, lowering transaction costs, and reducing agency costs. The analyses of the preceding sections on the dynamics of institutional change and the operational issues of production and risk control for financial intermediaries have thus emphasized innovation in products and services. However, with their focus on product and service innovations, those analyses do not address innovations in the financial “infrastructure”—that is, the institutional interfaces between intermediaries and financial markets, regulatory practices, organization of trading and clearing facilities, and management information systems.

But improvements in efficiency from innovative intermediary products and services cannot obtain without the concurrent changes in the financial infrastructure that are necessary to support those products and services. Indeed, perhaps the single most important perspective for public policy on financial innovation is the explicit recognition of the interdependence between product and infrastructure innovations and of the inevitable conflicts that arise between the two.

As an analogy of supreme simplicity,\(^4\) consider the creation of a high-speed passenger train, surely a beneficial product innovation. Suppose however, that the tracks of the current rail system are inadequate to handle such high speeds. In the absence of policy rules, the innovator, either through ignorance or a willingness to take risk, could choose to fully implement his product and run the train at high speed. If the train subsequently crashes, it is, of course, true that the innovator and his passenger-clients will pay a dear price. But, if in the process, the track is also destroyed, then those, such as freight operators, who use the system for a different purpose will also be greatly damaged. Hence, the need for policy to safeguard the system. A simple policy that fulfills that objective is to permanently fix a safe but low speed limit. But, of course, this narrowly focused policy has the rather unfortunate consequence that the benefits of innovation will never be realized. An obviously better, if more complex,

\(^3\) Even now, the explosive growth in custom contractual agreements, such as long-maturity currency and interest rate swaps, has made derivative products among the more profitable and more credit-sensitive intermediary activities. Merrill Lynch, Goldman Sachs, and Salomon Brothers have each created special-purpose AAA subsidiaries to issue those products and thereby address the credit concerns of customers. See International Financing Review (1993) and Cossin (1993).

\(^3\) This section draws heavily on Merton (1989, 1990, and 1992a).

\(^4\) Their potential benefits notwithstanding, these five categories of government activities also have potential costs including direct costs to intermediaries, such as legal and registration fees, distortions of prices and resource allocations, transfers of wealth among private-party participants in intermediation, and transfers of wealth from taxpayers to financial intermediaries.

\(^4\) This analogy is taken verbatim from Merton (1989, p. 257).
As an example, a range of regulatory reactions and recommendations for the over-the-counter derivatives markets can be found in Commodity Futures Trading Commission (1993), General Accounting Office (1994), and Global Derivatives Study Group (1993). See also Overdahl and Schachter (1995) and Paré (1994).
institutional change, which in turn feed back into the dynamics of regulation. As a result, the feasible set of sustainable regulatory policies is increasingly endogenously determined as the time horizon lengths. Therefore, regulatory change has a limited long-run role as an exogenous force for financial innovation and non-transitory structural changes in financial intermediation.

Both the time horizon that qualifies as the “long run” in this context and the scope of effective national government control over financial intermediation are likely to diminish in the future. Advances in telecommunications and computer technology have provided greatly increased flexibility in the choice of the physical and jurisdictional locations of financial intermediaries and markets. Consider, for example, the interbank foreign exchange market, arguably the largest financial market in the world. Consisting of a series of direct electronic connections among the computers of participating banks from around the globe, this market has no meaningful physical or political location. It is not regulated by any national authority, and it is moreover difficult to see how it could be.

The technological changes that have already dramatically reduced transactions and product-marketing costs are likely to make future changes in the institutional forms of intermediaries even more rapid and far-reaching. With much lower transactions costs, it becomes profitable not only to introduce new intermediation products but also to change entire institutional arrangements (including geographical and political locations) in response to much smaller changes in customer tastes or operating costs than in the past. These lower transactions costs, together with the prospect of even greater global competition in financial-intermediation services, provide the basis for forecasting substantial increases in both the frequency and the magnitude of the changes in the institutional structure of financial intermediaries. This forecast reduction in the “half-life” or expected duration of institutional forms applies not only to financial-service firms but also to the regulatory bodies that govern them.

This increasing flexibility and global mobility of financial institutions have far-reaching implications not only for regulation of intermediaries at the national level but for national monetary and fiscal policies as well. Thus, policymakers are effectively speculating against a long-run trend of declining transactions costs if they continue to assume that the “traditional” frictions within their individual financial systems will allow national governments to pursue monetary and related financial policies with the same degree of control as in the past. Much the same point applies to an individual nation’s fiscal policy, which will surely be further constrained not just with respect to transactions and other “targeted” taxes on financial intermediaries and markets but even with respect to general income tax rates, both personal and corporate.

A functional perspective on the financial system should prove more useful than an institutional one in times of rapid change. This perspective focuses attention on predicting the institutional structures that will perform the intermediation functions most effectively in the future. Armed with these forecasts, government could set policies and regulations to facilitate the requisite changes in structures instead of attempting to protect and preserve existing ones. Its flexibility with respect to different institutional environments makes the functional perspective on regulation more readily adaptable to a global setting for financial intermediation, which may be particularly useful if supranational regulatory bodies are to be formed.

A major shift in the format of regulation from “institutional” to “functional” seems inevitable. Increasingly more sophisticated trading technologies (such as the synthesizing production process of Section II), together with low-transaction-cost markets to implement them, tend to blur the lines among financial-intermediation products and services. The existence of these technologies and markets also implies easier entry into financial intermediation. As a result, the institutional lines between financial intermediaries are also likely to become less distinct. Indeed, insurance companies now offer U.S. Treasury money-market funds with check writing, while as described in Section II, banks use option and futures-markets

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43This process is the essence of Kane’s (1977) regulatory dialectic.
44See, for example, Lingren and Westlund (1990) and Umlauf (1993) on the effects of a transactions tax on the location of trading for Swedish stocks and derivative securities.
45Estimates are that between $600 billion and $1 trillion is transacted in this market every day.
46Government can also be limited in what it can do because it has too much power. See Merton and Bodie (1992, Section V) for discussion and examples of this paradox of power.
48See Scholes and Wolfson (1992) for an in-depth development of the theory and application of financial instruments and alternative institutional designs to respond to differing tax and regulatory structures. Although always available in principle, these techniques have a greatly magnified impact in a low-transaction-cost and global environment.
49See Grundfest (1990) for analysis and data on the globalization of world financial markets and its implications for regulation.
50See Merton (1995) for further discussion. The Chicago Mercantile Exchange (1993) has proposed a regulatory structure along functional lines. Some (e.g., Heurtas, 1987) have used the term “functional regulation” to mean regulation along product lines. As used here, the term is broadened to include different products that are (virtually) perfect substitutes from the perspective of their users.
transactions to provide stock-and-bond-value insurance that guarantees a minimum return on customer portfolios. Credit subsidiaries of major manufacturing firms, which once performed the single, specialized function of providing financing for customers of their parents, have become multiple-function financial institutions with intermediation services ranging from merchant banking for takeovers and restructurings to general credit cards and equity-indexed mutual funds sold to retail investors. In contrast, from the perspective of the user, the function of a financial product is relatively well-defined.

As in the case of the interbank foreign exchange market, electronics has made problematic the meaning of "the location of the vendor" of these products. Most regulation of financial intermediaries involves products and services for household customers and, hence, the user's location is often better defined than the vendor's. Over time, functional uses of products are typically more stable than the institutional forms of their vendors. In keeping with the trend toward greater user access to international financial markets, product and service functions appear to be more uniform across national borders than are the institutions that provide them.

Functional regulation also reduces the opportunities for institutions to engage in "regulatory arbitrage," which wastes real resources and can undermine the intent of the regulation. It thus promises more consistent treatment for all providers of functionally-equivalent products or services, thereby reducing 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 required with the current institutionally based regulatory structure.

The perceived benefits from a move to functional regulation 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 selected common policies are suboptimal.51

An important and innovative step along this line has been taken by the Basle Committee (1995) in its recent proposal to set global capital standards for bank portfolios of marketable securities. Although the standards are globally uniform, their implementation in terms of capital calculation will be based on the individual internal risk-management model of each bank. This diversifying delegation contrasts sharply with prior capital-requirement rules that depend on a single capital model specified by the regulatory supervisor. Moreover, the new proposal calls for penalties imposing higher capital requirements on banks with poorly performing risk-management models. Banks thus will have an incentive to compete with each other in developing more effective risk-management systems. It remains to be seen how much of this proposal is finally adopted.52 The international issue of the trade-off between the benefits of regulatory cooperation and the benefits of regulatory competition promises to be among the more important financial regulatory issues of the 1990s.

References

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51See, for example, Merton (1995) and White (1993). The former explores the increased possibility for a systemic event as an unintended consequence of standardized global regulation.

52Kupiec and O'Brien (1995a and 1995b) question the feasibility of the Basle proposals and offer their own alternative.


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