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*The Place of Risk Management
in Financial Institutions*

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The Place of Risk Management in Financial Institutions ¹

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Abstract: The purpose of this paper is to address two issues. It defines the appropriate role played by institutions in the financial sector and focuses on the role of risk management in firms that use their own balance sheets to provide financial products. A key objective is to explain when risks are better transferred to the purchaser of the assets issued or created by the financial institution and when the risks of these financial products are best absorbed by the firm itself. However, once these risks are absorbed, they must be efficiently managed. So, a second part of the current analysis develops a framework for efficient and effective risk management for those risks which the firm chooses to manage within its balance sheet. The goal of this activity is to achieve the highest value added from the risk management undertaken.

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1. Introduction

Financial institutions exist to improve the efficiency of the financial markets. If savers and investors, buyers and sellers, could locate each other efficiently, purchase any and all assets costlessly, and make their decisions with freely available perfect information, then financial institutions would have little scope for replacing or mediating direct transactions. However, this is not the real world.

In actual economies, market participants seek the services of financial institutions because of the latter's ability to provide market knowledge, transaction efficiency, and contract enforcement. Such firms operate in two ways. They may actively discover, underwrite, and service investments made using their own resources, or merely act as agent for market participants who contract with them to obtain some of these same services. In the latter case, investors assemble their portfolios from securities brought to them by these same firms.

In light of the two ways in which institutions may operate in the financial sector, several issues immediately arise. First, when and under what circumstances should these firms use their own resources to provide financial services, rather than offering them through a simple agency transaction? Second, to the extent that such services are offered through the use of the institution's own resources, how should it be managing its portfolio so as to achieve the highest value added for its stakeholders.

The purpose of this paper is to address these two issues. It defines the appropriate role played by institutions in the financial sector and focuses on the role of risk management in firms that use their own balance sheets to provide financial products. A key objective is to explain when risks are better transferred to the purchaser of the assets issued or created by the financial institution and when the risks of these financial products are best absorbed by the firm itself. However, once these risks are absorbed, they must be efficiently managed. So, a second part of the current analysis develops a framework for efficient and effective risk management for those risks which the firm chooses to manage within its balance sheet. The goal of this activity is to achieve the highest value added from the risk management undertaken.

In essence, we wish to define the role of risk in financial institutions, identify when these risks should be managed and when they should be transferred, and, in the broadest sense, the type of

procedures that must be established for successful risk management activity at the firm level. To develop our analysis of risk and return in financial institutions, we first define the appropriate role of risk management in Section 2. Then, in Section 3, we detail the services that financial firms provide, with specific reference to the risks that are fundamental to the financial sector. We define several different types of risks and discuss how they occur as an inherent part of financial institutions' business activities.

Some institutional types manage these risks while others contract to avoid them. The contrast between these two methods of dealing with financial risks is facilitated by the comparison of two different types of institutions in Section 4 of the paper. The first of these is a passive institution, namely, a real estate mortgage investment conduit, or REMIC. Passive institutions do not engage in active financial management of their portfolios. Further, they contract out for most services offered to investors. Debt and equity, or residual claims to the assets held by these institutions, are sold to investors who are presented with detailed information about the portfolio. This institutional type is contrasted with the most actively managed firms in the financial sector, namely commercial banks. In banks, assets change frequently and portfolios are shifted without the knowledge of debt and equity claimants. In addition, services are generally internally produced and frequently bundled with the investment management activities of the firm. Reasons will be offered for the emergence of such institutions and for the development of management techniques that limit the risk contained in their portfolios.

Contrasting REMICs and commercial banks logically leads us to Section 5. Here, we integrate the lessons of the previous sections to determine when, and to what extent a financial institution should engage in active risk management. We also outline the requirements and key principles necessary for successful implementation of a firm level system. The final section suggests specific topic areas to extend our current knowledge of risk management techniques and procedures. Here, the need to define best practice, and standardize approaches to both the measurement and control of risks of various kinds becomes apparent. As such, it lays out the next step in our search for appropriate (optimal) risk management procedures within the financial industry.

At the outset, however, one point ought to be made clear. The structure of systematic risk in the financial market is not affected by the operation of competitive financial institutions. Such risk can be traded or hedged, but it does not disappear in aggregate. Instead, the value added of the financial sector is that these institutions make the capital formation process more efficient, and hence more attractive, by providing services required by investors, creditors, and shareholders¹. In addition, it reduces non-market wealth transfers in financial contracting between sets of traders of differential wealth, knowledge or avarice. Financial institutions provide more efficient discovery, evaluation, and dissemination of information about legitimate investment opportunities, which presumably reduces monopoly positions and inefficient risk taking. At the same time, such institutions may bring some production efficiency to the market. The institutions reduce transactions cost through efficient processing-cost structures or information-cost sharing. This is a kind of economy of scale that is part and parcel of the financial sector, and an important service that it performs.

2. Risk in Financial Services

It seems appropriate to begin the discussion of the place of risk and risk management in the financial sector with the two key issues, viz., why risk matters and what approaches can be taken to mitigate the risks that are an integral part of the sector's product array. Understanding these two issues leads to a greater appreciation of the nature of the challenge facing managers in the financial community. Specifically, it explains why managers wish to reduce risk, and approaches taken to mitigate something that is an inherent part of the financial services offered by these firms.

2a. Why Does Risk Matter?

According to standard economic theory, firm managers ought to maximize expected profits without regard to the variability of reported earnings. However, there is now a growing literature on the reasons for managerial concern over the volatility of financial performance, dating back at least to 1984. Stulz² was the first to offer a viable economic reason why firm managers might concern

¹ See Gertler (1988), Herring and Santomero (1991) for a full discussion of this issue

²See Stulz (1984).

themselves with both expected profit and the variability around this value. Since that time a number of alternative theories and explanations have been offered to justify active risk management, with a recent review of the literature presenting four distinct rationales.³ These include:

- (i) managerial self-interest
- (ii) tax effects
- (iii) the cost of financial distress
- (iv) capital market imperfections

In each case, the volatility of profit leads to a lower value to at least some of the firm's stakeholders. In the first case, it is noted that managers have limited ability to diversify their investment in their own firm, due to limited wealth and the concentration of human capital returns in the firm they manage. This fosters risk aversion and a preference for stability. In the second case, it is noted that, with progressive tax schedules, the expected tax burden is reduced by reduced volatility in reported taxable income. The third and fourth explanations focus on the fact that a decline in profitability has a more than proportional impact on the firm's fortunes. Financial distress is costly and the cost of external financing increases rapidly when firm viability is in question.

Any one of these reasons is sufficient to motivate management to concern itself with risk and embark upon a careful assessment of both the level of risk associated with any financial product and potential risk mitigation techniques. In fact, the most well-known textbook in the field, Smith, Smithson, and Wilford (1995), devotes an entire chapter to motivating financial risk management as a value enhancing strategy using the arguments outlined above.

2b. Risk Mitigation Approaches

Accepting the notion that the volatility of performance has some negative impact on the value of the firm leads managers to consider risk mitigation strategies. There are three generic types:

- (i) risks can be eliminated or avoided by simple business practices,
- (ii) risks can be transferred to other participants, and,
- (iii) risks can be actively managed at the firm level.

In the first of these cases, the practice of risk avoidance involves actions to reduce the chances of idiosyncratic losses by eliminating risks that are superfluous to the institution's business purpose.

³See Santomero (1995) for a detailed discussion of this literature

Common risk avoidance actions, here, are underwriting standards, hedges or asset-liability matches, diversification, reinsurance or syndication, and due diligence investigation. In each case, the goal is to rid the firm of risks that are not essential to the financial service provided, or to absorb only the optimal quantity of a particular kind of risk.

What remains is some portion of systematic risk, and the unique risks that are integral to an institution's unique business franchise. In both of these cases, risk mitigation remains incomplete and could be further enhanced. In the case of systematic risk, any systematic risk not required to do business can be minimized. Whether or not this is done is a business decision that can be clearly indicated to stockholders. Likewise, in the case of operational risk, these risks of service provision - including fraud, oversight failure, lack of control, and managerial limitations - can be addressed. Aggressive risk avoidance activities in both these areas will constrain risk, while reducing the profitability from the business activity. Accordingly, the level of effort focused on reducing these risks can be communicated to shareholders and cost-justified.

There are also some risks that can be eliminated, or at least substantially reduced through the technique of risk transfer. Markets exist for the claims issued and/or assets created by many of these financial institutions. Individual market participants can buy or sell financial claims to diversify or concentrate the risk in their portfolios. To the extent that the financial risks of the assets created or held by the financial firm are understood by the market, they can be sold in the open market at their fair market value. If the institution has no comparative advantage in managing the attendant risk, there is no reason for the firm to absorb and/or manage such risks, rather than transfer them. In essence, there is no value-added associated with absorbing these risks at the firm level.

However, there is another class of assets or activities where the risk inherent in the activity must and should be absorbed by the firm. In these cases, risk management must be aggressive and good reasons exist for using further resources to manage firm level risk. These are financial assets or activities that have one or more of the following characteristics. *First*, the equity claimants, or others for whom the institution has a fiduciary interest, may own claims that cannot be traded or hedged easily by the investors themselves. For example, defined benefit pension plan participants can neither

trade their claims nor hedge them on an equivalent after-tax basis. A similar case can be made for policies of mutual insurance companies which are complex bundles of insurance and equity. *Second*, activities where the nature of the embedded risk may be complex and difficult to reveal to non-firm level interests. This is the case in institutions such as banks, which hold complex, illiquid and proprietary assets. Communication in such cases may be more difficult or expensive than hedging the underlying risk.⁴ Moreover, revealing information about customers or clients may give competitors an undue advantage. *Third*, moral hazard may exist such that it is in the interest of stakeholders to require risk management as part of standard operating procedures. For example, providers of insurance, e.g., the FDIC, can insist that institutions with insured claims follow appropriate business policies. A *fourth* reason for institutional risk management is that it is central to its business purpose. An index fund invests in an index without hedging systematic risk. A security dealer engaged in proprietary trading and arbitrage will generally not be fully hedged. In all of the above circumstances, risk is absorbed and risk management activity requires the monitoring of business activity risk and return. This is part of the cost of doing business since it absorbs management attention.

This view of risk mitigation is summarized in Table 1. The risks inherent in the industry are divided into the three categories we suggest, and the techniques of control as well as the goals of risk management for each group are enumerated. The communication challenge of informing stakeholders of the reasons for risk management activity is also reported for each risk category.

With legitimate institutional risk management rationales defined and outlined, non-economic or redundant risk management practices can also be identified. These practices are associated with reducing risks through ill-considered hedges or through inappropriate diversification. Consider a recent example. During the 1980s a number of companies diversified into unrelated businesses. This was an attempt by their managements to break out of the cyclical nature of the profitability inherent in their basic franchise. Regardless of outcome, these investments could not help shareholders unless

⁴ This point has been made in a different context by both Santomero and Trester (1997) and Berger and Udell (1993).

management had valuable skills in these areas. Clearly, without such skills, owners of the firms' stock could make such investments on their own.

3. A Taxonomy of Financial Institutions, Services, and Risks

Subdividing risk mitigation strategies into the three categories above, i.e., avoidance, transference, and active firm-level risk management, is conceptually useful. However, applying this classification to the full array of financial institutions and their activities is somewhat more difficult. Accordingly, in this section we will present a taxonomy of the services provided by the various members of the financial sector and the different types of risks that are part of the process.

We begin with the realization that a wide variety of organizations qualify as financial institutions. These include depositories (banks, thrifts, and credit unions), insurance companies (life, property and casualty, auto and health), investment companies (open-and closed-end funds, REMIC's and REIT's), pension funds (defined benefit and defined contribution), origination firms (insurance and security brokers, investment management companies, and mortgage bankers), market makers (specialists, dealers and reinsurance companies), exchanges (stock, insurance, and derivatives), clearing houses, and a set of largely unregulated firms, finance companies of various sorts (consumer and commercial, captive and lease finance, and pawn brokers).⁵

Some of these financial institutions act as principals, while others are agents for investors in transactions. Some institutions actively assume systematic and unsystematic risks, while other similar firms eschew risk altogether. What they have in common is their business focus on transacting the financial instruments generated by economic activity. To some extent, each type of institution provides one or more distinct financial services to facilitate the flow of funds between savers and investors in an economy.

⁵Absent from this list are institutions that are pure information providers, e.g., Moody's. These excluded firms provide important services to the financial sector, but only as third party vendors. Their credibility is based upon reputation and their product is used by buyers to make better-informed judgments.

3a. Basic Financial Services

The services provided by the set of institutions above can be separated into six distinct activities, as indicated in Table 2. These are origination, distribution, packaging, servicing, intermediating, and market making.⁶ A brief discussion illustrates each service.

Origination involves locating, evaluating and creating new financial claims issued by the institution's clients. The originator first assembles and evaluates information concerning the transaction. On the one hand, if the originator plans to maintain ownership of the new asset, it must set its own standards of acceptable risk and return for it to act as principal, as well. On the other hand, if the originator plans to act as an agent and sell the product, it must abide by the underwriting standards of other principals. An example of the latter is a mortgage banker that must originate mortgages in conformance with agency standards to sell such mortgages into an agency sponsored pool of mortgages.

Distribution is the act of raising funds by selling newly originated products to customers that have the resources available to finance them. This activity can be conducted as either a brokered transaction or with the institution acting as principal. In the former, newly originated assets are placed with investors who directly remit to the issuing firm. The financial institution never takes ownership of the asset in question, but merely facilitates its placement into a third party's portfolio. In the latter, the initiating institution purchases the originated assets and sells or distributes them from its own inventory. Most retail sales are made on a brokered basis, while institutional distribution is most frequently conducted with an institution acting as principal.

Servicing involves collecting payments due from issuers and paying the collected funds to claimants. In addition, a servicer maintains payment records, monitors contracts, and pursues action in defaults. In less developed economies, this aspect of financial service provision is relatively

⁶We distinguish here between the basic financial services offered by financial institutions and the six core functions outlined by Merton (1993) and Merton and Bodie (1995) that a financial system provides. In our view, institutions providing the basic services that we define will create a financial system that provides core functions as defined by Merton.

invisible. Most assets are originated and held by the same institution, particularly in the fixed income area. Accordingly, the customer service aspect of lending is less obvious. In developed economies, servicing is seen as a distinct business activity in the financial markets.

Packaging, is a relatively recent activity. It involves the collection of individual financial assets into pools, and possibly the decomposition of the cash flow from such assets again into different types of financial claims. Such repackaging of financial flows is done with an eye toward increasing liquidity or tailoring cash flows for specific customers. For example, securitizing mortgages creates a liquid market for residential mortgages in agency sponsored pools, while a REMIC divides the principal and interest flows from the pools into different classes of bonds.

Intermediating involves the simultaneous issuance and purchase of different financial claims by a single financial entity. It occurs when an institution purchases one type of financial instrument for its own account and finances the transaction by issuing a claim against its own balance sheet. Three types of such financial intermediation activity are common. These are (i) insurance underwriting whereby the issuer assumes the policy's contingent liability, (ii) loan underwriting, whereby the intermediary uses its own resources in extending credit to a borrower, and (iii) security underwriting which involves buying securities as principal to distribute to investors.

Market making is an activity involving the buying and selling of identical financial instruments by a dealer. The market making firm is usually, but not always, a principal in the transaction. A market maker acts as an intermediary when it finances inventory by issuing its own claims, e.g., security underwriting. Gains and losses associated with the change in inventory value accrue to the market maker's financial benefit or loss. Recently, several commercial auction firms have made markets for loans as the seller's agent. In this case, buyers and sellers take principal risks and the auctioneer gets a commission, acting more as an agent for bringing together buyers and sellers than as a market maker.

It is important to distinguish between principal and agency activities in all of these services. The risks and incentives are quite different. A principal commits capital and risks both time and money. The capital requirements of this business can be substantial. A principal owns a portfolio and

suffers from systematic and idiosyncratic risks. Quite differently, an agent works for someone else and risks time alone. In an agency business, investment of capital is modest. The risks are wholly idiosyncratic.

3b. Risks in Providing Financial Services

The risks associated with the provision of financial services differ by the type of service rendered. In general, the first four services in Table 2, namely, those of originators, distributors, servicers, and packagers are provided more or less on an agency basis. These services facilitate market access for buyers and sellers of financial instruments and provide little risk to the service provider. The last two, intermediation and market making, however, are largely principal businesses. In essence, these activities place a principal and his capital between direct trades by buyers and sellers. It is in these areas that the financial institution retains the bulk of the risk of the service provided, and where effective risk management is most crucial. Neither an intermediary nor a market maker will be perfectly hedged against all risks, and thus, its investors will bear an array of financial risks associated with the institution's activities.

A taxonomy of such risks will be helpful. The risks borne by these financial institutions can be broken into five generic types: systematic, credit, counterparty, operational, and legal. See Table 3. Briefly, we will discuss each of these risks facing the institution.

Systematic risk is the risk of asset value change associated with systemic factors. As such, it can be hedged but cannot be diversified completely away. In fact, systematic risk can be thought of as undiversifiable risk. Financial institutions assume this type of risk whenever assets owned or claims issued can change in value as a result of broader economic conditions. As such, systematic risk comes in many different forms. For example, as interest rates change, different assets have somewhat different and unpredictable value responses. Energy prices affect transportation firms' stock prices and real estate values differently. Large scale weather effects can strongly influence both real and financial asset values for better or worse. These are a few types of systematic risks associated with asset values.

Some financial institutions decompose systematic risk more finely. Institutions that have substantial balance sheet reactions to specific systemic changes may try to estimate the impact of these

particular systematic risks on performance, attempt to manage them, and thus limit their sensitivity to variation in these undiversifiable factors. Accordingly, many institutions heavily involved in the fixed income market attempt to track interest rate risk closely and more rigorously than those that have little rate risk in their portfolios.⁷ They measure and manage the firm's vulnerability to interest rate variation, even though they can not do so perfectly. Likewise, international investors are aware of foreign exchange risk and try to measure and restrict their exposure to it.⁸ In a similar fashion, investors with high concentrations in one commodity need to concern themselves with commodity price risk and perhaps overall price inflation, while investors with high single industry investments monitor both specific industry concentration risk and the forces that effect the fortunes of the industry involved.

Credit risk arises from non-performance by a debtor. It may arise from either an inability or an unwillingness to perform in the pre-committed contracted manner. This can affect the lender who underwrote the contract, other lenders to the creditor, and the debtor's own shareholders. Credit risk is diversifiable but difficult to hedge perfectly. This is because most of the default risk may result, in fact, from the systematic risk outlined above. The idiosyncratic nature of some portion of these losses, however, remains a problem for creditors in spite of the beneficial effect of diversification on total uncertainty. This is particularly true for creditors that lend in local markets and take on highly illiquid assets.⁹

Counterparty risk comes from non-performance of a trading partner. The non-performance may arise from a counterparty's refusal to perform due to an adverse price movement caused by systematic factors, or from some other political or legal constraint that was not anticipated by the principals. Diversification is the major tool for controlling nonsystematic counterparty risk.

⁷Commercial banks are a clear example of such institutions. Therefore, they have devoted considerable energy to interest rate risk management, see Esty, Tufano and Headly (1994) and Santomero (1997).

⁸To see how this is done, see Jesswein, Kwok, Folks (1995).

⁹Accordingly, lending institutions actively manage their credit portfolios. See Morsman (1993) or Babbal and Santomero (1997) for a presentation of the techniques used by the banking and insurance industry respectively.

Counterparty risk is like credit risk, but it is generally considered a transient financial risk associated with trading, rather than a standard creditor default risk associated with an investment portfolio. A counterparty's failure to settle a trade can arise from many factors other than a credit problem.¹⁰

Operational risk is associated with the problems of accurately processing, settling, and taking or making delivery on trades in exchange for cash. It also arises in record keeping, computing correct payment amounts, processing system failures and compliance with various regulations. As such, individual operating problems are small probability events for well-run organizations, but they expose a firm to outcomes that may be quite costly.

Legal risks are endemic in financial contracting and are separate from the legal ramifications of credit, counterparty, and operational risks. New statutes, court opinions and regulations can put formerly well established transactions into contention even when all parties have previously performed adequately and are fully able to perform in the future. For example, the bankruptcy law enacted in 1979 created new risks for corporate bondholders. Environmental regulations have radically affected real estate values for older properties as well. A second type of legal risk arises from the activities of an institution's management or employees. Fraud, violations of securities laws, and other actions can lead to catastrophic loss, as recent examples have demonstrated.

All financial institutions face these risks to some extent. Non-principal, or agency activity primarily involves operational risk primarily. Since institutions in this case do not own the underlying assets in which they trade, systematic, credit and counterparty risk accrues directly to the asset holder. If the latter experiences a financial loss, however, legal recourse against an agent is often attempted. Therefore, institutions engaged in only agency transactions bear some legal risk, if only indirectly.

Our main interest, however, is in the businesses which the institutions participate as principals. In these activities, principals must decide how much business to originate, how much to sell, how much to contract to agents, and how much to finance and manage themselves. Principals must weigh both the expected profit and the various risks enumerated above to assure stockholders that the result

¹⁰See Santomero (1997) for a discussion of how banks manage counterparty risk.

achieves the stated goal of maximizing shareholder value. The result of this exercise will permit a wide range of financial institutions to co-exist, as we shall see.

4. Financial Institution Types--A View of the Extremes

To illustrate institutions that can coexist in the financial market, two quite different types of financial intermediaries are worthy of analysis. The first of these is the simplest form of intermediary, a passive investment company. In particular, we detail a REMIC's operation. This type of investment company shows how passive ownership and financing by an intermediary, combined with efficient contracting and information revelation, provide valuable functions for investors, and at the same time eliminates the need for claim holders to monitor the intermediary's actions. Despite substantial systematic, credit and operational risks, no active asset management is required of the REMIC itself. Instead, the nature of a REMIC's structuring and contracting illuminates how active management must add value to a financial institution. If simple rules and outside contacts can satisfy investors, then the role of active risk management is circumscribed.

Next we discuss a commercial banking firm to examine the impact of management discretion. In this case, transparency becomes a substantial issue, and active management of the underlying asset portfolio and risk exposure becomes standard procedure. The contrast here is quite vivid, as risk management is conducted exclusively outside the financial institutional structure in the REMIC case, but occupies a substantial portion of management time in the case of commercial banking.

4a. REMICs as Financial Intermediaries

A REMIC is a special type of investment trust that was created in the Tax Reform Act of 1986. It is a tax free legal entity that can own qualifying real estate mortgages and issue two types of beneficial interests: regular (debt) claims; and a residual claim. Although only one class of residual interest can be issued, multiple and complex classes of regular interests can be sold. All payments to regular interests are made according to rules specified when the REMIC is established. Basically, the REMIC structure allows principal and coupon payments from mortgages owned by the REMIC to be

carved up in different ways.¹¹ The residual interest, which cannot exceed a small percentage of the asset principal value, receives all principal and interest payments not pledged to regular interests or required to cover trust administration costs.

A REMIC has a trustee but no management; its assets cannot be significantly changed after it is established; and it exists only as long as it takes for its assets to be repaid completely. However, it can contract for services as well as sue and be sued in contract disputes. A trustee acts as fiduciary for the beneficial interests, monitors contractors, makes payments to claimants, and keeps records, all for a fee. Thus, a REMIC¹² is an independent, passive, tax-free financial intermediary. It buys real estate mortgages, issues claims to finance the purchase, and contracts for all other services. All such services are provided by subcontractors, specifically: loan originators; loan underwriters; servicers of the loans; foreclosure and resale agents for loan defaults; the trustee; and an underwriter for REMIC interests. In effect, the REMIC and its contractors replace a conventional, actively managed, vertically integrated financial institution.

The REMIC finances its assets, which are originated by other economic agents, by issuing regular and residual interests that are underwritten and sold to investors. The master servicing and subservicing of the assets are contracted for by the REMIC trustee, who administers the trust as fiduciary for regular and residual interest holders. The reputation of the servicer, subservicer, and trustee are important features analyzed by the REMIC's investors. The investors do their own loan analysis with data supplied by the underwriter, and also analyze the REMIC structure and payment rules.

Enhancements are also used to increase the value of the interest holders' claims when the REMIC's assets are not agency mortgage pools. One structure that is frequently used for this purpose is over-collateralization. The senior class of regular interest holders has first claim on collateral

¹¹See Santomero and Babbel (1996) for a detailed discussion of this and other mortgage backed instruments.

¹²While we focus on REMIC's, huge amounts of credit card receivables, auto loans, and other consumer loans are also securitized in similar types of transactions

payments. Whatever principal and interest that is not required for the senior class is paid to the subordinated class (up to its scheduled payments), which has secondary claim on this cash flow. A super subordinated class can be defined too. This class gets what is not due the more senior classes up to some maximum amount. Finally, the residual interest is paid. In addition, rating is frequently used to certify quality. Rating agencies like Standard and Poors and Moody's have established criteria for rating degrees of over-collateralization or subordination based upon historical default rates in depressed economic times.

Overall, the total cash proceeds from stratifying and analyzing the mortgages, disseminating the information to investors in different markets, and structuring, underwriting and selling REMIC interests determine the value of the REMIC trust.¹³ This structure also makes several salient points about how financial institutions can be organized. It illustrates that contracting for specialized services can substitute for vertical integration in financial services. It also demonstrates the viability of institutions that are completely passive, communicating risks about the underlying portfolio but not actively managing them.

4b. Commercial Banks as Financial Intermediaries

Commercial banks are at the opposite extreme of the institutional spectrum in terms of portfolio and risk management practice. Unlike their REMIC investment company counterparts, they are actively managed, dynamic portfolio institutions. A banking charter is granted by state or federal agency with only equity capital in place. Assets and deposit liabilities grow, subject only to capital allocation requirements.¹⁴

Asset choice is subject to prudential supervision but, beyond regulatory standards, broad discretion is permitted. Except for some marginal fixed assets and mandatory cash positions, assets

¹³An interesting characteristic of REMICs is the use of tranching of the cash flows generated by the underlying assets. The underwriter tries to create each tranche to fit one or a few specific customers' needs. Other tranches are more or less generic.

¹⁴Such capital constraints have become increasingly stringent lately due to the multinational Basle accord. This requires minimum risk related capital. See Santomero (1991) for a broader discussion.

vary from one institution to another, and from one time to another for the same institution. By broad classification, however, the bulk of banking assets are held in fixed income instruments.¹⁵ By convention these are separated into two categories, viz., investment securities, and loans. The former group includes open market instruments of the money and capital markets. The latter represents debt instruments originated by the institution, for which there may or may not be a liquid secondary market.

The lack of a clear secondary market for a substantial piece of a bank's asset portfolio can be traced to two different, but fundamental problems that are part of the bank's portfolio. The first is that the basis of the credit decision is generally proprietary information that is gleaned from the bank's customer relationship or accessed at a substantial cost to the originating bank. Communicating this information in a convincing manner, or revealing its implication for the value of the underlying asset portfolio, is difficult and costly.¹⁶

Second, many of the instruments in the asset portfolio have no standard type of open market counterparts. Because assets are nonstandard and illiquid, no observable market quote can be used to revalue the asset over time. Credit deteriorations and systematic risks can cause the theoretical market value to vary, but no accurate signal of this value change is easily observable or credible for investors.

The problems associated with the asset side are mirrored by the liability structure of a bank. Deposits are issued for various terms, or on demand. The market value of these liabilities changes with interest rates, and perhaps also with exchange rate fluctuation. However, deposits are illiquid and often offered at rates associated with the bank's monopoly position in its market area. Again, market valuation becomes difficult in this context.

Such problems are exacerbated by accounting rules mandated by GAAP or regulatory authorities. Assets are held at purchase price or book value, in most circumstances and in most

¹⁵Some equity participation is permitted in different countries around the world. However, no U.S. chartered institutions are permitted to hold equity within the bank's portfolio. See Langohr and Santomero (1985).

¹⁶This issue has received substantial attention in the academic literature. See Leland and Pyle (1977), Campbell and Kracaw (1980), Santomero (1988), and Trester and Santomero (1997).

countries. Liabilities are virtually never marked-to-market, and reserve accounting has little resemblance to its theoretical counterpart of a valuation reserve.

The net result of illiquid markets and opaque accounting practices is that a bank's portfolio's value is not easily understood from the balance sheet entries. Assets are both illiquid and imperfectly priced by outside agents. Liabilities are mispriced by regulatory mandate, and equity value has the errors of both compounded. Unlike the REMIC, sufficient uncertainty exists concerning the market value of a bank's assets and liabilities to lead to substantial divergence between the book and market values of assets and liabilities. Thus a direct estimate of equity market value of the institution is quite difficult, if not impossible.

In addition, the current state of a bank's the balance sheet is not indicative of its future value. Discretionary portfolio trading, associated with the maturity differences among assets or liabilities, and active portfolio origination of new credits and claims, causes the true market value of assets and equity to change over time.

In light of these features of a banking firm's portfolio, appropriate asset management must include active risk management.¹⁷ Concern over the probability of default leads these commercial banks to measure, manage, and reduce their exposure to the various types of risks listed above. In effect, given the nature of the banking business, risk management becomes an integral part of the origination and monitoring of illiquid assets and the distribution of liabilities. This is distinctly different from the operation of a passive and fairly transparent REMIC.

5. When To Practice Risk Management

The contrast between the REMIC and commercial banking firm is stark. The debt and equity claims issued by both the REMIC and the commercial banking firm are risky in almost any sense. Yet, in the case of the REMIC, investors buy the instruments and seldom hold the intermediary accountable for the ex post performance of the instruments it issues. The trustee, as fiduciary for the

¹⁷Exactly how this is done is the subject of entire textbooks. See, for example, Saunders (1997) for a discussion of techniques employed.

regular and residual interest holders, monitors the servicer and foreclosure firm for a fee. However, the trustee is not held liable for market performance. From a theoretical standpoint, the REMIC is the ultimate passive intermediary. Conversely, active management is a critical part of the commercial bank's activity. It originates and manages illiquid assets that have imprecise values in the open market. These assets' values change over time, as do the assets themselves. Unlike the REMIC, the bank has no predetermined life span or asset replacement constraints. Table 4 summarizes these key distinctions.

5a. Understanding The Differences Between Institutions

The difference between a REMIC and a banking intermediary is the transparency and permanency of the organization's investor interests. An investor in a REMIC can obtain a very detailed description of the its assets, contracts, and payment schemes for regular interests. The rules for operation are quite clear. Thus, unexpected events that severely affect the REMIC's value are many, but they do not lead to questions of confidence or competence on the part of the trust.

In a typical actively-managed financial firm, however, such information is not available to anyone but management, due to the uncertainty concerning the economic value of financial claims. Either because of tied-in product composition, as in the case of insurance products, or because of ambiguity in underlying asset value, pricing these assets and therefore shareholder value, is problematic for the intermediary. In addition, the extent of dynamic asset change and the rules followed for such portfolio adjustment are rarely communicated, nor are they subject to monitoring, due to the features of the assets held.

From the above, one may be able to generalize from the distinctions between these two institutional types. Imagine principal financial institutions arrayed in a two-dimensional space along the lines of Table 5, in which one axis measures the degree to which its actions are transparent to investors and the other axis measures how actively its investments are managed. For simplicity, allow institutions to be either transparent, translucent, or opaque in information and either active or passive in operation. We can fill in categories with different institutions. Discretionary risk management activity is concentrated in the actively managed opaque institutions. These are clustered in the top

right-hand corner. On the other hand, transparent institutions with rather passive investment strategies are located in the lower left corner. In these institutions, rules substitute for management.

Institutions also exist at the other extremes. In the upper left hand corner actively managed institutions such as open end mutual funds can be found. These entities are fully transparent, but actively managed in a manner clearly defined by their prospectus. These institutions limit risk management to eliminating unnecessary risk in a manner outlined in Section 2 above. They shed non-essential risk at the same time that they seek those risks essential to the value-added activity. At the other extreme, agency mortgage pools flourish, but only with implicit government guarantees. The opaqueness of these portfolios makes the institutions' asset value uncertain, and only through credit enhancements can the investor be convinced of the timeliness of future cash flows.

Institutions can also flourish in the interior of this twodimensional space. Horizontally, this region is referred to as translucent because some knowledge is available, but it is often not timely, nor wholly credible. Vertically, the intermediate region can be dimensioned by the portfolio turnover rate, which increases as one moves from a purely passive portfolio to a more actively managed one. For institutions in this intermediate range, a substantial amount of energy is spent on communicating with stakeholders, and to presenting clear statements of investments or investment policy. These actions should be seen as attempts to clarify the position of the institutions and perhaps move the institutions to the left in our Table 5, so as to increase transparency.

At the same time, fees associated with intermediation services tend to be correlated with the extent of active management. For example, index funds generally carry lower management fees than either actively managed investment funds or depository institutions. In part, this is because the latter have higher operating costs, associated with more portfolio transactions and a higher turnover rate. However, it is also due to the presumed greater value-added provided by these managers. Discretion is given because of their expertise in their chosen market, and their associated reputation for supra-normal performance and skill in active risk management.¹⁸ In essence, one of the value-added

¹⁸The ability of fund managers to provide such services has long been debated. See Treynor (1966), or more recently Bodie, Kane and Marcus (1992).

activities performed by management is the control of risk at the firm level, so as to increase portfolio value to stakeholders.

5b. Requirements for Active Risk Management Techniques

Thus far it has been argued that risk is an essential ingredient in the financial sector, and that some of this risk will be borne by all but the most transparent and passive institutions. In short, active risk management has a place in most financial firms. In light of this, what techniques can be used to limit and proactively manage risk? And, what are the necessary procedures to implement in order to adequately manage the risks which have been identified as the responsibility of firm management? The answers to these questions are straightforward and are the issues to which we now turn.

If management is going to control risk, it must establish a set of procedures to obtain this goal. In the financial community this is referred to as a firm-level risk management system. Its goal is to measure and manage firm level exposure to various types of risks which management has identified as central to their franchise. For each risk category, the firm employs a four-step procedure to measure and manage firm level exposure. These steps include:

- (i) standards and reports
- (ii) position limits or rules
- (iii) investment guidelines or strategies
- (iv) incentive contracts and compensation

In general, these tools are established to accurately define the risk, limit exposure to acceptable levels, and encourage decisionmakers to manage risk in a manner that is consistent with management's goals and objectives. To see how each of these four steps of a risk management system achieve these ends, we elaborate on each part of the process below and summarize the approach in Table 6.

(i) Standards and Reports

The first step of these control techniques involves two different conceptual activities, i.e., standard setting and financial reporting. They are listed together because they are *thesine qua non* of any risk management system. Underwriting standards, risk categorizations, and standards of review are all traditional tools of risk control. Consistent evaluation and rating of exposure is essential for

management to understand the true embedded risks in the portfolio, and the extent to which these risks must be mitigated or absorbed.

The standardization of financial reporting is the next ingredient. Obviously, outside audits, regulatory reports, and rating agency evaluations are essential for investors to gauge asset quality and firm-level risk. These reports have long been standardized, for better or worse. However, the need here goes beyond public reports and audited statements to the need for management information on asset quality and risk posture. Such internal reports need similar standardization and much more frequent reporting intervals, with daily or weekly reports substituting for the quarterly GAAP periodicity.

(ii) Position Limits and Rules

A second step for internal control of active management is the establishment of position limits. These are imposed to cover exposures to counterparties, credits, and overall position concentrations relative to systematic risks. In general, each person who can commit capital has a well-defined limit. This applies to traders, lenders, and portfolio managers. Summary reports to management show counterparty, credit, and capital exposure by business unit on a periodic basis. In large organizations with thousands of positions maintained and transactions done daily, accurate and timely reporting is quite difficult, but perhaps even more essential.

(iii) Investment Guidelines

Third, investment guidelines and strategies for risk taking in the immediate future are outlined in terms of commitments to particular areas of the market, the extent of asset-liability mismatching or the need to hedge against systematic risk at a particular time. Guidelines offer firm level advice as to the appropriate level of active management - given the state of the market and the willingness of senior management to absorb the risks implied by the aggregate portfolio. Such guidelines lead to hedging and asset-liability matching. In addition, securitization and syndication are rapidly growing techniques of position management open to participants looking to reduce their exposure to be in line with management's guidelines. These transactions facilitate asset financing,

reduce systematic risk, and allow management to concentrate on customer needs that center more on origination and servicing requirements than funding position.

(iv) Incentive Schemes

To the extent that management can enter into incentive compatible contracts withline managers and make compensation related to the risks borne by these individuals, the need for elaborate and costly controls is lessened. However, such incentive contracts require accurate position valuation and proper cost and capital accounting systems. It involves substantial cost accounting analysis and risk weighting which may take years to put in place. Notwithstanding the difficulty, well designed compensation contracts align the goals of managers with other stakeholders in a most desirable way.¹⁹ In fact, most financial debacles can be traced to the absence of incentive compatibility, as the case of deposit insurance illustrates.

5c. Implementation Principles for Firm-Wide Risk Management

Implementing firm-wide risk management practice entails a significant commitment of management time and institutional resources. It requires a focus on the central businesses of the organization, bottom-to-top review of lending or origination, trading or market making, and intermediation with a risk management perspective. It leads to the construction of data bases and reporting systems quite different from standard accounting systems. In this process, several guiding principals must be maintained for successful implementation of firm-level risk management practices. See Table 7.

First, risk management must be an integral part of an institution's business plan. Decisions to enter, leave, or concentrate on an existing business activity require careful assessment of both risks and potential returns. Risk management practices must be defined for each business activity that is pursued. Finally, business activities not part of the institution's focus must be eliminated so that avoidable risks are not assumed due to lack of management oversight.

¹⁹See Jensen and Meckling (1976), and Santomero (1984) for discussions of the shortcomings in simple linear risk sharing incentive contracts for assuring incentive compatibility between principals and agents.

Second, the specific risks of each business activity of an institution must be defined and the means to measure the risks must be developed. Similarly, data bases must be developed to obtain proper and consistent risk measurement across the entire organization.²⁰ Credit risk evaluation techniques, for example, should be the same in corporate lending, as in correspondent banking. Only then will aggregate credit quality reports have meaning to senior management.

Third, procedures must be established so that risk management begins at the point nearest to the assumption of risk. This means that trade entry procedures, customer documentation, client engagement methods, trading limits, maximum loan sizes, hedging strategies, and a myriad of other normal business activities must be adapted to maintain management control, generate data in a consistent fashion, and eliminate needless exposure to risk.²¹

Fourth, data bases and measurement systems must be developed in accord with the way business is conducted. For example, most accounting systems for trading operations record trades on the basis of settlement day. However, to measure trading desk risks, risk management systems must record positions on a trade date basis. This means that the risk management system must access the trade entry system directly. Moreover, for accurate daily reports, trades must be recorded, entered, and checked in a timely fashion. Next day corrections of bad trade information are not timely enough.

Finally, none of the procedures or databases mentioned here are effective or meaningful until an overall risk management system is put in place and used by senior management.²² The system must be used to evaluate businesses, individual performance, and firm-level value added. It must be the focus of management analysis and discussion on an ongoing basis, and over time it will, and must,

²⁰This is an area where institutions like Bankers Trust have long excelled. For a review of their system of risk adjusted return on capital, see Salomon (1993).

²¹This is why value-at-risk has become an attractive risk management tool in proprietary trading, see Hopper (1996).

²²The recent disasters at Bankers Trust, Barings, and BancOne demonstrate that risk management systems in themselves do not prevent risk taking. It takes the commitment of senior management to use such systems in order to avoid such disasters. The work of Jorion (1997), Rawnsley (1995), and Faff, Tufano, and Headly (1994) suggests that these managers did not allow their risk management system to prevent devastating losses.

become part of board meeting presentations. To achieve this, the risk reports must be checked regularly by the business units being monitored; reports must be tailored for their users; and the system must be part of management's oversight, control, and compensation.

6. The Agenda for Improvements in Risk Management

The REMIC model of a financial institution indicates that risk management is not an inherent feature of institutions engaged in managing risky asset portfolios, even ones with complex claims. Asset disclosure, public operating rules, and the market for financial services seem to work well, at least for these simple, single purpose entities. However, such institutions require transparency and passivity to permit the stakeholders to evaluate the underlying portfolio, and its value added to their own.

In the case of institutions with dynamic and opaque portfolios, the challenge is to manage the value of the firm and its risk exposure in a clear, concise way. This involves limiting unnecessary risk, transferring other risks, which need not be absorbed, and managing the risks that remain. As noted above, appropriate risk management involves a considerable commitment to the task. The four-step process outlined, however, is both feasible and practical. In fact, it is in place at some institutions at this time.²³

Yet, even the most ambitious application of the principles of risk management will not eliminate risk, nor assure positive returns over a given period. The procedures constrain, and monitor risk; they do not eliminate it, as we noted in the introduction. In addition, substantially more work needs to be done to further advance our knowledge in this area. Questions remain in two distinct areas. First, there are still a number of methodological issues that need to be settled in the application of risk management techniques to the firm as a whole. Second, there are questions related to the value of such risk management techniques when the market is becoming more sophisticated and willing to accept both direct claims and claims from transparent institutions, like the REMIC above.

²³See Babel and Santomero (1997) and Santomero (1997) for a review of current practice in risk management system implementation.

We close with a list of just a few of the questions that warrant further study.

- 1) How much disclosure of embedded risk is required or even desirable for opaque, actively managed institutions? With changing portfolios, should risk management strategies be disclosed in addition to current risk profiles?
- 2) Are there reporting procedures that are sufficiently generic to report accurately not only the balance sheet values, but also the embedded risk of non-transparent firms?
- 3) Are there optimal rules for active management? Can we replace active, discretionary management with well-specified portfolio adjustment rules so as to make the opaque institution more transparent?
- 4) If there is no single rule for optimal risk management, how can an institution determine its particular optimal risk- return trade-off? Will this differ across institutions with similar product lines or be relatively constant for all members of an industry group?
- 5) Given the many different kinds of risk, how can they be aggregated so as to measure the total risk exposure of the firm? Recent approaches dimension risk using the concept of "value-at-risk," or "risk adjusted return on capital." Will either one of these emerge as a single index of institutional risk?
- 6) Can we demonstrate that active management adds value to intermediation? Can we demonstrate that institutions engaged in such activities are systematically valued beyond the level they would have been if they made no attempt to reduce the variability of returns?
- 7) What is the evolution of the financial structure and market share of various types of institutions? Has the development of broader capital markets made actively managed institutions outmoded? Will narrow transparent institutions replace the current opaque ones, so that this entire issue will eventually disappear?

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TABLE 1

FIRM LEVEL RISK MITIGATION APPROACHES

RISK MITIGATION TYPE			
	RISKS TO BE AVOIDED/ ELIMINATED	RISKS TO BE TRANSFERRED	RISKS THAT MUST BE ACTIVELY MANAGED
RISK AVOIDANCE GOALS	<ol style="list-style-type: none"> 1.Reduce chance of idiosyncratic losses arising from business activities 2.Shed superfluous risks by devoting resources to risk avoidance 3.Absorb <u>only</u> optimal quantity of particular risk 	<ol style="list-style-type: none"> 1.Buy/sell financial claims to diversify or concentrate portfolio risks 2.Sell assets with risks which the firm has no clear competitive advantage in managing 	<ol style="list-style-type: none"> 1.Act as agent for others who cannot hedge/trade 2.Protect proprietary knowledge 3.Disclosure complex or not legal 4.Avoid moral hazard 5.Key element of business purpose
TECHNIQUES OF RISK CONTROL	<ul style="list-style-type: none"> •Due diligence •Diversification •Matching •Hedging 	<ul style="list-style-type: none"> •Sale •Syndication •Derivative hedging 	<ul style="list-style-type: none"> •Active risk management
RISK MANAGEMENT GOALS	<ul style="list-style-type: none"> •Minimize non-relevant risk •Control <u>and</u> protect profitability 	<ul style="list-style-type: none"> •Concentrate on risks in which firm has competitive advantage 	<ul style="list-style-type: none"> •Center firm on distinctive competency •Control and protect profitability
COMMUNICATION CHALLENGES	<ul style="list-style-type: none"> •Control justified risk avoidance practices 	<ul style="list-style-type: none"> •Cost justify business activity after risk transfer 	<ul style="list-style-type: none"> •Communicate risk management objectives •Communicate risk management competency •Develop a track record

TABLE 2

FINANCIAL SERVICES TAXONOMY

Depositories	Banks Thrifts Credit Unions	<p><i>Institutional Response</i></p> 	Origination Firms	Brokers Investment Mgmt. Co. Mortgage Bankers
Insurance Firms	Life Property-Casualty Auto Health		Market Makers	Specialists Dealers
Investment Companies	Open-End Funds Closed-End Funds REMICs REITs		Exchanges	Stock Insurance Derivatives
Pension Funds	Defined Benefit Defined Contribution		Others	Clearing Houses Finance Companies Collection Companies

Financial Services Market

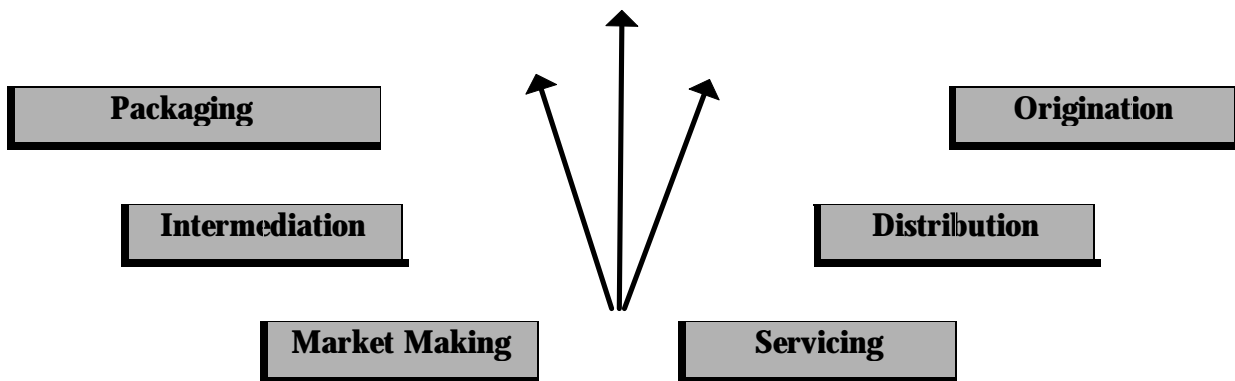


TABLE 3

DECOMPOSING FIRM RISK

SYSTEMATIC Asset value change associated with systemic factor			
interest rate	foreign exchange	commodity pricing	other

CREDIT:
Non-performance by debtor

COUNTERPARTY:
Non-performance by a trading partner (transaction oriented)

OPERATIONAL:
Problems of accurately processing and settling transactions

LEGAL:
Endemic to financial contracting

TABLE 4

REMIC vs. Commercial Bank

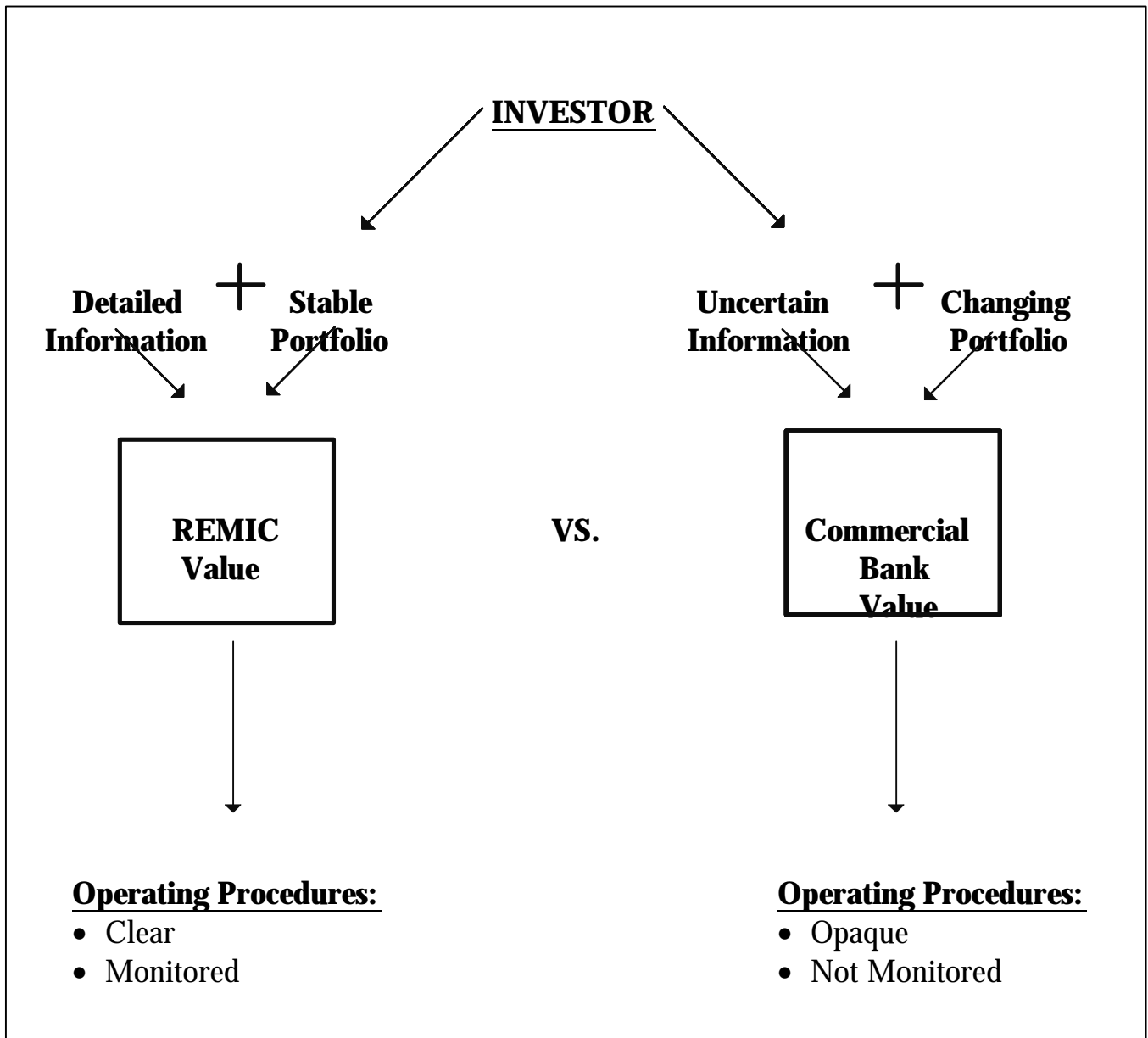


TABLE 4A

**PASSIVE VS. ACTIVE MANAGEMENT
INSTITUTIONAL CHARACTERISTICS**

TYPE	RISK CHARACTERISTICS	MANAGEMENT/ORG. STRUCTURE	POWERS/CONSTRAINTS	VALUATION CRITERIA
<p><u>REMIC</u></p> <p>Passive Investment Company/Static Portfolio</p>	<p>Systematic Credit Operational</p>	<p><u>Trustee Only:</u></p> <ul style="list-style-type: none"> -Fiduciary for beneficial interest -Monitor contracts -Pay claimants -Keep records <p><u>Operations:</u></p> <ul style="list-style-type: none"> -All provided by third party <p><u>Remuneration for managers/trustees/contractors:</u></p> <ul style="list-style-type: none"> -Fees 	<ul style="list-style-type: none"> -Contract for services -Cannot change assets/composition 	<p>Cash proceeds from:</p> <ul style="list-style-type: none"> -Mortgage investment activity -Information dissemination -Structuring/selling REMIC interests <p>Market value easily estimated</p>
<p><u>COMMERCIAL BANK</u></p> <p>Actively managed, dynamic portfolio</p>	<p>Credit Systematic Operational legal Counterparty</p>	<p><u>Management:</u></p> <ul style="list-style-type: none"> -Broad responsibilities and authority to structure portfolio -Active risk management is integral element of origination and monitoring of illiquid assets and distribution of liabilities <p><u>Operations:</u></p> <p>Internal/outsourced</p> <p><u>Remuneration:</u></p>	<ul style="list-style-type: none"> -Grow assets/liabilities -Choose asset mix -Illiquid markets; opaque accounting rules 	<p>Portfolio value not easily understood or estimated:</p> <ul style="list-style-type: none"> -Illiquid assets imperfectly priced by third parties -Liabilities mispriced by regulatory authorities -Equity value has multiple errors <p>True market value changes over time</p>

TABLE 6**THE FOUR STEPS OF AN ACTIVE RISK MANAGEMENT SYSTEM**

TECHNIQUE TO LIMIT RISK	EXAMPLE
1. Standards and Reports A. Standards B. Financial Reporting	<ul style="list-style-type: none">• Underwriting standards• Risk categorization• Review standards • Audits• Regulatory reports• Rating agency reports• Internal portfolio
2. Position Limits/Rules	<ul style="list-style-type: none">• Counter party exposures• Credit limits• Position concentration
3. Investment Guidelines	<ul style="list-style-type: none">• Concentrations• Commitments• A/L mismatch goals• Hedging requirements
4. Incentive Schemes	<ul style="list-style-type: none">• Performance-based compensation contracts

TABLE 7

PRINCIPLES FOR FIRM-WIDE RISK MANAGEMENT

FIRM REQUIREMENTS

- ◆ COMMITMENT OF MANAGEMENT TIME AND INSTITUTIONAL RESOURCES.
- ◆ FOCUS ON CENTRAL BUSINESS OF THE ORGANIZATION.
- ◆ COMPREHENSIVE REVIEW OF LENDING, ORIGINATION, TRADING, MARKET MAKING, INTERMEDIATION WITH A RISK PERSPECTIVE

GUIDELINES FOR SUCCESS

- ◆ BE INTEGRAL TO THE FIRM'S BUSINESS PLAN.
- ◆ DEFINE A MEASURE OF RISKS IN EACH BUSINESS CONSISTENTLY ACROSS THE FIRM.
- ◆ INITIATE PROCEDURES FOR RISK MANAGING AT THE POINT NEAREST TO THE ASSUMPTION OF RISK.
- ◆ DEVELOP DATABASES AND MEASUREMENT SYSTEMS IN ACCORD WITH BUSINESS PRACTICES.
- ◆ INSTALL COMPREHENSIVE RISK MANAGEMENT SYSTEM TO EVALUATE INDIVIDUAL, BUSINESS, AND FIRM LEVEL PERFORMANCE