

An Introduction to Financial Risk Management in Government



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The PricewaterhouseCoopers Endowment for
The Business of Government

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Foreword

August 2001

On behalf of The PricewaterhouseCoopers Endowment for The Business of Government, we are pleased to present this report by Richard J. Buttimer, Jr., “An Introduction to Financial Risk Management in Government.”

Understanding and managing financial risk is essential for any organization, private or public. In the private sector, financial risk management is a widely accepted practice designed to control risks that could lead to business failure if not properly managed. Although increasingly sophisticated financial risk management techniques have been employed in recent years, even by companies whose business is not primarily financial in nature, the application of those tools in the private sector—where profit maximization is the sole objective function—is relatively straightforward.

In contrast, government managers must manage financial risk in a manner recognizing the diverse missions and multiple objectives of public agencies. The multi-dimensional goals of the public manager help to illustrate the interesting, challenging, and rewarding nature of public service. Rather than seeking to realize the greatest profit, government officials must strive to manage financial risk in a manner that maximizes the likelihood of an agency achieving its mission.

Through the introduction of financial risk management concepts, processes, and tools, Professor Buttimer has developed this report as a primer to be used by government managers—including those working at non-financially oriented agencies—in managing financial risk to obtain desired results. With the enactment of laws such as the Government Performance and Results Act of 1993 and the Federal Credit Reform Act of 1990, government is clearly headed in the direction of improving its ability to identify, measure, and manage financial risks.

This report provides valuable information to public officials at all levels, from senior management to staff responsible for overseeing day-to-day agency operations, in managing the financial risk inherent in most governmental activities. The recommendations contained in the report provide sound guidance to facilitate the establishment of financial risk management programs across the government. We trust you will find this report informative and helpful.

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Executive Summary

The U.S. government has a long history of adapting and adopting successful and prudent business practices from the private sector. In the arena of financial management this is perhaps best illustrated by the adoption of the Chief Financial Officers Act of 1990, with its requirement that federal agencies pass financial audits similar to those of publicly traded companies. One of the most important recent innovations in private sector financial management has been the widespread adoption of advanced financial risk management techniques, even by companies whose primary business is not financial in nature. This adoption has allowed firms to control financial risk much more precisely and with fewer resources than ever before. Some government agencies, primarily those with a financial mission, have implemented similar techniques. The purpose of this report is to introduce financial risk management (FRM) concepts, processes, and tools to government managers at non-financially oriented agencies and to provide examples of current FRM use by the government.

This report consists of four main parts. The first part discusses the meaning of “financial risk” and “financial risk management” as those terms apply to the private sector, and explains how the different objective functions of government agencies affect their applicability in the public sector. The second part examines the major components of the financial risk management process. The third section examines the tools of financial risk management and their applicability for government use. Finally, the fourth section puts forth some

suggestions for any government oversight body, such as the Office of Management and Budget (OMB), to consider when contemplating the implementation of financial risk management techniques. Additionally, the paper contains two case studies of agencies—the Government National Mortgage Association of the U.S. Department of Housing and Urban Development and the Risk Management Agency of the U.S. Department of Agriculture (USDA)—that already use financial risk management techniques.

The major findings of this report are:

1. Government agencies, unlike private sector firms, do not have a single objective function. Each agency has a unique mission. Government risk managers, therefore, must recognize that their goal is to manage financial risk in such a way as to maximize the probability of the agency accomplishing its primary mission.
2. Managing financial risk does not mean eliminating it. Financial risk is something an agency must typically bear to achieve its mission. The goal of the agency financial risk manager is to take on the minimal amount of financial risk to meet the agency’s mission.
3. Unlike in the private sector, derivative securities will likely not be the primary tool used by government financial risk managers. Instead, they will use other private sector methods such as advanced measurement techniques, risk limits, and organizational structure.

4. The appropriate metric of financial risk is a function of the mission of the organization. For businesses this always translates into a dollar-based measure. For a government agency, however, the metric will be mission-specific. As such, the first step in any financial risk management process will be to define the mission of the agency in a quantifiable way.
5. In the private sector a measure that has become quite common is “Value at Risk,” which measures the riskiness of the firm in terms of the dollars it could lose due to a given risk with a given level of probability. A similar metric in government could be “Mission at Risk.” This measure would express financial risk in terms of the probability of the agency not being able to accomplish its mission due to financial risk.
6. Some government agencies have already begun to implement financial risk management tools, and others have expressed interest in doing so. Now is an appropriate time for OMB or some other oversight agency to begin developing a generalized approach to financial risk management throughout the government.

Introduction

During the past 15 years, Congress and the public have forced government agencies to adopt and adapt many of the accounting and audit practices of the private sector. The impetus for this financial management innovation was the notion that these tools are the bedrock on which modern financial management techniques rest. In the private sector, reliable accounting and audit information are, however, just the start of modern financial management techniques. One of the most important recent evolutions in financial management has been the introduction of sophisticated financial risk management (FRM) methods into nonfinancial companies. Managers and shareholders of those companies now use quantitative tools and techniques to develop highly detailed information about the financial condition and risks of their companies. This information allows them to respond rapidly and appropriately to changes in the risk profile of their company.

Financial risk management tools are now so common in the private sector that the market considers them to be the norm. Their introduction and adoption, however, occurred neither overnight nor uniformly. The first companies to adopt these methods were those with the most easily quantifiable financial risks, such as banks and securities firms. As nonfinancial firms began to see the benefits of precisely measuring and managing financial risk, they too began to adopt these tools.

A similar pattern is starting to happen within government. Those agencies with missions of a financial nature have begun to adopt variants of private sector

financial risk management tools. Now some nonfinancially oriented agencies have begun to wonder whether financial risk management tools could be of use to them.¹ Their hope is that these tools will provide them with the same managerial efficiencies reaped by private sector firms.

The private sector developed its current financial risk management systems over a period of time that in some sense stretches back hundreds of years, with researchers making the most important advances in the past 30 years or so. Government sector FRM has not had that same level of development, in part, because the problems faced by government risk managers are more difficult than those of their private sector counterparts. It has only been in the last five to 10 years, and then usually only in the largest of companies, that the private sector has begun to address the types of problems that parallel those encountered by government risk managers.

The purpose of this report is to examine some of the issues surrounding the use of financial risk management techniques in the government. In particular, the report will:

- Examine the tools of private sector financial risk management and examine their applicability to government use, particularly in the federal sector;
- Suggest some items that OMB or other oversight agencies should consider when proposing or reviewing governmental financial risk management techniques; and

- Examine how certain government agencies already use financial risk management tools.

Before examining these issues, however, it is important to first define what is meant by the terms “financial risk” and “financial risk management,” and to fully understand why they have come to have a great deal of importance in the private sector.

Financial Risk: What It Is and Why It Matters

Perhaps no single idea has influenced the field of finance as much as the idea that investors—i.e., shareholders—consider not only the returns to an asset, but also the standard deviation of those returns. In fact, most financial researchers today assume that investors are “risk-averse,” which simply means that given a choice between two investments with equal expected future returns, most investors will choose to purchase the one with the lowest standard deviation of returns. In other words, investors view volatility as risk. Investor attitudes toward risk are important to the managers of a firm because ultimately it is investors—i.e., shareholders—who hire and compensate the managers. They must pay attention to the risk preferences of investors because ultimately investor satisfaction is what determines management compensation.

This view is important for a number of reasons, not the least of which is the notion that investors are forward-looking in their investment decisions. Investors base their decisions not on the asset’s performance in the past, but on its expected performance in the future. Investors may rationally base their expectations of an asset’s future performance on its past, but they are still fundamentally making their investment decisions looking forward.

With the recognition that an investor’s decision making process is based largely on his or her expectations about unknown future returns, researchers realized they could model this as a statistical process. That is, the performance of an asset in the future could be viewed as the realization of a distribution of possible returns, which implies that researchers can view investor choices as functions of this expected distribution. Ultimately, financial economists realized investors consider

both the mean and standard deviation of the statistical distribution of an investment’s returns.

Similarly, stakeholders in a government agency will concern themselves with the ability of the agency to meet its mission going forward in time. That is, they will judge the agency based on how well they believe it will fulfill its mission in the future given the financial resources of the agency. In this sense, an agency’s stakeholders are forward looking in the same way as shareholders, and, to the degree the ability of the agency to meet its objectives in the future varies, it can be modeled as a distribution. There is no reason to believe the stakeholders of an agency will view the variance about the mean of that distribution as anything other than risk. That is, for government agencies, one can define risk as the standard deviation of the distribution of the agency’s ability to meet its mission in the future.

The example “Expected Returns and Standard Deviations for Three Investments” (see p. 8) illustrates one of the most important notions in finance: Risk is not “bad” in an absolute sense, only in a relative sense. Clearly most investors would never purchase investment A, even though it is riskless. The choice would be between B and C, each of which earns on average 15 percent. Most investors would select investment C since it has less risk but the same average return as investment B. The point is that investors do not absolutely minimize risk—if they did investment A would be their choice—but rather minimize risk *given a fixed level of return*. The job of a financial risk manager is not to eliminate risk from a company or portfolio, but rather to ensure it bears only the minimal level of risk required to earn a target level of return. Ironically, many companies that implement financial risk management strategies find they actually need to increase their risk to reach a target level of return.

The inseparability of financial risk and return requires a firm to take a different attitude toward its management than it takes toward other risk. For many risks, such as operational or legal, firms seek to eliminate them as completely as possible. When a firm, especially a nonfinancial firm, first begins to understand it bears financial risk, it is not unusual for the first reaction of its managers to be to search for a way to eliminate this risk. Unfortunately, this risk can be eliminated—but it costs the firm in

Expected Returns and Standard Deviations for Three Investments

Investment	Expected Return	Standard Deviation
A—Investment increases 1% with certainty.	1%	0
B—Investment increases by either 10% or 20% with equal probability.	15%	7.07%
C—Investment increases by either 14% or 16% with equal probability.	15%	1.41%

Since financial economists define risk as the variation in returns, it is important to note that the drift or average change in the asset's price is not part of the definition of its risk. To see this, consider the returns to three potential investments. Investment A will increase in value by 1 percent over the next year with certainty. Investment B will either increase in value over the next year by 10 percent or 20 percent, with equal probability. Investment C will increase in value by either 14 percent or 16 percent over the next year, also with equal probability.

While it may seem somewhat odd at first, investment A is not considered "risky." There is no risk—it will definitely increase in value. Considering that even in their worst cases both B and C outperform A, it is fair to call A a poor investment, but it is not risky. On the other hand, investment B is risky. It is clearly a superior investment over A, yet it has more variability in its returns. Investment C also has the same expected return as investment B, but has a lower standard deviation of those returns. Most investors would choose investment C since it has the same expected return (15 percent), but lower variability of returns. The table shows the expected returns and standard deviations for investments A, B, and C.

terms of expected returns. That is, the firm will not fully meet the mission its shareholders demand.

Similarly it is clear that many government agencies must bear financial risk to meet even the most basic of their missions. For example, the Federal Housing Administration (FHA), the agency charged with promoting homeownership in low- and middle-income groups, has as one of its primary missions the administration of the government's mortgage insurance program. Clearly when FHA issues mortgage insurance it takes on credit risk—i.e., the risk that the borrower may not pay back the loan—thus creating a potential claim against FHA's insurance. Yet if FHA did not take this risk, it could not fulfill its most basic mission.

In the private sector, the term financial risk management (FRM) is frequently associated solely with the use of derivative securities. This, however, is an overly restrictive view of the field. For many firms, FRM is a process that encompasses the identification, quantification, and management of a firm's financial risk. Taken in this con-

text, FRM has a much broader scope and role than simply being the use of derivative securities. Depending upon the nature of the firm's business, its FRM function could be as simple as an assessment of the financial risks that could possibly affect the firm, or it could be as complex as a real-time hedging and management system that also serves as the primary management information system for the entire company.

As the rest of this report discusses, the role of FRM in government is a topic researchers, government managers, and policy makers are just beginning to address. One issue that is clear, however, is that FRM in government will not likely rely on derivatives as much as the private sector. While there will undoubtedly be some use of derivatives by government,² much of the financial risk government faces is not well suited to hedging through the use of derivatives. What is much more likely to happen is government will examine the quantitative financial risk measuring and monitoring techniques of the private sector and then adapt them to the special needs of government. Government will have to

adapt the tools because of the fundamental differences in the goals of business and government.

The Goal of FRM in Business and Government

The management of a private sector firm knows that success ultimately lies in shareholder wealth maximization. While this standard can be very exacting, it has the benefit of creating a common metric across all firms regardless of the service they provide or the product they make. This rule has two benefits. First, senior management can always state financial risk management objectives in monetary terms, a rather clear standard, and second, it is unambiguous that the manager serves on behalf of the shareholders. To the degree that other constituencies—i.e., customers, suppliers, etc.—have agendas that conflict with those of the shareholders, the shareholders' agenda should prevail.³

Government risk managers and policy makers do not have to answer to shareholders. While they ultimately answer to voters, the degree to which voters can influence the daily running of a government agency is very small when compared to the influence that shareholders can have on corporate management. While there may be some analogy between shareholders of a corporation and taxpayers, the level of influence and control are so vastly different the analogy breaks down.

It is also tempting to think of either Congress or the executive branch as an analog to the shareholder, but there are difficulties with either of these approaches. While Congress has the legislative authority to impose rules on government agencies, allowing it to have control that is, in some senses, similar to that of a shareholder, in many ways that authority is more like that of a regulator than a shareholder. Further, for managerial issues within agencies, Congress will specify some goals, and then delegate to the White House (more specifically OMB) the responsibility of developing a standard or rule that agencies must then follow.⁴ Clearly OMB has more of a regulatory than a shareholder role to play in the running of the agency. Similarly, the White House (and OMB) can exert tremendous day-to-day control over agency actions, but that control is more akin to the most senior management of a corporation.

This fact both simplifies and complicates the government risk manager's task. It simplifies it in the sense that since there is not an unambiguous standard, such as shareholder wealth maximization, that must be followed, the manager has more flexibility in both objectives and measures. Since agency missions vary so widely, the ultimate objectives and measures for government financial risk management programs will vary just as widely. Indeed, the first task of a government risk manager may well be to determine how to quantify certain aspects of the mission of the agency and then translate those measures into terms appropriate for financial risk management. Private sector risk managers do not have to do this; they know their objective function is shareholder wealth maximization and all financial risk management activities should be stated in those terms. Under the correct circumstances, this flexibility could allow government risk managers to be more responsive than their private sector counterparts, but it could also lead to a poorly defined goal.

In other ways, however, the lack of a shareholder-like entity complicates their task. Government risk managers must answer to a number of stakeholders such as politicians, suppliers, taxpayers, and regulators. Frequently those stakeholders will have conflicting goals. To make matters more difficult, unlike in the private sector, when there is conflict between stakeholders there is no group to whom the manager always has an absolute and clear responsibility. In fact, frequently the stakeholders of the government agency are more similar to the customers than the shareholders of a private sector company.

Even with all of these difficulties, it still seems possible to develop a general standard to which the government financial risk manager should operate. That standard is to position the organization's financial risk profile such that it maximizes the probability of the organization meeting its mission. This is the role of private sector risk managers. Their mission, however, is to maximize the wealth of the shareholder. Government financial risk managers have to begin at a more basic step than their private sector counterparts, i.e., they have to first define their mission. Once defined, they, like their private sector counterparts, set the financial risk level of the organization to maximize the probability of achieving that mission.

The purpose of this introduction has been twofold: to spell out the major objectives of this report and to define financial risk and the general goals of financial risk management. The remainder of the report consists of four sections. The following section discusses the financial risk management

process. Next, the tools and techniques of private sector financial risk management, as well as their applicability to government, are discussed. The report concludes with recommendations for steps that could be taken regarding the implementation of FRM in government.

Glossary of Financial Risk Management Terms

Active Financial Risk Management: The use of financial instruments, primarily derivative securities, to control or manage the financial risk of an organization.

Counterparty Risk: The risk that one party involved in a trade will not perform its end of the deal. For example, consider if A entered into an agreement to purchase wheat from B in three months' time. Then B bears the counterparty risk that A might not be willing and able to pay for that wheat when the three months have passed.

Credit Risk: The risk that a borrower may not repay a lender according to the terms of the loan.

Derivative Security: A financial contract with cash flows that depend upon the behavior of some other financial instrument. Examples include options contracts, futures contracts, interest rate caps and floors, and credit swaps.

Financial Hedging: The use of financial contracts to reduce the risk borne by an organization. For example, a bakery might elect to enter into forward agreements on wheat (i.e., agree today to purchase wheat for a specific price on a specific date in the future) to eliminate the risk of wheat price increases hurting their profitability.

Financial Risk: The possibility that an organization will face deviations from its expected cash flows.

Financial Risk Management: The process through which an organization seeks to control the negative outcomes of the financial risk that it faces.

Monte Carlo Analysis: An analysis technique that uses a computer to simulate the random nature of a particular risk, and then measures the effectiveness of a risk management strategy given the risk.

Natural Hedging: In large organizations, the financial risks in one division of the organization may tend to offset the financial risks in another division. The net effect is that the two risks may cancel each other out, creating a natural hedge.

Passive Financial Risk Management: Managing the financial risk of an organization without the use of derivative securities. Normally this involves the setting of risk limits and then reducing or limiting business activities upon reaching those limits.

Risk Audit: A systematic review of the financial risks facing an organization. This review identifies the sources, magnitudes, and potential consequences of the financial risks. The review will also recommend managerial responses to those risks.

The Financial Risk Management Process

An organization that contemplates instituting a financial risk management system will have a wide range of techniques and tools at its disposal, and frequently there is a temptation to immediately begin implementing those tools and techniques. Unless the organization faces the most trivial of financial risks, however, it is usually a mistake to rush straight into implementation. Most organizations face a variety of financial risks, and they frequently interact with each other in subtle, complex ways. Implementing financial risk management tools without fully understanding the risk profile of the organization could lead to an overly costly management system or one that does not fully manage the organization's financial risk.

Three Phases of FRM

A better approach is to implement a financial risk management system in a methodical, studied manner. In fact, successful financial risk management implementations really go through three distinct phases: identification, measurement, and management. Indeed, an organization may be at different stages of this process for the different types of financial risk it faces. For example, a firm may well devote the resources necessary to actively manage its primary risk, but only enough to measure, or even just to identify, its secondary risks. The key to the process, though, is to gather enough information to understand the risks the organization faces

and then make informed decisions as to the appropriate stage in the process to take the management of that risk.

While at first the basic ideas of *identify, measure, and manage* may seem straightforward, they can be very challenging to implement, and they significantly affect how management runs the organization. The following sections briefly discuss each of these three stages.

Identify Risks

It is impossible for an organization's management to make informed decisions about handling its risk without first understanding the risks it faces and the sources of that risk. Thus, the first step in the risk management process is to clearly identify financial risks the organization faces. It is also important to begin identifying how various risks interact with each other. Depending on the nature of the risks and the subtlety of their interaction, it may be difficult to quantify this interaction but it is important to consider.

Many organizations turn both outward and inward during the identification phase. That is, they ask both employees and external consultants to help identify the risks. While external consultants frequently bring expert technical advice to this process, for organizations just beginning the FRM

process, the biggest benefit of consultants may be the project management experience they bring. That is, their previous experiences with identifying financial risks in organizations may be more valuable than their specific technical skills.

Measure Risks

After identifying the sources of risk, the next step is for management to decide how it will measure that risk. Many organizations will measure very similar risks in different ways, depending on how management structures the organization and chooses to view risk. Further, the degree to which an organization has exposure to a given risk may also affect how management elects to measure that risk. An organization with a very large exposure to a risk may well choose to devote the resources necessary to develop an advanced quantitative model, while an organization with a lesser exposure might elect to use a simpler, less costly measure.

The cost component of measuring risk is in data collection and the process that must be put in place to service that data collection process. The key for an organization is to select a risk measure that has an associated data collection cost proportional to its financial risk. In an organization such as a bank, where financial risk is very large, it is appropriate to bear high costs to get the most accurate measures of risk. In organizations with lower relative financial risks, it is more appropriate to put in place lower-cost financial risk measures.

Manage Risks

The final, and usually most involved, stage in this process is to manage the risk. That is, after identifying and measuring financial risks, an organization will then have to decide how to manage those risks. The organization can use either passive or active management techniques.

Passive management techniques involve putting in place limits on the amount of risk the organization will bear, and then modifying the daily activities of the organization to prevent it from exceeding those limits. For example, a firm may choose to exit a line of business if it finds the risks it entails are inherently greater than the risk limits of the firm. Similarly, a company may choose to enter a new

line of business because the risks entailed offset other risks faced elsewhere, i.e., it creates a natural hedge. In either case the firm is not actively managing the risk—instead it is managing its business operations to reduce risk.

Active management, in contrast, is the explicit management of risk, usually through financial contracts. While many organizations have long used insurance contracts as a form of active risk management, derivative instruments such as options, futures, swaps, and other derivatives have become increasingly common.

Mapping Risk and an Organization's Response

While identifying the various stages in the financial risk management process is straightforward, the key to success is applying these stages in a disciplined, systematic manner, and then reviewing those results on a regular basis. One useful tool is an organization-specific map of financial risks faced and responses (or potential responses) to those risks. This mapping can be especially important to an organization just beginning to develop its financial risk management capacity, and can be even more important if, as is the case for most government agencies, there is not a peer organization or industry that has already established a starting point.

The first step in this process is to perform a “risk audit”—i.e., a thorough examination of the sources of financial risk in the organization as well as the processes and procedures the organization has for dealing with those risks. Although many organizations will have a general idea of the most important risks they face, this risk audit is a useful activity for a number of reasons. First, systematically examining financial risk in the organization helps to prevent myopic assumptions about risk. Organizations that have one or two obvious financial risks can frequently fall into the trap of ignoring other financial risks that, while not as big as their primary risks, can nevertheless be significant. Organizations that do not perceive themselves as being “financial” may naively assume they do not bear financial risk.

A second benefit of the risk audit is that by systematically examining risks it is possible to find instances

of natural hedging within the organization. That is, a risk that affects one division or unit of the organization in one manner may affect another unit of the organization in a contrary manner, in essence canceling out some of the net risk.

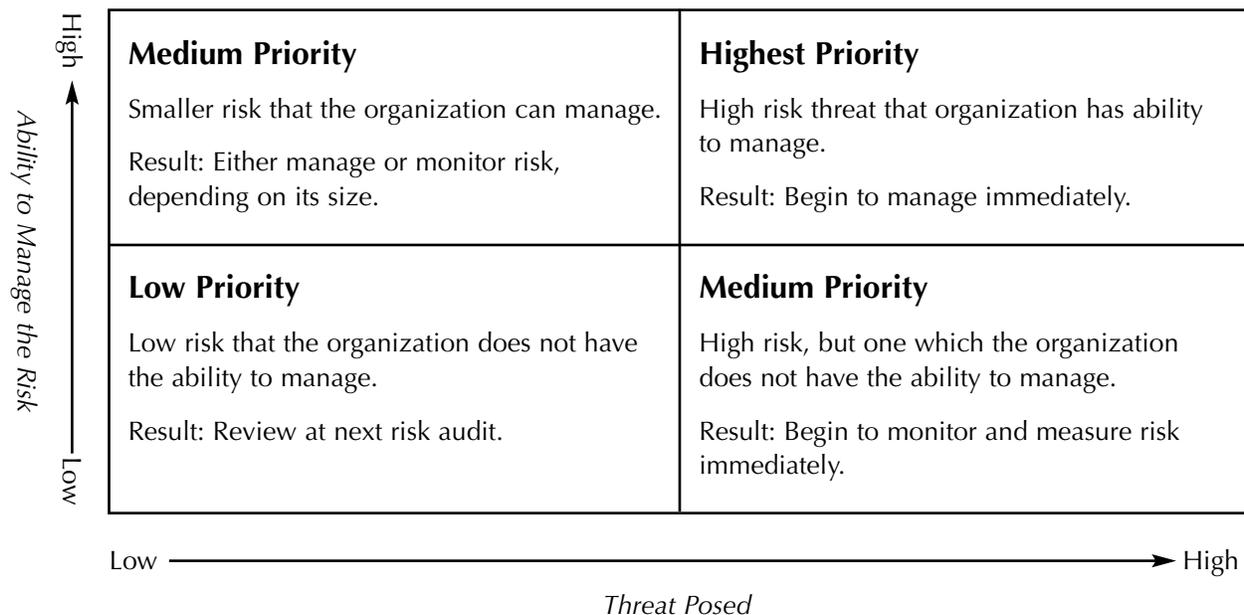
Finally, the third benefit of a risk audit is that it will allow the managers of an organization to develop a scorecard of risks, which will be useful in later prioritizing their monitoring and measurement efforts. For organizations that have not previously examined financial risk, a relatively straightforward but useful approach is to simply divide all risks using two basic criteria: whether they pose a major risk to the organization and whether the organization has the ability to affect or manage the financial risk.

This last point bears some additional discussion. A firm may not be able to manage all of the financial risks it faces. This can be for one of two reasons. The first is technological; the financial methods simply may not exist that will allow the firm to manage that particular risk. For example, until very recently firms could not, in general, hedge credit risk—i.e., the risk that borrowers, especially corporate borrowers, would not pay back their loans. This was largely due to a lack of empirical models of default. Once researchers developed these models, it became technologically feasible for a firm to manage this risk.

The second reason an organization may not be able to manage a financial risk is the lack of resources required to manage the risk. Managing certain financial risks, especially in a physically dispersed organization, can require a significant investment in computer infrastructure and support. It can also require a level of financial sophistication not readily available in all organizations.

Classifying financial risks by the threat they pose to an organization and the organization’s ability to manage those risks allows one to create a two-dimensional map of risks and appropriate responses to those risks. Figure 1 shows such a mapping. Clearly the risks with the highest priority to identify and manage would be those that fall into the upper right quadrant, i.e., those risks that pose a major threat to the organization and that it has the ability to manage. These are risks that are of high, short-term priority. For example, one of the largest financial risks facing a bank is interest-rate risk, that is, the risk that interest rates will move against the bank and reduce the value of the bank’s assets. This is also one of the most manageable risks of a bank, and hence is of extremely high priority. If an organization’s risk audit uncovered such a risk, the appropriate result would be for the organization to immediately begin active management of the risk.

Figure 1: Priority of Responses to Financial Risks Using a Two-Dimensional Map as Guide



Also of high priority, but of a longer-term nature, are those risks falling into the lower right quadrant. These are risks that do in fact pose a high risk to the organization, but which it currently does not have the capability to manage. As stated earlier, credit risk fell into this category for many years. While it was a risk the firm bore, there was little that its managers could do to manage the risk. In the short term, the only real response of the organization is to monitor the risk. The long-term goal, however, must be to develop the technology to manage the risk.

Of lower priority are those risks in the upper left quadrant. These are risks that, while somewhat less threatening, the organization already has the technical capability to manage. Continuing with the banking example, a domestic bank may enter into foreign exchange markets only rarely, and as such would have little *counterparty risk* in that market—the risk of one of their trading partners not honoring a foreign exchange contract.⁵ Yet most banks have extensive systems in place to monitor counterparty risk with their primary trading partners, and so adding their foreign exchange partners into this system would be relatively easy to do, even though the risk is relatively low. The result would normally be for the organization to begin managing or at least monitoring the risk, although they would assign a lower priority to it than to the more critical risks.

Finally, those risks that fall into the lower left quadrant would be those that, while real, would pose little overall risk to the organization and which the organization would not have the resources to manage. These would obviously be of very low priority, and would in fact probably be ignored until they were reviewed again at the next risk audit.

The final stage—and in some ways the stage that demarcates truly professional financial risk management—is to determine how the organization will internalize this process and use it on an ongoing basis. Clearly the degree of financial risk found in the initial risk audit will partially determine the degree to which this is done. Ironically this is relatively easy for organizations at the two extremes. Those with extensive financial risk, such as a bank, will recognize that managing this risk is the crux of its business, and will easily internalize

it. Those with little or no financial risk will determine that managing it is an activity to which they do not need to devote much time or effort.

A difficulty arises for those organizations with an intermediate level of financial risk. The risk is large, and could potentially affect the ability of the organization to accomplish its mission. It is easy to ignore this risk for relatively long periods of time; that is, it is easy to become complacent. The key component of the risk audit, therefore, is to put in place safeguards against this complacency. A minimal safeguard is to set a date for the next financial risk audit and to enumerate the basic steps to be taken and areas to be covered.

Tools of Financial Risk Management

The ultimate purpose of the financial risk audit is to determine the risk level of the organization and the relationship between that risk level and the ability of the organization to meet its objectives. Once management has performed this audit, it has a number of tools available to help maintain the appropriate level of financial risk. One can divide these tools into five broad categories: organizational structure, measurement techniques, reporting methods, risk limits, and derivative securities. This section discusses these tools of financial risk management.

Organizational Structure

The purpose of the financial risk management process, and the financial risk audit in particular, is to determine the risk an organization faces and the appropriate tools for managing those risks. In organizations with all but the most trivial of financial risks, it is not practical to assign responsibility to just one person or even to one group or division. Management must assign various responsibilities to different components of the organization. Although there is some variation across firms, one common approach is to define responsibilities in terms of managerial levels, beginning at the board of directors level and extending down through the “line” manager level. Most firms assign at least some responsibility to the following levels of the organization:

- Board of directors/senior management;
- External regulators;

- Risk management staff;
- Line managers; and
- Audit.

While there may be more variation in organizational structure for government agencies, there is normally at least an analog to each of these levels of responsibility. The next several sections discuss the responsibilities normally assigned to these levels and, where appropriate, the likely ways in which a government agency's organization will vary from that discussed above. Table 1 (see p. 16) provides a summary of the responsibilities for each of these levels.

Board of Directors/Senior Management Responsibilities

Any firm organized as a corporation will have a board of directors. The board is the most senior management body of the corporation and is directly elected by the shareholders of the corporation. The board normally appoints the senior managers of the firm, including the chief executive officer (CEO), the chief financial officer (CFO), and, if such a position exists in the firm, the chief risk officer (CRO). Working jointly with the board, these senior managers define the overall or strategic policies through which the firm will manage its risk.

Government departments and agencies have the equivalent level of management responsibility,

Table 1: Organizational Elements and Their Roles in Financial Risk Management

Level	Results
Board of Directors	Creates the general policy with respect to financial risk management. Responsible for setting the overall tone for the organization's risk appetite and its approach to risk management.
External Regulators	Responsible for setting standards for financial risk management across government. Verifies that board policy is prudent given the risks inherent in the agency.
Financial Risk Management Staff	Responsible for implementing board policy. Will create operational policy and procedures.
Line Managers	Responsible for complying with the organization's financial risk management policies. For organizations just implementing FRM policies, they may provide the best advice about which risks there are and the difficulties with managing them.
Audit - Internal	The internal audit unit is primarily responsible for ensuring the organization is correctly implementing the various risk management policies, and there are no systematic errors the risk management unit is committing.
Audit - External	The external audit is there to back up the internal audit unit and also to provide insights as to the best practices observed in other organizations, be they private or public sector.

although there will be some variation in its exact structure. For cabinet-level departments, the secretary and their undersecretaries usually take on the responsibilities that in the private sector are split between the board and the CEO of the firm. Some lower-level agencies, in particular those agencies that are organized as either government-owned corporations (such as the Public Broadcasting Service) or as government sponsored enterprises (such as Fannie Mae or Farmer Mac) will have boards of directors. Regardless of the organizational form, however, there will always be a senior management function with the equivalent responsibility of a corporate board within the organization.

In many ways it is not the actual policies that are the most important contribution of the board, but rather the attitude they take toward risk and the permeation of that attitude throughout the organization. Many private sector firms develop a formal risk management policy that states the type and amount of financial risk the firm is willing to bear and the steps they will put in place to ensure that

they bear only that amount. It is through this policy that the board sets the risk appetite of the organization. The policy must address two fundamental areas: It must ensure the organization's risk management policy is put in place for the proper reasons, and it must ensure the policy will allow the organization to meet its primary mission.

Clearly the proper reason for establishing a financial risk management policy is to increase the likelihood the organization will achieve its mission. For a private sector firm this means maximizing shareholder wealth, while for government the mission will vary with the agency. In either case, however, the board of directors or its agency equivalent must first fully define the mission and then carefully ensure the policy does in fact advance that cause.

The board must guard against proposals to put in place financial risk management policies benefiting constituencies other than those mandated by the mission of the organization. In the private sector

this means making certain the policy maximizes shareholder wealth and does not simply protect the interests of current management or securities salespeople. This will be an even more important issue within government, because there are so many entities with an interest in an agency's operations. It will be paramount for the board, or its equivalent, to ensure that its financial risk management policy, like any other managerial policy, has at its center the effect of increasing the likelihood of the agency meeting its primary mission.

External Regulators

While obviously not a formal part of an organization's structure, external regulators have a role much like that of the organization's most senior management in that they are there to provide significant direction and control over the organization's financial risk management policy and procedures. While the concerns of the regulator may differ from the manager, they both can greatly influence the financial risk management policy and its implementation. Consider that in the case of a commercial bank, the primary banking regulator, the Office of the Comptroller of the Currency, has the authority to review a bank's financial risk management policy and, in the event they find it inadequate, mandate its review and revision.

Federal agencies will have at least one executive branch regulator, in the form of OMB, and two legislative branch "regulators" in the form of House and Senate oversight committees. In many ways, OMB will be uniquely positioned to take the lead with respect to any financial risk management oversight. With its oversight role for the executive branch's financial management policies, OMB will have the capacity to influence the financial risk management policies of all agencies. It will have a unique ability to observe financial risk management best practices in the government and then disseminate those practices to other agencies.

There will almost always be tension between an external regulator and the management of an organization; it is simply a function of the power of the regulator. The real key for a manager is to benefit from the external regulator's experience. Especially in a field like financial risk management, where the technology is complex and rapidly evolving, the

regulator can bring insights to the organization that it might not otherwise have. To not utilize this opportunity is a mistake.

Risk Management Staff

After the senior management of the organization sets major policy directions, the risk management staff implements that policy. Normally the board will delegate to the risk management staff the responsibility for developing and implementing the organization's operational policies. From a practical perspective, this means senior risk management staff members will have tremendous day-to-day influence over the financial risk management of the organization. Also, since FRM tends to be very quantitative in nature, the staff members will frequently have a higher level of technical knowledge than will members of the board. As a result, many boards rely heavily on the advice and opinions of the senior financial risk management staff when setting strategic policy. In many organizations, this gives the senior financial risk management staff tremendous influence over both strategic and operational policy.

The degree of that influence, and the controls the board will put in place over it, are of paramount importance. The actual level of risk in the organization will partially determine the level of influence, but so will the organization's risk appetite and its desire to make financial risk management an integral part of the organization. There are two fundamental questions the board must answer when developing the risk management staff function:

1. How much autonomy will the financial risk management staff have?
2. How much authority does the financial risk management staff have to compel the "line" units to comply with both the board's policies and the financial risk management staff's policies?

Autonomy

In the private sector, the degree of financial risk management autonomy frequently is inversely related to the importance of the FRM function. That is, the more financial risk there is in the firm, and the more the FRM function is able to influence that risk, the less true autonomy the FRM staff has. They

will have more oversight simply because the consequences of any errors that they might make are more severe. In banks, for example, where the degree of financial risk is high, and where the FRM group—frequently referred to as an Asset-Liability Management (ALM) staff—normally has significant authority, their autonomy is usually rather limited. The ALM staff normally reports on at least a monthly basis to a subgroup of the board, known as the Asset-Liability Committee (ALCO), that has direct responsibility for financial risk management oversight. Their purpose is to ensure that the ALM group is properly carrying out its functions. In fact, the FRM policy of most banks states that the ALM group must get explicit approval from the ALCO before taking a number of actions including:

- Instituting any new operation policies;
- Using new risk management techniques;
- Changing any reporting methods or calculations; and
- Instituting trades with instruments not previously approved by ALCO.

The FRM policy must give the financial risk managers flexibility while maintaining reasonable oversight. Again, in a bank it is common for the board to set two aggregate interest-rate exposure limits. The first, called a reporting limit, is a level the ALM group has the authority to exceed, but it must report immediately to ALCO if the limit is exceeded. The second, the policy limit, is the level the ALM group cannot exceed without either ALCO or board approval. The idea of the reporting limit is that once the limit is reached, the board, through ALCO, will increase its oversight of and effectively reduce the autonomy of the ALM group.

A bank is, of course, a rather special case in the sense that it embodies much financial risk, more so than many government agencies. Government agencies will still have to wrestle with the degree of autonomy to grant to the financial risk management staff, and how to determine the conditions under which to trigger enhanced oversight of that function. While the exact conditions will vary depending upon the nature of the particular agency, clearly the board, or its equivalent, must set the limits based on the degree to which financial risk can affect the

ability of the agency to meet its mission. Ideally the board would be able to do this in a probabilistic sense—that is, enhanced oversight would begin when the probability of financial risk impeding the meeting of the agency's mission reached a predetermined level, be it 5 percent, 50 percent, or some other level the board chooses. It may not always be possible to explicitly calculate such probabilities—the board may have to use more subjective measures—but the idea is the same: The board must weigh the increased costs of oversight against the potential for harm.

Authority

The degree of authority the board grants the financial risk management staff can vary greatly. At one end of the spectrum, the FRM staff simply measures and reports the level of financial risks in the line units, but does not have the authority to take any action to manage that risk. At the other end, the FRM staff not only monitors the financial risk in the line units, but also can adjust the financial risk in one of two ways, either by compelling a line unit to alter its own risk profile through its normal activities, or by taking some action on its own, such as entering into a derivatives transaction, that will adjust the overall risk position of the organization.

The level of authority granted to the FRM staff will vary across government agencies, just as it varies across private sector firms. The key components to consider when setting this authority level are:

- The nature and degree of the financial risk in the organization, and the degree to which a centralized financial risk management function could alter the organization's risk profile;
- The degree to which the bearing of that risk is endemic to achieving the organization's mission; and
- The degree to which the financial risk management function could interfere with the ability of the line managers to perform their functions.

The first point is clearly the most important. If the nature of the financial risk the agency bears is such that there is little that can be done to alter it, then there is little reason to grant the financial risk

management function any authority over line managers. There may still be great benefit and use to collecting and reporting the risk, and this would undoubtedly be the best use of the FRM staff. On the other hand, if the financial risk the agency bears is of a nature that the agency can alter it, then it begins to make more sense to grant greater authority to the FRM staff. At that point the other two considerations become relevant.

Most economic activity, be it in the private sector or in government, necessitates the bearing of risk. One of the real challenges for financial risk managers is to determine the trade-off between the risk that is endemic to the agency's mission and the risk that they can eliminate without interfering in the achievement of that mission. The greater this second level of risk, the more it makes sense to grant the financial risk management staff greater authority.

This is of course closely related to the third consideration, which is the degree to which a financial risk management function could or, perhaps more appropriately, would interfere with the ability of line managers to perform their functions. The purpose of the financial risk management function is to increase the overall efficiency of the organization; it is not to put in place control merely for the sake of control. The greater the likelihood of the FRM function interfering with the line managers' ability to accomplish their goals, the more it makes sense to restrict the financial risk management staff's authority.

Line Managers

The line managers and their units, be they business unit directors in the private sector or program managers in the government sector, are directly responsible for the success that the organization has in accomplishing its mission. As a result, they will normally not have financial risk management as one of their top priorities, yet it is ultimately their attitudes that determine how well the organization internalizes its FRM policies.

The key is for the board to develop policies and for the financial risk management staff to develop procedures that accomplish the financial risk management goals of the organization while minimizing the impact on the line managers' ability to perform

their functions. For the line managers, the key is to recognize that these policies and procedures can, under the right circumstances, reduce the cost of financial risk they bear, thus freeing resources for use in their primary function. It is vitally important for the line manager that the board and FRM staffs include the line manager in the planning and implementation of these policies and procedures.

There are several reasons for this. One is that most line managers will already have some form of informal financial risk management function. This informal function has passed a sort of Darwinian test—it has survived because it works. This is a great source of information for the nascent financial risk management group. A second reason stems from the fact the line manager will be in the best position during the planning stages to determine exactly the impact of the proposed policies and procedures on their unit. Incorporating that information into the planning process will vastly improve the probability of its ultimate success. Finally, including line managers in this early planning and discussion will give them an opportunity to discuss any serious objections and to propose alternatives. This will increase the probability that they will ultimately “buy into” the policies and procedures and not resist them.

Audit

The goal of the audit function is to insure that the organization is in fact in compliance with its own policies and procedures, as well as in compliance with appropriate generally accepted accounting and operational procedures. It is probably best to distinguish between the roles of the internal and external audit functions.

The primary function of the internal audit function, at least as it relates to financial risk management, is more operational. That is, it seeks to verify that the financial risk management staff's operational policies do in fact implement the policies of the board. It also seeks to ensure the procedures put in place to ensure compliance are sufficient, and it looks for flaws in the procedures that could allow risk to go undetected either through accident or through intent.

The role of external auditors in financial risk management is quite different from either the traditional

Applicability of FRM Tools at Federal Credit Agencies

By Doug Criscitello

With nearly \$1.3 trillion in direct loans and loan guarantees outstanding, the need to apply sound financial risk management practices at federal credit agencies is clear. Deterioration in the health of the government's current portfolio or an inadvertent relaxation of standards used to screen borrowers or participating private lenders could result in huge additional costs to U.S. taxpayers. Given the enormity of the government's liability (both real and contingent), the legislative and executive branches have worked together over the past decade to ensure appropriate financial risk management tools are used across the federal agencies responsible for making or guaranteeing loans. Enactment of laws such as the Federal Credit Reform Act of 1990 and the Debt Collection Improvement Act of 1996 have mandated the use of FRM tools in credit program planning, budgeting, and loan servicing.

Four of the five broad categories of tools discussed in this section already have been applied to some extent at federal credit agencies. Application of the fifth tool, derivative securities, appears unlikely because the federal government does not actively seek to hedge its financial risks.

1. Organizational Structure

Financial risk management responsibilities are assigned to different components of federal credit agencies.

- **Board of directors/senior management.** Although top management at credit agencies—typically political appointees—are required to administer their programs consistent with laws enacted by Congress, a great deal of latitude exists for these officials to set policy priorities potentially having a profound impact on agency financial risk management activities. For instance, an agency head could adopt policies designed to loosen credit availability for the most needy, yet least creditworthy, borrowers eligible for assistance. Such an action

would likely expose the agency to additional credit risk.

- **External regulators.** Both the executive and legislative branches play important roles in the regulation of credit programs and agencies.

In the executive branch, the Office of Management and Budget (OMB) exerts significant direction and control over credit agencies' FRM policies and procedures. OMB's role as a formidable regulator of credit agencies stems from powers granted to that agency through both statute and regulation. Under the Credit Reform Act, for instance, OMB is granted the power to establish subsidy rates—which dictate the share of loans that must be funded upfront and therefore of enormous concern to congressional appropriators—for each federal credit program. Although that power has been delegated to the agencies, OMB continues to exercise its discretion in setting credit subsidy rates as part of the annual budget process. Moreover, OMB exercises substantial regulatory power over credit agencies, as evidenced by the existence of OMB Circular A-129, which prescribes policies and procedures for justifying, designing, and managing federal credit programs.

In the legislative branch, regulation over credit agencies is provided not only by authorizing committees with jurisdiction over specific agencies, but also by appropriation subcommittees responsible for funding the loan programs. Moreover, both the General Accounting Office and the Congressional Budget Office play significant roles in the review of federal credit programs.

- **Risk management staff.** Senior staff from loan program offices, often in consultation with the Office of the Chief Financial Officer and other internal offices with strong analytical abilities, typically play the lead role in developing and implementing an agency's credit policies.

Consequently, these staffers exert the greatest day-to-day control and influence over an agency's management of financial risk. The level of autonomy and authority provided to the risk management staff likely varies substantially across agencies due to differing statutory, regulatory, and organizational structures influencing the delivery of individual credit programs.

- **Line managers.** In the world of federal credit, the line managers—typically program office staffers—are responsible for approving loan applications or monitoring participating lenders for compliance with applicable risk management standards. These staff are generally not responsible for shaping risk management strategies, but they play a vital role in ensuring agency credit policies are implemented consistent with the objectives established by the three groups discussed above.
- **Internal audit.** Each federal credit agency has an inspector general responsible for audit and oversight of credit management policies, accounting, and organizational procedures. The level of inspector general involvement in financial risk management varies by agency, but Office of Inspector General staffers at a number of credit agencies have become increasingly involved in recent years through their review of agency audited financial statements.

2. Measurement Techniques

Two laws enacted in the 1990s have helped to reconcile a fundamental tension between businesslike financial management of credit agencies and their statutory missions to assist borrowers unable to obtain credit in the private marketplace. The Government Performance and Results Act of 1993 (GPRA) requires agencies to measure their performance, identify rationale for government involvement, and report on program impacts and outcomes. Coupled with the Federal Credit Reform Act of 1990—aimed at measuring the costs of credit programs—agencies now have two powerful risk management tools to allow them to determine whether their agency is meeting its mission at the given level of expense.

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3. Reports

Credit agencies prepare a number of annual reports designed to provide information on financial risks facing the government. Examples of these reports include:

- **Accountability report.** Describes agency program and financial accomplishments, and strategic plan goals and results.
- **Audited financial statements.** Provide detailed financial information aimed at evaluating the financial condition of credit agencies and the sufficiency of future budgetary resources to sustain program services and meet program obligations as they come due.
- **Budget submissions to OMB and Congress.** Include information on recent agency accomplishments and contain detailed requests for budgetary resources needed in the upcoming year.
- **Annual Performance Report.** Provides information on an agency's ability to meet objectives in a manner consistent with its strategic plan.

4. Limits

Both limits and operational procedures are in place at federal credit agencies to ensure maximum authorized risk levels are not exceeded. At the managerial level, well-defined policies exist pertaining to the risks that can be taken by line managers. For instance, loan applications in excess of certain thresholds require additional review and consideration. At the board level, limits are typically not as well defined and are set implicitly through broad policy objectives. Senior management may seek to expand lending in a particular underserved sector of the economy, but that goal must be tempered by budgetary constraints. OMB, the Treasury Department, and Congress impose regulatory limits on credit agencies. While agencies exercise considerable discretion in administering federal credit programs, they cannot exceed budgetary limits (either subsidy costs or loan limits) and must implement the programs consistent with the statutory intent of the programs as enacted by Congress.

view of an external auditor or of the internal auditor. Clearly their first objective is to verify that the internal auditors' process does in fact cover the areas of concern and that their policies and procedures are in keeping with the appropriate accounting standards. A second benefit they provide, however, is a broad perspective. Since the nature of their business is such that they see a variety of organizations' financial risk management processes, they are in a unique position to compare a specific organization's process to the best practices in industry or government. This best practices comparison can be done at different levels, literally from examining board-level policies down to operational implementations. The important point to consider about the audit function, be it internal or external, is that it provides an independent review that is systematic and scheduled.

The organizational structure of the financial risk management function can be as important as it is far-reaching. If the financial risk in the organization is large, its effect on the organizational structure will also be large; if the risk is small, the effect on the organizational structure will be correspondingly small. Regardless of the exact organizational responsibility that the organization chooses to implement, what is most important is that the organization put in place clear lines of responsibility and authority, and a systematic process for reviewing and analyzing the effectiveness of the financial risk management process. Of course the organizational form is just one of the tools the organization can use. Of nearly equal importance is the selection of the measurement technique that the organization implements. The next section examines measurement techniques and methods and discusses how a government agency could potentially alter them to measure the specific risks it faces.

Measurement Techniques

One of the first tasks for any financial risk manager is to determine the best way to measure financial risk for that particular entity. Devising accurate risk measures can be a very complex question even for private sector firms with missions that are easily defined in financial terms. These problems are just exacerbated for government users.

Even though the theoretical measure of financial risk is clear—the standard deviation of returns—

determining how to aggregate and present firmwide data so that management can quickly incorporate it into their view of the firm's risk level is not easy. Even in banking, where there is near uniformity of agreement that interest-rate risk is paramount, there is a surprising amount of variation in the number of methods available for presenting this information. For the majority of government agencies, this will be an even more daunting challenge because their fundamental missions are not financial in nature. The risk manager will have to first define financial risk in terms of its effect on the mission of the agency. Only after doing this will it be possible to modify the more traditional financial risk measures for use with the specific agency.

One challenge for any government agency will be to avoid taking the easy route and defining financial risk solely in terms of the agency's budget. What matters is how financial risk affects the ability of the agency to complete its mission. To some degree the budget may be a proxy for the agency's ability to complete its mission, but it is not an exact substitute. In fact, measuring financial risk in purely budgetary terms may actually understate the true effect of financial risk on the agency's mission. The proper unit for measuring financial risk in a government organization is the same unit in which it measures its own success. For the Justice Department this may be a measure of the crime rate, for the State Department it may be a measure of the number of visas processed, while for the Education Department it may be a measure of the improvement in national education achievement. The measure used will vary with the mission of the agency. What will not vary is the notion that fluctuations in the fulfillment of that mission caused by fluctuations in the finances of the agency are its financial risk.

Most agencies will find that they have exposure to several sources of risk. The risks will also frequently interact with each other, either partially canceling each other out or augmenting each other. It is the job of the financial risk management staff to be aware of these risks and to understand their full implications. The problem facing the financial risk management staff is that they will have to present this data quickly and concisely to a less technically oriented audience. They will need a method that accurately conveys the effects of these risks, but

that does not require the audience to be highly trained in the field of financial risk management.

This is, of course, a problem that is not limited to government. Private sector financial risk managers frequently struggle with this same issue. One approach to dealing with it that has become very common is a measure known as “Value at Risk” (VaR). The basic idea behind VaR is to form a composite “risk” from all of the individual risks a firm faces. The financial risk manager then uses this composite distribution to project forward the distribution of potential gains or losses attributable to those risks, and then estimate the maximum potential loss of value—the value “at risk”—for a given confidence level, with common levels being 95 percent, 99 percent, and 99.95 percent.

Government agencies could perform a similar analysis, but instead of using value as their metric, they could use their ability to perform their mission. To calculate the “Mission at Risk,” financial risk managers would first determine the distributions and effects of the individual risks the agency faces. They would then use these individual distributions to create a composite distribution from which they would estimate the maximal expected loss in the agency’s ability to meet its mission for a given confidence level. That is, compared to the agency’s effectiveness, if all of its sources of risk stayed constant at their average value, the Mission at Risk number would tell the agency how much effectiveness it would lose if the outcomes from its risk sources are at the extreme adverse tail of their respective distributions.

A multitude of authors have published methods for calculating Value at Risk in the private sector, and a full description of the various techniques is beyond the scope of this report.⁶ In general, however, there are two basic methods. In the first method the analyst estimates the composite function directly from historical data and then directly estimates the potential loss from that composite distribution. In second method, the analyst estimates the distribution of the individual risks and then uses *Monte Carlo* simulation to determine the composite distribution. *Monte Carlo* analysis is a technique that uses a computer to simulate the random nature of a particular risk, and then measures the effectiveness of a risk management strategy given the risk.

Although both methods do require significant historical data, the second method, with its forward-looking simulation, does appear to lend itself more readily to governmental use.

Even in the private sector, Value at Risk is a relatively new concept. There are other financial risk measures available, some of which government agencies, primarily financially oriented agencies, already use. Table 2 (see pages 24-25) lists several of these and briefly discusses their purpose and uses. Note that unlike a Mission at Risk metric, each of the measures discussed in Table 2 tends to be very specific in the risk measured. Unless the agency had a very narrowly defined mission, it is unlikely any one of these measures would fully describe the financial risk embedded in one agency.

Reports

Perhaps the most pervasive private sector tool of financial risk management is the report. While other tools, such as derivatives, may be more glamorous and garner more attention, reporting is really the backbone of the FRM function. The reason is straightforward—even those risks firms cannot directly alter they can at least monitor through a reporting structure. The reporting function is usually an integral responsibility of the financial risk management staff—in fact, it is frequently the case that what becomes a full-blown financial risk management function begins with a small reporting function.

In all but organizations with the smallest financial risk, report generation is a complex, multi-layered activity, and one that frequently is the most demanding in terms of time and resources. A firm or agency must carefully plan and analyze its reporting function to ensure it delivers meaningful, timely reports to the appropriate level of the organization. This planning must consider the differences in report content for different layers of the organization as well as the conditions under which the risk management staff will generate different sets of reports. In short, the reporting framework must consider both the content and timing of the various reports the organization uses.

As shown in a previous section, there are usually at least five different entities with some interest—and responsibility—in the financial risk management

Table 2: Common Private Sector Financial Risk Measurement Metrics

Method	What Is Measured	Methodology	Primary User(s)	Suitability for Further Adoption within Government
Beta	The sensitivity of a stock's price to changes in the market index.	The analyst regresses returns to the stock against the returns to the market index. The resulting coefficient is called Beta.	Investors and portfolio managers.	Low—Government project will tend to be uncorrelated with a market index, making this a less useful method.
Basis Risk	The likelihood of a hedge instrument not fully covering a loss in the underlying asset.	The analyst calculates the likely change in the value of the hedge instrument given a change in the underlying asset.	Any hedger.	High—Could easily be used for fuel price hedging and other commodity hedges within government.
Counterparty Exposure	The loss that an entity would incur if one of its trading partners defaulted on a trade.	This is the institutional equivalent of consumer credit scoring. An analyst normally calculates the potential net loss from a trading partner defaulting, usually under the assumption that if a partner defaults on one trade, the partner will default on all trades. Because institutional default is very rare, there is little the analyst can do in terms of statistical analysis. The analyst must, therefore, subjectively estimate the probability of the counterparty defaulting.	Financial institutions, international corporations, and FHA in its multifamily insurance programs.	High—This could easily be applied to any type of government contract—not just financial contracts. For example, an analyst could use it to evaluate the likelihood of subcontractors fulfilling their commitments.
Credit Scoring	The likelihood that an individual will not repay a debt or other obligation.	The analyst regresses borrower payment patterns against borrower financial characteristics and economic variables. This estimates a general equation for predicting borrower non-performance. When a new borrower applies for a loan, a potential lender enters his or her characteristics into the estimated equation, and it generates a "score" or measure of the probability of the borrower defaulting in a given period of time.	Banks, insurance companies, landlords, and other financial institutions. Already heavily used by GSE's and by FHA.	Moderate—Only suitable where consumers can default on obligations to the government or government-backed entities.

Table 2: Common Private Sector Financial Risk Measurement Metrics

Method	What Is Measured	Methodology	Primary User(s)	Suitability for Further Adoption within Government
Duration	The rate at which a financial asset changes when the underlying discount rate changes.	The analyst calculates the first derivative of the price function of the fixed-income asset with respect to its yield. In some cases, the analyst also calculates the second derivative as well. For options and some other derivative contracts, this same idea is captured by a variable referred to as "rho."	Banks, investors, and other entities that have large fixed-income exposure.	Moderate—Although the classic case for using this is with bonds, an analyst can apply a form of this measure to any interest-rate sensitive analysis. This could potentially be used across many agencies.
Sharpe Ratio	The risk-adjusted return of the asset.	This ratio measures the excess return of an asset over the risk-free rate per unit of risk. A higher Sharpe ratio indicates a greater risk-adjusted return for a given project.	Portfolio managers, general businesses.	Moderate—Since the purpose of government is not normally to maximize the risk-adjusted return but some other social return.
Vega	The exposure of a financial contract—usually an option—to changes in the volatility of the underlying instrument.	This is normally either calculated directly from a known pricing algorithm or through a Monte Carlo simulation.	Options investors.	Moderate—Government normally does not take direct option positions, but it frequently has some indirect exposure to changes in volatility. It is important to realize, however, that this is not additive across different sources of risk.

function. These are the board, the external regulator, the FRM staff, the line manager, and the auditor. These different entities each have need for different information in financial risk management reports. While there should certainly be uniformity in terms of reporting metrics, there will be wide variation in the level of detail in the reports. There will also be considerable differences in the timeliness and timing of report generation for the various levels, where timeliness refers to the recentness of data the FRM staff uses in preparing a report, and timing refers to the frequency with which they generate the report.

The content and timing of the report or reports the FRM staff generates for a given level of the organization is directly related to the responsibilities of that level of the organization. For example, the board (or its agency equivalent) is responsible for setting in place the broad financial risk management policies and then monitoring compliance with those policies. As a result, reports to the board will tend to focus on the overall level of financial risk management and will not contain large amounts of detail. The board will demand its reports be timely, in the sense they will want the FRM staff to use the most up-to-date data possible to create the report, but the timing burden will be relatively low in that normally the board will want reports to coincide with its meetings. As a result, the collection of data and dissemination of the report will occur on a very predictable schedule, normally on a monthly or quarterly basis.

In contrast, the FRM staff will normally need much more detailed reports more frequently. Since they are responsible for the routine monitoring and management of financial risk, they will want to be aware of all developments across the organization and will have to continuously monitor for unexpected or inappropriate changes in the organization's risk profile. Normally they will need to have detail down to the transaction level for any aspect of the organization, and they will need to be able to create these reports "on demand."

It has been the reporting function in general, and the "on demand" aspects of reporting in particular, that have been the primary beneficiaries of the development of enterprise-wide financial risk management systems. These packages are sophis-

ticated distributed computing systems that constantly collect information on the organization's financial risk. They are then able to generate virtually any report on demand, regardless of the detail level the user requests, using the most current and up-to-date data.

In many ways the report requirements of the board and the FRM staff are the opposite ends of a spectrum of reporting requirements. At one end is the board with its demand for regular, summary information; while at the other is the FRM staff with its demand for highly detailed, organization-wide, "on demand" reports. All other reporting needs tend to fall between these two extremes. The line managers will also need "on demand" reports, but normally only for their particular operational unit, and possibly for other units that directly affect their operations. The auditor will normally want detailed, organization-wide information, but at very regular and infrequent intervals. The external regulator, much like the board, typically will need organization-wide information, but at a summary level and at regular, predictable intervals. Table 3 summarizes the reporting needs for each level of the organization.

Report Types

In addition to different levels of detail and frequency, a financial risk management system will normally include different types of reports. One can generally classify them as exposure reports and scenario reports. An exposure report simply reports the potential exposure to a particular type of risk. A good example of this is a counterparty exposure report. In this type of report an organization simply adds together the value of all of the transactions it has entered into with a particular counterparty. Its purpose is to demonstrate the effect that a default by the counterparty would have on the entity, not the probability of such an event occurring. It is also not unusual for an entity to create an exposure report based on a class of risk as opposed to basing it on the source of the exposure. For example, an insurance company might choose to create an aggregate exposure report that would show its maximum liability based on different policy types. Such a report would aggregate the potential exposure based on policy type—that is, from life insurance, car insurance, homeowner's insurance, etc.

Table 3: Hierarchy of Reports and Their Usage

Entity	Purpose of Reports	Level of Detail	Frequency
Board or Its Agency Equivalent	To insure compliance with overall financial risk management policy.	Typically presented with aggregate information only, but for all units within the organization.	Normally reports are generated when the board meets. If financial risk is significant, the board may also elect to set limits that will trigger a special report when they are violated.
External Regulators	To insure compliance with both internal FRM policy and with regulatory requirements.	Usually at the aggregate level, although for certain extreme risks they may require more detailed reports.	Typically on a very predictable basis.
Financial Risk Management Staff	To monitor and manage the daily financial risk of the organization.	Requires highly detailed information from all units of the organization.	Continuous. In the private sector this has been the primary motivation for the creation of systems that provide “on demand” reporting.
Line Managers	To manage the financial risk of their particular units.	Requires highly detailed information, but only for their particular unit.	Continuous. They will also use “on demand” reporting functions.
Audit	To ensure that reports provide an accurate picture of the financial risk position of the organization.	For routine purposes the level of detail is not normally high, but when auditing the reporting function itself, the level of detail will be very high.	Infrequent and predictable.

An exposure report, however, tells only part of the story. It tells the potential exposure, but not the *likely* consequences; that is, normally an exposure report does not consider the probability of the various outcomes occurring.⁷ Scenario analysis addresses this issue. In such a report, the report creator defines several economic scenarios that she wishes to examine and then simulates the effect of the financial risk on the organization under those scenarios. Frequently the analyst will assign probabilities of occurrence to each of the scenarios in the analysis. The point of such scenario analysis is to demonstrate not only the effect of the risk *per se*, but also the compounding effect of the economic environment that is specific to that scenario.

Taken one step further than the scenario analysis is Monte Carlo analysis. With this analysis method, analysts use a computer to simulate the randomness inherent in the system they wish to model. For example, if one were dealing with bond prices, the random nature of interest rates would be the focus of the Monte Carlo analysis. The idea is that by simulating the random process, one analyzes not just some arbitrarily chosen scenarios, but those that are most likely to occur, given the distribution of the random event. In this sense it is a kind of “super” scenario analysis. Done correctly, Monte Carlo analysis provides a very complete picture of risk. It presents information on both the scale and scope of the risk.

Limits

Reports are a major component of any financial risk management system, but in and of themselves they do not control risk. That is done by the risk control practices and policies of the entity. Normally, the bedrock of such practices and policies are position limits and the operational procedures put in place to ensure the entity maintains compliance with them. One can classify these limits as being managerial limits, board limits, or regulatory limits. The idea behind each of these limits is that they establish maximum risk levels that a given unit or manager can authorize. Violating that limit requires the approval of a higher level of authority.

The next sections discuss the role and use of these various limits. It is important to realize, however, that any financial risk management system must enforce these limits, either on an *ex-ante* or *ex-post* basis. One of the great benefits of software-based FRM systems is that they can monitor the various limits in real time and physically prevent many events from occurring that would violate the limits. For organizations without such software systems, the enforcement must be *ex-post*, which can become very difficult to do if it turns out the violation does not lead to a bad outcome itself.

As an example, consider if the board of directors for an insurance company set a limit on the amount of property insurance it was willing to write in hurricane-prone areas, but that the line managers of the company wrote more business than the policy allowed. If the company did not have in place a software system that monitored the aggregate business written in such areas, and that could thus prevent violations on an *ex-ante* basis, it would have to rely upon *ex-post* analysis to determine if violations occurred. This most likely would be done as part of the normal internal auditing of the company. If there were not a hurricane, so that the final outcome was not bad for the company, it would be tempting to simply ignore the violation. In practice, of course, ignoring such a violation would have the effect of undermining the limits, rendering them useless from a risk management perspective.

Managerial Limits

The managerial limits are the maximum risk levels that the board or its equivalent will allow the orga-

nization to shoulder during the course of its normal operations. For example, the board of directors of a bank may grant its managers the authority to issue loans of no more than \$1 million to any individual without explicit board approval. Further it may state that the aggregate amount of individual loans in excess of \$500,000 cannot exceed \$100 million at any point in time without explicit authorization from the board. The point of such policies is to ensure that the risk within the organization does not exceed that which the most senior managers of the bank deem to be appropriate.

If the risks within an organization are of a nature that they can rapidly grow, it is not uncommon to have two sets of managerial limits: a “reporting” limit and a “hard” limit. The reporting limit is simply a level of risk managers have the authority to violate if they notify their superiors. The reason for the reporting is not punitive—that is, the policy recognizes that in the normal course of operations managers will violate the limit—but rather, it is informative. Its purpose is to ensure the next level of authority is aware that risk has reached a certain level, so that they are not caught unaware should the risk continue to increase. In contrast, the hard limit is a level of risk the line manager does not have the authority to exceed. Upon reaching this limit managers must get explicit approval from a designated higher level of authority before they can continue to increase the risk level.

Setting the reporting limit relative to the hard limit can be very difficult, especially if the inherent risk can change rapidly. The reporting limit needs to be set low enough that it can provide adequate warning to more senior management that risks are increasing and could approach the hard-limit level, but it needs to be high enough that it is not triggered so frequently that it loses its effectiveness. If during the normal course of operations the line manager crosses the reporting limit on a daily or even weekly basis, then the next level of authority will most likely become accustomed to these reports and grant them little attention, thus negating any benefit to be had from notifying the next level of authority. In contrast, if the limit is set too high, then there may not be enough time after reaching the reporting limit to take action to avoid hitting the hard limit.

There are two keys to striking a reasonable balance. The first is to incorporate the line managers into the process of setting the various limits. They should have a unique insight into the levels of risk that they can and should take on a daily basis. The second key is to review the limits on a routine basis and to make certain the limits are meaningful. That is, make certain they are not exceeded so routinely to lose their meaning, but also they are not so infrequently exceeded to provide no insight to senior management. A lack of reporting-limit exceptions may indicate to senior management the line manager is not taking *enough* risk—i.e., the line manager's risk appetite is not consistent with that of the senior management—and may indicate the need for some incentive realignment.

Board Limits

Board limits are managerial limits writ large. These are the limits, set out in the board's financial risk management policy, that the organization will not violate. The board may, under certain circumstances, choose to change or alter the limits, but it cannot allow violations of those limits. These limits are normally put in place through policies voted on either by the Board, or, in some cases, recommended by the board and voted on by the shareholders.

Board limits, like the limits put in place for more senior levels of management, will span both individual and aggregate risks. If an organization has individual risks that could endanger its continued viability, the board, or its equivalent, may set organization-wide limits on those risks. The board of an insurance company, for example, may elect to set limits for specific risks such as earthquakes or fire. The board must also concern itself with the aggregate risks within the organization and the interaction between various risks. As such, it will frequently set limits that are aggregate limits. The point of such limits is to reduce the risk in one part of the organization to offset additional risk taken in another part of the organization.

Regulatory Limits

If an organization falls under outside regulatory supervision, it is not uncommon for the regulator to set its own risk limits on the organization. The purpose of these limits is normally not to protect the organization *per se*, but rather to insure the

regulator or its superior. For example, the Office of the Comptroller of the Currency, the primary federal banking regulator, requires banks with a federal charter to maintain certain capital standards. The reason for this is not because these capital standards maximize the bank's profits, but rather because they minimize the probability of a bank failure, which minimizes the probability of the federal government having to "bail out" the bank or its depositors. Similarly, Government Sponsored Enterprises, such as Fannie Mae or Freddie Mac, must also maintain minimum capital standards. Once again, this is not to maximize profits to shareholders, but to minimize the probability of the government having to make good on its implicit guarantee of the GSE's debts.

Perhaps the biggest difficulty with regulatory limits is that they tend to be rather generic. This is understandable given the problem facing the regulator: It has to devise a risk measurement standard that can be applied to any entity it regulates, regardless of how that entity conducts its own business. The net result is that frequently the regulator will develop a risk measurement technique inconsistent with the method the regulated entity uses. Since regulatory reporting is normally done through the regulated entity's own systems, this means the organization must maintain two reporting methods—its own internal method and the regulator's method.

This will be a continual problem for government financial risk management reporting. The primary government oversight body, OMB, will undoubtedly come under pressure to develop a uniform method for measuring financial risk across the government. This uniform method is unlikely to fit perfectly with the internal methods used by government agencies. They agency's management will, therefore, be required to meet two different risk limits—its own internal limits and the "external" regulatory limits.

Derivative Securities

Within the private sector, reporting methods and risk limits frequently comprise two of the three prongs of a financial risk management triad. The third prong is the "active" management of the risk through derivative instruments. Consider that risk

limits are a rather broad, and imprecise, management tool. By themselves they really offer managers only one option: If risk levels get too high, they can stop or reduce the activity that generates the risk—for example, an insurance company might stop writing new insurance policies—which will stop the risk from increasing, but they do not provide a means to actively reduce risk.

Derivative instruments, such as options, futures, and swaps, do provide private sector risk managers with a very precise method for controlling some of these risks. In fact, the reason for the explosive growth in the use of derivative securities in the past two decades has largely come from the desire of companies to actively adjust the level of financial risk that they bear. Fortunately for private sector firms, the risks that they do not wish to bear are such that other entities, primarily speculators, are willing to bear. In essence, the company that wishes to hedge, or remove, its risk is willing to pay the speculator to bear that risk for it. The system works provided that the speculator demands less to bear this risk than the costs to the firm of maintaining the risk in-house.

For such a system to work there has to be enough speculators in the market that their competition keeps the cost of the derivatives in line. There must also be enough hedgers in the market to provide liquidity and to prevent speculators from “ganging up” on a given hedger.⁸ Except in some relatively rare cases, this is likely to be a problem for government risk managers. The financial risks that government bears tend to be unique, and as such, derivatives set up to hedge those risks would tend to have low liquidity, meaning that the prices of such instruments would tend to be rather high.

There have been some cases where government has used derivative instruments to hedge risk. As previously mentioned, Texas has used put options on oil futures contracts to hedge oil extraction tax revenues for several years, and Alaska has also implemented similar programs. These are, however, rather unique cases where a state government had a risk that was similar to that faced by many private sector entities, and which was not too large in the sense that the state’s hedging activities were not

larger than those of other participants in the market. It appears unlikely that this would be the norm for government. As a result, it would appear most unlikely that active management of risk through derivative instruments will, for the foreseeable future, become the primary risk management tool that it has become in the private sector. It appears that the primary financial risk management tool for government will be the measurement, reporting, and limiting of that risk.

Conclusion: Toward a Financial Risk Management Policy

Financial risk management is a tool that has been and will continue to be very important to the private sector. There is also an increasing sense among voters and policy makers that government should, where practical, adopt successful business practices. This seems to be a trend that is not limited to political party or ideology. Indeed, each political party has passed significant legislation to this effect during its time in office. The Chief Financial Officers Act of 1990 was passed during the George H. W. Bush administration, while the Clinton administration championed its own “re-inventing government,” including the passage of the Government Performance and Results Act of 1993.

The net effect is that government will likely come under increasing pressure to adopt, at least in part, private sector financial risk management tools. This will create both opportunities and problems. The opportunity is that, properly used, such tools may well allow for more efficient use of scarce government resources. The risk is that a poorly implemented system could divert those scarce resources to less productive uses. Further, given the wide disparity in the missions and risks that various government agencies have, there is a real risk that different agencies could each develop FRM practices and cultures independent of each other, and there could

be real differences in the quality of practices. This might easily lead to non-uniform standards, as well as measures that, while outwardly appearing similar, would have drastically different meanings and implications.

Almost certainly, the Office of Management and Budget (OMB) will be the entity selected by Congress and the executive branch to oversee any major effort to implement financial risk management practices across the government. There are a couple of reasons OMB is the obvious choice. First, OMB already has the responsibility for ensuring agencies follow the financial management practices of the administration. This means OMB is already familiar with the financial practices of the various agencies and has the background to understand the risks inherent in them. OMB is also the oversight organization most likely to have staff with the appropriate financial and technical backgrounds to help develop such a system.

The purpose of this section, therefore, is to recommend some issues OMB should consider and steps it could take to help ensure the smooth implementation of financial risk management programs across the government.

- **Begin a dialogue across government agencies to determine the degree to which financial risk poses a threat to mission accomplishment, especially to nonfinancial agencies.** This could begin with something as simple as a survey among agency CFOs. The idea is to quantify, as much as possible, the degree to which agencies face financial risk and the degree to which their ability to meet their missions is sensitive to this risk. If the survey does uncover significant financial risk, the next step might be to form a working group among agency CFOs to begin exploring how to measure and manage those risks.
- **Perform an “FRM census” across the government to determine and document efforts already made and structures already in use.** The results of this census could then form the basis for a more formal analytic study of the determinants of financial risk management practices in government. In addition to finding out which techniques agencies have implemented and currently use, this census would also provide an opportunity to identify methods tried and rejected. This may well be some of the most valuable information an oversight agency could gather because it might allow agencies to avoid costly delays and missteps.
- **Bring private sector financial risk management experts into the process early.** Many of them will have been through similar transitions themselves and will have unique insights into how private sector firms have handled similar problems. Because of their experience they will also be able to identify hidden financial risks that might otherwise at first go undetected.
- **Urge academic researchers in finance, economics, and political science to begin studying this issue.** Financial risk management in government spans three different areas of academic study. Finance academics tend to study the quantitative techniques and tools, political scientists tend to study the government organizational issues, and economists tend to focus on policy issues. Each of these disciplines has a contribution to make, but it will take an external force, such as OMB, to get them to focus on the issue in its entirety.
- **Develop a prototype financial risk management process for government.** This prototype would set out the various steps a government agency would use in its FRM process. While there would undoubtedly be alterations made to such a plan within specific agencies, it would be a uniform and comprehensive starting point.
- **Develop some organizational structure templates for financial risk management.** These templates would serve as initial guides for government agencies setting up FRM structures. The templates would simply serve to outline the major components and relative placement of the FRM function, but specific implementation would depend on the agency. One approach would be for OMB to specify the level at which an agency must place the financial risk management function and the basic responsibilities of that function, but then allow the individual agency to structure its specific organization.
- **Standardize risk measurement as much as possible.** The measurement of financial risk in nonfinancial agencies will be one of the most difficult issues OMB or any such oversight agency will face when developing a general financial risk management policy for government. The agencies will have to weigh two competing issues: uniformity in measurement and applicability for specific agencies.

The goal of financial risk management is to ensure an organization takes on its optimal level of risk. Most economic activity requires the bearing of risk, so it cannot, and should not, normally be eliminated entirely. Neither should an organization take on more risk than successfully accomplishing its mission requires. Financial risk management has been very successful in the private sector, and with that success, it has become an integral part of many private sector firms, even in those that do not have a primarily financial mission. Reducing financial risk allows firms to devote their scarce resources to more productive activities. There is no fundamental reason the same should not happen within government, and, in fact, some government agencies, albeit mainly those with a financial mission, already have in place financial risk management groups or processes.

In the private sector, it was financially oriented firms that first adopted financial risk management as a field. The success that the firms had in their implementations, and the benefits that they accrued, led non-financially oriented firms to adopt the same, or very similar, methods. This process is likely to happen in government also. Financially oriented agencies, such as the Government National Mortgage Association (GNMA), have already adopted their own versions of FRM, and some agencies with missions that are not primarily financial in nature—such as the Department of Agriculture—have also begun to adopt FRM in some form.

Financial risk management eventually will become commonplace in government. The benefits of the efficiency increases are simply too great for it not to succeed, and the ability to measure uniformly across government is too strong a management tool for Congress to ignore. The only real question is what form these risk measures will eventually take, and whether government will adopt them in either a piecemeal or systematic way.

Appendix: Governmental Financial Risk Management Case Studies

As the Introduction notes, the first adopters of financial risk management tools in the private sector were those firms that bore large amounts of financial risk. Similarly in government, there has already been some adoption of these tools in agencies that have a primarily financial mission. The experience of these agencies in implementing financial risk management structures provides insight into how government might generally adopt these tools and ideas.

What follows are two case studies on the implementation of financial risk management by government agencies. The first is of the Government National Mortgage Association (GNMA), part of the Department of Housing and Urban Development (HUD). The primary mission of GNMA is to insure that there is a secondary market for loans insured by the Federal Housing Administration (FHA) and by the Veterans Administration (VA). GNMA clearly has a mission that is financial in nature. In fact, GNMA operates in the same arena as Fannie Mae, Freddie Mac, and commercial banks, which is precisely why it makes a good candidate for an initial case study. The managers of GNMA were selected precisely because they have the appropriate background and training to understand the FRM issues facing the organization. Their primary responsibility is to control that risk. As a result, they have put significant thought and effort into developing methods

for controlling that risk. The net result is that they have developed a very sophisticated financial risk management system. While the exact system will not be useful to all government agencies, much of it will be, and it provides some unique insights into successfully implementing such a strategy.

The second case study is of the Risk Management Agency (RMA) of the Department of Agriculture. The primary mission of RMA is to administer the crop insurance programs of the federal government. As is the case with GNMA, RMA does have a primarily financial mission. Unlike GNMA, however, its mission is much less like that of private sector firms. Crop insurance is a function that has traditionally been administered by government. While RMA certainly has adopted many of the private insurance industry's tools, it has clearly developed its own methods and tools. Most striking is its partnering with private sector firms as a form of risk management.

Case Study: GNMA

The Government National Mortgage Association is a wholly owned corporation housed within the Department of Housing and Urban Development. GNMA has, since its inception in 1969, made financial risk management one of its core values. This has allowed it to keep pace with, and fre-

Case Studies at a Glance

Agency: Government National Mortgage Association (GNMA)

Organization: Wholly owned corporation housed within the Department of Housing and Urban Development.

Established: 1969

Mission: To maintain a viable secondary mortgage market for FHA and VA insured mortgages.

Accomplishes Mission: By guaranteeing that issuers of GNMA guaranteed mortgage-backed securities will make all of their promised payments to the investors in those securities.

Primary Risk: That issuers will default on their promised payments.

Risk Management Tools: Primarily monitoring of the issuer's financial condition and of the cash flows of the underlying mortgages. GNMA can, in the event of fraud or imminent default, act to take over the servicing of the mortgage-backed security to prevent a default.

Agency: Risk Management Agency (RMA)

Organization: Part of the Department of Agriculture.

Established: 1996

Mission: To maintain stability in the U.S. agricultural economy even during times of economic distress.

Accomplishes Mission: By providing a system of crop insurance to the nation's farmers, and by educating about and encouraging the use of modern financial risk management practices by farmers.

Primary Risk: Massive potential claims on the crop insurance program.

Risk Management Tools: The structure of the reinsurance program is the primary management tool. The private insurers bear the initial risk, with risk flowing to the RMA as the size of the claims on the private insurers increase.

quently surpass, private sector financial risk management practices. Indeed, according to George S. Anderson, executive vice president of GNMA, the program maintains "state of the art" database systems for monitoring and measuring their primary financial risk.⁹

GNMA Mission

The primary mission for GNMA is to "support expanded affordable housing in America by providing an efficient government-guaranteed secondary market vehicle linking the capital markets with federal housing markets."¹⁰ GNMA undoubtedly has a mission closer to private sector organizations than many government agencies, yet it has a subtle but important distinction: Its primary purpose is to support and expand the market for affordable housing, not to maximize profits.¹¹

FHA loans in particular are typically made to borrowers that would have difficulty getting loans under normal private sector programs. The

general perception is that these loans have higher delinquency and default rates than their conventional counterparts. Because of this, Congress was concerned that private sector secondary market participants would not be willing to bear this risk, and so it created GNMA to ensure that such a market existed. Congress did, of course, mandate that GNMA prudently manage its risks, but it clearly did not place the same profit expectations on it that a private sector firm would have.

GNMA Operations

Historically the mission of GNMA has meant ensuring the existence of a secondary market for FHA/VA-insured mortgages, and GNMA has created an innovative system to meet this mission. GNMA does this by guaranteeing the performance of the issuers of Mortgage Backed Securities (MBS). The issuers form these MBSs from pools of FHA and VA mortgage loans. GNMA does not insure individual mortgage loans; that is the mission of FHA or VA insurance and of the MBS issuer. Rather,

what it does do is guarantee that if the issuer of the MBS goes into default—i.e., does not make their promised payments to the investors—the investors are still paid.

The mission and operations of GNMA illustrate one of the most important points made earlier in this report: Managing financial risk does not mean eliminating it. In fact, in the case of GNMA this would be virtually impossible; as long as it is operating, it must take on financial risk. What GNMA must do is balance the risk that it takes against the accomplishment of its mission. Consider that the only way for GNMA to eliminate all of its financial risk is to not insure any issuers. Next consider that GNMA can always expand the number of MBS issuers, and presumably accomplish more of its mission by further increasing the size of the FHAVA secondary market by insuring less financially secure issuers. The key for GNMA is to maximize its mission accomplishment while minimizing the financial risk that it bears.

GNMA Organizational Structure

The government created GNMA as a wholly owned corporation housed within the Department of Housing and Urban Development. This structure provides two benefits. First, it grants GNMA independent contracting authority, giving it the flexibility that it needs to respond rapidly to events in the financial markets. Second, it provides an additional layer of insulation between FHA and GNMA.

By making GNMA a separate corporation, albeit one housed within HUD, Congress created an organizational firewall between the two organizations, and they have taken this separation seriously. They communicate when appropriate, but each operates to maximize its mission independently of the other. One result of this independence is that the two operations effectively serve as checks on each other. That is, they have to analyze the practices of each other independently, increasing the probability some component of HUD would be the first to detect serious programmatic flaws and giving it the opportunity to correct them.

GNMA is not a large organization, and its structure reflects this. The company has fewer than 100 employees. This relatively small organization can

still be an efficient operation because all of the mortgage servicing—i.e., payment collection, balance computation, etc.—is done by the MBS issuers. GNMA has to monitor only the issuers and ensure they are doing their jobs. This monitoring and analysis is one of the primary operational activities of GNMA, and it permeates the entire organization. Of the five offices that report to the executive vice president, three have direct financial risk management responsibilities.

The Office of Issuer Management works to ensure GNMA's programs are viable for its issuers and attractive to investors. By doing this, GNMA seeks to ensure it does not inadvertently increase its own financial risk by making the programs riskier for its issuers. The Office of Finance has the responsibility for monitoring the financial risk of GNMA. This includes analyzing the potential risk of issuers defaulting and GNMA having to honor its guarantee of their securities. This office also conducts field audits of issuers and monitors the compliance of those issuers with GNMA policies. Finally, the Office of Policy, Planning, and Risk Management is responsible for developing mitigation strategies for GNMA.¹² The involvement of these three offices shows the degree to which GNMA has incorporated financial risk management into its business practices.

GNMA Financial Risk Measurement

Since MBS issuer default is the primary risk that GNMA faces, it has geared its financial risk management systems toward that risk. These systems focus on two related but distinct contributors to this risk. The first is the performance of the actual mortgage loan pools. The higher the default rate on those pools, the higher the costs to the issuer, which raises the probability of the issuer having to default on its obligations to the investors. If the underlying mortgages do not go into default, it is unlikely that the MBS issuer would go into default. The issuer will most likely have the money to meet its obligations under the MBS since the underlying mortgages would generate it. Essentially GNMA's analysis tries to determine if the issuer will have the ability to meet its obligations.

GNMA must also be concerned with whether the issuer has the will to meet its obligations. Even if

the underlying cash flows from the mortgages are there, it is still possible for an issuer to commit fraud or have other financial difficulties that prevent it from meeting its obligations. As a result, GNMA analyzes the financial health of its issuers in an attempt to identify developing problems. For this reason, GNMA maintains databases on the financial health of its MBS issuers.

The net result is that on at least a quarterly basis GNMA receives literally millions of pieces of information. It has developed extremely sophisticated databases to collect, sort, and organize all of this data. These databases, named CPADS and IPADS, receive inputs from multiple sources including FHA, VA, and the MBS issuers and servicers. Their complexity and scale rival that of any private sector enterprise risk management (ERM) system. What is even more impressive is that many of these systems have been in use at GNMA since the 1980s. In short, GNMA's ERM pre-dates virtually the entire private sector ERM industry.

Creating this system was a complex, costly process. It was, according to Elton Peller of the Office of Policy, Planning and Risk Management, also a process that took considerable support from the highest levels within GNMA and also within OMB.¹³ Indeed, the lesson for other agencies is that, as with any major policy or initiative, both internal and external support for a financial risk management initiative will be crucial to its successful implementation. If this external support was crucial for GNMA, an organization with relatively clear financial risks, it will be even more important for those organizations with more subtle risks.

GNMA Financial Risk Management

The goal of the financial risk measurement systems is to allow GNMA personnel to determine which of the issuers are most likely to default, and to let them then take actions which will either prevent the default or mitigate its consequences. GNMA ranks their issuers in tiers based on their likelihood of default. Those with the highest default risk come under increased scrutiny of GNMA personnel. This increased oversight could include an increase in the frequency of reporting requirements; audits of their financial position; and, in the extreme, GNMA intervening to take over, or have another issuer take over, the servicing of the MBS.

This is rather typical of the options available to any government financial risk management process. The financial risks GNMA must bear are not those they could use derivatives to easily manage. Instead, they must measure the risk, and then, if that risk becomes too large, take "real" actions to manage or reduce it. These actions are clearly costly for GNMA. The least expensive way for GNMA to manage these costs is to identify potential problems early and intervene aggressively to minimize problems before they become extreme.

Lessons

Because of its easily identified financial risk, it would be easy to dismiss the GNMA financial risk management experience as unique, and to minimize its applicability throughout government. This would, however, be a mistake. True, other agencies will probably not have the same degree of financial risk, but they will face many of the same problems, just on a different scale. Some general conclusions:

- Risk measurement is the key. GNMA has been successful in its financial risk management efforts because it has the ability to gather and analyze in a systematic manner a large amount of data. It is able to take this data and then use it to determine where it faces its largest financial risk.
- If an agency cannot remove the risk by using derivative securities, then constant monitoring and a plan for mitigating risk is crucial. A plan that has been thought out in advance is much more likely to be effective than an ad-hoc plan devised during a financial risk management emergency.
- Having both internal and external support for a risk management system is very important. The financial risk management system at GNMA has had the strongest support of GNMA senior management, GNMA line managers, HUD, and OMB. Given the nature of GNMA's business, building this consensus was not that difficult, but without it the financial risk management system would not have come into being. For those agencies with less obvious financial risk exposures, building support, both externally and internally, is a prerequisite to developing the program.

- Determine and state clearly the responsibility for managing financial risk. Within GNMA, financial risk management responsibility clearly flows from the executive vice president to the Office of Finance and then to the various operational units.

Case Study: Risk Management Agency of the USDA

The Risk Management Agency (RMA) of the U.S. Department of Agriculture is the agency in charge of the administration and operation of the nation's crop insurance programs. As is the case with GNMA, the nature of RMA and its operations requires it to take risk management seriously and to make its control one of its primary objectives. Congress established the agency in 1996 to administer a system of increasingly complex and comprehensive crop insurance programs. Today the agency administers programs that cover roughly two-thirds of the total farm acreage of the country.¹⁴ In 1999 the total exposure of the crop insurance programs that RMA administered was over \$30 billion.¹⁵

RMA Mission

The primary mission of RMA is to improve the stability of the U.S. agricultural economy. Although its most visible method for doing this is the crop insurance programs, it also accomplishes this mission by educating farmers about financial risk management techniques. That is, RMA teaches farmers about the various methods and techniques they can use to reduce their financial risk. This includes teaching them about insurance programs, financial and crop diversification strategies, and the use of derivative securities. The net effect is that RMA becomes a complete risk management solution for the nation's farm economy: It directly reduces farmers' risk through crop insurance and provides them with the knowledge to use the tools of open-market financial risk management.

As with any insurance operation, fraud must always be a concern, and, in fact, RMA maintains an entire division devoted to program compliance. One likely indirect benefit of RMA's educational efforts is a reduction in fraudulent claims they would otherwise have. Consider that farmers using

the risk management techniques taught by RMA's education division are less likely to experience severe financial distress, and it is well known that severe financial distress is one factor that leads people to commit fraud. It is reasonable to assume, therefore, that the educational efforts of RMA likely result in fewer cases of fraud.

Finally, although it is not stated as part of RMA's direct mission, it has a tertiary effect on the total financial risk of the federal government. The reduction of crop-loss risk to farmers also reduces the risk of farmers with federally insured mortgage loans (through the Farm Credit Bank system) defaulting. This reduces the probability of that federally guaranteed system running into financial trouble.

RMA Organizational Structure

RMA is a very good example of how government can use its organizational structure to control financial risk. Technically, all of the crop insurance contracts are signed by, and are hence the legal responsibility of, the Federal Crop Insurance Corporation (FCIC), a wholly owned corporation housed within RMA. By vesting the contracting authority within this corporation, the government can allow it to behave somewhat independently while still maintaining financial and managerial control. More importantly, RMA must implement all policy and managerial decisions of the FCIC. The net effect of this is that it allows RMA to effectively run the program on a daily basis, but the legal liability for the program rests in this corporation. This effectively insulates RMA from that liability.

Within RMA itself, risk management responsibilities rest within two separate lines of administrative responsibility. Administration of the crop insurance programs *per se* rests within the Reinsurance Services Division, which is under the authority of the deputy administrator for insurance services. Responsibility for detecting fraud and other compliance problems rests with the Risk Operations Division, under the deputy administrator for compliance. This mirrors private sector financial risk management practices. Private firms normally house compliance and policy monitoring under a separate group, normally an audit-like group, from the division that has primary contact with the organization's customers.

RMA Operations

Within the federal government, RMA is in a relatively unique position to work with the private sector to control or manage financial risk. RMA does not directly insure the crops of farmers. A farmer that desires to purchase crop insurance will go to a private company to make the purchase. What RMA does do, however, is to subsidize the farmer's insurance premium, making the insurance affordable to the farmer and profitable to the insurance company. More importantly, the RMA provides *reinsurance* to the insurance company.

Reinsurance is a common financial risk management tool for private insurance companies. With such a contract the reinsurance company agrees to pay a percentage of the claim losses of the primary insurer. Companies normally purchase these contracts to protect themselves when they have high concentrations of a single risk.

In the case of crop insurance, the private companies bear the initial risk, but as their claim losses grow larger, the FCIC begins to pay a larger and larger portion of their claims. The claim that the insurance company has on the RMA reinsurance is a function of the *loss ratio*, which is simply the ratio of the premium dollars collected by the company to its claims paid. Under any given program the reinsurance payments to the company depend upon the bucket that the loss ratio falls into.¹⁶ The bigger the loss ratio, the larger the percentage of the loss the government covers, i.e., the larger the reinsurance payment to the insurance company.

This system has two risk-reducing benefits for RMA. The first is that the private insurers directly bear the initial financial risk of the policies. Through its reinsurance program, RMA effectively provides them with protection against abnormally large or catastrophic losses. With protection from such losses, private insurers can efficiently and profitably manage risks inherent in the policies. If it did not use this system, RMA would have to bear that risk.

The second benefit is that under this system private sector companies have the responsibility to manage the "retail" side of the program. That is, they have the obligation to sign farmers up for crop insurance programs, service the farmers' policies, and, in most cases, make payments for any claims on the

policies. In essence, the government is able to put the primary administrative burden on the private sector. This reduces the direct administrative cost to the government and, most importantly, puts the variance of administrative costs on the private sector. Given that participation in the crop insurance program may well vary from year to year, the profitability of maintaining a network of agents will likely vary. This is a form of financial risk that government is not particularly well suited to handle; government, unlike the private sector, is not able to rapidly decrease its workforce when business falls off. Further, since these private companies are attempting to earn a profit, it is reasonable to assume they will find the most efficient methods for administering this portion of the program.

RMA Risk Measurement

Risk management is relatively straightforward for RMA. Its potential exposure is simply the total dollar amount of reinsurance it has outstanding. Of course, just because a policy exists does not mean RMA will necessarily have to pay out on that policy. By its nature, insurance liability is a function of both the potential exposure and the likelihood of the risk occurring. As such the primary risk measure is not the potential liability but rather the expected liability, which is the actuarial liability of the policy. In FY99 farmers received payments made under the federal crop insurance of \$2.4 billion.¹⁷

In its strategic plan, RMA notes several ways that it can measure its success in meeting its mission, including the number of policies in force, the dollar amount of insurance in force, and the percentage of farmers that participate in the program. Interestingly, it also notes that the agency's success "will be judged by the extent to which the needs of agricultural producers are met in times of disasters or other uncontrollable conditions which threaten the stability of American agriculture."¹⁸ This definition is similar to the idea of a "Mission at Risk" metric. It recognizes that the agency's success is a function of its performance under conditions that do not occur frequently, but are severe when they do occur. Given this definition, it would be relatively straightforward to create a Mission at Risk metric from it.

RMA Risk Management

RMA uses a number of risk management techniques, including its managerial structure and the placing of the initial insurance risk on private sector companies. Ultimately, however, RMA retains a certain amount of financial risk. Indeed, according to Heyward Baker, of the Reinsurance Services Division, the program operates under a policy of “self-insurance.”¹⁹ This means the program must take in at least as much money, on average, as it pays out.

Baker notes that it would be theoretically possible for the government to enter into re-reinsurance contracts, possibly with a group such as Lloyds of London, to divest itself of this risk, although that would take a major policy shift by Congress. Another approach would be to hedge this risk using the financial futures markets. Since payouts on a particular crop insurance program would be inversely related to farm production, a carefully constructed long position in an appropriate futures contract could at least partially hedge that risk. Baker points out that the difficulty with this approach is that the size of the crop insurance programs are large enough that such hedging activities may well affect the market prices for those contracts, which would limit their effectiveness as a hedge. He notes that while RMA continues to work with the chief economist and the Research Division of the USDA to look for alternative risk management tools, the current system is unlikely to change in the immediate future.²⁰

Although RMA is unlikely to use derivatives to directly control its financial risk, it is actively developing new derivatives-based pilot programs for farmers to use. One such program is the Dairy Options Pilot Program. RMA is working with the Commodity Futures Trading Commission to determine if farmers can reduce their financial risk through the use of put options on milk. As RMA notes in its strategic plan, one potential difficulty is producers may elect to stay with a program they know—i.e., crop insurance—instead of taking advantage of new non-insurance-based programs.²¹ This is a problem RMA will have to overcome if it is to reduce its crop insurance exposure. If RMA can convince farmers to substitute derivatives-based programs for crop insurance, it will reduce the amount of financial risk RMA must directly

bear. Pilot programs such as the Dairy Options Pilot program can help to overcome farmer concerns by generating data to show how successful such programs can be.

RMA Lessons

It is important to recall that RMA’s primary mission is to increase the stability of the agricultural economy. It does this through its crop insurance programs, as well as through its extensive financial risk management educational programs. There are several lessons one can draw from this agency that are applicable across government:

- Even though an agency may have financial risk that it ultimately must bear, there may still be methods it can use to control or manage that risk. In the case of RMA, its ultimate position as a self-insured entity means it must retain significant financial risk. Yet, it can reduce and control that risk through its contracts with private insurers and through farmer education.
- Government can affect financial risk indirectly as well as directly. Consider that the farmer education programs do have an effect on the overall level of financial risk in the agricultural economy. By encouraging farmers to adapt financial risk management practices themselves, RMA helps fulfill its primary mission of providing stability to the farm economy, but it does so without taking on financial risk itself.
- The private sector is able to manage certain financial risks very efficiently. Government financial risk program managers should recognize which risks the private sector can profitably manage and, when possible, outsource those risks. In the case of RMA, the private sector can efficiently manage the financial risks inherent in the retail-level administration of the program. RMA wisely outsources the enrollment and processing of farmers into the crop insurance program.
- Even if government could potentially use derivatives markets to manage its financial risk, it must be careful when doing so that it does not “move” the markets. That is, it must take care not to introduce so much new risk into the market that the price for hedging that risk increases.

Endnotes

1. For example, the Health Care Finance Administration (HCFA) recently issued a request for proposals to assist HCFA in the development of a financial risk management plan.

2. For example, the state of Texas already uses options on oil futures to hedge oil production tax revenues.

3. There is a subfield of finance known as “agency theory” that focuses on shareholder efforts to insure alignment of managerial incentives. The seminal paper in this field is that of Jensen and Meckling (1976).

4. One notable exception to this was the 1990 CFO Act and its subsequent followup legislation. In this act Congress mandated that federal agencies adopt accounting practices that were closer to those of the private sector. Even in this case, however, OMB was given authority to insure uniform standards and compliance.

5. More generally, counterparty risk is simply the risk that a trading partner will not honor its obligations under a given trade. While this is clearly similar to credit risk—the risk that a corporate borrower will not repay a debt—it differs in that the risks are for shorter durations (until the trade settles).

6. For advanced summary texts on these methods see *Risk Management and Financial Derivatives: A Guide to the Mathematics* by Satyajit Das, McGraw-Hill, 1997.

7. It would of course be possible to weight the various exposures by the probability of their happening, but even this is of limited value. The point of scenario analysis is to understand the economic events that would occur along with the loss from the risk.

8. See Culp and Miller (1995) for an examination of the Metallgesellschaft case to see the consequences of illiquidity in the market.

9. George S. Anderson, Executive Vice President, GNMA, interview by author, September 7, 2000, Washington, D.C.

10. From the GNMA website:
<http://www.ginniemae.gov>

11. This is not to say the GNMA is not profitable. As shown in the audited financial statements of its 1999 annual report, GNMA is profitable. Earning a profit was not, however, the reason that Congress chartered GNMA; it did so to ensure the existence of a viable secondary market for FHA/VA loans.

12. From the GNMA website:
www.ginniemae.gov

13. Elton Peller, GNMA, interview by author, September 8, 2000, Washington, D.C.

14. From the RMA website: www.rma.usda.gov.

15. Department of Agriculture, Risk Management Agency, Risk Management Agency Strategic Plan for FY 2000-2005. (Washington, D.C.: US Department of Agriculture, Risk Management Agency, 2000), p. 4.

16. In FY 1999, RMA provided 138 different insurance plans to producers. (Ibid, 9)

17. Ibid., 4.

18. Ibid., 6.

19. Heyward Baker, interview by author, Washington, D.C.

20. Ibid.

21. Risk Management Agency, Strategic Plan, p. 6.

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