

Global Risk
Management Survey:
Sixth Edition
Risk management
in the spotlight



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Foreword

Dear Colleague,

We are pleased to present the sixth edition of Deloitte's *Global Risk Management Survey*. This edition is titled *Risk management in the spotlight* because the current turbulent conditions—including business volatility, a lack of liquidity in many financial markets, and a worldwide economic downturn—are bringing the importance of risk management front and center, perhaps as never before.

The systemic risk to the global financial system posed by these and other recent developments have substantially raised the demands placed on both regulators and risk managers. Today, many institutions have a Chief Risk Officer or similar senior-level executive responsible for assessing and managing risk across their institution. Boards of directors at many firms have properly assumed overall responsibility for the oversight of risk management. In the banking sector, preparations for compliance with the Basel II requirements are nearing completion, while in the insurance industry similar preparations are being made for Solvency II.

Yet, much work remains to be done. Many boards of directors and senior management teams will likely seek additional education and training on risk management. Institutions may need to create a more risk-aware culture, further infusing risk management into performance objectives and business decisions. Many institutions still may need to implement enterprise risk management programs to gain a more comprehensive view of the risks they face. More sophisticated methodologies will likely be adopted by many institutions to manage the risks in today's more complex environment, such as "tail risks" from unlikely events and the risks from a lack of liquidity.

Deloitte's survey provides an assessment of how financial services companies around the world are responding to these realities and the key risk management challenges they face. The survey includes responses from 111 financial institutions worldwide with more than \$19 trillion in total assets, and we would like to express our appreciation to all that participated.

We hope that the survey results presented in this report will provide you with useful information on how financial institutions are meeting the challenges facing risk management today and will facilitate a broader dialogue on the steps that may be needed to enhance risk management in the future.

Sincerely,

Edward T. Hida II, CFA
Global Leader - Risk & Capital Management
Global Financial Services Industry Practice
Deloitte Touche Tohmatsu

Executive summary

Risk management today is in the spotlight, being tested by unprecedented turbulence in the financial markets, including depressed asset prices, reduced liquidity in many markets, and a contraction in the credit markets. The changed marketplace has affected every segment of the financial services industry including banks, insurance companies, and asset management firms. While the confluence of these events has challenged risk management within financial firms, these events have also demonstrated the need for enhanced risk management capabilities and reiterated a basic principle – risk and return are generally correlated and should be evaluated together.

Boards of directors at many institutions may need to continue their efforts to become more actively involved in understanding the risks within the business, approving organizational risk appetite and tolerance, and providing increased oversight over business decision-making and the consideration of relevant risk management issues. Management may require more comprehensive metrics and tools to adequately assess all the risks inherent in the range of complex products. And institutions may need to more fully recognize and effectively manage liquidity risk, which has afflicted the markets for securitized products as well as the broader financial markets.

The sixth edition of Deloitte's *Global Risk Management Survey* examined these and other challenges facing global financial institutions. The survey received responses from 111 financial institutions around the world, with aggregate assets of more than \$19 trillion.

Since our last report issued in early 2007, the economic environment has changed dramatically. Risk management has always been a core competency of financial institutions, but the extraordinary developments in the financial markets and the broader economy that began in late 2007 have made it an even greater priority. The volatility of the financial markets is placing a premium not only on risk management systems that can consistently assess risk, but also on those that help institutions to identify and monitor emerging risks and react quickly. This implies that institutions may need a more robust, integrated IT infrastructure that can quickly achieve a broad picture of risk across multiple lines of business, portfolios, products, and geographies.

Value at Risk (VaR) has been considered by many to be the industry-accepted methodology for assessing market risk, but its limitations in assessing the risks of extremely rare events, often called "tail risks," have become apparent. Institutions may need to further supplement the use of VaR with other methodologies such as stress tests. The high degree of correlation across asset classes, risk categories, and geographies revealed in times of stress may need to be factored into portfolio management decisions and enterprise-level capital needs.

Key findings

- Risk management is not fully integrated throughout many institutions: 49 percent of the institutions surveyed had completely or substantially incorporated responsibilities for risk management into performance goals and compensation decisions for senior management.
- Overall responsibility for oversight and governance of risks rested with the board of directors at 77 percent of the institutions participating, and 63 percent of these had a formal, approved statement of risk appetite.
- Seventy-three percent of the institutions surveyed had a Chief Risk Officer (CRO) or equivalent position. As an indicator of the role's importance, the CRO reported to the board of directors and/or the CEO at roughly three quarters of these institutions.
- Only 36 percent of the institutions had an enterprise risk management (ERM) program, although another 23 percent were in the process of creating one. Among institutions with \$100 billion or more in assets, 58 percent had an ERM program already in place. The institutions that had ERM programs found them to be valuable: 85 percent of the executives reported that the total value (both quantifiable and non-quantifiable) derived from their ERM programs exceeded costs.
- Institutions have made substantial progress towards complying with Basel II. For many areas, more than half of the institutions subject to Basel II reported they had already complied or that little work remained, a far higher number than in our previous global risk management surveys. These responses are clearly influenced by the fact that Basel II has different timeframes for implementation in different countries, with multiple approaches available in many jurisdictions.



- Economic capital continues to be widely used, with 83 percent of the institutions reporting that they calculated economic capital and 53 percent saying that their boards of directors and senior management used these calculations to assist in strategic decision making.
- Roughly 80 percent of the institutions employed stress tests for their banking and trading books, although a smaller amount, 58 percent, reported performing stress tests of their structured product (or securitization and related transaction) exposures. Among institutions that conducted stress tests of their structured product exposures, only 17 percent conducted them daily, while 68 percent conducted these tests quarterly or less often. Given the pace at which markets move, institutions may face regulatory or other pressure to perform stress testing more frequently.
- Regulatory authorities have been encouraging financial institutions to independently validate their risk-related models, to better enable them to assess reliably the likelihood and magnitude of potential risks, but action to date in response to this guidance is not uniform. While 53 percent of the participating institutions indicated having an independent model validation function, almost two thirds of the remaining respondents reported having no plans to create such a function.
- Roughly three quarters of the institutions had fully completed or substantially completed the work required to identify operational risk types, and to standardize the documentation of processes and controls for operational risk. Yet, only roughly 40 percent of executives considered their operational risk assessments and their internal loss event data to be well-developed. Other operational risk methodology areas, such as key risk indicators, external loss event data, and scenario analysis, were said to be well-developed by 20 percent or less of the institutions surveyed.
- Many institutions may have significant work to do to upgrade their IT risk management infrastructure. Roughly half of the executives were extremely or very satisfied with the capabilities of their risk systems to provide the information needed to manage market and credit risk. In other areas, such as systems for liquidity risk and operational risk, 40 percent or fewer provided ratings this high.

The volatility and illiquidity in many markets have illuminated a range of challenges for risk management in financial institutions. Beyond methodologies, data, and technology capabilities, effectiveness in risk management may require enhancing or, in some cases, creating a pervasive risk-aware culture throughout the organization—and creating an environment and incentives that sustain this culture over time. Appropriate governance is a key to establishing such an environment. Executive management must provide leadership, with oversight and input from the board of directors, towards enhancing and making more transparent the institution’s risk strategy, risk appetite, and risk management framework. It is important that these perspectives are refreshed with changing business conditions so that they remain relevant to guiding business decisions.

The risk management function should determine that risks are defined and monitored consistently within the context of the organization’s risk appetite. What might be considered second- and third-order risks are not readily apparent, may end up being highly correlated, and are not easily diversified. These risks should be monitored closely and reported consistently along with other risks in the organization. Risk management responsibilities may need to be infused throughout the organization and integrated into performance goals and compensation decisions. To the extent it has not already been done, creating a risk-aware culture, supported by specific methodologies, tools, and governance structures discussed in this report, will likely be essential to helping financial institutions navigate the challenging times ahead.

Introduction

The sixth edition of Deloitte's *Global Risk Management Survey* was conducted at a time of substantial turmoil in the financial markets and the broader world economy that has posed significant challenges to the risk management programs at all types of financial institutions. The survey shines a light on how financial institutions are responding to recent developments and how risk programs are likely to evolve in the future. As in previous editions, the financial institutions participating in the survey represent a range of industry sectors, geographic regions, and asset sizes. (See the sidebar, "About the survey.")

About the survey

This report presents the findings of Deloitte's most recent survey of the state of risk management in the global financial services industry. We solicited the participation of CROs or their equivalents at financial services firms around the world. The survey was conducted online in the latter part of 2008 and is the sixth in our series of global risk management surveys, which we have conducted approximately every two years.

- Institutions participating in the current survey represented a wide range of financial sectors, with the greatest representation by commercial banks, retail banks, and diversified financial services firms.
- Participants represented institutions headquartered in all the major geographic regions. Most institutions participating in the survey were global, with 61 percent having operations in multiple countries.
- The institutions participating had total assets of more than \$19 trillion. Institutions represented a variety of asset sizes, with 27 percent having more than \$100 billion in assets.

See Exhibits 1, 2, and 3 for further detail on these survey participant demographics.

In early 2007, we released our *Global Risk Management Survey: Fifth Edition – Accelerating Risk Management Practices*¹, which was conducted during the latter part of 2006. Where relevant, we have compared the results of the current survey to those in the prior survey.

A turbulent time

The financial services marketplace has recently experienced a series of dramatic developments. The annual volume of global issuance of collateralized debt obligations (CDOs), which had more than tripled from 2004 to 2006 to reach \$520.6 billion, plummeted almost 90 percent to just \$56.1 billion in 2008.² There was a widespread drop in equity prices. Stocks in the MSCI index, which covers 23 developed countries, lost more than half their aggregate value from the beginning of 2008 through March 5, 2009.³

The world economy entered a broad slowdown around the beginning of 2008, with both developed and emerging economies seeing GDP growth rates either turn negative or drop significantly. The International Monetary Fund (IMF) expects aggregate global output will contract in 2009, which would be the first time that has happened since World War II.⁴ The IMF predicts the sharpest contraction will occur in developed economies, while emerging economies will grow more slowly due to lower demand for their exports.

In response to the developments roiling the financial markets and the world economy, a series of major government actions has been taken or are under discussion:

Monetary policy. In an effort to loosen credit markets, many central banks have slashed interest rates. In 2008, the United States Federal Reserve cut the Fed Funds rate to 0.2 percent. The European Central Bank reduced its benchmark interest rate from 4.25 percent in October 2008 to one percent in May 2009. Governments have also taken steps to increase the money supply, with M1 in the United States increasing by a seasonally-adjusted rate of 15.9 percent from April 2008 to April 2009, after decreasing by just 0.7 percent in the prior 12 months.⁵ With interest rates at such historic lows, and "real" rates (considering inflation) negative in many cases, authorities have few traditional monetary levers to spur growth through credit easing.

¹ *Global Risk Management Survey: Fifth Edition - Accelerating Risk Management Practices*, Deloitte Development LLC, 2007

² Securities Industry and Financial Markets Association, "Global CDO Market Issuance Data," http://www.sifma.org/research/pdf/CDO_Data2008-Q4.pdf

³ "Economic and Financial Indicators: Market Performance," *The Economist*, March 7, 2009, http://www.economist.com/markets/indicators/displaystory.cfm?story_id=13240287

⁴ "Advanced Economies to Contract Sharply in 09, Upturn Next Year—IMF," International Monetary Fund, March 19, 2009, <http://www.imf.org/external/pubs/ft/survey/so/2009/NEW031909A.htm>

⁵ "Money Stock Measures," Federal Reserve Statistical Release, May 21, 2009, <http://www.federalreserve.gov/releases/h6/current/h6.htm>

Fiscal policy. By early 2009, the 11 largest economies were planning economic stimulus plans worth 3.6 percent of their combined GDP over the next several years. In some European countries, these stimulus plans include a mix of tax reductions, government spending, and assistance for non-financial companies.⁶ In February 2009, the United States passed a \$787 billion stimulus package of increased federal spending. Emerging economies such as China also announced their own stimulus packages of similar magnitude.

Assistance to financial institutions. Governments have also moved to strengthen financial institutions, with the United States and European countries having provided a total of approximately \$5 trillion in capital injections as of May 2009.⁷ Many expect that more assistance will be required, and some are concerned about potential nationalization of financial institutions, either explicitly or in effect through increasing government investments. Goldman Sachs estimated that the total value of the troubled assets at U.S. institutions alone was \$5.7 trillion, and there are no doubt additional troubled assets in other financial institutions around the world.⁸

Government intervention and capital investments have led to public debate over the extent to which governments should influence financial institutions in such areas as lending, transaction fees, use of capital, compensation, and spending for items such as client and employee travel and entertainment. It has also raised concerns that some governments may go beyond their stated objective of injecting needed capital on a temporary basis for stability, and take an active role in management decisions – even potentially furthering social and political agendas through these financial institutions.

Proposals for regulatory reform. In the wake of the credit crisis and the collapse of several commercial and investment banking institutions, the current regulatory structure for oversight and supervision has come under scrutiny, and several recommendations have been made for regulatory reform. Some have recommended closer coordination among regulators around the world, or even the creation of a global regulatory regime. In the United States, there have been calls for comprehensive regulation that addresses systemic risk because the current regulatory structure is functionally based, and no single regulator provides comprehensive oversight of the large, diversified financial institutions that pose potential systemic risks.

As noted in a recent Deloitte report, there have been many other proposals to strengthen regulatory requirements, introduce regulatory oversight of unregulated entities and products, as well as broadly strengthening risk management.⁹ For example, on January 15, 2009, the Group of Thirty (G30) Steering Committee on Financial Reform, chaired by Paul A. Volcker, made a series of recommendations including the following:¹⁰

- Large, systemically important banking institutions should be restricted in undertaking proprietary activities that present particularly high risks and serious conflicts of interest... Participation in packaging and sale of collective debt instruments should require the retention of a meaningful part of the credit risk.
- Large proprietary trading should be limited by strict capital and liquidity requirements.
- International regulatory capital standards should be enhanced to address tendencies toward procyclicality. Benchmarks for being well capitalized should be raised, given the demonstrable limitations of even the most advanced tools for estimating firmwide risk. These benchmarks should be expressed as a broad range within which capital ratios should be managed with the expectation that, as part of supervisory guidance, firms will operate at the upper end of such a range in periods when markets are exuberant and tendencies for underestimating and underpricing risk are great.
- Much-needed planned improvements to the infrastructure supporting the OTC derivatives markets should be...supported by legislation to establish a formal system of regulation and oversight of such markets.

The future regulatory landscape for financial institutions is unclear because it is not known which of the many regulatory reform proposals will ultimately be adopted. What is clear, however, is that there are likely to be substantial revisions to the structure and scope of regulation of the financial services industry, and that regulatory authorities may place new and more stringent requirements on risk management programs in the future. To comply with these new regulatory requirements, institutions may need to institute significant changes to their business and risk processes and supporting technology systems, as well as provide additional training to their employees.

⁶ "Big Government Fights Back," *The Economist*, January 31, 2009, http://www.economist.com/finance/displaystory.cfm?story_id=13035552

⁷ Bloomberg News, May 1, 2009 <http://www.worthynews.com/top/bloomberg-com-apps-news-pid-washingtonstory-sid-aGq2B3XeGKok/>

⁸ "Big Government Fights Back," *The Economist*, January 31, 2009, http://www.economist.com/finance/displaystory.cfm?story_id=13035552

⁹ *Risk management in the age of structured products: Lessons learned for improving risk intelligence*, Deloitte Development LLC, 2008

¹⁰ *Financial Reform: A Framework for Financial Stability*, Group of 30, January 2009

The sixth edition of Deloitte's *Global Risk Management Survey* assessed the state of risk management in these difficult times and the prospects for the future. This report presents key findings across the following areas:

- Risk governance
- Enterprise risk management
- Basel II
- Management of key risks
 - Credit risk
 - Market risk
 - Liquidity risk
 - Operational risk
- Risk management systems and technology infrastructure

“What lessons have been learned from the recent market events? Engage only in businesses you fully understand; do not over-leverage; and stay liquid.”

— Senior banking executive

Exhibit 1

Participants by primary business

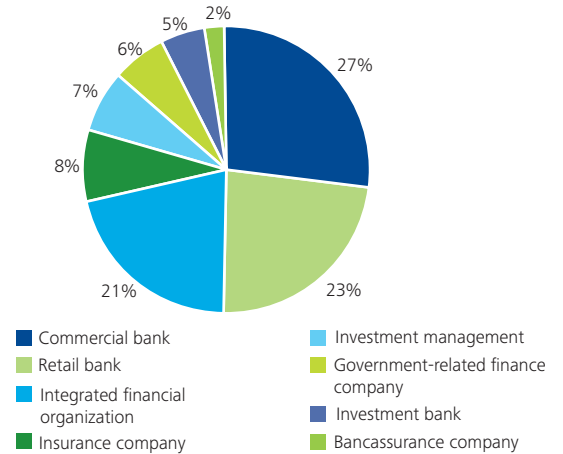


Exhibit 2

Participants by headquarters location

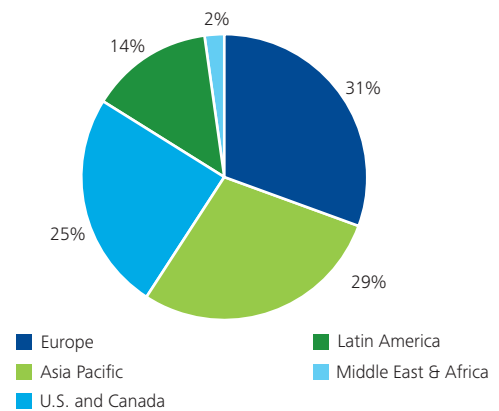
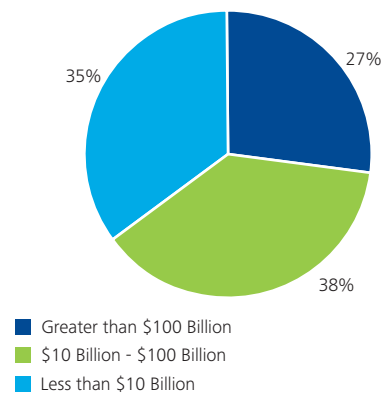


Exhibit 3

Participants by asset size



Note: Some graphs do not add to 100% due to rounding.

Risk governance

The impact that a risk event can have on a financial institution has made risk management a significant concern of the boards of directors and senior management at most financial services firms. Yet, risk management has not received such high-level attention at all firms, and many institutions may also struggle with creating a risk-aware culture throughout their organizations. The role and accountability of boards of directors vis-à-vis risk management has been debated in the financial press. Going forward, to satisfy their fiduciary responsibilities, boards of directors are likely to become more activist and potentially more risk averse.

Oversight by the board of directors

Oversight of risk management should be an acknowledged responsibility of the board of directors, and 77 percent of the participating institutions reported that their boards of directors had overall oversight responsibility for the management and control of risk. As part of this responsibility, the board of directors should consider and approve a clearly-stated risk framework and associated risk policies, which should be communicated throughout the organization. In Deloitte's survey, roughly three quarters of the respondents said that the board of directors approved the institution's risk management policy and reviewed regular risk reports from management.

In addition, the board of directors should approve a statement of the institution's risk appetite, and the survey results indicate that many do. A formal statement of risk appetite can provide strategic direction for business decision-making by making explicit the amount of risk that an institution is willing to take. Further, the report of the Counterparty Risk Management Policy Group III (CRMPG III) recommends that "each institution ensure that the risk tolerance of the firm is established or approved by the highest levels of management and shared with the board."¹¹ Although the risk appetite is generally defined by management and should be approved by the board of directors, it is important that the risk appetite be aligned with business activities and the scope of authority for key positions, and also reflected in risk reporting. The value of defining risk appetite comes in guiding business decisions, which can take the form of limits in trading or lending, and in assessing the aggregate level of risk across the institution through dashboards.

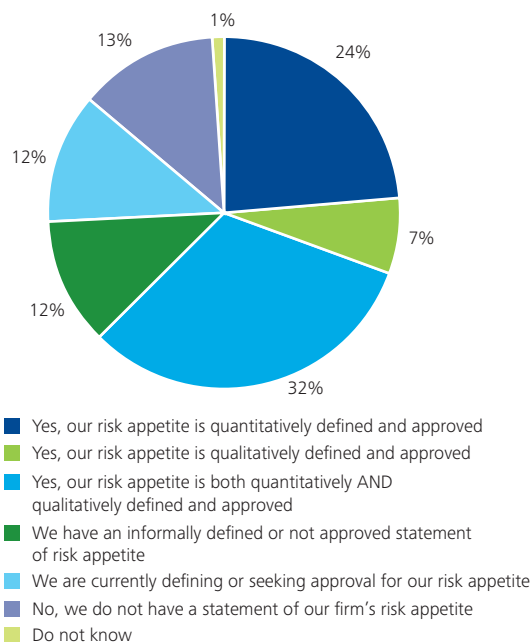
“We expect the board of directors to oversee and ensure the effectiveness of risk management. We have seen the board of directors increase their focus on this issue recently, and it is more effective than before. Specifically, the board of directors requested our company to conduct more extensive stress tests relating to risk capital and then to report the results.”

— Senior banking executive

Sixty-three percent of the institutions had a formal, approved statement of their risk appetite. (See Exhibit 4.) Roughly one quarter of the institutions said they relied on a quantitatively defined statement of risk appetite, while about one third used both quantitative and qualitative approaches.

Exhibit 4

Do you have a defined and approved enterprise-level statement of the firm's risk appetite?



Note: Some graphs do not add to 100% due to rounding.

¹¹ CRMPG III, *Containing Systemic Risk: The Road to Reform*, August 6, 2008

However, simply having a statement of risk appetite is not enough by itself. Institutions have faced challenges in translating the risk appetite statement into risk management decisions consistent with enterprise objectives. While individual decisions may appear appropriate in isolation, collectively they may create an aggregate amount of risk across the organization—especially when the inter-relationships and correlations among different transactions or types of risk are considered—which exceeds the institution’s risk appetite. The objective is that the statement of risk appetite should become a guiding principle when making business decisions.

Key role of the CRO

To help communicate the elevated role of risk management within an organization, it is important to have this function led by a Chief Risk Officer (CRO), or an equivalent senior risk officer, reporting to the CEO and considered to be an integral part of the institution’s executive leadership team. In this survey, 73 percent of the institutions participating reported having a CRO or equivalent position. Roughly 90 percent or more of these institutions indicated that their CRO was responsible for escalating risk issues to the CEO and the board of directors when necessary; developing and implementing the institution’s risk management policy and methodologies; and overseeing the aggregation of risk exposure, risk analytics, and risk quantification across the organization. Over 80 percent also said their CRO was responsible for limit monitoring and reporting.

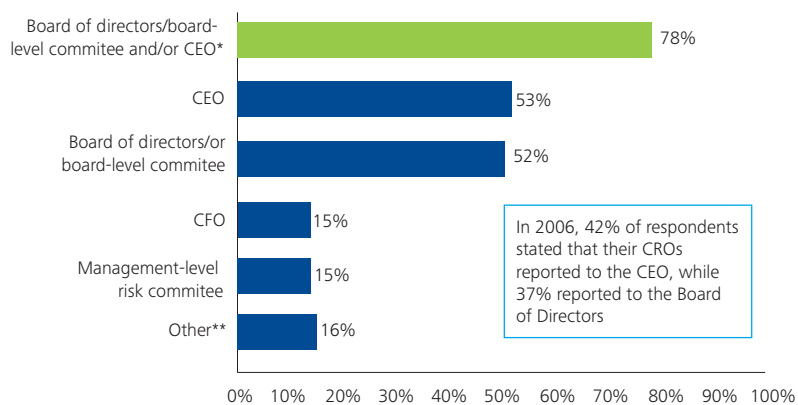
The survey found that more CROs are now reporting to higher levels within their organizations than was true in the past. Among the institutions with a CRO or equivalent, 53 percent said their CRO reported to the CEO, up from 42 percent in the 2006 survey; 52 percent said their CRO had a reporting relationship to the board of directors or a board-level committee, up from 37 percent. (See Exhibit 5.) In 78 percent of the institutions with a CRO or equivalent, this position reported to the board level, to the CEO, or both.¹² This trend of the elevation of the role of the CRO is likely to continue. Increasingly, CROs will likely report to the CEO and have a closer reporting relationship with the board of directors to enhance risk management as a central consideration in setting strategy. Given the risk oversight responsibilities of the board of directors, the CRO is a valuable conduit of information on emerging risks, technical or specialized information, and on policy changes that can assist the board to keep pace with changing expectations in the marketplace and among regulators. In return, the board’s support of the CRO can strengthen the role of risk management in the organization, which is particularly important when changes in business practices are needed.

“If you’re a financial institution and you don’t have a separate risk committee, you will have one. For all of us, the intensity of oversight and the need for boards to do more to fulfill their duty to ensure that management has the proper controls in place, that they understand and are managing the risks, has increased... The temperature has been turned up a fair bit.”

— Banking Chief Risk Officer

Exhibit 5

To whom does the CRO (or equivalent) report?



Base: Respondents from institutions with a CRO (or equivalent).

Note: Percentages total to more than 100% because respondents could make multiple selections.

* This bar represents the total population of institutions where the CRO reported either to the CEO, to the board of directors, or to a board-level committee, or to a combination thereof.

** Other includes:

- Chief administrative officer
- Chief compliance officer
- Chief operating officer
- Controller
- General counsel
- Heads of business units
- Internal auditor
- Manager of corporate services
- The investment risk department reports to the chief investment officer
- Vice chairman

¹² This is the total percentage of institutions where the CRO reported either to the CEO, to the board of directors, or to a board-level committee, or to a combination thereof.

Boards of directors typically play a more prominent role in the European governance model, and this was reflected in the survey results. Among European institutions, 55 percent said their CRO reported to the board of directors or to a board committee, compared to just 26 percent among U.S. and Canadian institutions. In Asia-Pacific, however, the figure was even higher, with 78 percent of CROs reporting to the board of directors. The CRO reported to the CEO at 59 percent of the U.S. and Canadian institutions and 56 percent of the institutions in Asia-Pacific, compared with 35 percent among European institutions.

The board of directors held executive sessions with the CRO at only 37 percent of the institutions surveyed. With the growth in the scale and complexity of financial products, and the penetration of financial firms into more business areas, these sessions also provide a mechanism for the board to improve its understanding and knowledge of the institution's changing business mix and risk exposures. Whether or not the CRO reports to the board of directors, a close relationship between the CRO and the board is important. As a first step, the CRO should have regularly scheduled meetings with the board of directors. But it is equally important that the CRO have the opportunity to meet with the board in executive sessions, without management present, to allow completely frank discussions.

Creating a risk-aware culture

The risk management function should play a key role in driving business strategy and endorsing important business decisions. Eighty-two percent of the institutions participating said that risk management must formally approve new products, and 64 percent said risk management sign-off was required for entering a new business. An increasing focus in the financial services industry has been on the role and authority of the CRO. For example, in the *Final Report of the IIF Committee on Market Best Practices: Principles of Conduct and Best Practice Recommendations*, it was recommended that "The CRO should have a sufficient degree of autonomy, be independent of line business management and have sufficient seniority and internal voice in the firm to have a meaningful impact on decisions."¹³

In addition, creating a risk-aware culture may require organizations to go beyond the CRO and senior executives, and to infuse risk considerations into the fabric of the organization. Successful enterprise-wide risk management efforts should include a significant communication component such that the key principles and goals of risk management are understood by all employees. This communication effort can include an introduction by senior executives to demonstrate their commitment to the program. It is equally important that risk management professionals also understand the business directly, and some institutions are providing hands-on experience by rotating executives between risk management and business unit roles.

While the role of the risk function itself continues to gain prominence within organizations, some institutions have not aligned risk management goals with performance goals and compensation decisions for senior management. Forty-nine percent of respondents said their institutions had completely or substantially incorporated responsibilities for risk management into performance goals and compensation decisions for senior management, while roughly one third said this alignment had occurred for finance executives, front-office personnel, and middle management. Regulatory authorities, guided by the Basel Committee, have made it clear that risk management should be a central responsibility of executives throughout an organization, especially among senior management.

“When it comes to risk management practices and reporting, a resounding theme is accountability across the organization. All understand that there is widespread accountability – there are incentives, individual performance is rated, and there are rewards and consequences. This is a key component in raising the profile of risk management across the institution.”

— Senior banking executive

¹³ *Final Report of the IIF Committee on Market Best Practices: Principles of Conduct and Best Practice Recommendations - Financial Services Industry Response to the Market Turmoil of 2007-2008*, Institute of International Finance, July 2008, <http://www.iif.com/download.php?id=Osk8Cwl08yw>

Enterprise risk management

The objective of enterprise risk management (or ERM) is to provide an integrated, comprehensive assessment of all the risks that an institution is exposed to, and an objective and consistent approach to managing them. ERM provides a common language and view of risk across an institution. This foundation, empowered by industry knowledge, allows an institution to further understand its risk profile. The risks faced by diverse business units can be assessed using common categories and compared to the organization's strategic goals, and the risks associated with new products can be assessed in a comprehensive manner. ERM allows an institution to gain a clearer picture of its overall risk level, taking into account the correlations and dependencies that can exist across different financial products and risk types.

For all these reasons, financial institutions of a significant size should consider the benefits of an ERM program, and regulators are increasingly encouraging this trend. It is important to keep in mind, however, that there is no universally-accepted definition of ERM. An institution may have in place many of the elements of ERM but still not consider itself to have a full ERM program.

Yet, the survey seems to indicate ERM implementation during the last two years has been limited. Only 36 percent of the institutions participating reported that they had an ERM program or equivalent in place, similar to the percentage in the 2006 survey, while another 23 percent were in the process of implementing one. (See Exhibit 6.) More than 40 percent of the participating institutions lacked an ERM program.

ERM programs were more common at the larger firms, as 58 percent of institutions with \$100 billion or more in assets had ERM programs and another 19 percent were in

the process of implementing one. The size and complexity of the larger institutions make ERM more important; on the other hand, their very size and complexity also make it harder to achieve an enterprise-wide view of risk. Fewer smaller institutions had ERM programs: 32 percent of institutions with assets of \$10 billion to less than \$100 billion, and 27 percent of institutions with assets of less than \$10 billion. While one might argue that smaller, mono-line financial firms would see limited value from implementing an ERM program due to fewer sources of risk, any enhanced understanding of a firm's risk, may yield incremental benefits.

An analysis of the survey responses by primary business reveals that 44 percent of diversified financial organizations had ERM programs. None of the institutions who identified themselves as investment banks had ERM programs in place, although 29 percent said they were implementing one. These results are not surprising, given the greater emphasis on ERM programs placed by banking regulators than by securities regulators. Further, investment banks have traditionally adopted a shorter-term perspective on risk due to their trading and mark-to-market culture. This may have resulted in a different perspective on the role and value of ERM for these institutions.

Among institutions with ERM programs, 83 percent reported having an approved ERM framework or policy, with the remaining institutions in the process of creating one. Sixty-six percent of the institutions said their ERM framework had been approved at the board level. (See Exhibit 7.) While most institutions had their boards of directors play this essential review and approval role, ideally all institutions with an ERM program may want to have their ERM policy approved by the board, either by the full board of directors or by a board committee with responsibility for risk management oversight.

Exhibit 6

Does your organization have an integrated ERM program or equivalent?

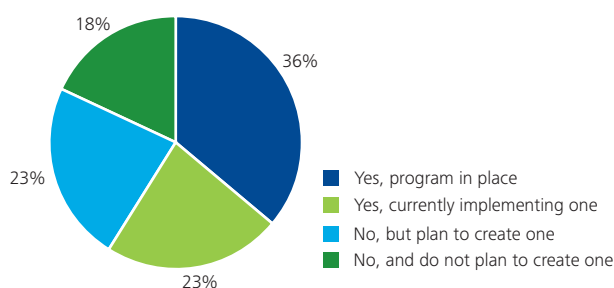
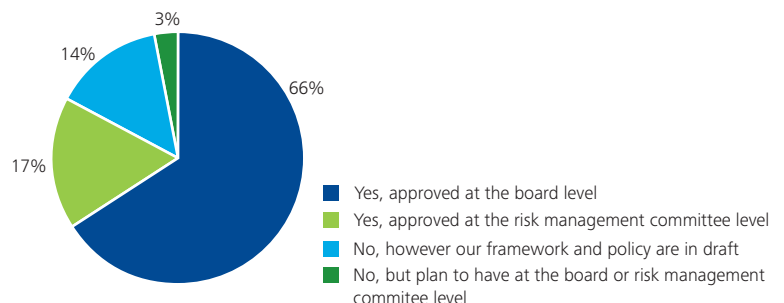


Exhibit 7

Does your organization have an approved ERM framework and/or an ERM policy?



Broader scope of ERM

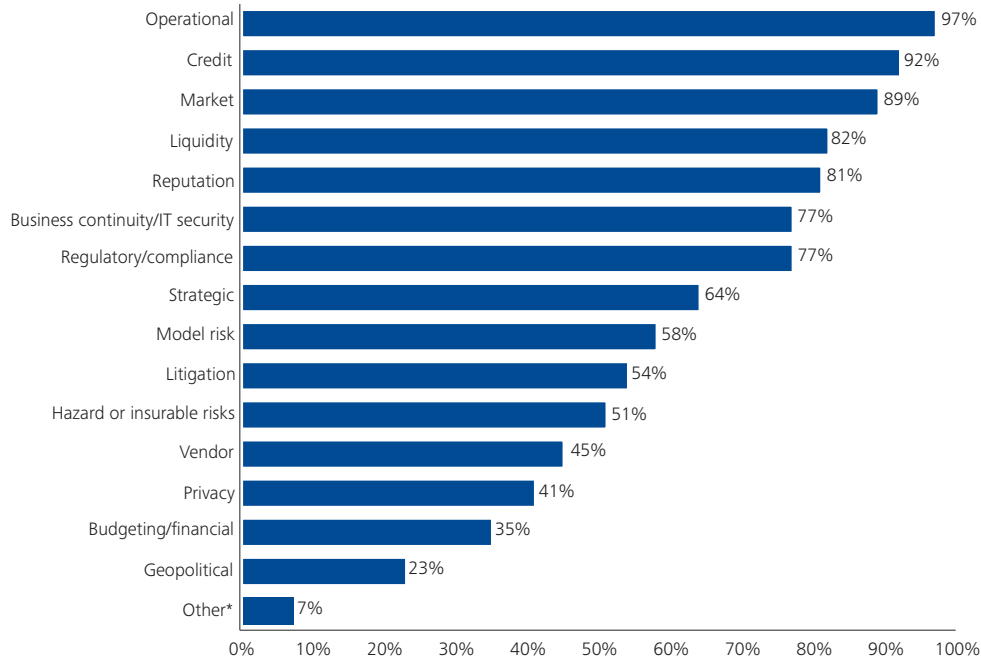
In the survey, almost all ERM programs focused on the more traditional risk types – credit, market, and operational risk. (See Exhibit 8.) Roughly 90 percent of ERM programs at the participating institutions covered credit and market risk. Operational risk, which has become a focus largely because of Basel II, was also included in nearly all of the ERM programs, indicating that it has now become almost universally accepted as a fundamental risk type to manage.

For the purposes of this discussion, we refer to “emerging” risk types as those not currently included in the Basel II Pillar 1 capital requirements. A number of these emerging risk types were also included in three quarters or more of the ERM programs: liquidity, reputation, business continuity/IT security, and regulatory/compliance risks. Improving model risk control and management has become more important due to the rising volatility in the financial markets, and the increased focus by regulators, and 58 percent of institutions participating included model risk in their ERM programs. On the other hand, relatively few institutions included a number

of other emerging risk types in their ERM programs such as vendor (45 percent), privacy (41 percent), budgeting/financial (35 percent), and geopolitical (23 percent).

The scope of many ERM programs has broadened, with several risk types now being included more often in ERM programs than was reported in the 2006 survey results. For example, 82 percent of the ERM programs now addressed liquidity risk, compared with 68 percent in 2006. Reputation risk and strategic risk are other emerging risk types that are now being considered more often by ERM programs. The percentage of ERM programs that covered reputation risk roughly doubled to 81 percent in this survey, as compared to the 2006 survey. Strategic risk was addressed in 64 percent of the programs in the current survey, but only by 37 percent in 2006. The increased focus on strategic and reputation risk may stem from the recent losses at many firms. Strategic missteps have contributed to many of the largest loss events, which have led to reputational damage as the market has called into question the leadership of executive management.

Exhibit 8
What types of risk do you attempt to manage within your ERM framework?



Base: Respondents at institutions with ERM program (or equivalent).
Note: Percentages total to more than 100% because respondents could make multiple selections.

***Other includes:**

- Environmental
- Operations, human resource
- Physical risk, infrastructure risks
- The framework is by definition comprehensive and attempts to capture all risks faced by the organization. In terms of management execution, business continuity, IT security, litigation, vendor and budgeting/financial risks have groups outside GRM with primary responsibility for the management/execution of the risks

ERM value and costs

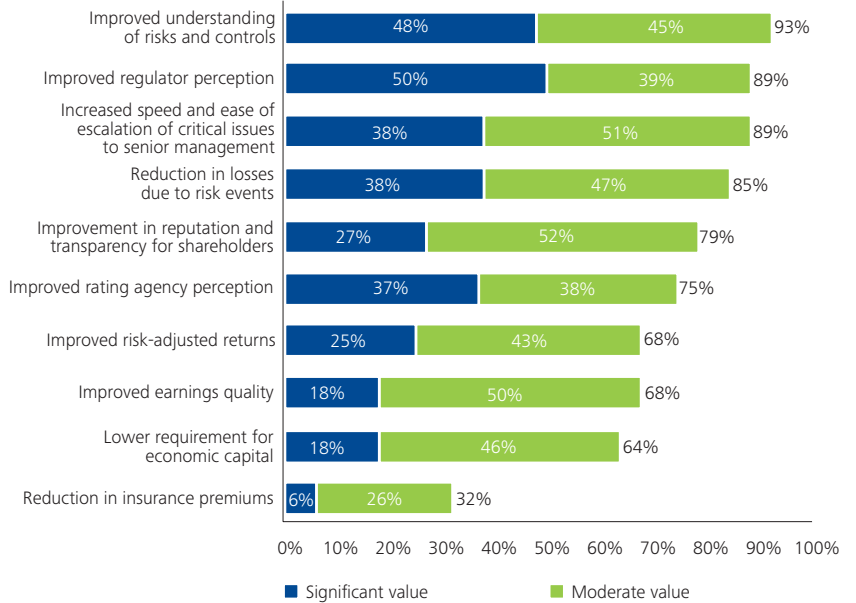
Among executives at institutions with ERM programs, 72 percent reported that the quantifiable financial benefits from the program exceeded its costs, while only eight percent said the costs were greater. When the comparison also included elements of value that cannot be quantified, the benefits of ERM were even more likely to exceed the costs. Eighty-five percent of executives said the total value (both quantifiable and non-quantifiable) of their ERM program was greater than its costs, up from 75 percent in the previous survey. In this survey, the figure included 45 percent who said the total value of ERM was much greater than its costs. An effective ERM program may lead an institution to forgo specific transactions, exposures, or product types based on consideration of all the risk elements and correlation with existing business, allowing it to avoid potentially large losses. Other important benefits may include a consistent language in which to assess risk, clearer governance for risk decisions, and achievement of a holistic view of exposures across the enterprise.

Forty-eight percent of executives said an improved understanding of risks and controls was a very significant value that their organization had gained from its ERM program. (See Exhibit 9.) This improved understanding of the risk environment and the organization’s mitigation efforts is a reason regulators have placed a priority on ERM. In fact, 50 percent of executives said ERM had provided significant value by improving perceptions of their institutions by regulators. Other benefits identified by respondents included the increased ability to quickly escalate critical issues to senior management, a reduction in losses, and improved perceptions by the rating agencies.

“One of our successful strategies in meeting the current challenges is having multi-disciplinary teams that include people who understand the traded mortgage product market extremely well, others who are accrual book/securitization types, hard core analysts, traders, and so on. Having that kind of team has really helped us get a deeper understanding of the issues.”

— Banking Chief Risk Officer

Exhibit 9
How much value do you believe your organization has received in the following areas from its ERM program or equivalent?



Base: Respondents at institutions with ERM program (or equivalent).

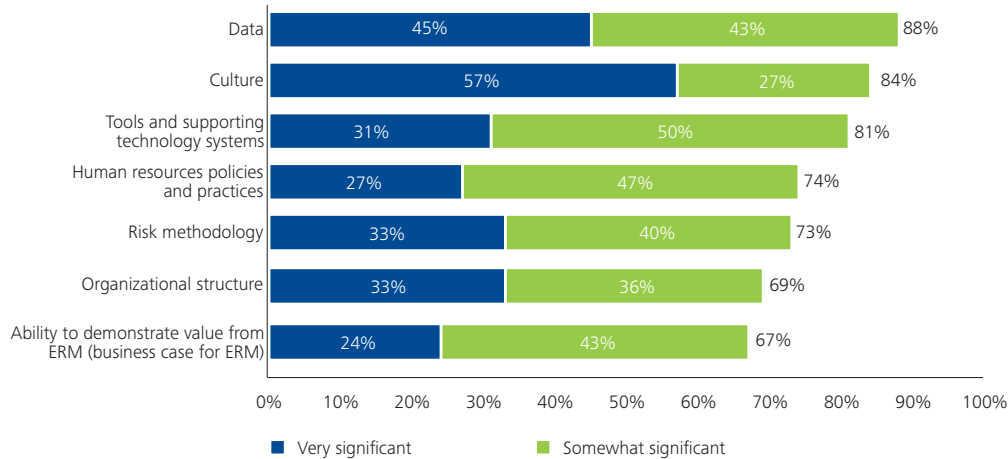
ERM challenges

Executives cited a number of issues as presenting significant challenges in implementing ERM. (See Exhibit 10.) Notably, cultural issues led the list, being rated as a very significant challenge by 57 percent of executives. In implementing ERM, institutions may need to manage turf battles as business units may resist having their decisions questioned by risk managers. It remains to be seen whether the losses that institutions have suffered recently in the turbulent financial markets may lessen these tensions. Because the degree of correlation and volatility across instruments, products, and geographies was unprecedented, business and risk managers alike should recognize that ERM can provide a more consistent risk framework.

The breadth of ERM also presents data challenges, as institutions may need to integrate data across their organizations from disparate information systems, which often have inconsistent definitions. Although data integration remains a challenge, it appears that some progress has been made. Forty-five percent of executives rated data as a very significant challenge to ERM implementation in the current survey, down from 61 percent in 2006. The significant investments in data infrastructure in response to Basel II implementation requirements likely contributed to the improvement on this front.

Exhibit 10

How significant are the following challenges to your organization in implementing its ERM program or equivalent?



Base: Respondents at institutions with ERM program (or equivalent).

Other significant challenges mentioned include:

- Developing methodology relevant to our business model and associated activities
- ERM is the approach we are taking to manage the risk profile and risk appetite of the company; it is not done as a "program" and one of the main reasons we have had minimal resistance is that it is understood as the mechanism we use to manage risk for the enterprise

Regional perspective: ERM

ERM programs were more common among U.S. and Canadian institutions (at 47 percent) and among Asian institutions (at 42 percent). In contrast, only 17 percent of European firms had an ERM program in place. The more widespread adoption of ERM by U.S. and Canadian institutions likely reflects the focus by banking regulators on ERM in their assessments of the effectiveness of risk management. Among U.S. and Canadian institutions that had an ERM program, 76 percent had their ERM framework approved at the board level, compared to 57 percent for European institutions.

Basel II

Basel II improves the risk sensitivity of an organization's regulatory capital measures, and requires significantly improved measurement of credit, market, and operational risks based on a sufficient history of internal data. Basel II is in varying stages of implementation around the world, with the timeframe for its adoption in the United States trailing that in other developed markets. Solvency II is a similar capital adequacy regime for European insurance companies that is currently under development.

Even as the implementation process for Basel II continues, however, the Basel Committee is revisiting elements of the framework in light of the lessons learned from recent financial market turmoil. In January 2009, the Basel Committee issued a series of consultation papers containing proposed revisions to the Basel II framework. According to Nout Wellink, Chairman of the Basel Committee, "The proposed enhancements will help ensure that the risks inherent in banks' portfolios related to trading activities, securitizations, and exposures to off-balance sheet vehicles are better reflected in minimum capital requirements, risk management practices, and accompanying disclosures to the public."¹⁴ The proposals include additional capital requirements in the trading book for complex securitizations, such as collateralized debt obligations, and for off-balance sheet vehicles such as asset-backed commercial paper conduits.

In June 2008, the Basel Committee published a consultative document recommending steps to strengthen the management of liquidity risk. These recommendations included the establishment of a liquidity risk tolerance across an institution, improvements to liquidity risk measurement, the additional use of stress tests, and the maintenance of an adequate cushion of high-quality liquid assets to enable an institution to survive should liquidity decline significantly.¹⁵

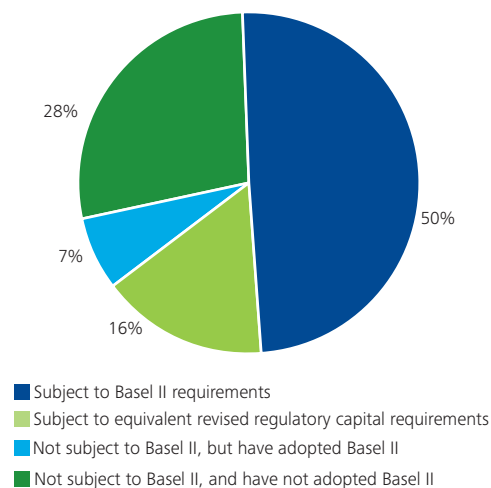
The Basel II supervisory framework is also evolving with regard to expectations under the Internal Capital Adequacy Assessment Process (ICAAP), or Pillar 2. ICAAP is a future-oriented process that is expected to become far more rigorous, with an enhanced focus on emerging risk types such as liquidity, strategic, and compliance risks, that are not included in the minimum capital requirements specified in Pillar 1. (Please see the sidebar on page 18, "Internal Capital Adequacy Assessment Process (ICAAP).") The techniques used to address Pillar 2 may include stress tests and calculating economic capital. (See the section

"Economic Capital" on page 17.) In implementing ICAAP, institutions face challenges in aggregating these different risk types, because institutions use different methodologies for measuring each, as well as how to assess tail risk. The actual use of the advanced risk systems, data, and models as an integral part of business decision-making and operations will likely be key to regulatory acceptance of an institution's regulatory capital models and framework. This is the so-called "use test."

Progress being made

Half of the institutions participating in the survey were subject to the Basel II requirements. (See Exhibit 11.) In addition, 16 percent reported being subject to revised regulatory capital requirements that were equivalent to Basel II, while seven percent said that although not subject to Basel II, they had voluntarily adopted the Basel II requirements. These responses reflect the varying options that different jurisdictions are provided with regard to Basel II compliance. In the United States, only the largest banking institutions are subject to the advanced approaches, while use of the standardized approaches for the vast majority of banks is still under development. In other jurisdictions, simpler approaches are generally available to small banks, and even to some larger institutions, as a phased adoption of the advanced approaches is still in progress.

Exhibit 11
Is your organization subject to Basel II requirements or to equivalent revised regulatory capital requirements?



Note: Some graphs do not add to 100% due to rounding.

¹⁴"Regulators Unveil Raft of Rules to Bolster Banking System," *Global Risk Regulator*, January 2009

¹⁵"Principles for Sound Liquidity Risk Management and Supervision," Basel Committee on Banking Supervision, September 2008, <http://www.bis.org/publ/bcbs144.htm>

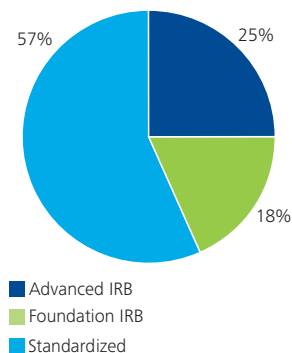
The institutions subject to Basel II were employing a range of approaches to comply. (See Exhibit 12.) Since the capital adequacy requirements for assessing market risk were first issued by the Basel Committee in 1996, institutions have had more time to adopt an advanced approach for market risk. For market risk, roughly half of the institutions were using the more advanced Internal Models Method, while 42 percent were employing the Standardized Measurement Method. Most institutions were not as far along in assessing credit and operational risk. For credit risk, more than half of the institutions were using the Standardized Approach, although one quarter were employing the Advanced IRB approach. For operational risk, roughly 40 percent each were using the Standardized/Alternative Standardized Approach or the Basic Indicator Approach, while fewer were using the Advanced Measurement Approaches.

Typically, the larger or more sophisticated institutions employ the more advanced Basel II methods. While these methods can provide a more reliable assessment of an institution's risk profile, they are also more complex and expensive to implement. The scale and scope of the requirements may impact front, middle, and back office systems, business processes and operations, risk management, and the regulatory reporting infrastructure.

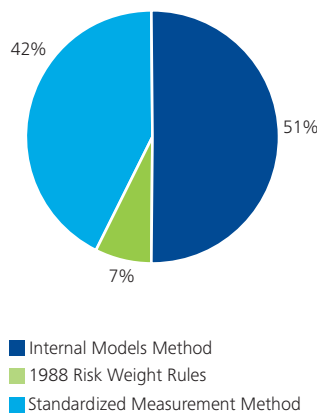
There were a variety of approaches that institutions had taken when conducting an ICAAP for Basel II Pillar 2. As expected, the most common approach taken was the Economic Capital Approach, employed by 51 percent of the institutions, followed by the Pillar 1 Plus Approach (22 percent) and the Expert Judgment Approach (15 percent). ICAAP is likely to drive greater convergence between economic capital and regulatory capital processes. While the underlying models and methodologies may continue to differ (as they currently do in many cases), the data and processes are likely to be leveraged to drive both applications. Differences between the two models may have to be understood, documented, and explained.

Exhibit 12
Which approach does your organization currently use or intend to use for Basel II on a consolidated basis?

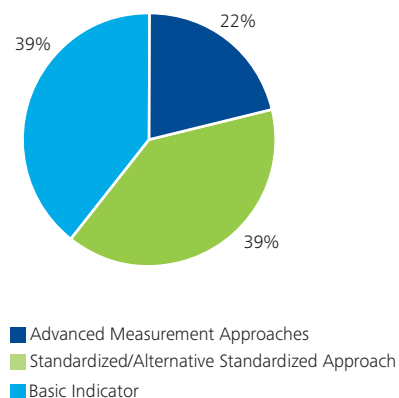
Credit risk



Market risk



Operational risk



Base: Respondents at institutions subject to Basel II.

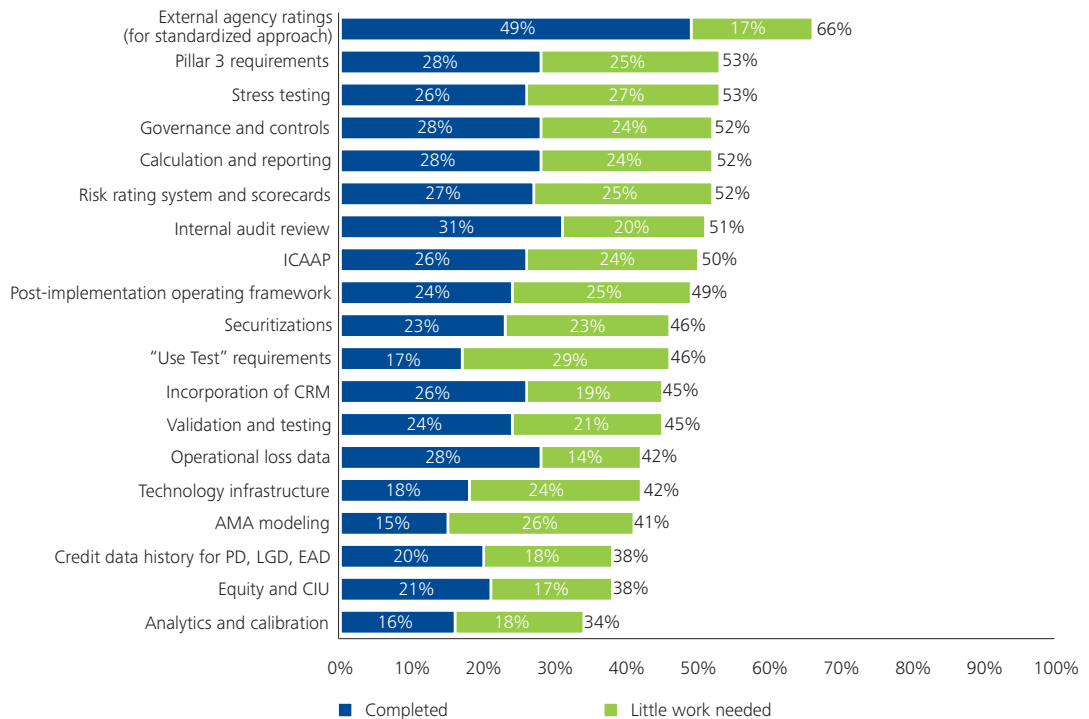
Most institutions have made substantial progress in implementing the Basel II requirements. (See Exhibit 13.) For many areas, more than half of the institutions reported that they had implemented Basel II or that little work remained. These results represent a significant improvement since the 2006 survey. For example, work on employing external agency ratings for the Standardized Approach had been completed by 49 percent of the institutions, while 17 percent said little work was needed, compared with only 19 percent and 27 percent, respectively, in 2006. Similarly, 52 percent of institutions said work on governance and controls was

completed or substantially completed, compared with 31 percent in 2006.

While much of the focus had been on complying with Pillar 1, roughly half of the institutions reported that they had completed work to comply with Pillar 2 requirements, or that little work remained. In addition, roughly half of the institutions had fully or substantially completed their preparations employing stress tests and ICAAP. Responding to the credit crisis may have led more institutions to make progress in these areas while they were developing stress testing and other capabilities.

Exhibit 13

What level of progress has your organization made with respect to implementing the following areas for the purposes of Basel II?



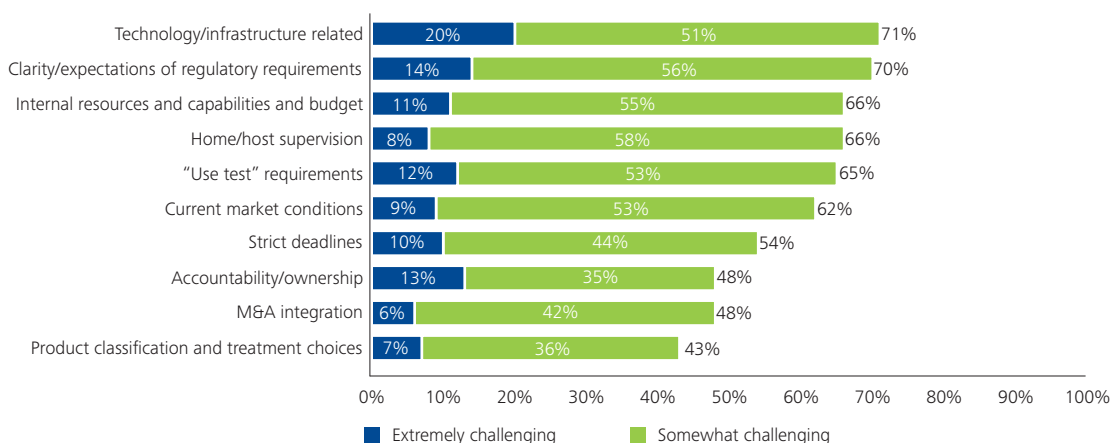
Base: Respondents at institutions subject to Basel II and to whom these implementation areas are applicable.

Given such considerable progress on implementation, it is not surprising that institutions found the remaining challenges around Basel II to have diminished since 2006. Only seven to 14 percent of executives considered most issues to be extremely challenging in complying with Basel II requirements. (See Exhibit 14.) Technology infrastructure was seen as the most challenging issue, but was still rated as extremely challenging by only 20 percent of executives. The explanation for these low percentages seems to be the additional experience that institutions now have with the Basel II requirements. For example, many institutions are doing a “parallel run” – a mandatory one-year period when both Basel I and Basel II capital results are produced before the Basel II floor period starts.

The survey findings regarding the lack of significant implementation challenges are likely influenced by respondents from non-U.S. jurisdictions where more work has been done due to earlier timelines, and where the standardized approaches are available. In these jurisdictions, far more institutions have implemented the standardized approaches (for credit and operational risk) and not advanced approaches (AIRB for credit risk or AMA for operational risk). Since the Standardized Approach is structurally similar to the current rules, it is possible that respondents may be underestimating the effort needed to build advanced systems, if and when they migrate to the advanced approaches.

Exhibit 14

How challenging are the following issues for your organization in relation to your Basel II implementation effort?



Base: Respondents at institutions subject to Basel II and to whom these implementation areas are applicable.

Regional perspective: Economic capital

The comparatively early adoption of Basel II requirements by European regulatory authorities has likely contributed to economic capital calculations being reviewed and employed more often by the boards of directors of European institutions. Approval of economic capital reporting and results was a responsibility of the board of directors at 65 percent of European institutions, compared to 55 percent of institutions in Asia-Pacific and only 17 percent of U.S. and Canadian institutions.

European institutions were also more likely to calculate economic capital in specific areas. For example, 61 percent of European institutions calculated economic capital for counterparty credit risk of the trading book, compared to 45 percent of U.S. and Canadian institutions and 33 percent of institutions in Asia-Pacific. Similarly, 64 percent of European institutions calculated economic capital for operational risk, compared to 50 percent of U.S. and Canadian institutions and only 37 percent of institutions in Asia-Pacific.

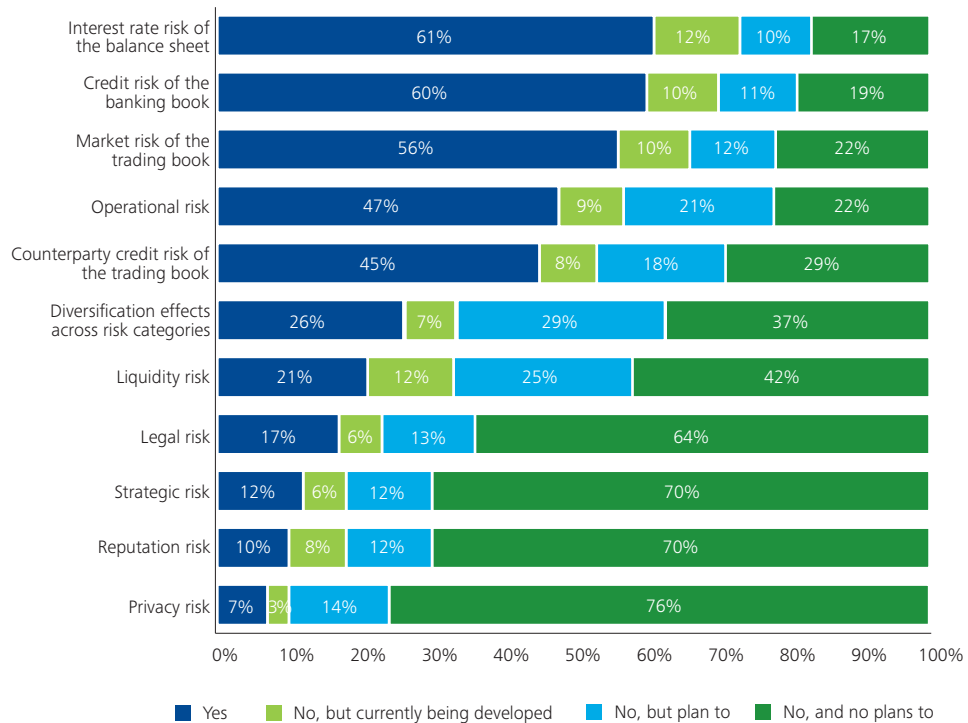
These differences across regions are also apparent in responses to the Internal Capital Adequacy Assessment Process with respect to Basel II Pillar 2. Among the European institutions, 58 percent employed the economic capital approach, while 50 percent of the U.S. and Canadian institutions and only 38 percent of the institutions from Asia-Pacific did so.

Economic capital

Economic capital (EC) is the underlying concept behind Basel II regulatory capital definitions, and that has gained attention due to the ICAAP/Pillar 2 requirements. Calculating EC that reflects an institution's actual risk profile and risk tolerance is a key tool for allocating capital internally for management reporting and assessing risk-adjusted performance. While 83 percent of the participating institutions calculated economic capital, the underlying approaches and applications of EC varied. Among institutions that use EC, 56 percent evaluated/allocated economic capital at the enterprise level, while 53 percent said the board of directors and senior management used economic capital calculations to assist in strategic decisions. Among institutions that calculated economic capital, 45 percent said the board of directors periodically reviewed the capital allocation results.

As expected, most institutions calculated economic capital for more traditional risk types. More than half of the institutions did so for interest rate risk of the balance sheet, credit risk in the banking book, and market risk for the trading book. (See Exhibit 15.) Just under half of the institutions also calculated economic capital for counterparty credit risk for the trading book. Forty-seven percent of the institutions calculated economic capital for operational risk, which is similar to the percentages for the more established categories of market and credit risk. The timeframe for Basel II implementation is also likely driving the adoption of EC for operational risk. In Deloitte's experience with its clients, to increase efficiency, many institutions use the same underlying operational risk model for both economic capital and Basel purposes. This is less likely the case for credit and market risks.

Exhibit 15
Do you calculate economic capital for the following risk types?



Note: Some graphs do not add to 100% due to rounding.

While 83 percent of institutions reported calculating economic capital on at least an overall basis, many institutions did not calculate economic capital individually for important risk types. For example, 40 percent of the institutions participating did not calculate economic capital separately for the credit risk in their banking book. In addition, 55 percent did not allocate economic capital for the counterparty credit risks for traded products. Only 26 percent of the institutions participating calculated economic capital for diversification effects, and only 21 percent did so for liquidity risk. Calculating economic capital for other risk types, such as legal, strategic and reputation, is even more difficult. This is an area where many institutions may consider enhancements: More institutions may need to calculate economic capital for the traditional risk types at a minimum, but over time for emerging risk types as well. These results may point to the reality that relatively simple, top-down models are in place within many firms, and that institutions should consider developing more sophisticated EC frameworks that provide comprehensive coverage of risk exposures before relying on these models for significant management decisions. In some cases, EC models may have been put in place largely to satisfy regulatory objectives.

Underscoring this point, the survey found that among institutions that did calculate economic capital, most executives did not consider these calculations to be particularly sophisticated. Only 35 percent of institutions using EC models rated their economic capital calculations for market risk as highly sophisticated, while 31 percent gave this rating to their calculations for interest rate risk. For other risk types, percentages were even lower. For example, only nine percent of respondents considered their economic capital approach for liquidity risk to be highly sophisticated.

A topic of discussion is how stringent regulatory capital requirements should be, and the survey addressed the relationship between economic capital and regulatory capital in the aggregate. Interestingly, the responses were fairly evenly split: Forty-six percent of executives said economic capital at their institutions was greater than regulatory capital requirements, while 42 percent said regulatory capital requirements were higher than economic capital. The relative amounts of economic and regulatory capital are heavily influenced by the types of businesses that an individual institution engages in, and whether those businesses are capital intensive. Given the relatively stressed environment during which the survey was conducted, it is surprising that economic capital requirements were not higher. Typically, the EC models assume a higher confidence level of loss coverage than do regulatory models.



Internal Capital Adequacy Assessment Process (ICAAP)

The ICAAP is more than just another regulatory compliance challenge. First, it includes several areas (e.g., business risk, risk aggregation) for which no market standard has yet emerged, and therefore is less prescriptive than other risk regulations. Second, it touches the core of being a financial institution, by providing an answer to the question ‘How much capital does it need to protect all its debtors while at the same time achieving an adequate return on equity for the shareholders?’

Obviously, the outcome of the ICAAP is the answer to the question of whether the organisation has enough capital to support its business. However, the process by which the company arrives at that number is as important, if not more so. By involving people at different layers, including board members and members of the senior management and of all entities of the organisation, head office and subsidiaries, we increase the risk awareness of the entire organisation, and protect against dogmatic thinking by letting employees in the field contribute to risk identification and assessment.

Another essential ingredient of the ICAAP lies in its forward-looking nature. It is not sufficient to take into account the present exposures, but also how they are expected to evolve over time.

Excerpted from the “Foreword” of:

Pillar II in the New Basel Accord:

The Challenge of Economic Capital

Professor Dr. Frank De Jonghe

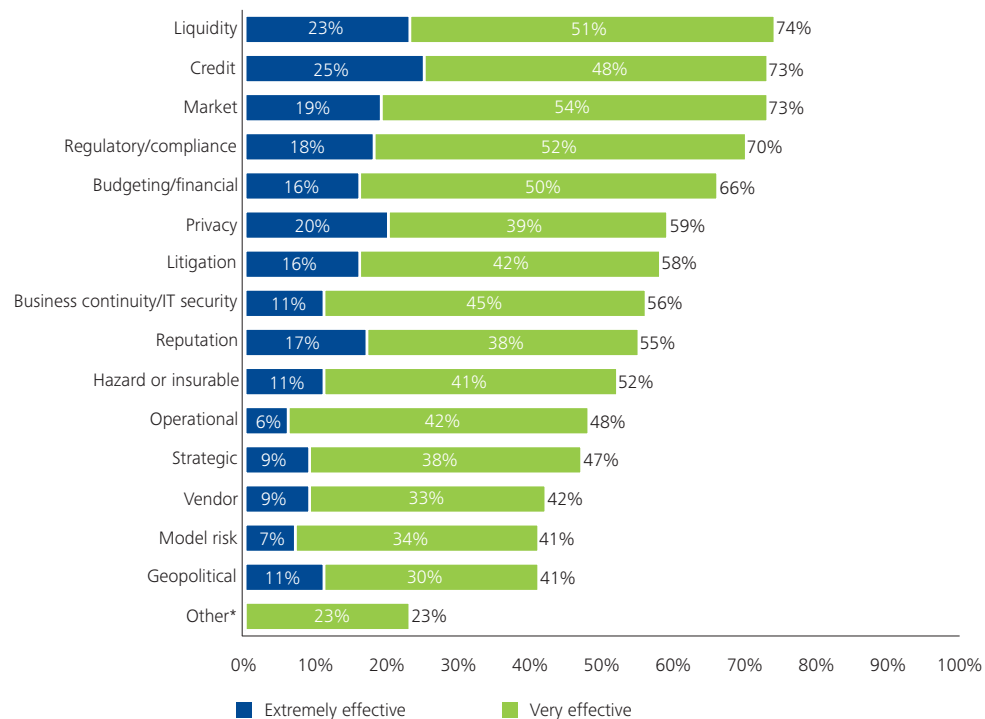
Partner and EMEA Quant Initiative Lead, Deloitte Belgium

Management of key risks

The turbulence in the financial markets and the broader economy have created a complex and rapidly shifting landscape for risk management programs to navigate. Financial institutions may need to enhance their management of key risks, including traditional risks such as credit and market risk, while also addressing emerging risk types. While this survey focuses on several risks as being “key,” it is incumbent upon each institution to do their own assessment of key risk types. In total, this survey asked respondents about their institution’s capabilities in managing 15 individual types of risk.

Most respondents gave high ratings to the effectiveness of their risk management programs for the more traditional risk types. (See Exhibit 16.) Roughly three quarters of those surveyed rated their organizations as being extremely or very effective at managing liquidity risk (74 percent), credit risk (73 percent), and market risk (73 percent). Seventy percent of risk executives considered their institutions extremely or very effective at managing regulatory/compliance risk, an increasing concern over the last several years as new or strengthened regulatory requirements have been established. The importance of managing regulatory risk is expected to continue to grow because of the numerous recommendations for changes to the regulatory framework in many jurisdictions.

Exhibit 16
How effective do you think your organization is in managing the following risks?



***Other includes:**

- IRROBB (interest rate risk on banking book)
- Project risk
- Systems risk regarding legacy systems, etc.
- We leverage much of our resources in producing and delivering services. We don't manage the broad risks associated with maintaining our infrastructure competencies as much as we should. Examples would include improving our “people” practices to insure that we retain and grow our knowledge base; assessing and replacing our support technologies, e.g., investment performance systems, compliance systems, etc., and updating our critical processes, e.g., client service

However, there is opportunity at many institutions to create a more integrated compliance function. The proliferation of regulatory requirements, many of which address risk management, has created multiple groups within some organizations with compliance-related responsibilities, including Sarbanes-Oxley, internal audit, compliance, and finance. Different regulations frequently contain similar or overlapping requirements, which have frequently led to several groups gathering the same data and conducting similar tests. In addition, organizations often have multiple control and quality assurance/testing groups. The result has often been an inefficient process, and multiple groups with overlapping responsibilities may have made it more difficult for management to achieve a comprehensive, integrated picture of the institution's risk profile.

Creating an integrated structure for compliance and risk management may improve the management of compliance risk while also increasing efficiency and lowering costs. Most executives said that integrating these functions is a significant priority for their institutions over the next 12 months. More than half of surveyed executives said that it was a high priority to communicate the importance of compliance across their organizations, to ensure management is committed to compliance at all levels, and to centralize risk management reporting across functions and lines of business.

“What has the credit crisis taught us? First, that typical observed diversification doesn't always work. You've got to worry about all of the effects—on equity, on liquidity, on capital availability, etc. Also, whatever you imagined as an extreme tail event, imagine something even worse. And then make sure you understand all its implications to your business as a whole and also to your various entities.”

— Insurance Chief Risk Officer

Many firms may also want to improve their capabilities in assessing and mitigating certain of the less traditional emerging risk types. For example, 59 percent of executives rated their institutions as extremely or very effective at managing privacy risk, which is receiving more attention because of additional regulatory requirements designed to safeguard the privacy of customer data, as well as widely-publicized instances in which personal information such as credit card data has been lost, stolen, or misplaced. Similarly, less than half of the executives rated their institutions as extremely or very effective at managing operational risks, model risks, strategic risks, and vendor risks.

Managing model risk is important. Models are used in financial services institutions in a wide variety of ways, including for credit decisions, transaction pricing, allowances and reserves, financial instrument valuation, asset-liability management, and to assess and measure risk. Regulatory authorities have been encouraging financial institutions to independently validate their models to ensure they reliably assess the magnitude and likelihood of potential risks. The recent developments in the financial markets have also underscored the importance of model validation. Fifty-three percent of the institutions participating had an independent model validation function, with an additional 17 percent planning to institute one. Almost two thirds of the remaining respondents did not have such a function nor plans to create one; the survey also found that smaller institutions were less likely to have a model validation function.

Larger firms were more likely to independently validate their models, as 66 percent of institutions with assets of more than \$100 billion did so. This compares with 56 percent of institutions with assets of \$10 billion to \$100 billion and 41 percent of institutions with assets of less than \$10 billion. Viewed by region, almost two thirds of the institutions headquartered in Europe, the U.S. and Canada had an independent model validation function, compared with only 40 percent in the Asia-Pacific. This difference appears to reflect the emphasis that European, U.S., and Canadian regulatory authorities have placed on model validation. In the future, we expect that more institutions may choose, or be compelled, to develop an independent model validation function.

The survey explored in detail how institutions are managing four key risk types – credit, market, liquidity, and operational risks.

Credit risk

The developments in the credit markets have led to an increased focus on managing credit risk. Credit markets have contracted, underwriting standards have become more stringent, and spreads have generally widened. As noted in the Senior Supervisors Report, “Firms that sought to offset the risk of these positions by purchasing protection from financial guarantors were subject to a “wrong-way” counterparty credit exposure because the financial capacity of these counterparties to perform on their contracts is correlated with the value of the underlying positions being hedged.”¹⁶

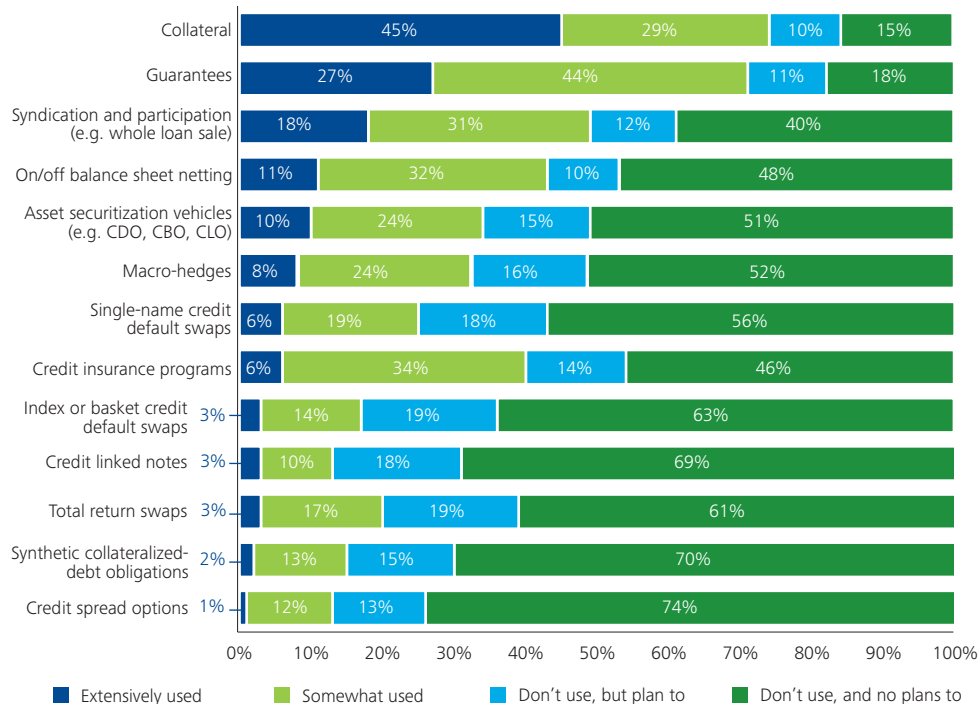
Changes in the securitization market necessitate new approaches to managing credit risk. With the current inability to securitize assets, some consider that the “originate-to-distribute” model is no longer viable. In addition, new regulations may require originators to hold a significant portion of the assets they plan to securitize. Given this shift in the paradigm, making sound credit approval and pricing decisions becomes more important. Institutions are likely now more focused on conducting independent credit analysis, both for borrowers and for credit providers and guarantors. In this effort, they will likely require input from predictive analytics using the latest information on borrower behavior. Loan portfolios

may require rigorous monitoring for deterioration in credit quality and related delinquencies and charge-offs. Institutions will likely need to recognize the importance of managing both credit risk and market risk for loans intended for eventual sale.

There was broad consensus among the institutions surveyed about the responsibilities of the independent credit risk management function. Roughly 80 percent of institutions said that primary responsibilities included risk analytics, quantification, and portfolio risk reporting; monitoring of risk exposures compared to limits; overseeing and participating in risk committees; and developing controls and policies. Roughly 40 percent of institutions reported that the primary responsibilities of the credit risk management function included calculating and reporting economic and regulatory capital; approving individual transactions; and recommending actions to reduce, neutralize, or hedge positions. In some institutions, it appears that these responsibilities are handled by other groups such as finance, compliance, business units, or in some cases a portfolio management function.

Executives were asked which tools their institutions used in credit risk mitigation, both in their banking books and in their trading books. (See Exhibits 17 and 18.) Most

Exhibit 17
Use of credit risk mitigation in the banking book

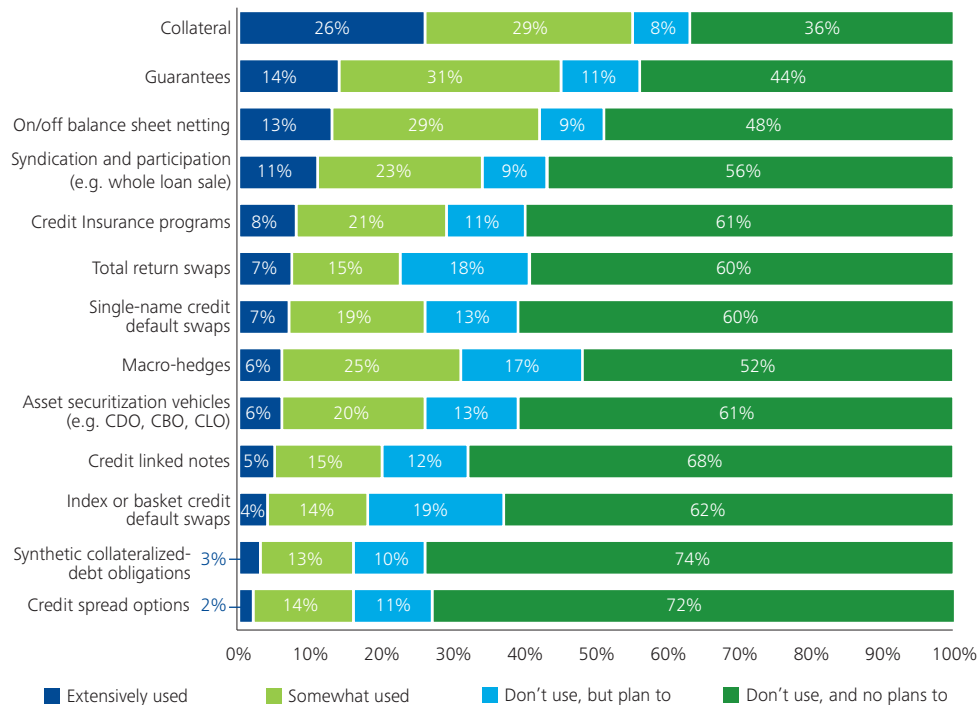


Note: Some graphs do not add to 100% due to rounding.

¹⁶Senior Supervisors Group, *Observations on Risk Management Practices during the Recent Market Turbulence*, March 6, 2008

Exhibit 18

Use of credit risk mitigation tools in the trading book



Note: Some graphs do not add to 100% due to rounding.

institutions said they continued to rely on traditional methods to mitigate credit risk in the banking book, such as collateral (74 percent) and guarantees (71 percent). These methods were also often used in the trading book, although somewhat less frequently than for the banking book exposures – 55 percent for collateral and 45 percent for guarantees.

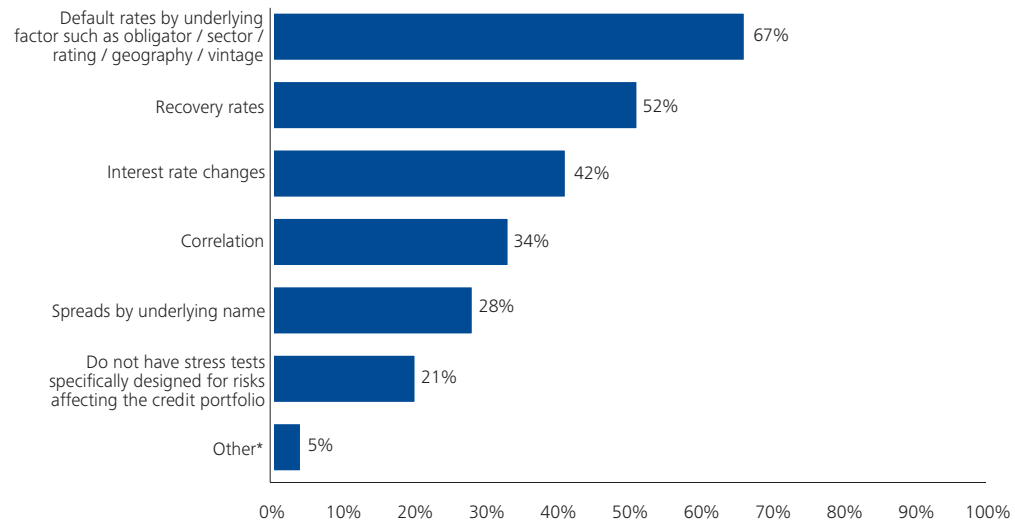
Some of the more complex tools for credit risk mitigation were used by relatively few firms. For example, only 34 percent of institutions reported using asset securitization vehicles in their banking books, with 26 percent reporting using the same in their trading books. For single-name credit default swaps, 25 percent used them in their banking books and 26 percent in their trading books.

When it comes to measuring counterparty/issuer credit exposures, most institutions again relied on traditional methodologies. The most common methodology was principal/notional (such as by industry, sector, or geography), which was used as the primary methodology by 69 percent of institutions for their banking book exposures, and by 61 percent for their traded credit product exposures. Also common were the aggregating of potential exposures for individual transactions and assessing potential exposure by using analytical methods, each of which were used by roughly half of the institutions for both their banking and trading books. Only about one third of the institutions used the method of assessing potential counterparty/issuer exposure by simulation, for either their banking book or their trading book.

Roughly two thirds of institutions reported stress testing default rates by underlying factors such as obligor, sector, or rating, while 52 percent stress tested recovery rates. (See Exhibit 19.) Yet, 21 percent of institutions said they did not have stress tests specifically designed for credit risks. Institutions have found that developing robust stress tests is difficult, especially in the current turbulent market conditions, and many firms may need to make additional progress in this area. Since there is no recent historical parallel for the current severe downturn in the financial markets and the broader economy, the data available to institutions is limited in that respect.

Almost two thirds of the respondents indicated they do not have capabilities to conduct scenario analysis of tail risk for their structured products. Only 20 percent of institutions said they had this capability before recent market events, while 16 percent reported adding the modeling capabilities in response to these events. The use of scenario analysis was most common among the larger institutions, where 41 percent of institutions with assets of more than \$100 billion reported having this capability before the recent market events. Tail risk, especially for structured credit products, is an important issue, and many institutions may need to upgrade their capabilities to assess risk in stressed market conditions.

Exhibit 19
Which of the following types of stress tests does your institution employ for risk factors affecting the credit portfolio?



Note: Percentages total to more than 100% because respondents could make multiple selections.

***Other includes:**

- Changing of risk weights of some Basel II portfolios. Changing of the exchange rates
- Private equity (part of our credit portfolio) stress tests are set like equity stress tests

Relatively few institutions reported modeling various types of reference names/assets – corporate names (59 percent), RMBS names (46 percent), ABS names (45 percent), CMBS names (46 percent), and CDO tranches (35 percent).

Monitoring counterparty credit risk for traded credit has aspects of both credit risk and market risk, and may be best managed jointly. However, only 34 percent of institutions reported having this responsibility shared by credit risk and market risk management functions. On the other hand, 31 percent of the institutions participating placed this responsibility with credit risk management, while the market risk management function performed this role for 11 percent of respondents. The remaining institutions assigned this responsibility to various other groups including front office, middle office, and product controllers/finance.

Market risk

In the wake of the turmoil in the financial markets, the markets for structured products, such as collateralized debt obligations, have generally remained closed. Rather than being actively traded, structured products are being traded in negotiated transactions. As a result, there has been a greater focus on trading simpler products driven by customer hedging activity, such as foreign exchange and interest rate swaps.

In managing market risk in this environment, many are now challenging long-accepted methodologies, notably VaR. In a recent and widely-read article in the *New York Times Magazine*,¹⁷ the merits of VaR were discussed and debated. One individual quoted, David Viniar, Chief Financial Officer, Goldman Sachs, said: “VaR is a useful tool. The more liquid the asset, the better the tool. The more history, the better the tool. The less of both, the worse it is. It helps you understand what you should expect to happen on a daily basis in an environment that is roughly the same. ... The question is: how extreme is extreme? Things that we would have thought were so extreme have happened. ... Nothing ever happens until it happens for the first time.”¹⁸

The challenges of VaR have also been acknowledged by key financial regulators. In its March 6, 2008, report to the Financial Stability Forum of the Bank for International Settlements,¹⁹ the Senior Supervisors Group (a consortium of banking regulators from five large developed countries) reported on a range of observations of banks’ risk management practices and noted: “VaR measures formed a key barometer for most firms in understanding their sensitivity to changes in market conditions. In the course of market events, most firms indicated that their VaR measures performed as expected, but many identified weaknesses in the assumptions and specifications underpinning their VaR measures. Some firms identified shortcomings in their assumptions about the scale of shocks or degree of market volatility they may face; how their holdings of (relatively new forms of) instruments may behave in comparison with more established debt products when shocks strike markets; or how the accuracy of their VaR measure is affected by the accuracy of price estimates for less liquid or illiquid securities. Nonetheless, some firms emphasized that the dependence on historical data makes it unlikely that a VaR-based measure could ever capture severe market shocks that exceed recent or historical experience, highlighting the importance of supplementing VaR with other views on risk.”²⁰

“This has been a massive lesson on the potential for tail risk to really hit you over the head. So understanding the size of the tail risk and focusing more on the tail distribution is absolutely critical.”

— Banking Chief Risk Officer

¹⁷Joe Nocera, “Risk Management: What Led to the Financial Meltdown,” *New York Times Magazine*, January 4, 2009

¹⁸Ibid, p.12

¹⁹Senior Supervisors Group, *Observations on Risk Management Practices during the Recent Market Turbulence*, March 6, 2008

²⁰Ibid., p. 4

Some of the regulators' more recent criticisms of VaR have been more focused. In the March 2009, *Turner Report*, the United Kingdom's Financial Services Authority said: "It is clear in retrospect that the VAR measures of risk were faulty and that required trading book capital was inadequate. ... The financial crisis has revealed ... severe problems with these techniques. They suggest at very least the need for significant changes in the way that VAR-based methodologies have been applied: some, however, pose more fundamental questions about our ability in principle to infer future risk from past observed patterns. Four categories of problem can be distinguished: Short observation periods ... Non-normal distributions ... Systemic versus idiosyncratic risk ... Non-independence of future events; distinguishing risk and uncertainty."²¹

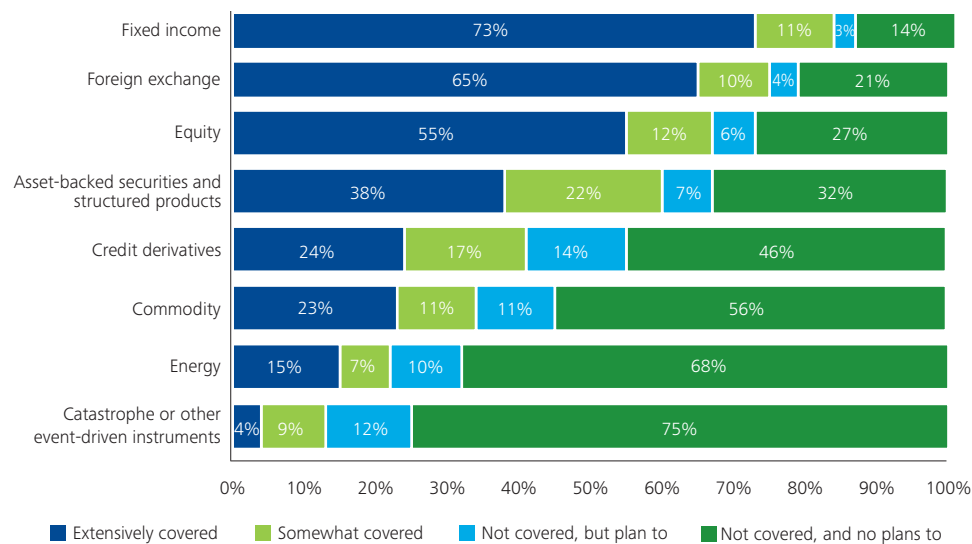
While VaR is useful, institutions are increasingly supplementing its use with other tools such as stress tests and scenario analysis. In our view, institutions should not rely on a single risk model, but should instead use a variety of tools. These should include stress tests and also simpler methods such as monitoring the size, concentration and liquidity of positions. Senior management should also have a deeper understanding of the drivers of value and risk in the institution's different businesses, and be ready to apply business judgment to the results of quantitative models. Among the institutions participating in the survey, nearly all (95 percent) reported using VaR to measure

and monitor market risk. There are many different VaR methodologies; the most common VaR methodology was historical simulation/full revaluation, employed by 46 percent of institutions.

The tools used by an institution to assess market risk should be appropriate for its portfolio. For example, variance/covariance based on first-order Greeks, used by 31 percent of the surveyed institutions, is generally considered appropriate for simpler, less complex product portfolios with linear risk profiles. Methodologies like Monte Carlo simulation with full revaluation, employed by 27 percent of the institutions, are similarly considered suited to portfolios with more complex instruments and more complex risk profiles.

Institutions were most likely to report using VaR for more mature asset classes such as fixed income, foreign exchange, and equity, where between 55 percent and 73 percent said they were extensively covered by VaR analytics. (See Exhibit 20.) In contrast, when asked about newer and more complex products, only 38 percent of institutions said asset-backed securities and structured products were extensively covered by VaR analytics, and 24 percent said credit derivatives were extensively covered. Although it should not be the sole methodology, VaR should generally be used more consistently as one of the measures to assess market risk across an institution.

Exhibit 20
To what extent does your Value at Risk (VaR) analytics cover the following asset classes?



Note: Some graphs do not add to 100% due to rounding.

²¹Financial Services Authority, *The Turner Review: A regulatory response to the global banking crisis*, March 2009

Stress tests are an important supplement to VaR. Roughly 80 percent of the institutions reported stress testing their banking books and trading books. (See Exhibit 21.) Fifty-eight percent performed stress tests of their structured products book.

Many institutions may consider performing stress tests more frequently. Among the institutions that performed stress tests of their trading books, 41 percent performed them daily and 17 percent performed them weekly. This leaves 42 percent of institutions where trading book stress tests occurred at monthly intervals or even less often. Among institutions that conducted stress tests of their structured products books, only 17 percent conducted them daily, while 68 percent conducted these tests monthly or less often. Given the recent volatility and turbulence of financial markets, many financial institutions should consider doing stress testing more frequently, possibly even daily.

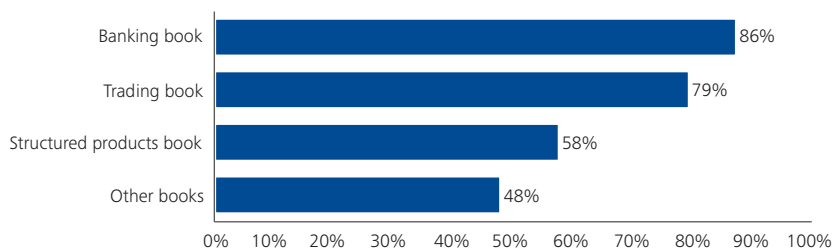
Independent price verification

Trading desks, finance, risk management, capital determination, and other important areas and functions necessarily rely on pricing models, and institutions may require an independent control on the prices they employ. It is notable that 86 percent of the institutions reported performing independent price verification, but they took a variety of approaches in terms of which group performed this function. The most common choice was risk management, where 40 percent of institutions placed independent price verification. At many other institutions, however, the groups performing this function included the middle office (21 percent), product controller/finance (18 percent), and back office (12 percent).

Investment banks may be most reliant on models, and all the investment banks participating in the survey performed independent price verification, as did 85 percent of the diversified financial organizations. Sixty-seven percent of the investment banks and 53 percent of the diversified financial organizations placed this function with their risk management group. However, 29 percent of the retail banks surveyed reported that they do not perform independent price verification.

Exhibit 21

Stress testing: Percent of institutions performing stress testing in each area



When valuation differences are found between traders and independent price verification, 56 percent of institutions said they reported these differences to senior management, while 47 percent reported them to the risk management group. Often this is a question of materiality. When significant discrepancies are discovered, it is important to inform senior management. Depending on the circumstance, less significant differences may simply be reported to the risk management group, as well as to the finance function and to the front office.

It was interesting that participants reported a wide range of alternatives in terms of responsibility for their prices/marks: One third of institutions placed responsibility with the risk management group, while other organizations placed it with the product controller/finance (19 percent), the back office (16 percent), the middle office (13 percent), the front office (13 percent), or various other groups (seven percent). This split likely reflects different philosophies on ownership of valuation as well as practical differences for institutions with different scales of business. Some believe that valuation should be owned by the front office to enforce responsibility with the traders; this approach may then be supplemented with an independent price verification function managed by a group such as finance or risk. In some organizations, especially smaller ones, positions are directly valued by the finance function.

Liquidity risk

The rapid loss of investor interest in securitized products, which quickly spread to other markets throughout 2008, underscored the importance of managing liquidity risk.

Methodologies for assessing liquidity risk have been included in guidance from regulators for some time, but it has usually been considered a funding issue and been excluded from capital frameworks. Given the recent illiquidity in many markets and the impact on bank liquidity management, the Basel Committee has announced that it is considering including liquidity risk in the Basel II regulatory capital calculations.

There have also been some instances observed where regulators requested institutions to use forecasted cash-flow-based methods to manage liquidity risk in both short-term and long-term time horizons, in addition to any other existing liquidity risk management procedures. Such requests address stressing “base case” projected cash levels that are calculated under this forecasting process by applying different potential market scenarios that may arise

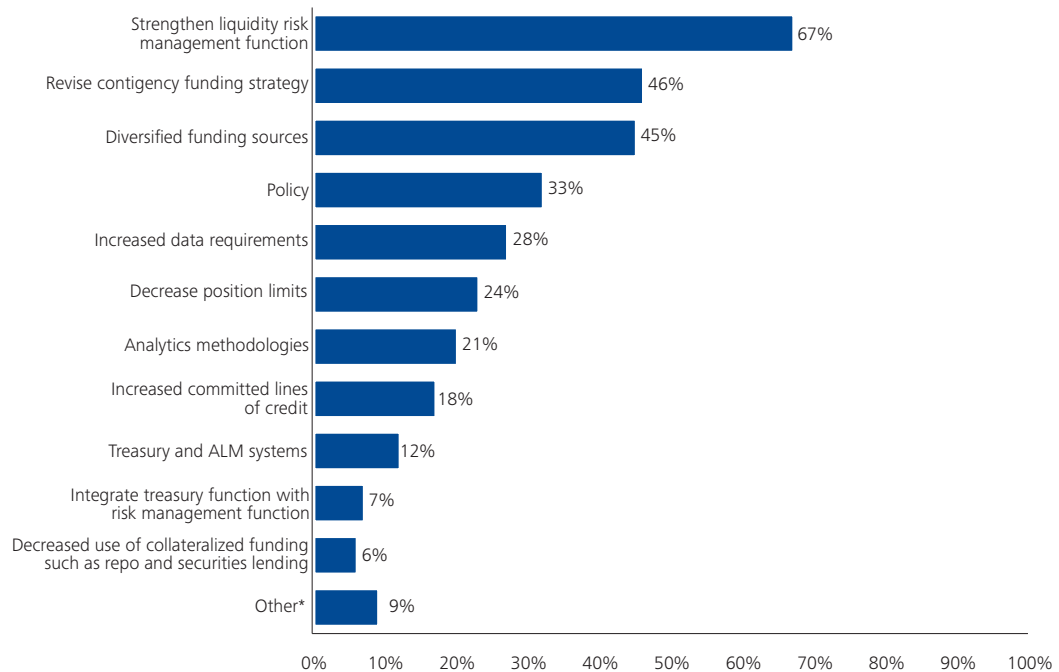
and calculating stressed projected cash levels. Institutions then demonstrate the effect of executing on a contingency funding plan or components of a contingency funding plan in order to indicate that projected cash shortfalls, even under stressed market environments, could be addressed by executing against that contingency funding plan. Requests that expected cash flows initially be analyzed on a daily basis, with greater detail for nearer periods, have also been noted. In addition, regulators are drawing attention to day-to-day liquidity guidelines to be applied under normal market conditions through the use of various liquidity ratios or guidelines, such as cash coverage ratios or maturity concentration guidelines.

Of course, liquidity risk is important beyond regulatory requirements. Even retail institutions that are not actively engaged in proprietary trading or the wholesale markets need to manage their ability to fund their businesses.

The most common response to the changed liquidity environment has been to strengthen liquidity risk management, which was cited by 67 percent of institutions. (See Exhibit 22.) Other common responses

Exhibit 22

Changes in response to liquidity environment: Percent of institutions who made changes in each area



Note: Percentages total to more than 100% because respondents could make multiple selections.

***Other includes:**

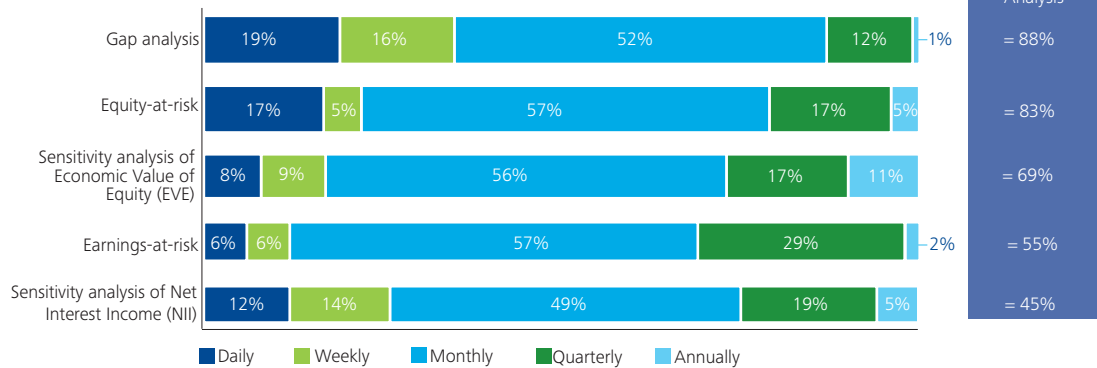
- Considered the need to set up a contingency analysis within Pillar 2 analysis
- Daily Credit Crunch Committee (part of regular procedures)
- Exposure limits for the interbank transactions (OTC market) are reviewed
- Increase liquidity minimum cushion
- Increased focus on managing liquidity risk but general conclusion that our approach and liquidity management processes have served us well and do not require material changes
- More executive management involvement

were to revise the contingency funding strategy (46 percent) and diversify funding sources (45 percent). Institutions would also benefit by carefully considering additional possible responses to the changed liquidity environment noted less frequently in the survey responses – increased data requirements (28 percent), analytics methodologies (21 percent), and Treasury and Asset-Liability Management systems (12 percent). Institutions engaged in proprietary trading and capital markets may wish to consider decreasing their position limits and more closely integrating the liquidity risk management aspects of their Treasury function with the risk management function.

Institutions use Asset-Liability Management (ALM) to help manage their funding requirements. Almost all of the institutions in the survey performed basic analyses for ALM such as gap analysis (88 percent) and equity-at-risk analysis (83 percent). (See Exhibit 23.) Insurance companies use other ALM techniques that are customized for their industry. ALM analyses were usually performed monthly, which may be due to the fact that many institutions have monthly meetings of their Asset-Liability Committees. Institutions should consider holding such committee meetings and conducting these analyses more often to more closely monitor their ability to meet their funding needs.

Exhibit 23

How frequently do you perform the following analyses for Asset Liability Management (ALM) reporting purposes?



Note: Some graphs do not add to 100% due to rounding.
Base: Respondents who perform these analyses for ALM reporting purposes.

“What lessons have been learned from the recent market events? Liquidity risk has been underestimated.”

— Senior banking risk management executive

Operational risk

Financial institutions have managed operational risk for years, recognizing the importance of maintaining tight controls and low error rates. Perhaps because operational risk losses usually result from many small events rather than a major failure, in the past institutions had not formally or consistently measured and managed operational risk. By including it in the capital framework, however, Basel II has spurred institutions to increase their focus on operational risk.

Roughly three quarters of executives surveyed said their institutions had either fully or substantially implemented the work required to identify operational risk types and standardize documentation of processes and controls, while two thirds had done so for the gathering of relevant data. (See Exhibit 24.) Institutions had made less progress in other areas. Less than half of the executives said work was either fully or substantially implemented for developing methodologies to quantify risks, for rolling out a formal training program for operational risk, and for creating metrics to monitor operational risk types. Clearly, developing methodologies and metrics for operational risk has proven to be a major challenge for many institutions.

Most institutions reported that they conducted scenario analysis. Eighty-eight percent of institutions said they conducted scenario analysis by risk type, and between one half and two thirds of respondents did so for the trading desk, product types, business units, and the overall enterprise. In each case, approximately one half to two thirds of institutions used a mix of quantitative and qualitative approaches.

However, only 43 percent of executives considered their operational risk assessments, and 38 percent considered their internal loss event data, to be well-developed. (See Exhibit 25.) Other methodologies – such as key risk indicators, external loss event data, and scenario analysis – were considered to be well-developed by only about one fifth or fewer of the executives. Developing a robust set of internal loss event data presents significant challenges. Institutions first may need to develop the framework, tools, and methodologies to capture all relevant data across their organization, and then to collect this data for a sufficient period of time to allow for meaningful analysis.

Exhibit 24

To what extent has your organization implemented the following aspects of operational risk management?

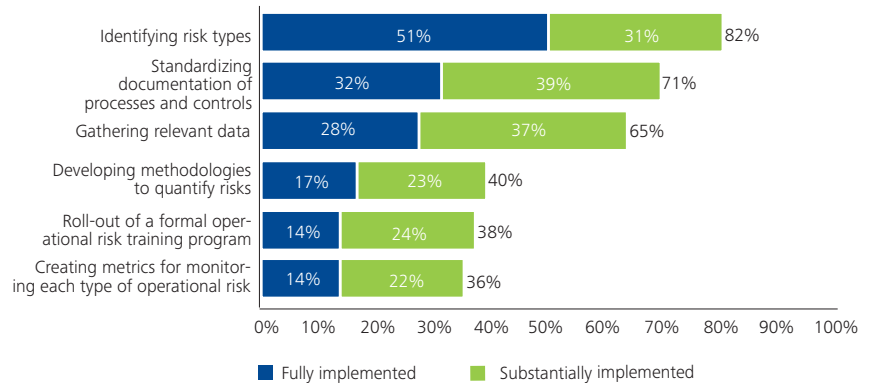
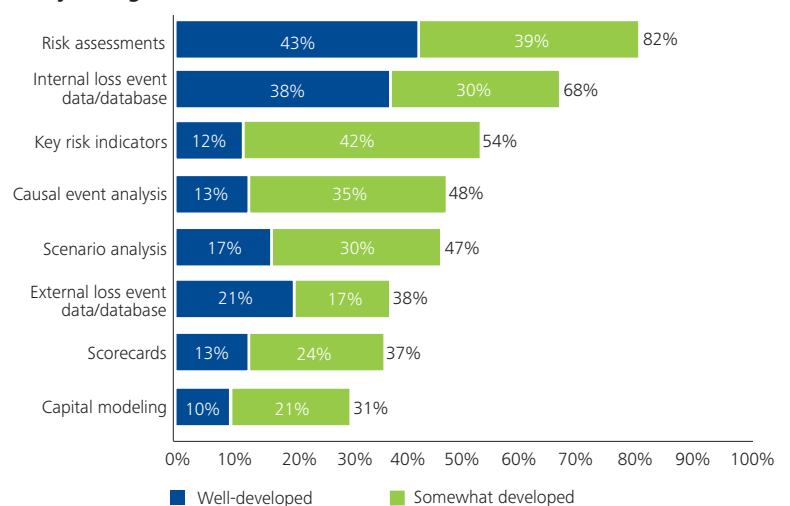


Exhibit 25

To what extent are the following operational risk management methodologies developed at your organization?



In the same vein, few executives rated their technology platforms for operational risk management as very capable. Only roughly one quarter of executives considered their institution's operational risk management technology platforms to be very capable in data gathering, risk assessments, reporting, or risk capital calculations. Ratings were even lower for scenario analysis and causal event analysis.

Measuring operational risk is especially difficult. In particular, there is a question about whether institutions have the relevant data they need and for a sufficient time period. Linking the measurement of risk with its management is a challenge for all risk types, but especially so for operational risk. Although the catalyst of Basel II has led to significant progress, much work remains to be done in measuring and managing operational risk.

Risk management systems and technology infrastructure

Effective risk management relies on a robust technology infrastructure. When risk management systems lack the capability to integrate and quickly analyze data across the institution, risk managers perform these analyses using end-user computing tools, such as Excel spreadsheets. The lack of automation may mean that less time is available to devote to higher-value activities such as more in-depth risk analysis or discussions with the business units. While some institutions saw Basel II as an opportunity to streamline and integrate their risk IT systems, many firms simply added incremental Basel II capabilities onto their existing IT infrastructures.

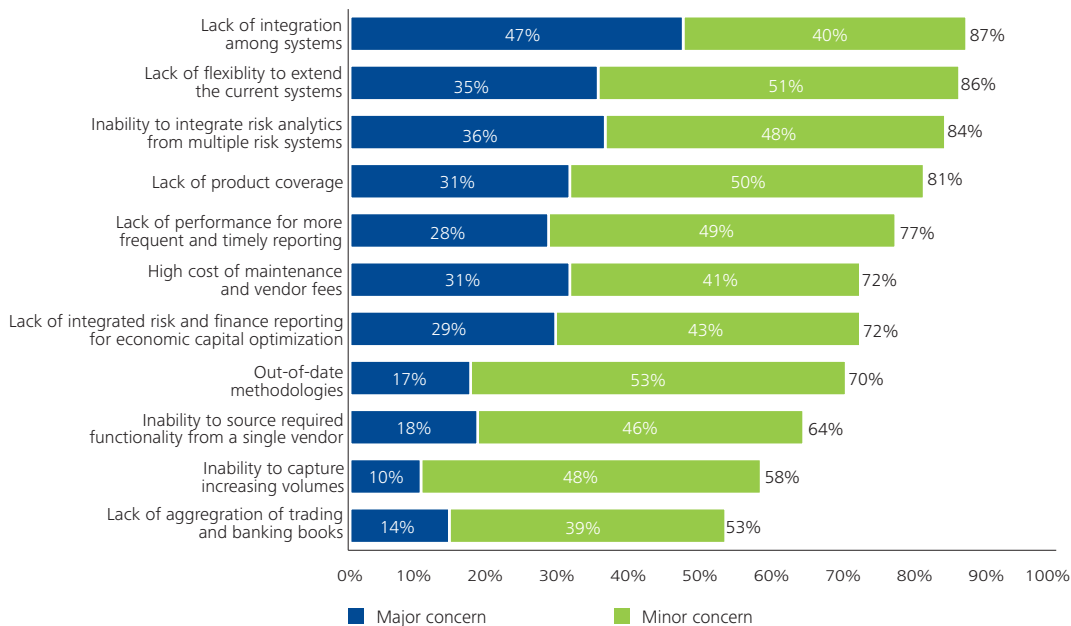
Executives surveyed expressed concern about their technology capabilities. The issue cited most often, rated as a major concern by 47 percent of executives, was the lack of integration among their risk systems. (See Exhibit 26.) In addition, 36 percent of executives cited their inability to integrate risk analytics as a major concern. Many institutions have a fragmented IT environment, both for risk management systems and for underlying product systems. These diverse frameworks often use different data formats and structures, making it difficult

to achieve an integrated view of the institution's risk profile. For example, many existing risk management systems cannot support integrated stress tests across both credit and market risks. Performing needed analyses can be time consuming because they often require manual manipulation. This may reduce the effectiveness of risk monitoring information.

Many executives believed their institutions could better leverage opportunities to enhance their risk infrastructures. For example, even though data warehousing is not a new approach, only 12 percent of executives felt their institutions had a well-developed data warehousing strategy. In our experience, many institutions have difficulty in aggregating risk data across asset classes; given risk correlations revealed during recent market events, this may be a higher priority going forward. Similarly, few executives reported that their institutions had well-developed strategies to address risk infrastructure deficiencies in other areas, including risk applications (19 percent), hardware (16 percent), architecture standards (10 percent), and data sourcing (8 percent).

Exhibit 26

How much of a concern are the following issues with your risk management information technology systems?



Executives recognized that they have a large unfinished agenda related to the upgrading of their risk management systems. Roughly half of the executives said they were extremely or very satisfied with the ability of their risk management systems to handle market risk and credit risk, and 40 percent were equally as satisfied with their liquidity risk capabilities. (See Exhibit 27.) And when it comes to other important areas – such as operational risk, compliance management, and Basel II/economic capital – one third or fewer of the executives were extremely or very satisfied with the functionality of their risk management systems.

Given these areas for improvement in risk management IT systems, 71 percent of institutions expected to increase spending on risk management technology over the next three years, in some cases substantially. In fact, 16 percent expected spending to increase by 25 to 50 percent, and 18 percent expected it to increase by 50 percent or more. The developments in the financial markets may have also significantly increased the requirements for risk analytics and reporting, making an integrated IT infrastructure even more important. For example, the turbulent market conditions have placed a premium on securing more timely updates on counterparty exposures across organizations. Many institutions may also want to upgrade their risk infrastructures to achieve a better integration of credit and market risk, support stress testing, and improve the granularity of risk data. Although financial institutions are under severe pressures to restrain spending in the current environment, organizations that invest now to integrate risk IT systems could reap benefits from improved information for risk management decisions.

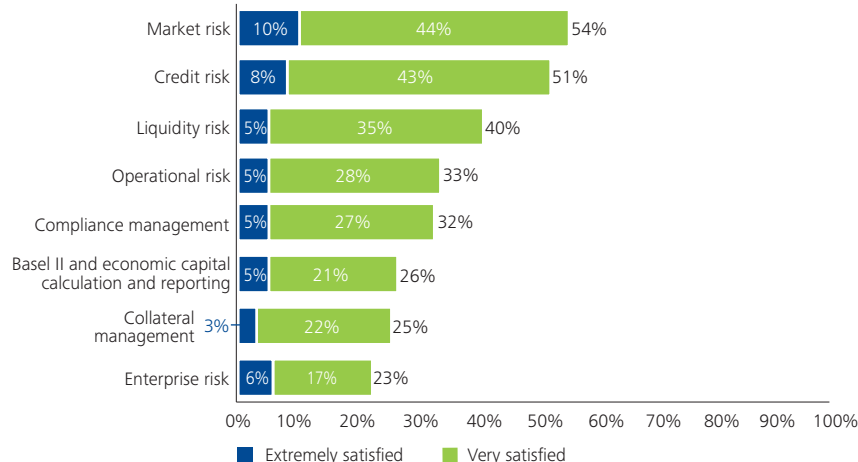
Where did executives anticipate that their institutions would invest to upgrade their risk management capabilities? The areas most often rated as high priorities for improvements over the next 12 months were liquidity risk management systems (38 percent), Basel II capital calculations and reporting (36 percent), and specialized credit risk systems such as credit VaR and global counterparty limit management (36 percent). An indication of the progress made in Basel II compliance is that 36 percent of the executives rated Basel II as a high priority, compared to 61 percent in 2006.

Other areas that were rated as high priorities by roughly one quarter of the survey respondents, tended to be more focused, such as economic capital, market risk systems (including enhanced Monte Carlo VaR, and specific risk treatment), enterprise-wide risk data warehouse development, collateral management systems, operational risk measurement systems, compliance management systems, and integrated market and credit risk measurement systems.

When institutions invest in new technology, they must decide whether to build the capability in-house or to purchase it from a third-party vendor. Firms must balance the potential cost savings from employing a third-party provider to develop or host an application with their concerns over customization needs and potential data security and privacy issues with hosted systems. The institutions in the survey were split in terms of their decision making: Over the next 12 months, 47 percent said they would invest in internally-developed applications, while 46 percent said they would invest in third-party vendor applications that are installed in-house, and 22 percent in third-party vendor applications hosted by the vendor.

There is no ‘right’ approach to the buy-versus-build decision. Large institutions tend to have more skills and more resources and often rely on proprietary systems. In fact, 64 percent of the institutions with assets of more than \$100 billion expected to use internally developed applications. Smaller institutions may lack the required expertise and funding, which is reflected in the fact that 42 percent of the institutions with assets of \$10 to \$100 billion, and 39 percent of the institutions with assets of less than \$10 billion, anticipated developing proprietary systems.

Exhibit 27
How satisfied are you with your current risk management systems in the following areas?



Conclusion

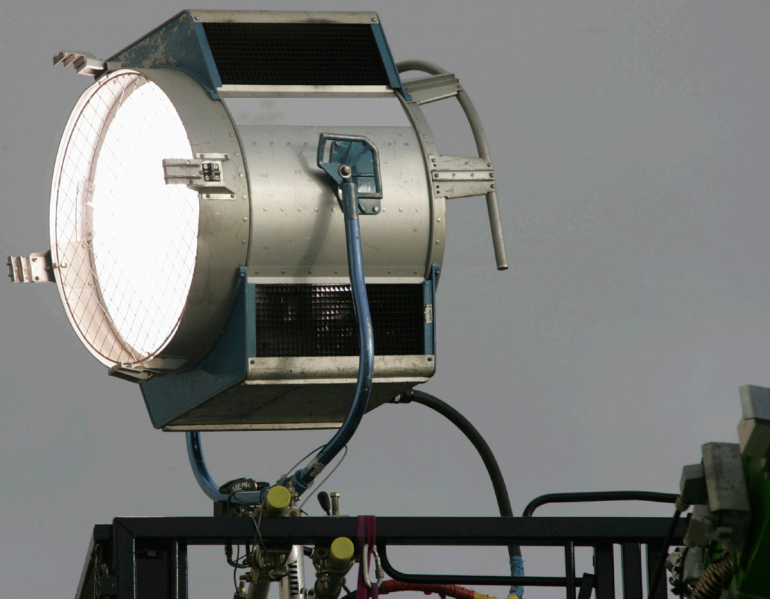
Risk management is facing a turbulent environment, and responding will likely require continuing enhancement of the risk management function. Financial institutions will continue to look to their boards of directors to provide strong oversight to risk management, including enhancing and approving the risk appetite statement if this has not already been done. A CRO or a similar senior-level executive position with overall responsibility for risk management across the organization can be another key element of a successful program. The board of directors or a designated board committee may meet regularly in executive session with the CRO to receive an objective appraisal of the state of their institution's risk management.

To gain a comprehensive view of all the risks they face, their linkages, and how they are being managed, more institutions may need to consider implementing ERM programs. While financial institutions have a long history of managing the more traditional areas of market and credit risk, many firms may need to improve their ability to manage emerging risk types, such as reputation risk and liquidity risk. Risk management programs may also require more sophisticated methodologies that

reflect the increasing complexity of financial products and interdependence of financial markets. In particular, VaR may need to be supplemented by additional methodologies in order for institutions to assess and mitigate potential tail risks.

Beyond specific metrics and tools, however, successful risk management rests on creating a risk-aware culture. Senior management may need to provide additional communications that reinforce that managing risk is part of every employee's responsibilities, and take steps to incorporate risk management goals into performance objectives across the organization.

Recent developments in the financial markets have tested the capabilities of risk management across the financial services industry. But as the survey results help to illuminate, the continued strengthening of the risk management function allows institutions an opportunity to emerge more resilient and better able to meet the competitive challenges ahead.



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Acknowledgements

This report is a result of a team effort that spanned our global financial services industry practice. A special thanks to DeloitteDEX for administering the survey, Sanjeev Mankotia, former manager, Deloitte & Touche LLP, and Bayer Consulting for their considerable assistance. In addition, the following individuals conducted analysis and provided coordination support:

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Item #9067
June 2009