

# SENIOR SUPERVISORS GROUP

## Observations on Developments in Risk Appetite Frameworks and IT Infrastructure

*December 23, 2010*



OSFI  
BSIF

BaFin



BANCO DE ESPAÑA  
Eurosystem

**CANADA**

*Office of the Superintendent  
of Financial Institutions*

**FRANCE**

*Prudential Control Authority*

**GERMANY**

*Federal Financial  
Supervisory Authority*

**ITALY**

*Bank of Italy*

**JAPAN**

*Financial Services Agency*

**THE NETHERLANDS**

*The Netherlands Bank*

**SPAIN**

*Bank of Spain*

**SWITZERLAND**

*Financial Market  
Supervisory Authority*

**UNITED KINGDOM**

*Financial Services Authority*

**UNITED STATES**

*Board of Governors of the  
Federal Reserve System*

*Federal Reserve Bank  
of New York*

*Office of the Comptroller  
of the Currency*

*Securities and Exchange  
Commission*

**SENIOR SUPERVISORS GROUP**

December 23, 2010

Mr. Mario Draghi, Chairman  
Financial Stability Board  
Bank for International Settlements  
Centralbahnplatz 2  
CH-4002 Basel  
Switzerland

Dear Mr. Draghi:

I am pleased to send you this report of the Senior Supervisors Group (SSG), *Observations on Developments in Risk Appetite Frameworks and IT Infrastructure*. The report summarizes the efforts of two SSG working groups to assess the progress that financial institutions have made in developing risk appetite frameworks and building robust information technology infrastructures. These assessments follow up on two of the key weaknesses in risk management practice identified in our last report, *Risk Management Lessons from the Global Banking Crisis of 2008*.

Our observations in this report indicate that while most firms have made progress in developing risk appetite frameworks and begun multiyear projects to improve IT infrastructure, financial institutions have considerably more work to do in order to strengthen these practices. In particular, we have observed that aggregation of risk data remains a challenge for institutions, despite its criticality to strategic planning, decision making, and risk management.

The effectiveness of risk management practices will be tested as financial institutions adjust their business strategies to meet the continued challenges in the market and the evolving regulatory environment. As firms seek a forward-looking balance between risk and reward, we believe that vigorous leadership and a commitment to strengthening management's ability to make judgments about risk will prove essential in the uncertain times ahead.

Supervisors will continue to monitor and review these practices periodically to ensure their effectiveness going forward.

Sincerely,



**William L. Rutledge**  
*Chairman*

TABLE OF CONTENTS

- I. INTRODUCTION ..... 1
- II. SUMMARY OF KEY OBSERVATIONS AND CONCLUSIONS ..... 2
- III. IMPLEMENTING A RISK APPETITE FRAMEWORK..... 3
  - A. Background and Approach ..... 3
  - B. The Risk Appetite Framework as a Strategic Decision-Making Tool ..... 4
  - C. Risk Appetite Governance: The Board, “C-Suite,” and Business Lines..... 6
  - D. Promoting a Firmwide Risk Appetite Framework..... 9
  - E. Monitoring the Firm’s Risk Profile within the Risk Appetite Framework ..... 9
- IV. IMPLEMENTING A COMPREHENSIVE RISK DATA INFRASTRUCTURE ..... 10
  - A. Background and Approach ..... 10
  - B. The Importance of IT Governance in Strategic Planning and Decision Making ..... 11
  - C. Automating Risk Data Aggregation Capabilities ..... 12
  - D. Prioritizing the Integration of IT Systems and Platforms..... 13
  - E. Maintaining Appropriate Systems Capacity ..... 14
- V. CONCLUDING COMMENTS..... 14
  
- APPENDIX A: MEMBERS OF THE SENIOR SUPERVISORS GROUP ..... 15
- APPENDIX B: MEMBERS OF THE RISK APPETITE WORKING GROUP..... 16
- APPENDIX C: MEMBERS OF THE IT INFRASTRUCTURE WORKING GROUP..... 17

---

## I. INTRODUCTION

On March 6, 2008, the Senior Supervisors Group<sup>1</sup> (SSG) released its first report, *Observations on Risk Management Practices during the Recent Market Turbulence*. The report assessed the risk management practices that helped make some firms better able than others to withstand market stresses in the autumn of 2007. On October 21, 2009, the SSG released a follow-up report, *Risk Management Lessons from the Global Banking Crisis of 2008* (the “2009 SSG report”), which reviewed in depth the funding and liquidity issues central to the crisis and explored critical risk management practices warranting improvement across the financial services industry. In addition to pinpointing various risk management areas in need of strengthening, the 2009 SSG report raised the concern that recent changes to firms’ risk management practices might not be sustained as memories of the crisis faded and pressures to pursue revenue opportunities increased.

A number of environmental factors have changed since the release of the 2009 report, including considerable progress toward raising global regulatory standards for capital adequacy and liquidity as well as a substantial easing of pressures in broad financial markets since the height of the crisis. Concurrently, however, market uncertainty has grown regarding the strength of sovereign finances and the resiliency of the banking sectors in some countries. These changes to the financial and regulatory environment underscore the importance of remediating the risk management weaknesses identified in the 2009 SSG report. In particular, firms must be able to make forward-looking and well-informed strategic decisions that can shape their ability to remain profitable while also managing risk prudently in the face of material economic, market, and regulatory events.

For help in guiding those strategic decisions, financial institutions will need to make demonstrable improvements in two key areas identified in the 2009 SSG report: 1) articulating a clearly defined risk appetite for the firm, and 2) monitoring risk effectively through reliable access to accurate, comprehensive, and timely quantitative information. The Financial Stability Board echoed this sentiment in a November 2010 report, *Intensity and Effectiveness of SIFI Supervision* (the “SIE report”), which urged supervisors to ensure that systemically important financial institutions (SIFIs) develop and maintain state-of-the-art risk appetite and data aggregation capabilities. Specifically, the SIE report emphasized that more stringent criteria be applied to these areas, given the complex and broad array of financial services offered by SIFIs. In any case, all financial institutions will need to devote board and senior management attention, as well as significant financial and human resources, to developing these tools for use in adapting strategies to a changing business landscape.

Since the issuance of its 2009 report, the SSG has continued to meet regularly to discuss emerging supervisory and risk issues and to work collectively on selected risk management weaknesses exposed during the crisis. This report delivers observations about the interdependence between formal risk appetite frameworks and highly developed information technology (IT) infrastructures and considers how elements of those frameworks and infrastructures can be implemented effectively. We view these practices as crucial in providing the risk information that boards of directors and senior management need to make well-informed judgments—not only about risk management but also about their firms’ forward-looking business strategies.

---

<sup>1</sup> The Senior Supervisors Group currently includes senior supervisory authorities of major financial services firms from Canada, France, Germany, Italy, Japan, the Netherlands, Spain, Switzerland, the United Kingdom, and the United States.

## II. SUMMARY OF KEY OBSERVATIONS AND CONCLUSIONS

Most firms have made progress in developing risk appetite frameworks and have begun multiyear projects to improve IT infrastructure. These steps are clearly in the right direction, but considerably more work is needed to remediate risk management practices that were revealed as particularly weak during the height of the crisis.

**In particular, many firms have made progress in conceptualizing, articulating, and implementing a risk appetite framework (RAF) and have undertaken significant IT projects to aggregate risk data more accurately, comprehensively, and quickly.** The extent of needed improvements varies across firms, even in instances where firms have committed considerable financial and human resources to both efforts. While planned improvements are in progress, it is unclear whether firms will have advanced these practices sufficiently to be resilient in an increasingly competitive and changing regulatory environment. Consequently, developments in RAF and IT infrastructure will require continued review by firms and supervisors alike.

**An effective RAF and a robust risk data infrastructure greatly improve a firm's strategic planning and tactical decision making.** Firms that have taken their RAF and technology projects the most seriously acknowledge that these practices have improved their understanding of firmwide risk profiles and enhanced their decision-making capabilities, allowing them to be more forward-looking, flexible, and proactive. In addition, more nimble organizations establish in advance their risk appetite parameters and take steps to ensure that necessary quantitative risk information will be accurate and timely, improving the firm's ability to adjust positions quickly during a market event and thus reducing the potential for financial loss. Nevertheless, many firms concede that their risk data infrastructure requires considerably more work to be as flexible as that of their more advanced competitors.

**Strong and active engagement by a firm's board of directors and senior management plays a central role in ensuring that RAF and risk data aggregation projects have a meaningful impact on the organization.** RAFs were found to be more effective when generated by highly engaged boards

of directors working closely with the chief executive officer (CEO), the chief financial officer (CFO), and the chief risk officer (CRO), because these individuals have the strongest ability to influence business strategy and risk management decisions. Furthermore, the CEO's commitment to an RAF was observed to be instrumental, as was the strength of the CRO's relationship with the board of directors in explaining critical risk issues. Active engagement by directors and senior management was observed to be critical in securing the financial and human capital necessary to implement IT infrastructure projects. In particular, this level of management support was seen as critical for IT projects aiming to improve the aggregation of risk data.

Supervisors also observed several additional elements of RAFs and comprehensive infrastructures for risk data that make their implementation more effective.

### *Implementing a Risk Appetite Framework*

1. **The implementation of an RAF necessitates strong internal relationships at the firm.** Risk appetite frameworks are reinforced most effectively at firms where close cooperation exists between the board of directors and the senior management team, between the senior management team and business line leaders, and between the CRO and the board of directors, other senior managers, and business line leaders. The role of the CRO and its relationships with others is particularly notable, because the CRO leads risk discussions among the board, the senior management team, and the business line leaders. Strong communication among these individuals allows the management team to effectively translate the board's expectations of risk appetite into the firm's day-to-day operations.
2. **The board of directors should ensure that senior management establishes strong accountability structures to translate the RAF into clear incentives and constraints for business lines.** While risk limits set boundaries, they do not by themselves offer enough accountability for operating within the RAF. The provision of positive incentives, such as career advancement and compensation, for individuals demonstrating strong risk management abilities helps promote a risk culture consistent with the RAF.

3. **A common risk appetite language across the firm, expressed through qualitative statements and appropriately selected risk metrics, facilitates the acceptance and effective monitoring of the RAF.**

A consistent approach provides management with a clear road map for execution and improves internal transparency. While firms with a common language can be more effective when discussing the RAF, dialogues at the board level, the CEO, CFO, and CRO level, and the business line level do differ. Accordingly, the metrics presented should be tailored to reflect these differences, in order to maximize the effectiveness of the discussion and the analysis of the firm's risk appetite and risk profile.

### ***Implementing a Comprehensive Risk Data Infrastructure***

1. **Firms with highly developed IT infrastructures exhibit strong governance processes, including strategic planning that thoroughly incorporates IT infrastructure issues, a commitment of appropriate resources, established and accountable project management offices, the appointment of data administrators, and clear data owners.**  
The partnership between business lines and IT management is critical to initiating a project; IT project implementation often falls short when the governance process is not clearly defined.
2. **The implementation of highly developed risk data infrastructures requires more automation and fewer manual workarounds—two important conditions that can improve the accuracy and timeliness of risk data aggregation.** While some manual interventions might be necessary, a move toward more automation and fewer manual processes increases senior decision makers' ability to rely on risk information.
3. **As soon as is practically possible, disparate IT systems identified from a new business or through mergers and acquisitions activity should be integrated with firmwide systems and infrastructure.** Business line leaders and senior IT managers should make it a priority to develop an integration plan consistent with the goal of providing accurate and comprehensive risk reporting to senior decision

makers. If integration is not seen as a priority, critical risk data may sit in legacy systems and be treated separately from, and inconsistently with, the existing firmwide risk metrics reviewed by the senior leadership team.

The following sections emphasize our observations that well-developed risk appetite frameworks and risk data infrastructures are key factors to ensuring effective strategic decision making. Furthermore, strong governance practices that tie long-term business and risk management priorities to RAFs and IT infrastructure projects are critical for their implementation. Each section outlines additional elements of implementation that we identified as important for firms to incorporate in their RAF and risk data aggregation efforts.

## **III. IMPLEMENTING A RISK APPETITE FRAMEWORK**

### **A. Background and Approach**

Although institutions participating in the 2009 SSG report had assessed their risk appetite practices as being fully or partially aligned with industry and supervisory recommendations, supervisors remained concerned that firms did not provide evidence of the full scope and depth of improvements needed for an effective RAF.

- Most boards of directors and senior management representatives did not actively articulate, measure, and adhere to a level of risk acceptable to the firm. Overall, the 2009 SSG report found little evidence that boards received definitive information on their firms' actual risk positions relative to their risk appetites.
- At the time, most firms acknowledged some need for improvement in their procedures for setting and monitoring risk appetite, and many acknowledged the need to revamp the way in which their boards were receiving financial and risk information.

Subsequently, the Basel Committee on Banking Supervision, in its report *Principles for Enhancing Corporate Governance*, outlined expectations that it is the board's responsibility to

“approve and oversee the implementation of the bank’s overall risk strategy, including its risk tolerance/appetite.”

To better understand the progress firms have made in improving their risk appetite frameworks, the SSG formed a working group that met with board members, CEOs, CROs, CFOs, and business heads at fourteen global financial institutions to gain insight into how firms are defining, communicating, and monitoring risk appetite and how they are meeting the challenges involved in implementing an RAF. The participating firms represent a broad cross-section of the industry in terms of geographic reach, business focus, and experience with risk appetite.

Participating firms have taken a wide variety of approaches in adopting RAFs, which range from the high-level, brief, and qualitative to the complex, lengthy, and quantitative. This variety reflects different views as to what an RAF should look like, as well as the different development stages of the frameworks across firms. While some RAFs are more advanced than others, no single firm was observed to have developed a fully comprehensive framework containing all the better-practice elements described in this report. Furthermore, most RAFs are not particularly mature in their development. While the majority of participating firms do have a risk appetite statement, more than half reported that the statement has been in effect for a year or less.

## **B. The Risk Appetite Framework as a Strategic Decision-Making Tool**

**While most firms are still establishing a formal RAF, those with a more developed RAF can typically point to examples where the framework has helped drive strategic decisions and right-size the risk profiles.** The majority of firms interviewed indicated that their RAF is clearly linked to their strategic planning and budgetary process. Using the RAF to frame decisions, firms have established a common language for assessing the risk, budgetary, and strategic implications of a business opportunity or external event affecting the firm’s risk profile. A number of managers have taken concrete actions based on the comparison of their risk profiles with their risk appetites, such as rescaling the size of a certain business or adjusting compensation to reflect risk embedded in a particular business line. In some cases, a more developed and formal RAF has helped influence the exit from a business that was not well aligned with the firm’s desired risk profile.

While this decision is more difficult to reach when a business is profitable, the RAF can guide key decision makers seeking to trade short-term revenue or profits for reduced potential for future risk. Conversely, an RAF can lead to a decision to expand a business when it fits within the risk-taking activities outlined in the framework. Some observations from interviews that are worth noting include the following:

- One firm incorporated into its risk appetite statement the principle that the board and senior management must understand and be able to manage all risks. As a result, the firm decided to exit a specific business whose risk was not well understood, even though the business was profitable at the time. That particular line of business would eventually generate significant losses for other firms during the financial crisis.
- Another firm reduced its warehousing of subprime assets by half, following its RAF principles to scale down noncore businesses. When the crisis hit, not only had the firm scaled back its subprime warehousing, but it was also more aware of the exposures that remained, the risks they posed, and the best methods of addressing those risks.
- In another revealing comment, a firm reported that its RAF helped identify gaps in IT and human resources. After having formalized its RAF, this firm hired significantly more risk personnel and built out its data infrastructure.
- A number of firms interviewed noted that the process of articulating risk appetite focused discussion on the firm’s key strengths and competitive advantages, better positioned their boards to challenge business proposals outside of the firm’s core competencies, and served as a better yardstick for discussing risk on a forward basis, rather than simply comparing the results of risk models and limits.
- While many firms lauded the importance of an RAF in aiding decisions about acquisitions and divestitures, some firms—usually those with less developed frameworks—were unable to provide concrete examples of how the RAF influenced specific decisions.

**An RAF establishes an explicit, forward-looking view of a firm’s desired risk profile in a variety of scenarios and sets out a process for achieving that risk profile.** An RAF establishes practices that link the expressed desires of directors and senior management to the actions of individuals throughout the organization, ensuring that the firm’s actual

risk profile stays within the parameters set within the framework. It codifies which types of risk the firm is willing to bear and under what conditions, as well as which risks the firm is unwilling to assume, and it translates these expectations into supporting processes and actions.<sup>2</sup> The RAF helps in measuring risk, monitoring the risk profile, transmitting risk appetite to internal and external stakeholders, and reassessing periodically the risk appetite level of the firm.

**The RAF typically begins with a risk appetite statement that establishes boundaries for the desired business focus and articulates the board’s desired approach to a variety of businesses, risk areas, and, in some cases, product types.**

Driven by the board of directors and supported and implemented by senior management, the risk appetite statement is essentially a risk philosophy—or, as one firm put it, a “mission statement for risk.” When issued by the board of directors, a risk appetite statement provides senior managers with both guidance and constraints as they pursue the firm’s strategy. Across firms, risk appetite statements speak to some of the following elements: desired business mix and composition of the balance sheet, risk preferences (for example, “we focus on retail credit risk, tolerate some wholesale credit risk, and hedge market risk”), the acceptable trade-off between risk and reward, tolerances for volatility, capital thresholds (including regulatory capital, economic capital, and leverage ratios), tolerances for post-stress loss, target credit ratings, and optimum liquidity ratios, among others. A useful risk appetite statement is relatively simple, easily communicated, and resonates with multiple stakeholders. Furthermore, and very importantly, it is referenced frequently.

---

<sup>2</sup> To establish common expectations in its discussions with management, the SSG working group provided participating firms with the following industry definitions of risk appetite, risk capacity, and risk profile:

- Risk appetite is the level and type of risk a firm is able and willing to assume in its exposures and business activities, given its business objectives and obligations to stakeholders. Risk appetite is generally expressed through both quantitative and qualitative means and should consider extreme conditions, events, and outcomes. In addition, risk appetite should reflect potential impact on earnings, capital, and funding/liquidity.
- Risk capacity is the full level and type of risk at which a firm can operate and remain within constraints implied by capital and funding needs, as well as other obligations to external stakeholders. Risk capacity is a maximum measure and is not necessarily intended to be reached, meaning that a firm might set a buffer between risk capacity and risk appetite and manage that on an ongoing basis.
- Risk profile is a point-in-time assessment of actual aggregate risks associated with a firm’s exposures and business activities, through the use of several tools and measures. Generally, a firm should aim to have its risk profile remain within its stated risk appetite and should ensure that its risk profile does not exceed its risk capacity.

**Since it is difficult to forecast with any certainty market conditions over time, the more developed RAFs are flexible and responsive to environmental changes; however, risk appetite must also be definitive and consistent enough to contain strategic drift.** To ensure that any adjustments are tracked and understood, more advanced RAFs incorporate a process whereby management documents decisions made on the basis of the RAF as well as changes made to the framework. A firm’s RAF is useful at many levels of the organization in framing discussions and decisions about strategic direction, including deliberations concerning possible acquisitions, new business lines, or new products. Often, these strategic opportunities cannot be anticipated, and the decision to take them on may require adjustments to risk appetite or to the RAF. For this reason, it is important that the RAF be flexible and that the articulation of risk appetite be iterative, allowing a firm to respond to changing or unanticipated circumstances. However, the RAF clearly loses utility if its goals are constantly adapted to justify every emerging opportunity. Indeed, the framework should serve as a reminder to management, as well as to the board, of the original core risk strategy. This means that any movement away from that core strategy will be recognized as a deliberate decision to move outside of or to alter the firm’s risk appetite, which should limit any gradual unconscious drift. It is a challenge for firms to strike an appropriate balance: RAFs are meant to establish boundaries without becoming too rigid. The formalization and documentation of any changes will help ensure that this process is a conscious one.

**RAF help firms prepare for the unexpected. Firms with a more developed RAF set an expectation for business line strategy reviews and conduct regular discussions about how to manage unexpected economic or market events in particular geographies or products.** Those discussions consider how business strategies may affect the consolidated entity. Firms with more seasoned RAFs have also created a forward-looking process that establishes expectations about the firm’s consolidated risk profile in a variety of circumstances based on stress tests and scenario analyses. The use of stress tests and scenario analyses on a consolidated basis can test the RAF as well as help firms identify where their risk profiles are most vulnerable. In response, an RAF can help establish a road map for risk taking, loss mitigation, and the employment of contingency measures.

Despite a consensus among firms on the usefulness of stress testing and scenario analyses in helping to measure risk level and prospective risk appetite, firms still face significant

challenges in relying on a comprehensive risk data infrastructure to produce accurate results. A number of firms, however, are investing substantially in consolidated stress-testing capabilities. A few have already established enterprise-wide stress-testing functions, which can produce internal stress-testing metrics and reporting using a variety of macroeconomic indicators and market variables across differing levels of severity (for example, base, moderate, and severe). A flexible system can conduct these stress tests on an ad hoc basis, even during periods of financial stress.

The following observations from interviews are noteworthy:

- The use of stress-testing results in setting limits was not a common practice among many of the interviewed firms, although most acknowledged that integrating the two was a worthwhile goal.
- At those firms where stress tests did influence the RAF and limit setting, senior managers emphasized that no single stress test would capture all elements of a firm's risk profile. More developed RAFs included a periodic review of whether the risk elements used in stress scenarios continued to be relevant.
- Further complicating matters were the significant challenges in aggregating data comprehensively to ensure that the risk metrics reported captured as many important risks as possible.

### C. Risk Appetite Governance: The Board, “C-Suite,” and Business Lines

An RAF is an explicit effort to describe the boundaries within which management is expected to operate when pursuing the firm's strategy. Firms that implement an RAF most effectively are those that communicate and champion the framework throughout the organization, starting from the top. Significantly, the strength of the relationships among the directors, the CEO, the CFO, and the CRO will play an instrumental role in the RAF's effectiveness. Firms with more effective frameworks have increasingly focused on the distinctive mandates and responsibilities of each of these levels of governance. Specifically, firms with more developed RAFs assign roles in this basic but fundamentally important way:

- The board of directors, with input from senior management, sets overarching expectations for the risk profile.

- The CEO, CRO, and CFO translate those expectations into incentives and constraints for business lines, and the board holds the businesses accountable for performance related to the expectations.
- Business lines, in turn, manage within the boundaries of these incentives and constraints, and their performance depends in part on the RAF's performance.

### Board of Directors<sup>3</sup>

**At leading firms, engaged boards with solid expertise support the formulation, assessment, and monitoring of the firm's RAF. An engaged board is accountable for the RAF and uses it to frame strategic decisions.** While the board or its risk committee cannot be expected to monitor every facet of a firm's risk profile, boards that invest a significant amount of time and effort in articulating a firm's risk appetite statement will have a greater stake in ensuring that the process for adhering to that statement is properly implemented and guides decision making throughout the firm. Many directors describe their role as one of challenging management until they are comfortable that management both understands the risk profile and is running the business in a manner consistent with the RAF. In practice, the board's critical review of management can be overly backward looking—that is, focused on past actions rather than strategic, forward-looking issues. Effective board members need to “get ahead of the issue” by articulating their expectations in advance so that management can establish strategic plans accordingly. This practice is not as widespread as it could be.

**To drive an effective RAF, stronger boards employ an active, iterative process of review. They shape the firm's risk appetite statement and work regularly with management to align the framework with that statement.** Better practice indicates that when a board or its risk committee challenges management and insists on a thorough vetting of the RAF, the institution ultimately develops a more complete,

<sup>3</sup> While this report refers to a governance structure consisting of a board of directors and senior management, the SSG acknowledges that different jurisdictions—even among SSG member countries—apply different governance structures as a result of divergent legislative and regulatory frameworks. In some SSG countries, a two-tier governance structure is in place, in which a supervisory board has a supervisory but not an executive function while a management board carries out the executive function. Other SSG countries use a one-tier structure that combines the two functions. For purposes of this report, “board of directors” refers to the role of a board that provides a broad oversight function. Readers should interpret these observations consistently with the applicable law in each jurisdiction.

well-considered product. While nearly all boards report spending more time on risk issues than they did before the financial crisis, many do not actively participate in the articulation of their firm's risk appetite statement and fewer still take part in defining the RAF. At those firms where the board is more engaged, once management has built or adapted the RAF according to the board's established risk appetite, the board's risk committee enters into an iterative process with senior management through which multiple versions of the RAF are presented until all are satisfied with the approach. Once the RAF is decided upon, there is ongoing challenge and discussion to ensure that the risk appetite continues to be relevant and reflects the thinking of the board. Having a clear process for discussing and determining when the RAF should be adapted to changed circumstances, as described above, is a leading practice we have observed. This regular communication helps management ensure that board members—and, critically, the chair of the risk committee—are fully conversant with the firm's risk profile.

**Engaged board members have a sophisticated understanding of financial and risk concepts.** In the interviews, one explanation provided for some board members' weaker involvement in setting the risk appetite and RAF of a firm is their lack of risk management expertise. Appropriate board composition is critical to effective performance of duties, and some firms have adjusted board composition since the crisis to ensure that members have a suitable level of expertise to set expectations and monitor risks. However, even though some firms see a role for board members who are not financial experts, reasoning that these members are sometimes the ones who "ask the obvious but important questions that the experts overlook," firms continue to struggle with finding the right knowledge base. It is typical for a firm to rely on a handful of board committee members who understand the firm's risk exposures, while the remaining members lack the background to fully engage in the discussion and inquiry. One board member voiced frustration at the fact that he still could not depend on many of his board colleagues to think through particularly difficult risk issues with him. Board composition must be balanced to ensure a broad and common understanding of the firm's risks and to avoid "two-speed boards."

To address shortcomings in board expertise, many firms provide extensive training to board members on subjects ranging from derivatives to processes for assessing internal capital adequacy. Some firms have also introduced requirements for cross-membership among risk, audit, and compensation committees to ensure that key functions are

supported by a sophisticated knowledge base. However, not all firms have introduced formalized training programs, and while both training and cross-membership are certainly positive practices, they should complement existing expertise. One CEO, whose firm requires all board members to serve on the risk committee, made the point succinctly: "If someone is going to serve on the board, that person needs to understand the business of the bank, which is taking risk."

**Engaged boards indicate a need to receive the right level and type of information in order to set and monitor adherence to risk appetite. To achieve this objective, boards need to be clear about what kind of information they require and how frequently they need it.** Many firms also faced challenges during the crisis because information was not fully consolidated, and therefore boards were not in a position to discuss the firm's aggregate risk profile. This shortcoming can be attributed in many cases to poor reporting systems, a topic considered later in this report. Regardless of systems capabilities, it can be a challenge for both management and board members to determine what subjects should be discussed at the board level and at what level of detail. The more engaged board members generally agree that reporting should be comprehensive and complete, and not be oversimplified for the board. At the same time, some board members insist that management communicate with them in business terms and not just in technical terms, a practice that has proved useful at these firms. Only a few boards, however, have shown that they are trying to actively reshape the intelligence they get from management. Most continue to be too passive in accepting the types of information chosen by management.

Finally, the crisis has reemphasized the importance of reputation risk as a key focus at the board level. Virtually all firms attempt to incorporate assessments of reputation risk in their RAFs to protect their brand, but they often find it difficult to quantify this risk. Efforts to measure reputation risk qualitatively have proven useful, such as monitoring industry headlines and reporting trends to the board, engaging third parties to conduct surveys, and creating reputation risk committees to assess environmental changes and approve particular transactions based on geography or product line. Indeed, roughly one-third of the firms interviewed indicated that they now have a reputation risk committee, while many others reported that this type of risk is discussed as part of some form of new-product review committee. Several participating firms have explicitly identified businesses or geographies that they will avoid because of potential implications for reputation risk.

### The “C-Suite”

**Not surprisingly, the review team observed that strong support at the CEO level is crucial for the RAF’s successful implementation throughout the firm. This view includes empowering the right people—notably, the CRO—and ensuring that the board has access to these individuals.**

While it is accepted that the CRO and the risk management function will usually be responsible for developing the risk appetite framework, the process does not appear to be as effective in cases where the CEO does not strongly support the RAF. CEOs who refer to and use the RAF in support of difficult risk and strategic decisions send a strong message about the importance of the framework. The CRO’s stature and decision-making power were found in prior SSG work to be areas for improvement within the industry. The CRO has also proved important to achieving the firm’s risk appetite goals, as he or she usually manages the RAF’s implementation. At some interviewed firms, the CEO’s willingness to give the CRO the final word on many risk decisions has strengthened the stature of the risk management function.

The relationship between the board or board risk committee and the CRO is also very important. The CEOs at some of the firms with more developed RAFs encourage board members to contact the CRO directly. In some cases, this relationship is even formalized, and the board’s risk committee plays a direct role in the CRO’s review and compensation. At one firm with extensive board engagement in risk issues, the value-at-risk (VaR) limit was breached at the height of the financial crisis. When the business requested that the board increase the limit, the risk committee refused; instead, the committee chair began to engage in weekly conversations with the CRO to discuss the progress of measures for pushing VaR exposures back to within the limit. These discussions took place until the excess exposure had been managed down. Another firm even reconvened the board risk committee to discuss a key decision because the CRO was not able to attend the initial meeting at which the issue had surfaced.

**A strong alliance between the CRO and CFO helps increase the framework’s transparency and dissemination.**

The alliance between these functions reflects the interplay and critical linkage between risk strategy and budgetary considerations, as well as the common approach the RAF engenders from multiple perspectives within the firm. A better practice that we observed was that of the CRO and CFO reporting to the board or board risk committee at every meeting on the firm’s risk profile relative to the risk appetite

statement. The CRO’s discussion can be very strategic and broad-gauged, whereas the CFO’s perspective is more likely to provide specific insight into the framework’s impact on budgeting, liquidity, and funding. In cases where the firm does not comply with the framework, the CRO or CEO outlines to the board the corrective action that management is undertaking to address the deficiencies.

### Business Lines

**A critical element in the process of building an RAF is the link with the business strategy and budgeting process. In this regard, the RAF is a useful tool to ensure that each business line’s strategies align with the firm’s desired risk profile.** In many cases, business lines propose a medium-term business plan that is assessed by senior management (and sometimes the board’s risk committee) to determine whether it fits with the firm’s RAF. Stress testing and scenario analyses serve as useful tools to assist in this determination. The RAF then dictates the cascading of limits to the business lines, depending on the desired risk profile for each business.

**The RAF helps the board and senior management understand how much one business line’s medium-term business plan needs to adapt in order to allow another business line’s proposal to go forward.** To the extent that a particular business line’s plan proposes opportunities that would require loosening the RAF constraints for that particular business, senior management and the board’s risk committee may decide to “borrow” from the risk appetite allotment of another business line to make room for the given opportunity or, alternatively, to build up the firm’s risk capacity (for example, through an increase in capital). In many cases, firms have noted that the existence of a clear RAF that is well communicated to the business lines sharply reduces the occurrence of proposals that are well outside those parameters. This may also prevent a firm from drifting unknowingly from its initial risk appetite as market conditions change. When a firm has a formalized risk appetite, revisions are well documented and they can be more easily monitored by all stakeholders.

Discussions of new business initiatives are seen as an opportunity to “say who we are and how we operate,” according to one participant, while another saw them as a way to embed the framework within the firm. The majority of firms indicated that their RAF is (or is being) integrated with their process for new product initiatives.

## D. Promoting a Firmwide Risk Appetite Framework

**By establishing a set of incentives and consequences, firms with more developed RAFs ensure that the entire firm is committed to a successful framework.** In particular, directors and senior managers at these firms consider carefully how to incentivize adherence to the RAF and how to communicate the consequences of ignoring it. Some approaches included promotions based on adherence to the RAF, career advancement through postings to higher level control functions, compensation explicitly linked to the RAF (on the upside and the downside), and even dismissals for those who disregard the framework. At one firm, the CRO regularly reported to the board's compensation committee on business line performance measured against the RAF. Nonetheless, the emphasis on promoting the RAF through incentives and consequences remains limited at most firms.

**Among the senior leaders interviewed, there was no clear agreement about the scope and reach that the RAF should have within the organization.** One firm indicated that more than 200 town hall meetings had been held with staff over the course of the year to help socialize the RAF. Other practices included involving new staff in risk and capital committee meetings to ensure a strong understanding of the risk culture and decision-making process. Many firms, however, communicated the RAF on a "need-to-know basis," based on the belief that the RAF would be meaningless to employees at lower levels of the firm and that they would focus too much on limits and constraints.

## E. Monitoring the Firm's Risk Profile within the Risk Appetite Framework

**The assessment of a firm's consolidated risk profile against risk appetite should be ongoing and iterative.** Some firms conduct quarterly reviews of the RAF and monitor the link between the firmwide risk profile and risk appetite. These firms test whether the consolidated risk profile continues to align with the business practices, limits, and stress performance expectations that constitute their RAFs. As a result, the firms are able to determine early and often whether their risk profile is straying from the desired path and can make informed decisions about whether the RAF

is functioning as intended. Two observations from our interviews are particularly noteworthy:

- Firms with more developed RAFs have a clear, documented, and regular process for reviewing their risk profile against their risk appetite.
- One firm used the discipline of assessing the fair value of all its risk exposures as a way to compare risk profile with risk appetite, as the mark-to-market changes to profit-and-loss (P&L) statements provide a real-time window into the evolution of risk.

**RAFs should not simply be a set of loss tolerances or limits; they should include a wide array of measures to monitor the firm's risk profile.** A common shortcoming shared by firms in the beginning stages of creating an RAF is to review only the high-level risk limits measured against point-in-time regulatory capital levels or simple liquidity buffers.

**Firms with more developed RAFs combine multiple risk metrics that help in managing or mitigating downside risk in a thoughtful, deliberate way.** The metrics used should range from the dynamic and forward looking to the static and point-in-time; they could include (but not be limited to):

- capital targets beyond solely regulatory measures (economic capital, tangible common equity, and total leverage) or capital-at-risk amounts;
- a variety of liquidity ratios, terms, and survival horizons;
- net interest income volatility or earnings-at-risk calculations;
- VaR limits;
- risk sensitivity limits;
- risk concentrations by internal and/or external credit ratings;
- expected loss ratios;
- the firm's own credit spreads;
- asset growth ceilings by business line or exposure type;
- performance of internal audit ratings;
- economic value added; and
- post-stress-test targets for capital, liquidity, and earnings.

**Firms agreed that the risk metrics to be monitored must directly meet the needs of the audience, be it the directors, the “C-suite,” or business line leaders.** The metrics used to measure firmwide aggregate risk at the board level will, of necessity, be significantly different from those used to measure and limit risk at the business level. For example, we have observed that the risk metrics that matter most for directors were typically high-level metrics that reflect the firm’s key vulnerabilities. When directors received reports that contained too many detailed risk metrics, the ensuing discussion distracted the directors from their principal concerns. One director pointedly told us that it is critical for management to speak with the directors in language they can understand, and that risk management jargon can impede a more intuitive understanding of the firm’s risk profile. While risk metrics used at different levels of the organization should relate to one another, it is reasonable to keep them “high level” for directors, increasingly “more detailed” for the “C-suite,” and “appropriately pointed” for business line leaders. Firms that parsed out metrics in this way found their internal dialogues about risk appetite and actual risk profiles to be more robust and meaningful.

As highlighted above, the interdependence between an effective RAF and a robust IT infrastructure is critical to strategic decision making. Section IV outlines observations on current efforts to improve IT infrastructure—in particular, the aggregation of risk data—that are key to helping boards and senior management assess whether their actual risk profiles are in line with the stated risk appetite.

## IV. IMPLEMENTING A COMPREHENSIVE RISK DATA INFRASTRUCTURE

### A. Background and Approach

The 2009 report underscored the importance of the IT infrastructure in effective risk management. Inadequate IT systems hindered the ability of many firms to manage broad financial risks as market events unfolded rapidly and intensely. The report endorsed the need for firms to build “more robust infrastructure systems [that may] require a significant commitment of financial and human resources on the part of firms” because supervisors view these efforts as “critical to the long-term sustainability of improvements in risk management.” Since publication of the 2009 report, many firms have begun

substantial projects to improve IT infrastructure—in particular, projects to address the aggregation of risk data.

A number of factors have led to the fragmented IT infrastructure that is currently slowing risk management remediation projects at firms:

- A lack of agreement between business lines and IT management on a long-term strategy, often driven by competition within the firm for financial resources, makes it difficult to implement key IT infrastructure projects.
- Decisions that favor short-term financial considerations have often led to budget reductions for IT infrastructure projects. In addition, turnover in key IT management areas has exacerbated delays in project execution.
- Weak data governance processes can contribute to inconsistent approaches to the upgrading of systems. Similarly, the lack of a firmwide framework for data management can lead to inconsistencies across business units and/or regions.
- Mergers and acquisitions have increased the number of legacy systems in place at newly consolidated organizations. Multiple system platforms often contain their own unique data taxonomies, making aggregation across products and business lines difficult.

The system fragmentation that can result from such environments often requires a significant number of manual processes to aggregate data firmwide. Some firms still require days or weeks to accurately and completely aggregate risk exposures; few firms can aggregate data within a single business day.

Observations in this report are drawn from the SSG’s collective supervisory work undertaken in 2010, which included formal examinations conducted by individual supervisory agencies, meetings with firms’ management, and detailed reviews of firms’ remediation plans. While we did not formally survey firms on their progress, a number of SSG members have been conducting supervisory work to benchmark firms’ progress in remediating the risk management gaps identified in the self-assessments described in the 2009 SSG report. The SSG members’ observations reveal that most firms still need to achieve significant progress on their existing multiyear technology projects before they can implement a comprehensive risk data infrastructure.

## B. The Importance of IT Governance in Strategic Planning and Decision Making

For firms to make effective business and risk management decisions, it is critical that they be able to aggregate timely and accurate data for reporting on credit, market, liquidity, and operational risks. As the financial and regulatory environment becomes increasingly complex, this capability within the firm is of paramount importance to senior decision makers. They need the proper information to make judgments about the strategic direction of their firms, to help set risk appetite, and to manage risk according to rapidly changing economic or market circumstances.

**Strategic planning processes should include an assessment of risk data requirements and system gaps.** Firms with highly developed IT infrastructures are able to clearly articulate, document, and communicate internal risk reporting requirements, including specific metrics, data-accuracy expectations, element definitions, and timeframes. These requirements also incorporate supervisory expectations and regulatory reporting requirements, such as segmenting financial and risk data on a legal-entity basis. The technology planning process has to align both business and IT strategies to ensure that a productive partnership exists and that it values the investments made in financial and human resources to complete the project. We have observed that strategic business expansion at most firms occurs before they have fully incorporated IT requirements, often putting IT implementation plans far behind the business plans and creating volume and data capacity issues when the business or product grows.

**Firms with leading, highly developed IT infrastructures bring together senior IT governance functions, business line units, and IT personnel to formulate strategy.** These firms have defined standards and internal risk reporting requirements to ensure that business lines and IT units operate within an enterprise-approved framework. The requirements establish the basis for effective IT infrastructure and internal reporting. Firms operating in a less coordinated and more fragmented way do not have technological systems and platforms that meet their strategic needs. Several key elements underpin an effective IT partnership at a firm:

- Firms with leading IT infrastructures commit budgetary resources to developing IT infrastructures for internal risk reporting with the same level of priority

that they give to the funding of projects that emphasize front-end revenue generation and speed to market.

- Revenue-generating infrastructures for new businesses and products often outstrip associated risk infrastructures that are critical to manage these operations. The lag between the development of front-office and risk infrastructures can stretch from a few months to a few years.
- Most notably for new products, technology infrastructure and capacity assessments are critical to the strategic planning process. While it is good practice for firms to require assessments of IT infrastructure and capacity prior to approving new products, it is also a leading practice for firms to conduct reviews six to eighteen months after implementation to ensure that the technology projects have met the needs of the risk professionals.
- Firms that rely on outsourced IT activities that affect infrastructure, data aggregation, and internal risk reporting should apply the same level of governance to these activities as if they were performed in-house. Furthermore, outsourced activities should not limit the effectiveness of implementation or access to data.

**Firms successful in aligning IT strategies with the needs of business line managers and risk management functions have strong project management offices (PMOs) to ensure that timelines and deliverables are met.** Many firms have numerous projects in progress to remediate gaps in IT infrastructure that can span multiple functions, business lines, and legal entities. Firms that have achieved more successful project implementation have established high-level PMOs for firmwide projects, such as post-merger IT integration, and concentrate on specific project management functions for key business line or product efforts.

One firm appointed a dedicated individual from the risk management function to oversee the PMO and monitor issues and corrective actions through to completion. This firm has shown that having a single person as the focal point for program oversight results in better coordination and communication among project staff and, by extension, better project implementation and execution. In contrast, some firms have chosen a committee-based approach to project management. We have found that this approach lacks the high levels of accountability and focus required for effective execution, leading to a fractured and slow—and therefore often more costly—implementation effort.

**Firms with effective IT project implementation appoint a data administrator and a data owner with responsibility and accountability for data accuracy, integrity, and availability.** The data administrator oversees all aspects of business databases, including initial design of the database architecture, project implementation, backup, and support. A centralized data administration function has proved particularly useful for firms. A data owner is an individual or group of individuals, usually within a business line, responsible for developing and implementing the data governance framework and internal risk reporting. The role of a data owner aligns the interests of the business—accurate and timely information—with the need for accountability in execution, resulting in the owner taking an active role in ensuring that projects meet the goals of end-users.

**Firms with high-performing IT infrastructures ensure that the board committees institute internal audit programs, as appropriate, to provide for periodic reviews of data maintenance processes and functions.** Leading firms' internal audit departments assess the adequacy of risk management information systems (MIS). Their activities include planning and consideration of risk MIS requirements and assessments of risk MIS in terms of timeliness, accuracy, consistency, and completeness. Leading internal audit departments review specific efforts and projects to remediate infrastructure gaps noted from assessments that are compared against recommendations made in SSG and other supervisory communications. Some internal audit departments employ continuous monitoring in this area while others conduct specific examinations, often at the product or business line level. Prompt remediation of internal audit findings in this area helps reinforce the governance objective of a consistent, enterprise-wide approach to data governance.

### C. Automating Risk Data Aggregation Capabilities

**Supervisors observe that while many firms have devoted significant resources to infrastructure, very few can quickly aggregate risk data without a substantial amount of manual intervention.** In particular, firms' multiple infrastructure platforms have made it difficult to comprehensively aggregate critical risk data and effectively monitor and report on exposures in a timely way. One key attribute that allows risk data to be aggregated quickly is the ability to automate data flows and reduce the amount of manual intervention necessary to compile this critical information.

**Firms with leading practices have very limited reliance on manual intervention and manual data manipulation.** These firms have largely automated their risk data aggregation, which increases the timeliness of internal risk reporting and minimizes operational risks linked to human error. Many firms, however, still rely heavily on spreadsheet environments, which significantly delay report processing while raising concerns about accuracy.

**Supervisors have observed that an inability to aggregate risk data in an accurate, timely, or comprehensive manner can undermine the overall value of internal risk reporting.** For example, whereas most firms focus on establishing a management information reporting framework to meet operational requirements, internal risk reporting standards do not articulate the type of critical reporting that would be required in a crisis or the speed at which these reports would have to be produced. We believe that in order to meet the needs of the business line and risk management staffs, firms should establish standards, cutoff times, and schedules for internal risk reports.

**Consolidated platforms and data warehouses that employ common taxonomies permit rapid and relatively seamless data transfer, greatly facilitating a firmwide view of risk.** Centralized static databases with single identifiers and/or unified naming conventions for legal entities, counterparties, customers, and accounts enable a consistent approach to pulling multiple records of risk data across the firm in a timely manner. Consistent identifiers and naming conventions also permit segmentation in cases where it may be necessary to identify risk concentrations or to meet a supervisory or legal requirement. We have observed that most firms have not yet adopted these common conventions, but rather are addressing them in the context of larger IT infrastructure projects, whose implementation is planned over the next one to three years on average. Specifically, we have observed the following:

- A number of firms have implemented or have projects under way to build comprehensive data platforms with unified customer and asset data that can quickly aggregate and report information. We have observed that the more robust designs are single-platform ones that can include trading, pricing, the general ledger, and risk management reporting.
- One firm has built a system that can aggregate all necessary data within a few hours.
- Another firm has constructed a system that acts as a gateway to credit risk and market risk applications,

using web-based tools, reports, and data. Reporting covers all issuer and counterparty exposures, including derivative and loan-equivalent risk, as well as exposure by asset class for ongoing monitoring and reporting of risk.

- One firm is creating a global liquidity platform to aggregate the firm's liquidity profile worldwide. Other firms are creating global general ledgers to consolidate their balance sheets and income statements.
- Several firms have or are constructing data warehouses to produce MIS or regulatory reports. A data warehouse will take feeds from different subsystems, including a general ledger, and store all the information in the "warehouse." Data in a warehouse are typically cleaned and catalogued under common taxonomies before being made available to users. Custom reports are then developed that can pull specific information from the warehouse. Some firms have employed centralized teams in charge of controlling data collected in the warehouse. This control supplements controls at the local business level and includes a review for missing data and analysis of significant variances. Other firms conduct self-assessments to certify information in the warehouse.

**Leading firms implement data aggregation processes covering all relevant transactional and accounting systems and data repositories to maintain comprehensive coverage of MIS reporting.** Leading practice in this area includes automated reconciliation wherever possible to reduce the risk of manual error or truncation of information reported. It is also critically important to include all off-balance-sheet information in the reconciliation of financial statement data to risk MIS. Trailing firms do not effectively reconcile off-balance-sheet data to risk MIS.

**Leading firms' MIS practices also include periodic reconciliation between risk and financial data.** The nature, scope, and frequency of such reconciliation practices are commensurate with the firm's business and risk environment, but some reconciliation is essential with a view to ensuring accuracy and periodic validation of the firm's MIS. For example:

- Well-developed systems for capital market activities include strong daily profit-and-loss attribution and reconciliation processes, wherein firms use sensitivity

measures such as delta, vega, and gamma to compare risk management data such as VaR calculations with P&L data reported by the back office on a daily basis.

**While we believe strongly that aggregation of risk data must occur on a firmwide basis, increasingly there is a need for firms to be able to compile internal risk data on a legal-entity basis, as systems have been largely designed along business lines.** While risk data aggregation efforts should support the goal of providing firmwide data to senior decision makers, the financial crisis clearly demonstrated that firms must also manage the geographic and legal risks associated with a global, cross-border financial marketplace. The ability to segment risk data by legal entity can become important when a global counterparty defaults, as Lehman Brothers did in 2008. The few firms that can currently parse data by legal entity tend to have inherently simpler legal vehicle structures or have not undergone numerous mergers or acquisitions; such firms often have the ability to produce reports on an ad hoc basis as well as in a standardized way.

#### **D. Prioritizing the Integration of IT Systems and Platforms**

The lack of integrated systems and platforms is a key challenge to ensuring that firmwide aggregation of risk data is accurate and comprehensive. Specifically, we have observed the following practices at firms having a highly developed IT infrastructure that can aggregate risk data effectively:

- business practices that prioritize the integration of legacy systems from mergers or acquisitions as soon as is reasonably possible after the transaction is completed; and
- new product approval procedures that include technology operations personnel to ensure that systems can process and aggregate data from new products or initiatives.

Significantly, firms with a single firmwide data taxonomy, as described above, can facilitate the integration of disparate systems and platforms with the firm's existing architecture. Thus, development of this taxonomy will directly improve firms' ability to address the otherwise difficult task of integrating legacy systems.

## E. Maintaining Appropriate Systems Capacity

Strong MIS is essential for effective business and risk management in steady-state environments and in periods of economic volatility or stress. Capacity constraints, particularly during periods of economic volatility or stress, significantly undermine the ability of management to produce and use MIS. For example, during the financial crisis, the capacity constraints of risk systems inhibited VaR calculation at certain firms; in some cases, firms found errors in VaR reporting for previous end-of-day risk reports. Leading firms are able to process VaR calculations within hours.

Most firms are currently able to establish appropriate planning, policies, and testing to handle volumes for both steady-state and stressed-volume scenarios. These firms opt to include the business lines, risk management, and IT staff in the tasks of capacity assessment, planning, and testing. Most firms employ forward-looking volume assessments, define capacity-related failure, and conduct stress tests to that level.

However, in their capacity planning and testing, most firms still have to include scenarios involving sharp fluctuations in volume. They also have to plan for and test the ability to meet processing windows under stress scenarios, including the ability to make risk MIS available on short notice (such as during crisis situations) and at any given time. For most firms, additional work is required to understand the true impact that outages of critical systems will have on other key systems.

## V. CONCLUDING COMMENTS

The observations in this report indicate that most firms have made progress in developing risk appetite frameworks and have begun multiyear projects to improve IT infrastructure. These steps are clearly in the right direction, but considerably more work is needed to strengthen those practices that were revealed to be especially weak at the height of the crisis. In particular, we have observed that aggregation of risk data remains a challenge for institutions, despite its criticality to strategic planning and decision making.

The effectiveness of risk management practices will be tested as financial institutions adjust their business strategies to meet the continued challenges in the financial marketplace and the evolving regulatory environment. As firms evaluate this forward-looking balance between risk and reward, vigorous leadership and a commitment to strengthening management's ability to make judgments about risk will likely prove essential in the uncertain times ahead.

Along those lines, it is important to note that even the leading or more effective practices identified in this report could still benefit from further enhancement. Supervisors will continue to review these practices periodically to ensure effectiveness going forward.

We welcome further engagement with industry representatives and other public authorities on our observations.

## Appendix A

**Members of the Senior Supervisors Group****CANADA***Office of the Superintendent of Financial Institutions*

Karen Badgerow  
Ted Price

**FRANCE***Prudential Control Authority*

François-Louis Michaud  
Patrick Montagner

**GERMANY***Federal Financial Supervisory Authority*

Claudia Grund  
Ludger Hanenberg  
Frauke Menke

**ITALY***Bank of Italy*

Stefano DePolis  
Andrea Enria

**JAPAN***Financial Services Agency*

Hideo Hashimoto  
Ryozo Himino  
Mamoru Yanase

**THE NETHERLANDS***The Netherlands Bank*

Petri Hofste  
Armand Schouten

**SPAIN***Bank of Spain*

Manuel Caro  
Alberto Alonso de Linaje

**SWITZERLAND***Financial Market Supervisory Authority*

Urs Bischof  
Tim Frech  
Roland Goetschmann

**UNITED KINGDOM***Financial Services Authority*

Alastair Hughes  
Arran Salmon

**UNITED STATES***Board of Governors of the Federal Reserve System*

Timothy Clark  
Patrick Parkinson

*Federal Reserve Bank of New York*

Michael Alix  
Arthur Angulo  
Brian Peters  
William Rutledge (*Chair*)

*Office of the Comptroller of the Currency*

Kenneth Peyer  
Kurt Wilhelm

*Securities and Exchange Commission*

Denise Landers  
Michael Macchiaroli

*Secretariat*

Toni Dechario, Kyle Grieser, and Bronwen Macro, Federal Reserve Bank of New York

Appendix B

**Members of the Risk Appetite Working Group**

**CANADA**

*Office of the Superintendent of Financial Institutions*

Karen Badgerow (*Co-Chair*)

Jacqui Campbell

**FRANCE**

*Prudential Control Authority*

François-Louis Michaud (*Co-Chair*)

**GERMANY**

*Federal Financial Supervisory Authority*

Maik Esser

**ITALY**

*Bank of Italy*

Giampiero Longo

**UNITED STATES**

*Board of Governors of the Federal Reserve System*

David Palmer

*Office of the Comptroller of the Currency*

Kenneth Peyer

Molly Scherf

*Securities and Exchange Commission*

Denise Landers

*Secretariat*

Toni Dechario, Federal Reserve Bank of New York

Appendix C

**Members of the IT Infrastructure Working Group**

**CANADA**

*Office of the Superintendent of Financial Institutions*

Abhilash Bhachech (*Co-Chair*)

**FRANCE**

*Prudential Control Authority*

Christian Masson

**GERMANY**

*Federal Financial Supervisory Authority*

Simone Bock

Joerg Vahlenkamp

**ITALY**

*Bank of Italy*

Vincenzo Re

**JAPAN**

*Financial Services Agency*

Hideo Hashimoto

Nobuyasu Sugimoto

**THE NETHERLANDS**

*The Netherlands Bank*

Evert Koning

**SWITZERLAND**

*Financial Market Supervisory Authority*

Tim Frech

**UNITED KINGDOM**

*Financial Services Authority*

Jill Savager

**UNITED STATES**

*Board of Governors of the Federal Reserve System*

Adrienne Haden

*Federal Reserve Bank of New York*

Ronald Stroz (*Co-Chair*)

*Office of the Comptroller of the Currency*

Joel Anderson