



## Embedding confidence

*The business case for embracing model risk management*

### Summary

Modeling data is an essential practice for financial institutions of all sizes. In the aftermath of the credit crisis, the perceived failure of models and the regulations that followed led many organizations to question how models could be used with greater confidence. These concerns have been reflected by a growing market interest in model risk management (MRM) as an approach to help firms demonstrate the effectiveness of their models, and to satisfy regulatory concerns.

To acquire buy in at the Board level and gain support for MRM as a strategic initiative, connections between model risk, tangible losses, and business benefits must be clearly demonstrated. A recent industry report indicates that this level of support has not taken hold. MRM is viewed as a tactical issue across a diverse range of institutions, undertaken primarily in response to regulation.

The challenges surrounding MRM are worth addressing, and must be addressed. Model risk programs are an important component of an enterprise-wide approach to risk governance and assessing the quality of a firm's financial risk measurement capabilities. MRM is uniquely qualified to mitigate financial and reputational losses tied to model failure, and can provide compelling data to help decision makers gain confidence in the performance of their models, meet current and anticipated industry regulatory requirements, and pursue more business within existing capital allotments and policies.



This white paper explores more deeply some of the high level responses collected by Chartis in *The Risk Enabled Enterprise: Model Risk Management*. This recent report is part of a two-year research initiative in collaboration with IBM. Key findings from the report are used as a starting point to discuss approaches MRM practitioners can leverage to communicate its potential value. Specifically, we argue that to build the type of institutional trust needed to make risk informed decisions, implementing MRM as a strategic initiative is essential. MRM helps equip organizations with the holistic perspective required to perform sustainably against a business climate of volatility and uncertainty.

Articulating our approach to MRM is part of a greater commitment to Smarter Risk. IBM's Smarter Risk approach enables customers to build trust across organizational silos and drive value for the business with an enterprise approach to governance—trust in the organization's ability to manage and protect its data, to understand exposures before they become disruptive, and to empower decision makers to act with confidence and make risk-aware decisions.

### The fundamentals of model risk

Models are designed to capture essential information in order to estimate an outcome. By necessity, models reflect a simplification of reality to forecast the risk of a potential future. Those who expect models to deliver results with absolute precision may become disillusioned with their results, and come to believe that a specific model is not behaving appropriately.

As a broadly cautionary tale, consider that the Basel Committee on Banking Supervision, through the Fundamental Review of the Trading Book, has proposed replacing Value at Risk (VaR) with expected shortfall as the trading book capital metric. One can intuit some of the reasoning behind this proposal. VaR can become unwieldy to calculate large portfolios. Although it is often thought of as a measurement for “the most that can be lost,” VaR only ties losses to a given confidence level. There is also the issue of reputation: VaR became a scapegoat during the financial crisis. Mainstream media pointed to VaR as an example of financial risk management's inability to properly capture tail risks.

If expected shortfall does become the new standard for the trading book, it may well prove to be a more effective measure than its predecessor. Yet many of VaR's perceived shortcomings reflect the potential shortcomings of all models. If a single model is used by different groups to estimate a similar outcome, but each group embeds the model with its own assumptions, the results will be different for each group; perhaps drastically so. It should not be forgotten that models can lead to a false sense of security if attention is paid only to the number provided and not the steps taken to get there.

For firms wishing to make the transformation into a risk-enabled enterprise, model risk management (MRM) must be embraced as an essential program. MRM addresses issues of oversight, governance and accountability. Models produce the numbers that are relied upon in all aspects of decision making—and therefore having a meaningful impact on the organization's understanding of, and trust in, those numbers.

*MRM enables organizations to build trust across disparate business units, increase the quality of data inputs and outputs, and support decision makers with actionable insights that can be used as the basis for risk-aware decision making.*

Research from *The Risk Enabled Enterprise: Model Risk Management* points to the industry and internal challenges MRM practitioners face. The report helps to identify best practices for approaching MRM and for convincing senior management why MRM should be viewed as a strategic initiative that can deliver tangible benefits to the entire organization.

### **The financial model ecosystem**

Financial models are designed to assess financial variables and describe their connected relationships within a system; for example, a firm. Financial models incorporate a number of assumptions into their design that may include: an acceptable level of accuracy, a testing schedule with a specified frequency, the specific system for which the model has been designed, and a production environment that ensures high quality data input.

When the underlying assumptions of a financial model no longer reflect the system it is intended to represent, the potential for model risk exists.

Within some individual business lines, a model's intended use and its associated risks may appear to be well understood. Such models could be actively monitored and effectively governed. However, there is a fundamental lack of consistency across businesses in how models are documented and utilized. There are also substantial discrepancies in policies that often emerge in

a distributed environment. Further, different businesses may use similar models—and so the overall materiality of the model may be much higher than any one business recognizes. What the business line / silo approach therefore fails to take into account is how the use and management of models can affect the entire organization. Potential areas of impact include pricing, system monitoring, credit assessments, operations, risk measurements and risk management, financial projections performance monitoring, and ultimately, strategic decision making.

Financial models are designed with a specific function in mind, but are also part of a larger ecosystem. Input data can be repurposed across multiple models, and the outputs can be fed into further models. Each model will have its own built-in assumptions and varying levels of uncertainty. As data flows from an original model towards one further downstream, the overall levels of uncertainty may increase. Since the financial crisis, firms have learned that what was considered a robust model might become unreliable or unpredictable just when it is required the most. When models contain embedded assumptions about the “normal” range of possibilities that fail under stressed conditions, those assumptions become inappropriate for certain use cases, especially stress testing. Although models themselves received heavy criticism following the crisis, it is perhaps more accurate to say that it was a lack of understanding about the models' assumptions, more than the models themselves, that failed. Despite this recent history, Chartis research determined that the majority of firms struggle to identify MRM as an enterprise-wide initiative.

## A strategic divide

Over 80% of respondents indicated that model risk was a priority that should be addressed in some fashion. Holding back the adoption of MRM programs at a majority of firms is an apparent divide between practitioners who view model risk as a strategic activity, and the Board, which does not. One respondent observed:

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*“Losses from model risk only lead to a letter from the regulator; losses from a trading error are more noticeable. If there is a material loss that has occurred, you can show that; it’s difficult to get it considered before it becomes an issue.”<sup>1</sup>*

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Respondents surveyed by Chartis cited a number of reasons why model risk does not register as a higher priority. Factors included the vying for attention with other aspects of ERM; its reputation as a category that doesn’t impact performance or profitability; it is seen as an operational risk issue; and since it doesn’t fit neatly into a category, MRM is often viewed by default as a regulatory compliance activity.

Regulatory pressure was cited by 59% of respondents as a motivator to address model risk. Yet a compelling case should be made for MRM as a strategic initiative, because the issues Boards do care about are very much in line with the potential deliverables of MRM programs. The strategic importance of models within the organization is known, yet without a matching program to oversee the risks attached to models, organizations are missing the opportunity to maximize the utility of their model-based numbers.

## Capital efficiencies

Much like volatility, regulators and supervisors seeking increased capital buffers have become a standard fixture in the marketplace. The Dutch central bank recently completed a review of capital set aside by the three largest Dutch lenders, to determine if the amounts were sufficient to withstand losses on commercial real estate loans worth 70 billion euros (\$96 billion US). Minister of Finance for the Netherlands, Jeroen Dijsselbloem, reported to parliament that this buffer has more than tripled since the end of 2011. The recent assessment followed a two-stage review of the major banks completed in 2013. The first part focused on models for assessing buffers and provisions, while the second addressed loans and collateral.<sup>2</sup>

MRM can assist firms to better analyze and gain confidence from scenarios tied to capital buffers.

Consider an organization developing a new financial product. To gain approvals and go to market, regulators propose a 100% capital buffer above the calculated risk-based capital requirement. In such a scenario, the bank may have to option to accept the buffer, or provide evidence to support a lower buffer within a set timeframe. An MRM program, with the proper governance in place, could be leveraged to help credibly demonstrate the additional buffer is unwarranted, potentially freeing up millions of dollars in capital.

An MRM program has the capacity to provide similar capital relief in other instances. Since capital is finite and essential, most risk models err on the side of conservatism, in methods and estimates. A lack of confidence in the models or systems that may result in these already-conservative results being further augmented by an add-on percentage—either internally, by the Board or CRO, or externally, by the regulators. When the Board has a greater degree of trust in its numbers, and more accurate estimates can be provided on the risk of transactions, the result could present as lower risk estimates, or the elimination of certain buffers altogether. As a fully realized program, MRM can help organizations pursue more business within existing limits and capital levels.

Australian Reserve Bank Governor Glenn Stevens is a proponent of increasing the general capital buffers held by banks. In a recent speech to the Federal Reserve Bank of San Francisco, Mr. Stevens indicated his hope that by 2019, not only would major financial institutions reach new international minima for capital, but exceed them: “There is a reason to go faster, rather than slower, in accumulating capital to higher minima, while one can.”<sup>3</sup>

Amounts required to fulfill buffer requirements take away capital that could otherwise be used to support lending and trading activities. The presence of an MRM program would help the Board acquire, with a greater degree of confidence, evidence that they are holding the correct amounts of capital to offset the introduction of new products and the extension of credit at approved levels.

While Finance provides information on the current state of an organization, the impact of potential future events requires the ability to generate and stress quality scenarios. Risk information generated with consistency and under the umbrella of a strong governance program can be leveraged to extend the horizon of visibility farther into the future. The examples above illustrate ways in which the introduction of MRM provides their own unique benefits, while augmenting existing ERM programs and generating further confidence in numbers generated across the organization.

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## Risk loss events

The consequences of model failure can lead to associated financial losses, reputational costs, and costs in terms of lost profits associated with model risk. By learning from the experience of others, firms can take steps to avoid such losses themselves. Below are four large scale risk loss events connected with model risk, taken from the IBM Algo FIRST database.

### **AXA Rosenberg LLC | France** **Loss Amount: 307,000,000 USD**

AXA Rosenberg, a quantitative money management firm, disclosed to clients that a model error affecting the flow of information from its risk model to its portfolio optimization process was discovered and fixed during the previous year. Following the announcement, the SEC announced the firm would pay \$217 million in compensation to investors, plus a \$25 million fine over the handling of its error. A subsequent investor class action suit was settled for \$65 million, while Mr. Rosenberg agreed to a \$2.5 million fine and a lifetime ban from the securities industry.

### **Long-Term Capital Management | United States** **Loss Amount: 44,000,000 USD**

Long-Term Capital Management (LTCM) famously imploded due to a number of breakdowns, including overexposure to leverage, sovereign, model, liquidity and volatility risks. LTCM's failure to implement a broad-based risk management strategy and stress test its models paved the way to its downfall, particularly since the firm lacked the diverse revenue streams of the Wall Street investment banks it liked to compare itself to.

### **UBS AG | Switzerland** **Loss Amount: 126,000,000 USD**

UBS AG, a Swiss bank, incurred a nine-figure loss as a result of a faulty pricing model for derivatives. Losses also stemmed from valuation adjustments relating to the change in UK advance corporation tax.

### **National Australia Bank Ltd. | Australia** **Loss Amount: 2,086,000,000 USD**

National Australia Bank came under scrutiny in September 2001 when it wrote down over USD \$2 billion to cover losses at HomeSide Lending Inc., its mortgage servicing subsidiary. The bank was accused of feeding incorrect inputs into its computer models for the alleged purpose of meeting aggressive profit targets. The event was one of the largest devaluations in Australian corporate history.

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## The governance umbrella

Governance provides the structure to define and oversee the lifecycle of models within the organization. This oversight begins with the determination as to where a particular model should be put to use, when it should be retired, and the ongoing responsibility to identify, track, validate, and test models for accuracy and data quality.

An enterprise-wide approach to MRM governance, bringing in perspectives from multiple levels within the organization, can leverage existing structures while providing senior management with insights into controls, business-level details, information-specific risks, and regulatory responsibilities. In a structural sense, this proposed best practice approach is similar in scope and structure to an ERM program. Yet model risk governance takes on an additional responsibility: classification.

In order to measure model risk and engage the Board in a strategic dialog, there has to be some way to put a common measure on model risk, so that “apples to apples”-type discussions can take place.

As different units within the organization will likely be using different models, a range of quantification methodologies, subject to the organization’s usage, will be required. A variety of factors exist to advance classification efforts, including usage, model complexity, financial impact, regulatory impact and reputational impact. Through harmonization of measurement and taxonomy, the firm will be more likely to achieve strong model risk governance, supporting a tangible delivery of strategic benefits.

## Model risk and sustainability

Models are a core function of the modern financial institution. A great deal of attention continues to be focused on the quality of data inputs and outputs generated by models, but less so on the construction, health, and utility of the models themselves.

In the aftermath of the financial credit crisis, the strategic value of well-functioning models continues to grow. Regulations, capital buffers, and the desire to be better prepared for plausible future events all rely to a large degree on the behavior of financial models, both independently and firm-wide. MRM is a necessary prerequisite for organizations to acquire an enterprise view of governance, and to make risk-aware decisions with greater confidence.

Some elements required to support a comprehensive MRM program remain aspirational. Data management and automation are required to provide effective model risk oversight. Model risk programs require clear ownership, additional quantification, and governance systems that carry unique responsibilities within the organization.

*These challenges are slight compared to the reality that numbers produced by risk processes are of little value unless decision makers trust them.*

Embedding MRM as a strategic program helps make all numbers generated across the organization more trustworthy, becomes a stepping stone towards a fully risk-enabled enterprise, and bridges the gap between the data provided by models, and the confidence decision makers require to act on plausible future outcomes. The importance of these decisions and of models themselves should make the strategic value of MRM programs clear to practitioners and the Board alike.

IBM is a leading provider of Model Risk Management solutions. To learn how IBM's Smarter Risk approach enables you to build trust across risk and compliance organizational silos and drive value for the business, visit [ibm.com/software/products/en/enterprise-model-risk-governance](https://ibm.com/software/products/en/enterprise-model-risk-governance).

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- 1 Page 18, *The Risk Enabled Enterprise: Model Risk Management*, Chartis Research, in collaboration with IBM, June 2014
- 2 Corina Ruhe and Maud van Gaal, *Dutch Say Banks' Real Estate Capital Buffers, Provisions Suffice*, Bloomberg, March 28, 2014 <http://bloom.bg/1pdhXpO>
- 3 Speech to the Federal Reserve Bank of San Francisco's Symposium on Asian Banking and Finance, San Francisco, June 10, 2014 <http://www.rba.gov.au/speeches/2014/sp-gov-100614.html>



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