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Chartis

Leading Practices in Capital Adequacy

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About Chartis

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- Credit risk
- Operational risk and governance, risk and compliance (GRC)
- Market risk
- Asset and liability management (ALM) and liquidity risk
- Energy and commodity trading risk
- Financial crime including trader surveillance, anti-fraud and anti-money laundering
- Insurance risk
- Regulatory requirements including Basel 2, Basel 3, Dodd-Frank, EMIR and Solvency II

Chartis is solely focused on risk and compliance technology giving it significant advantage over generic market analysts.

Chartis has brought together a leading team of analysts and advisors from the risk management and financial services industries. This team has hands-on experience of implementing and developing risk management systems and programs for Fortune 500 companies and leading consulting houses.

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1- Executive summary

The evolving regulatory landscape means that financial institutions (FIs) are implementing huge structural changes. This research sets out to understand the current standing, issues and challenges organizations are facing in implementing capital adequacy, stress testing, model risk management, governance, compliance and successful data quality programs. We surveyed 103 risk management professionals working in a wide range of financial service sectors around the world, and conducted in-depth follow-up interviews. Some of the key findings include:

- **Capital adequacy programs fall short of their potential:** Close to 80% of FIs said Basel 3 regulation has a fairly significant impact on their capital adequacy programs. Dodd-Frank and CCAR were seen to have the most significant impact in the US. However, FIs are struggling with the breakneck speed at which they must adopt new mandates, and therefore see the guidelines as a regulatory compliance issue with moderate impact on other aspects of the firms business. By 2019 the anticipated additional capital reserve requirements will be in excess of $870 billion and €1.1 trillion for US and European FIs respectively. Successful, standardized and transparent risk management practices will help demonstrate effective capital adequacy programs to regulators. However, there are untapped opportunities to adopt strategies around capital efficiencies which can lead to business benefits beyond compliance, particularly around retail banking and capital market activities.

- **Stress testing still needs to be pushed to board level:** More than 60% of FIs have identified stress testing as a core risk and control activity and have constituted committees (either board level or executive level) that engage entirely with passing stress testing and ICAAP reporting. Around 66% of respondents have reported that stress testing is one of the agenda items in their board meeting – with 51% reporting that it is a core agenda item only to "some" extent. However, more concerning, almost 65% of the respondents said stress testing is only part of their ICAAP and not embedded within their business planning and risk management processes.

- **Model risk management and governance is underdeveloped:** Overall 70% of FIs have implemented internal policies and rules to separate model development and model validation activities, enabling an independent review of the models' performance, design objectives and business use. Most FIs have appropriate model risk governance guidelines, with reporting to a risk committee and/or CRO, and have implemented standardized validation procedures, but have yet to establish corporate-wide validation tools to help manage the workload. However, only a few respondents (less than 14%) indicate any involvement of internal audit, which highlights a major operational governance gap and significant inconsistencies between model risk management and implementing Basel guidelines.

- **Data quality challenges plague financial firms:** It is evident that data quality is a pressing issue, with no uniform approach across the various tiers of FIs. Tier-1 FIs lead the charge, with data quality ownership residing with the business lines[1], while data management is controlled by functions such as CIO/IT, centralized data governance teams and the CRO/CFO. That said there is still a need for enterprise-wide standards and controls under a single point of visibility and governance such as the emerging Chief Data Officer role.

- **Governance and compliance:** In a majority of larger FIs, the onus is on the business lines to develop, measure and manage their own data quality, lending models and risk estimates, while the independent risk function is tasked with capital adequacy calculations, assessment and allocation, among other model and portfolio calibrations. In terms of the compliance assessment, in tier-1 FIs the role of internal audit is under-emphasized and under-utilized, demonstrating low confidence in the organization's governance initiatives. Although FIs are reporting board awareness and monitoring of activities associated with passing stress tests and regulatory compliance reviews, the fact that neither internal nor external audit review and reporting mandates are in place points to a serious lack of governance. This could become a major capital reserve requirement issue for boards and their banking operations by 2019. There were numerous stress test failures in 2014 in both the US and Europe that reflect the impending seriousness of this issue.

- **Coverage and reach of regulatory bodies:** There is clear evidence of the regulatory focus on the tier-1 lending institutions, with limited attention on the tier-2s and virtually no assessment of the tier-3 and tier-4 lenders, which could become a serious issue in a severe economic downturn. Most regulatory agencies face three confounding pressures – constrained budgets; lack of qualified practitioners, and lack of industry-wide model management standards; including benchmarks and interpretive or calibration tools and methods. Combine these challenges with the number of lenders today – about 6,000 in Europe and the equivalent in the US – and the greatest concentration at the tier-2, 3 and 4 levels, one could readily anticipate a 10%-15% bank failure rate, when combining capital reserve requirements and a severe economic recession. This could represent a $100 billion to $200 billion problem for the global lending system.

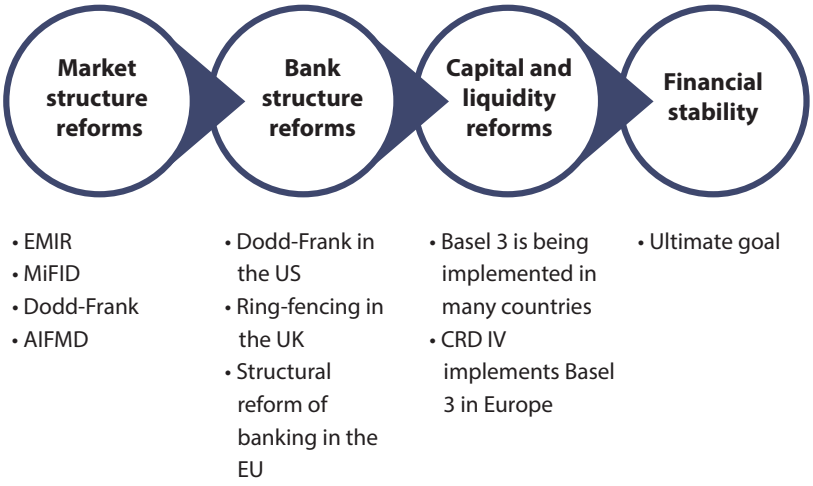
[1] Chartis defines Tier-1 firms as those with over US$100 billion in assets. Tier-2 firms are those with between US$100 and US$10 billion in assets, and Tier-3 firms are those with less than US$10 billion in assets

2- The continuing challenges of global financial reform

Since the 2008 financial crisis, governments have pushed for major reforms to make global financial markets safer and more transparent. The result is the introduction of new regulations designed to strengthen the financial system and increase the resilience of FIs to cope with any future episodes of economic stress.

Central to these reforms is the way capital adequacy is calculated and defined. The Basel 3 Accord has led the charge by providing an international standard for calculating capital adequacy ratios (CARs), requiring FIs to increase the level, quality and transparency of their capital. In the US, the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) and Comprehensive Capital Analysis and Review (CCAR) also have a significant impact on capital adequacy programs. Figure 1 gives an overview of the major financial reforms.

Figure 1: Overview of major financial reforms



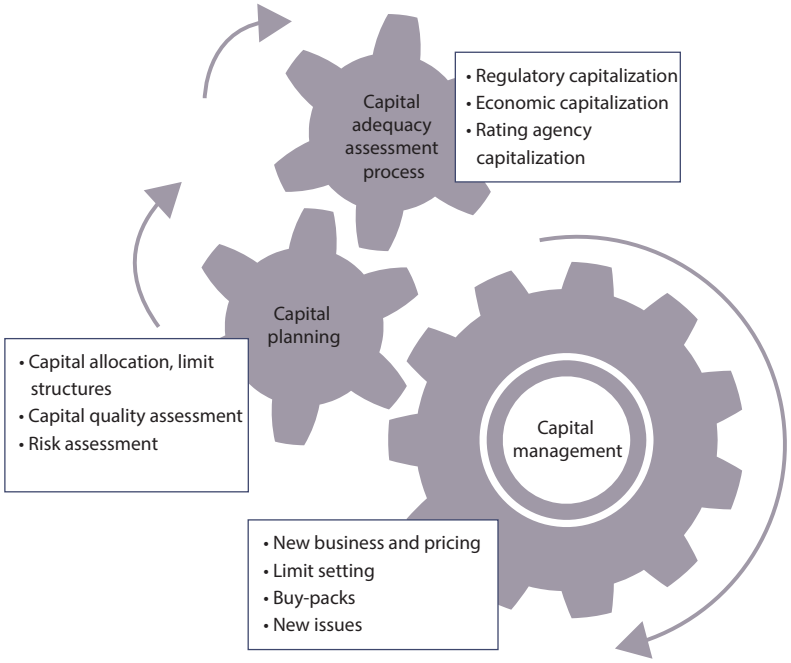
However, mastering the art of capital management for growing regulatory and internal risk management purposes comes with its challenges. For example:

Scarcity of capital: In Europe, with FIs needing around €1.1 trillion of additional tier-1 capital by 2019, a lack of quality capital could significantly impact many capital adequacy programs. Likewise, a gaping hole of $870 billion in tier-1 capital is set to impact the US banking sector. These capital shortfalls are staggering and warrant an increased focus on FIs' ability to raise, calculate and maintain minimum regulatory capital.

Increased stress testing: Although regulatory capital is a preferred capital metric, its failure to account for economic risk – risk run as a 'going concern' – can be seen as a weakness. The use of economic capital models has therefore recently gained traction, with regulators setting economic capital as the minimum regulatory capital. In this case, FIs are required to assess the adequacy of minimum capital through Basel 2's Internal Capital Adequacy Assessment Process (ICAAP). As a result, stress testing has become the central theme for FIs. In the US, the Federal Reserve Board's (Fed) Comprehensive Capital Analysis and Review (CCAR) is the main talking point among the complex 'bank holding companies' (BHCs), which must establish robust processes for managing capital resources and risk measurement and management practices.

Total cost of ownership: To accurately calculate capital adequacy ratios and carry out robust stress tests, FIs should invest in implementing the necessary tools and infrastructure. These will ensure regulatory compliance and help optimize capital, but could increase the total cost of ownership (TCO) of the infrastructure exponentially. It is therefore worth considering investment in systems, benchmarks and tools that can be embedded across the business and add value, rather than being a 'box ticking' compliance exercise. As outlined in Figure 1, the global financial reforms drive a complex interplay of planning, assessment and management of capital as illustrated in Figure 2.

Figure 2: Capital management process workflow



About the survey

To understand how FIs are coping in the new regulatory landscape, Chartis and FICO carried out a global survey on *Leading Practices in Capital Adequacy Programs* that looks at the current capital adequacy regimes of FIs of different sizes and geographies. A total of 103 professionals across the financial services industry responded to the survey.

In addition, Chartis carried out in-depth follow-up interviews with numerous industry practitioners to discuss their views. Discussions were also undertaken with subject matter experts from FICO.

3- Capital adequacy programs: The untapped opportunities

We asked FIs which of the major regulatory mandates are having the greatest impact on their capital adequacy programs. Overall, Basel 3 (51%) and Basel 2 (39%) have the greatest impact on capital adequacy practices, while the Fed's Dodd-Frank (32%) and CCAR (24%) exercises are also a driving force (See Appendix for detailed charts).

As Figure 3 indicates, there are significant regional differences. Not surprisingly, given the primary focus of the Fed, the impact of Dodd-Frank and CCAR is felt mainly in the US.

Figure 3: Which regulations have the greatest impact on your firm's capital adequacy program?

Regulatory compliance is still a reactive exercise

While FIs are working hard to meet requirements, our research showed that many are overwhelmed by the number of regulations they must comply with. The breakneck speed at which local regulators are adopting Basel guidelines and initiating local regulations means that compliance is largely a reactive exercise for FIs, who have limited time and resources to proactively focus on devising and adopting capital efficient strategies that can lead to business benefits beyond compliance.

In this regard, it is also worth noting interviewees were quick to point out that the volume and the speed at which the new regulations are being introduced puts a significant strain on the scarce resources of the regulators themselves. Given this, regulators do not have the bandwidth to look at the smaller tier FIs in any meaningful way. Supervisory scrutiny related to capital adequacy is, for practical purposes, limited to larger FIs.

Capital-focused strategies see a significant improvement potential

FIs are allocating large portions of their budgets and human resources to address risk and compliance issues. Furthermore, the expenditure on risk management and regulatory compliance is unprecedented and expanding, in terms of involving different work streams, including remedial work on the capital plans.

However, despite these pressures and limitations, there are opportunities FIs can capitalize on to adopt efficient capital-focused strategies that can drive improvements in risk management across the business, particularly in retail banking and capital markets activities. Some FIs are therefore making a number of adjustments to their capital management strategies, with leading practices including:

- **Improved counterparty risk assessment:** establishing dedicated credit value adjustment (CVA) desks, and selecting counterparties after assessing the CVA impacts.
- **Prioritizing counterparties:** according to risk weighted asset (RWA) rules.
- **Establishing collateral optimization strategies:** by improving netting and efficient collateral management.
- **Optimizing their product portfolio for low capital consumption:** by restructuring products and exiting from unprofitable business lines.
- **Establishing and enforcing standardized model risk management practices:** using industry standards, benchmarks and calibration tools to consistently compare, contrast and report on portfolio performance.

As long as capital remains scarce, capital adequacy and capital management will top the strategic agenda at FIs and propel the adoption of technology optimization programs and capital-focused business models in the future.

To truly exploit this opportunity FIs must ensure that steps are taken to make strategic improvements and enhancements to their systems and processes, rather than making arbitrary adjustments to the existing ones. There are many areas where improvements can be made, but we believe some key areas warrant attention in the medium term:

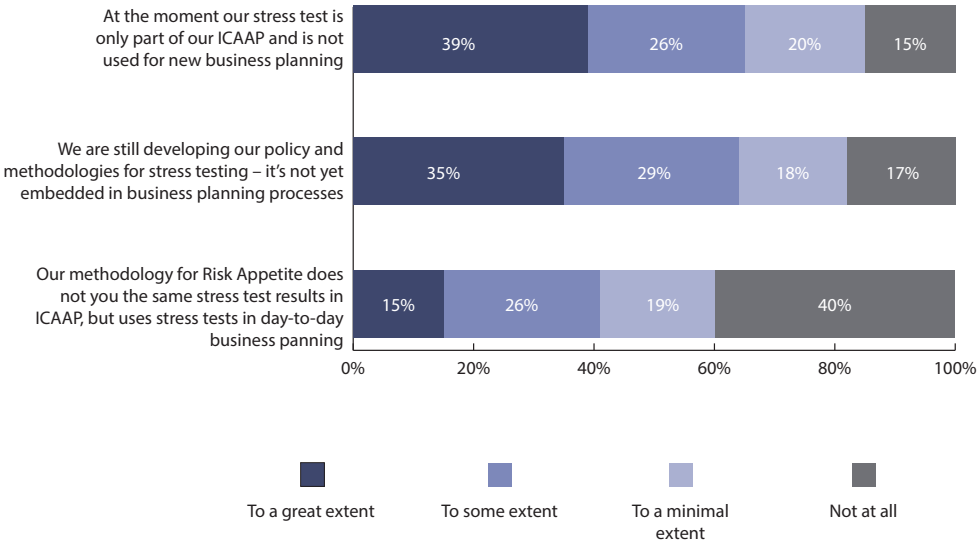
- **The coverage and granularity of risk models:** combining an enterprise-wide view of risk with the ability to understand the impact of multiple variables for stress testing, compliance and liquidity risk management.
- **The quality of data:** ensuring accuracy and providing a foundation for capital-efficient models and strategic business decision-making.
- **Eligibility and the visibility of collateral:** establishing an integrated view of all collateral and its risk mitigating value.
- **RWA related processes:** developing complex models to accurately calculate risk, especially in times of crisis.

4- Stress tests: A failure to embed the results is a concern

In Europe and the US, regulators are making it mandatory for FIs to integrate stress testing into their ICAAP. As a result, a large part of compliance teams' time is spent on identifying and analyzing the impact of various hypothetical scenarios on their portfolios. As capital adequacy planning and stress testing are mandatory regulatory requirements, FIs should embed the results fully, adopting them within the firm's business processes to truly mitigate risk and optimize capital allocation – as well as driving efficiencies and taking full advantage of them throughout the business.

It is clear from the survey that stress testing is seen more as an ICAAP compliance exercise, with little focus on how the results relate to actual business plans or risk appetite. As illustrated in Figure 4, for 65% of respondents, stress testing is not embedded within their business planning process at all. This percentage increases for larger FIs, with tier-1 at 91%, tier-2 at 86%, tier-3 at 64% and tier-4 at 40% (See Appendix for detailed charts on tiers).

Figure 4: Incorporating stress testing results into business planning



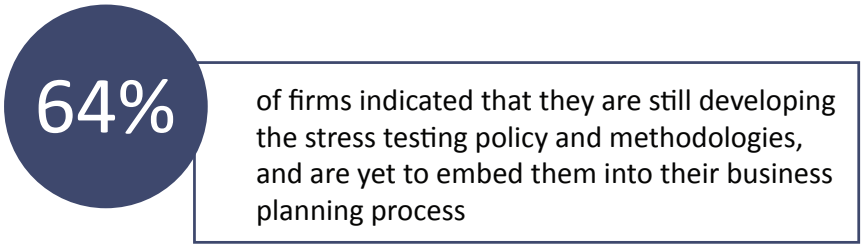
Linkage to risk appetite is minimal

40%

of firms indicate that stress testing, business planning and linkage to risk appetite are fragmented

Given the importance of stress testing to the ICAAP requirements, FIs should have a well-defined strategy linking their stress testing results with risk appetite and, in turn, with the new business planning process. It is therefore alarming to see that only 40% of FIs indicate that they use different stress tests for risk appetite and business planning. This highlights the fact that stress tests, business planning and linkage to risk appetite are fragmented. As risk appetite, business planning and stress testing are inextricably linked, it is difficult to address any of the three concepts individually without addressing the others. FIs should therefore aim to gain the most benefit from stress testing exercises by incorporating them into the overall risk management and business planning processes.

Stress testing policies and methodologies are still evolving



Almost two thirds of respondents (64%) say they are still developing their stress testing policy and methodologies, and are yet to embed them into their business planning process. This number varies across the tiers (tier-1 (86%), tier-2 (66%), tier-3 (41%) and tier-4 (50%). It is worth noting that even the larger tier FIs are still in the process of developing policies and methodologies, which is contrary to the expectation that larger FIs would have developed them already. This suggests the regulatory compliance exercise is at present poorly linked to business planning and further accentuates a siloed approach to stress testing and ICAAP.

Stress testing is still not a core Board-level issue

Respondents from across the tiers highlighted stress testing is yet to be considered a board level issue; 15% said stress testing is a core item on the agenda in their board meeting, while 51% include it only to some degree.

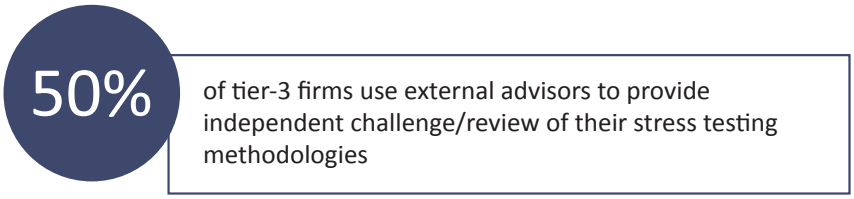
At larger FIs, boards are aware of the importance of stress testing, but they are yet to adopt or establish the operational procedures, business practices and organizational or reporting structures needed to demonstrate the more diligent risk management objectives of regulatory stress testing. Best practices, such as internal or external audit reviews of operational governance involving established standards, practices, or thresholds are neither carried out nor are the results ever reviewed. That observation was confirmed during the course of our qualitative interviews; some FIs expressed concern at their inability to optimize their business practices against their likely capital reserve levels. Outside of the regulatory context, they are not systematically conducting tests and internal reviews of the business practices and operational procedures that have been put into place.

Smaller FIs lag behind in adopting best practices

Integrating stress testing results into business planning enables FIs to superimpose additional limits to manage losses arising due to risks that may not materialize in normal market conditions. To achieve such integration, stress testing processes must be well coordinated and senior executives and business heads should be involved at every level.

Although tier-1 and tier-2 firms demonstrated some level of maturity, it is evident this is not trickling down to smaller tier FIs. This is perhaps because smaller FIs are under less regulatory scrutiny than larger FIs; they may also be discouraged by the increasing cost associated with adopting the compliance practices visible at their larger peers. The implications of not adopting best practices could undermine the objectives set by the regulators. This is especially problematic, given the fact that smaller tier FIs account for a large proportion of financial institutions.

Tier-3 FIs lead on use of external advisers



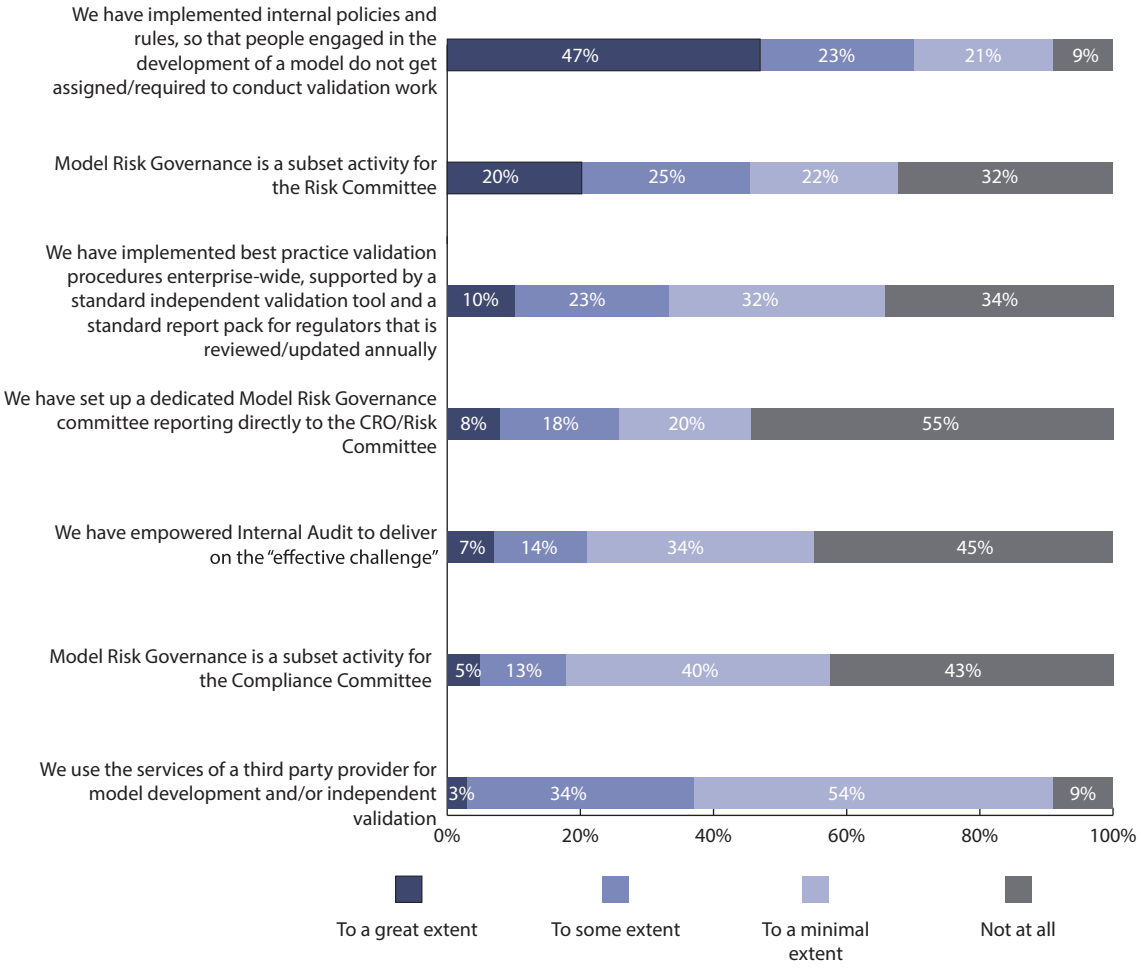
To ensure a comprehensive assessment of the bank's real vulnerabilities to stress situations, it is best practice that an independent reviewer challenges and validates the methodologies and business assumptions used. This exercise can be carried out internally or externally. The survey found that, largely, stress testing is an internal process whereby the bank's internal teams (business, risk and finance) are responsible for carrying out their periodic stress testing exercises. External support is only employed for documentation support or model review/challenge and assurance. This was evident in tier-1 (13%), tier-2 (29%) and tier-4 (10%). However, in tier-3 FIs, the external adviser's involvement in challenge/review goes up to 50%, indicating that these firms rely on external teams to some extent to provide independent challenge/review of their stress testing methodologies.

5- Model risk management: An evolving landscape

FIs rely heavily on the quantitative analysis and models to help make various financial decisions. The term 'model' is broadly referred to in Supervisory Guidance on Model Risk Management (SR 11-7) as: "a quantitative technique, structure, or method that applies economic, statistical, financial or mathematical theories, assumptions and methodologies to process historical data into quantitative estimates".

There are inherent risks in model usage, for example where the models are not performing well against their intended business use, or when they are used inappropriately. It is therefore essential for FIs to have robust model risk management processes, or ensure their model suppliers do, that comprise robust model development, model validation and governance. With the changing landscape of what constitutes a model and the coverage being enlarged under the various regulations (particularly SR 11-7), FIs are now expected to adopt a model risk oversight and control process for all the analytic models in place. We asked FIs what processes they have in place to meet these requirements. Figure 5 outlines the model risk management practices adopted by the participating firms.

Figure 5: Model risk management



We found that 70% of respondents (tier-1 (96%), tier-2 (78%), tier-3 (49%) and tier-4 (70%)), have implemented internal policies and rules for the separation of model validation from model development. This indicates that these FIs have developed a mechanism to enable an independent review of the models' performance, design objectives and business use.

Mixed approaches to model development, validation and governance

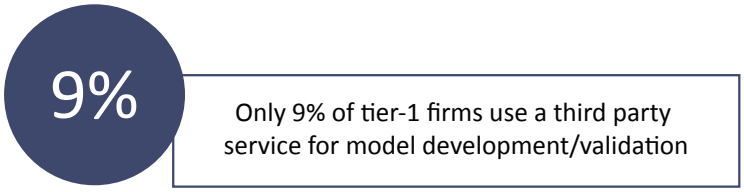
Efficient model risk governance allows for an increase in aggregation and regulatory reporting capabilities, a decrease in duplication of effort, and savings across the balance sheet.

Model risk governance can be considered to comprise three lines of defense:

- The controls exerted by business and corporate functions, and the responsibilities for managing those models throughout their lifecycles. This includes formal processes for definition, development, implementation and monitoring.
- Enterprise risk functions and committees. These establish standards for governance, validation, and monitoring of adherence to model risk governance policies.
- Independent audit. Independent assessment of the design and operational effectiveness of the controls and policies of the first and second lines.

Models require critical, unbiased analysis to determine potential limitations and assumptions. There are five primary advantages of model risk governance:

- Regulatory compliance
- Evidence that models are fit for purpose
- Improvement in the end-to-end lifecycle management of models
- Improved business intelligence
- Reduction in duplication of effort.



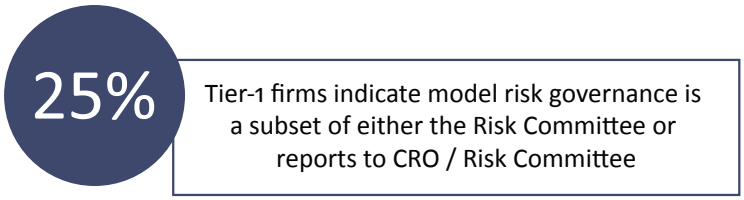
Overall, smaller tier firms have taken significant steps towards defining their model risk governance framework, but are more likely than larger FIs to use a third party provider for model development and validation. Just 9% of larger firms used a third party, compared to 33% for tier-2, 37% for tier-3 and 54% for tier-4. This could be due to the evolving landscape, lack of regulatory compliant model management methods and/or a lack of experienced resources to develop new model risk management processes.

Front office on the front line

In the majority of Tier-1 FIs (96%), individual business lines regularly assess compliance of their governance and other requirements. The front office, according to respondents, is at the forefront of this process. This is because the business units are responsible for their own profitability, risks and control mechanisms, and can dedicate resources to proactively assess measure, manage and check the compliance assessment against the mandated requirements.

Business units, independent risk management, and internal audit are often referred to as the three lines of defense and together establish an appropriate governance structure and control mechanism. Therefore, these units should also ensure that the Board and senior management has sufficient information on the bank's risk profile and risk management practices to provide credible information to management's recommendations and decisions.

Model risk governance still underdeveloped



Contrary to our expectations, tier-1 FIs have limited model risk governance maturity; just 25% saying that model risk governance is the responsibility of the Risk Committee. Tier-2 and tier-3 FIs demonstrate a more mature approach, with model risk governance being the remit of the risk committee.

Despite some positive steps being taken towards model risk management, as demonstrated above, very few respondents (less than 14%) indicate more than a limited use of internal audit. This result points to a regulatory gap between model risk management and Basel guidelines; according to Basel guidelines, internal audit has a responsibility for "the approval and maintenance of risk models including verification of the consistency, timeliness, independence and reliability of data sources used in such models"[2].

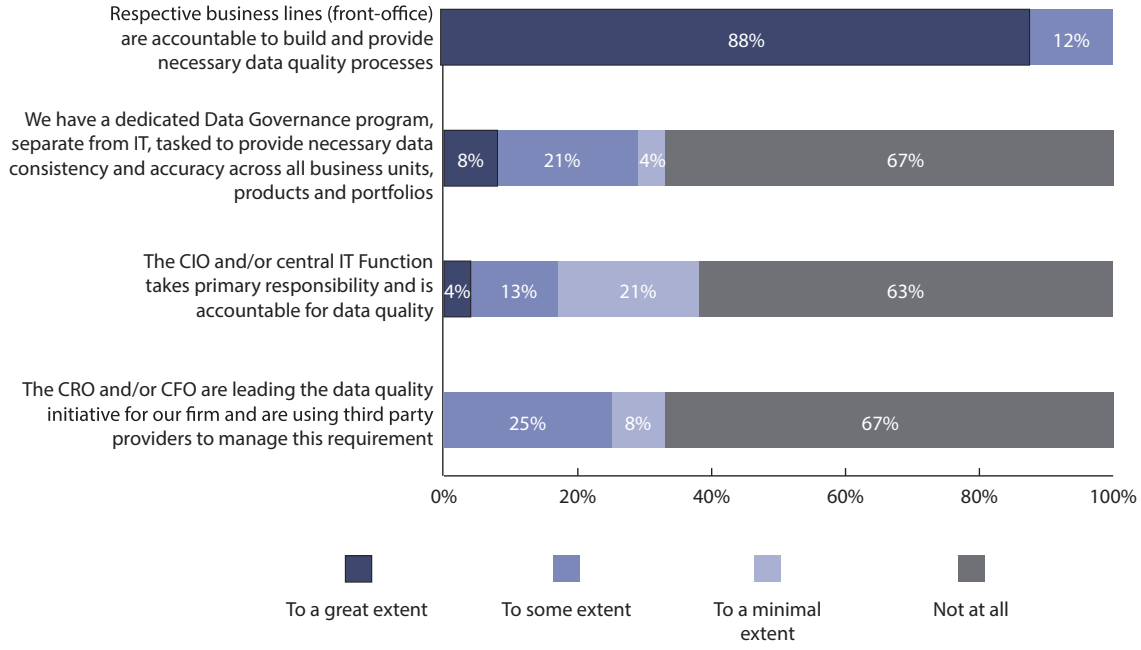
[2] BIS, The internal audit function in banks (2011)

6- Data quality: Divided views on responsibility

Good data governance is essential to ensure good data quality and underpins confidence in all reporting, business decisions and capital calculations – quality data is recognized as the foundation of sound analytical decisioning. New and existing regulations, including Dodd-Frank, Basel 3 and Basel Committee on Banking Supervision 239 (BCBS 239), therefore require that FIs' data is comprehensive, accurate, timely and auditable. In addition, the expected implementation of the BCBS 239 initiatives (from Jan 2016) will require global and domestic systemically important FIs (G-SIBS and D-SIBS) to create data lineage, document hierarchies and develop the enterprise data dictionary.

So, data governance is a critical challenge for all FIs, including identifying who will take ownership of data quality policies, mitigation and management programs. Globally, large FIs have embarked on data transformation initiatives with FIs creating specialist data governance teams and programs for managing data quality challenges. Figure 6 shows the approaches taken by the participating firms to mitigate data quality challenges. (See Appendix for detailed charts on tiers).

Figure 6: How is your firm approaching data quality challenges?



Strikingly, 100% of tier-1 FIs said that data quality and data management initiatives are the responsibility of the respective business lines. Less than 30% of respondents have a dedicated data governance program (which is separate from IT). Data quality challenges are not addressed at the "C" level (i.e., ownership does not belong to CIOs, CROs or CFOs).

Larger FIs have allocated budgets and resources for handling their data quality issues right at the source, by embedding and making the business lines (front office) responsible for the data quality initiatives. It is important to note that this lack of central control/governance may lead to the lack of standardization, inconsistent taxonomies and complex enterprise-wide data architecture, reconciliation and data quality issues at the group level.

While tier-2 FIs have allocated fixed responsibilities for data quality issues, with the onus being on the business lines (66%), at tier-3 FIs, data governance programs (separate from IT) are more prevalent (57%). However, the CRO/CFO along with third party providers also has equal responsibility in meeting the data quality initiatives. The situation reverses in tier-4 firms, where the responsibility is shouldered by the CIO/IT function (65%). Clearly, in smaller organizations, data is seen as an IT issue and hence not owned by business lines.

Chartis expects the trend towards centralized data governance and the emergence of the Chief Data Officer role to prevail over time as a key aspect of industry best practice in risk management. For larger FIs this will be accelerated in response to BCBS 239 but will also 'trickle down' to medium and smaller sized FIs.

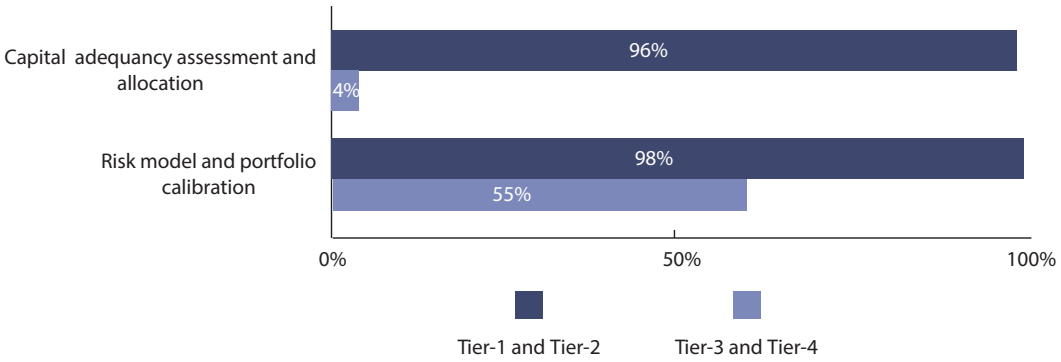
7- Tier-1 FIs lead the way in adopting best practices

Basel guidelines stipulate that the primary responsibility of the ICAAP, model risk and portfolio calibration should be with the risk function. These guidelines provide much needed direction for FIs to implement requisite methodologies and strategies. Tier-1 firms, which are under greater regulatory scrutiny, are expected to adopt them. The best practice approach will be for smaller FIs to follow suit. The survey results confirm that larger FIs (tier-1 and tier-2) lead smaller FIs (tier-3 and tier-4) with respect to following Basel best practice guidelines for capital adequacy assessment and risk model calibration.

Tier-1 banks are leading the way in embedding these processes. The survey found that the business lines are responsible for the majority of work, including data quality management, internal model development, risk calculations and stress testing.

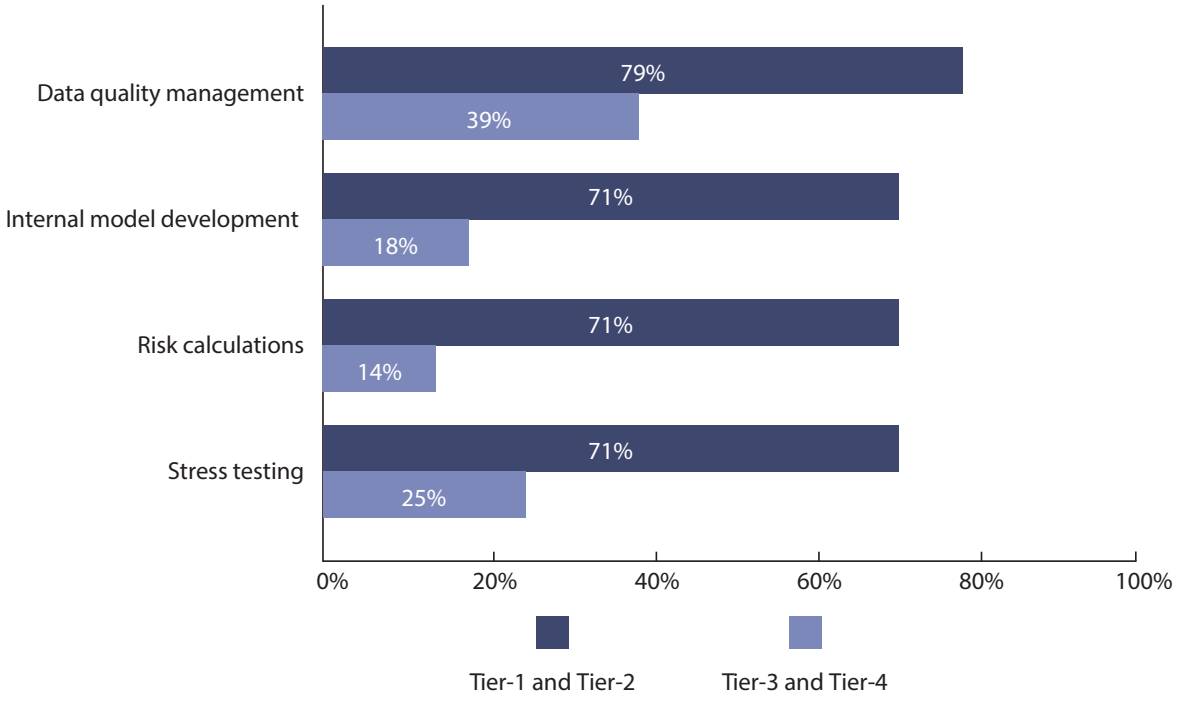
Tier-2 banks follow similar trends as Tier-1 banks, however Tier-3 Banks allocate the bulk of the responsibilities to the independent risk management functions. The risk management function therefore takes onus on all activities which are non-business in nature and are more oriented towards risk, modeling, data, capital and control activities.

Figure 7: Comparison of larger and smaller FIs' adoption of best practices



In other areas such as data management and stress testing the best practice is for issues to be addressed at the first line of defense, the business lines. Larger FIs lead in this respect as well.

Figure 8: Comparison of larger and smaller FIs in other best practice areas



8- Conclusion

Data quality issues still plague the participating institutions, most notably their limited data governance programs. Approaches to data quality vary across organizational type, with tier-1 institutions delegating the responsibility to individual business lines, whereas smaller institutions have greater centralization of responsibility around data quality and data strategy. Data management should be addressed at C-suite level, using a centralized data governance program to establish standardized and consistent taxonomies and data architecture, including increased prevalence of the CDO role.

Crucially, regulatory reporting and stress testing appears to be a reactive exercise and largely compliance driven across the board – FIs are not embedding the results of stress testing into their business planning, or optimizing their capital planning in line with evolving capital adequacy ratios. Stress-testing should be driving business decisions, and should be embedded in business planning and risk management processes at the board level. Establishing linkages between risk appetite, business planning and stress testing will allow firms to prepare for both regulatory and market-based impacts with efficient capital allocation.

The survey indicated that there are currently regulatory gaps in model risk management processes for validation and independent audit. Firms will need to address these issues not only to prove to regulators that their models are fit for purpose, but to enable end-to-end lifecycle model management, improve business intelligence and reduce duplication of effort.

In particular, boards and audit have a greater role to play in the formal review and governance of lending risk analytics, including application and support of the stress test and capital allocation exercises. The cost of disengagement from the governance of lending risk analytics is potentially large. Regulators will have no choice but to assess larger and larger capital reserve judgments on lenders when faced with inconclusive, inaccurate or confusing results from their risk and stress test assessments.

The lesser regulatory burden on smaller firms is not an excuse for decreased rigor in capital management strategies: even if smaller firms have less individual presence, they have an enormous aggregate impact on markets, and regulators should turn their attention to them sooner rather than later. Optimized capital management, best-practice model risk governance, stress testing and data quality procedures should be established.

The research findings demonstrate that, despite significant industry expenditure in lending risk analytics, FIs are far from fully engaged. FIs of all sizes should therefore prioritize:

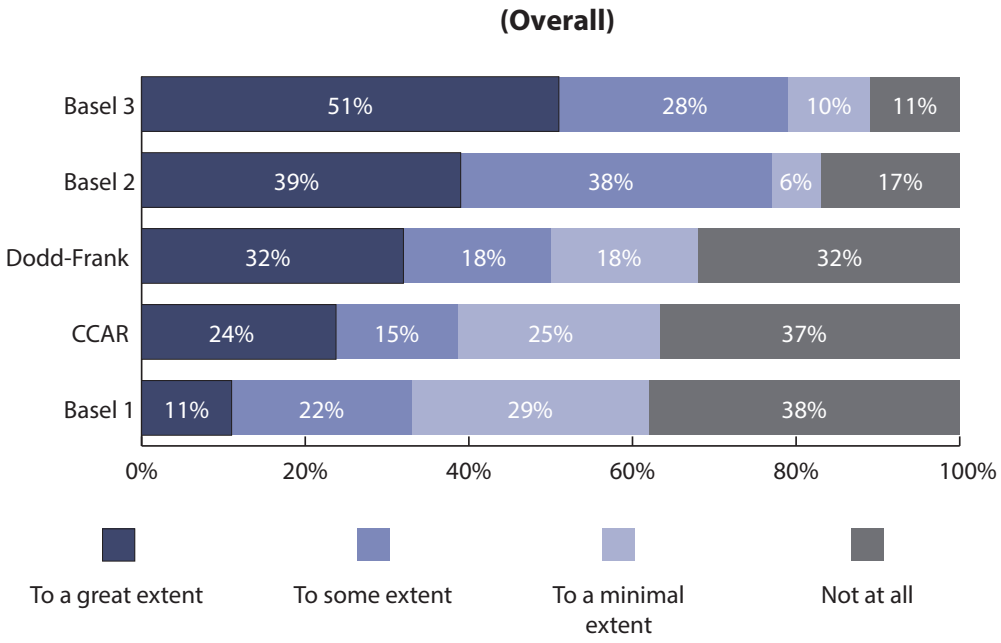
- Putting in place the processes, benchmarks and systems to integrate regulatory compliance activities, and the resulting information, with business planning, risk management and operational efficiencies
- Ensuring the development and internal/external validation of models are kept separate to ensure effectiveness decisions and accuracy of reports
- Allocating budgets and responsibility for data governance and regulatory compliance to the appropriate business lines
- Facilitating clear communication between risk function, business lines, internal auditors and the Board
- Placing capital allocation and lending risk management practice audits on the formal board review agenda

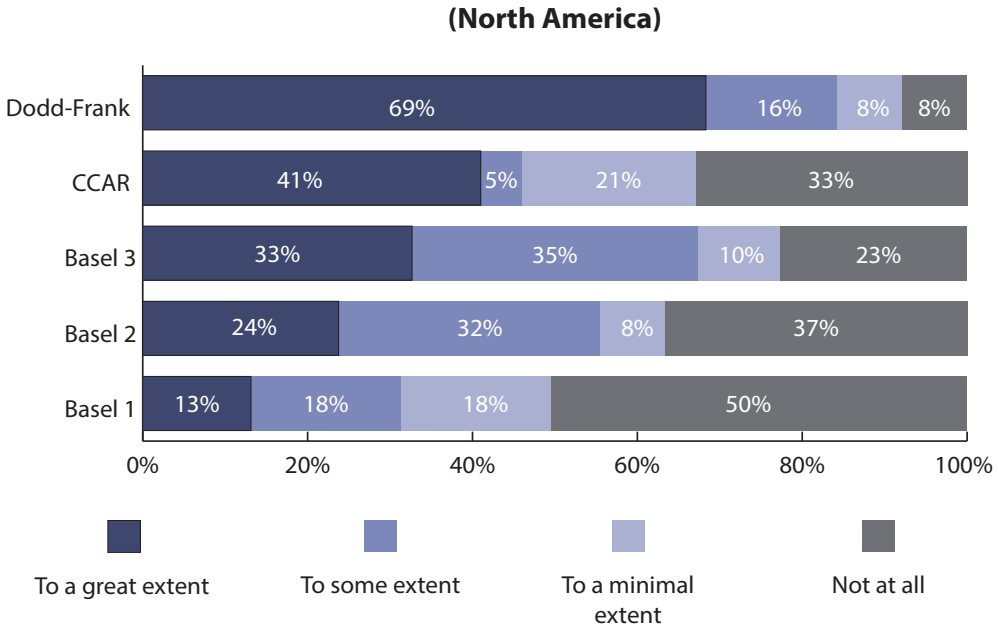
9- Glossary of abbreviations and acronyms

BCBS 239	Basel Committee on Banking Supervision 239, *Principles for effective risk data aggregation and risk reporting*
CAR	Capital adequacy ratio
CCAR	Comprehensive Capital Analysis & Review
CVA	Credit value adjustment
D-SIB	Domestic systemically important banks
Dodd-Frank	Dodd-Frank Wall Street Reform & Consumer Protection Act
EMIR	European Market Infrastructure Regulation
FI	Financial institution
G-SIB	Global systemically important banks
ICAAP	Internal Capital Adequacy Assessment Process
MiFID	Markets in Financial Instruments Directive
RWA	Risk-weighted asset
SR 11-7	Supervisory Guidance on Model Risk Management
TCO	Total cost of ownership

10- Appendix

Figure 9: Which of the following regulations have the greatest impact on your firm's current capital adequacy methods and practices?





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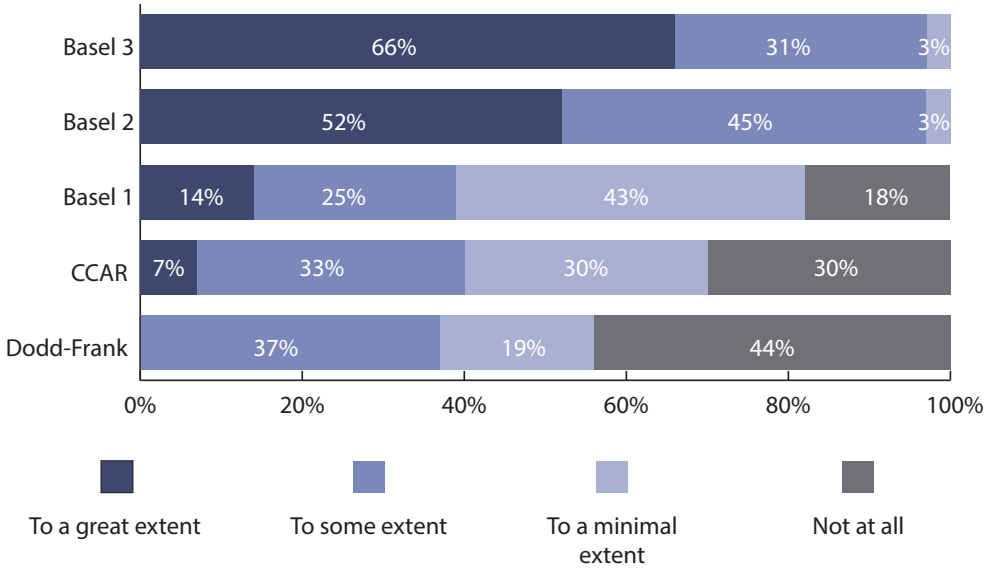

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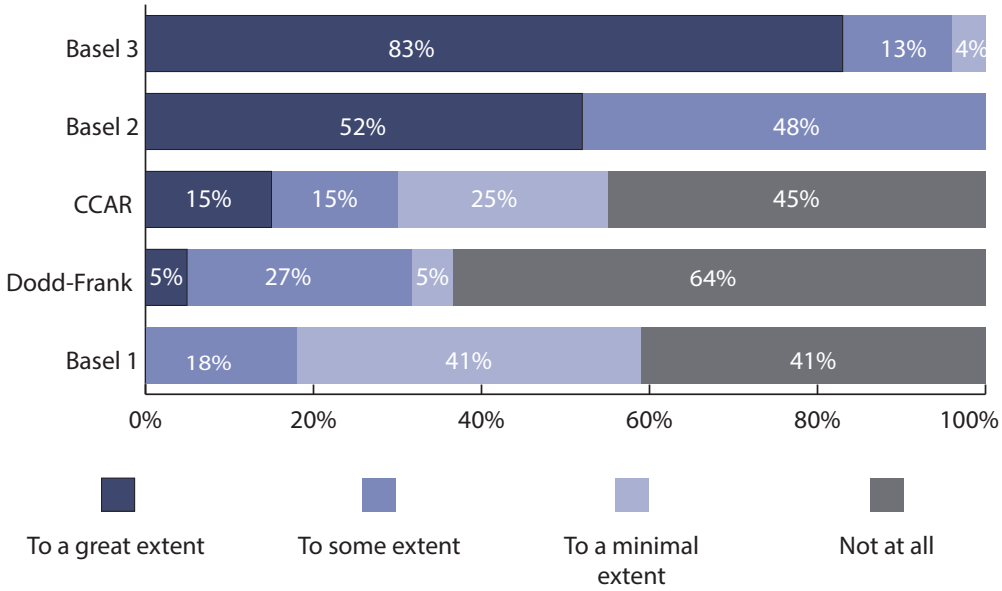
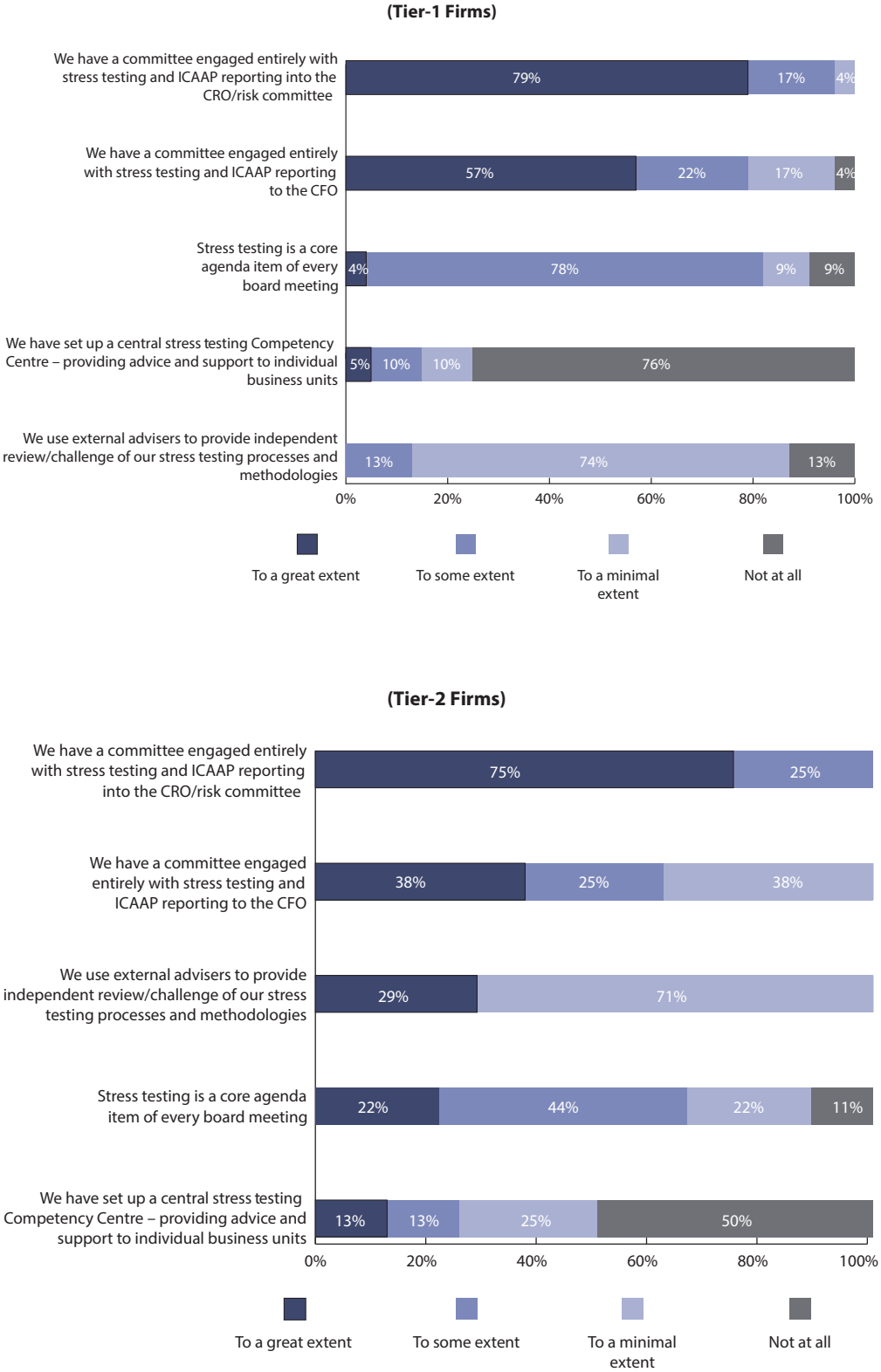
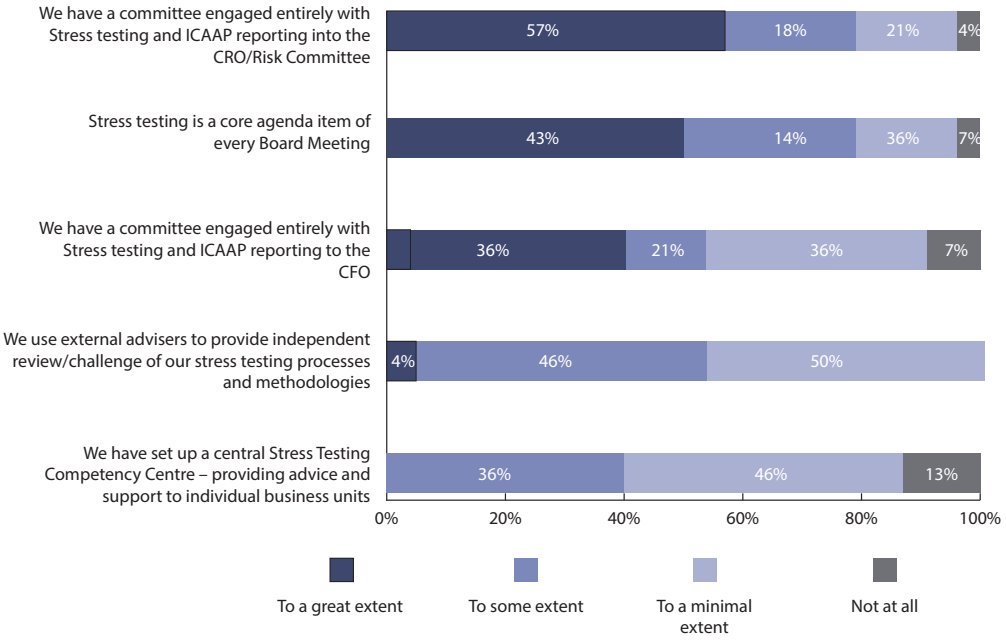


Figure 10: Senior management oversight of all processes and execution of stress tests



(Tier-3 Firms)



(Tier-4 Firms)

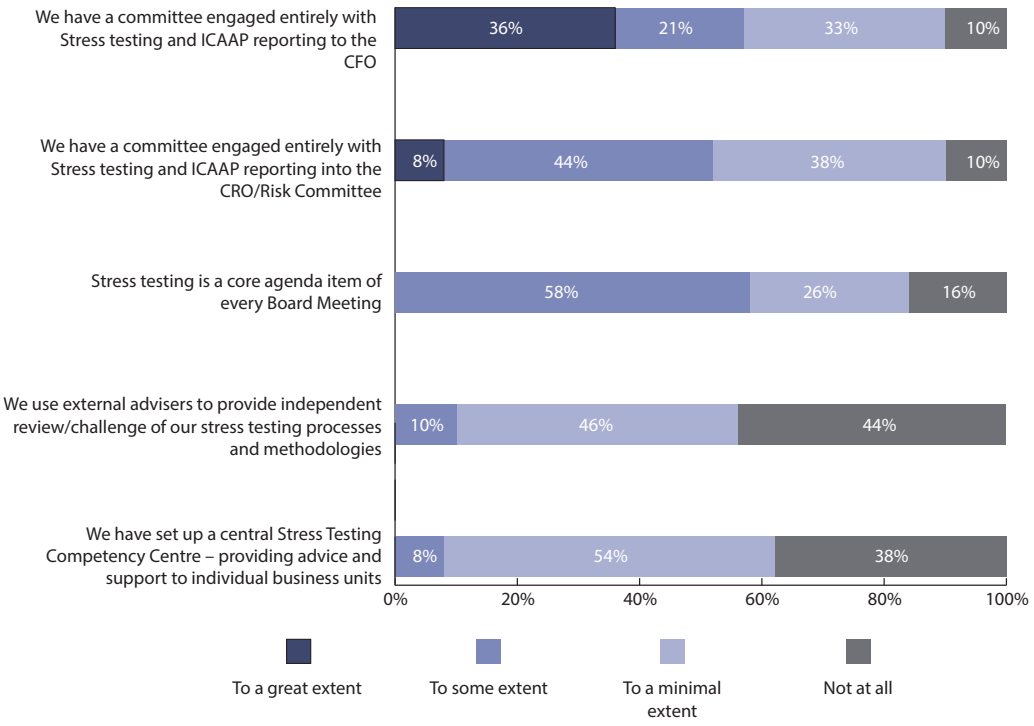
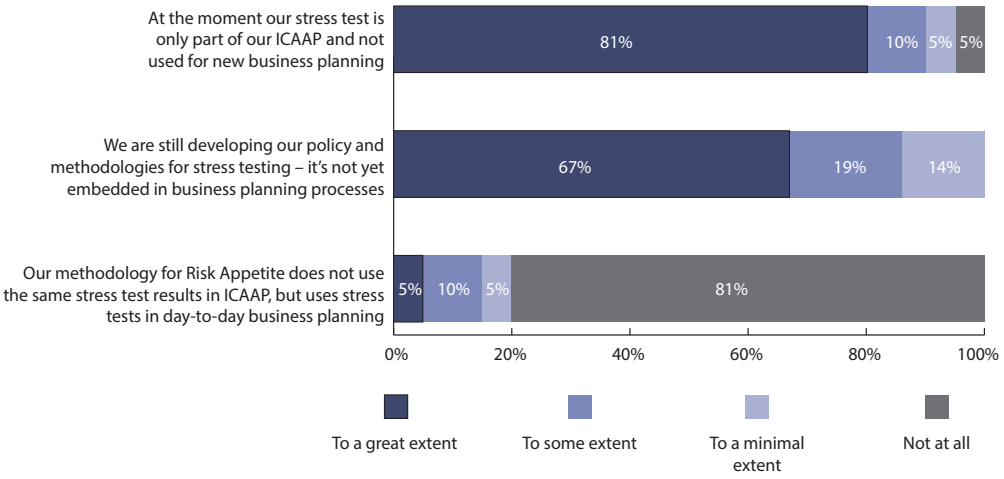
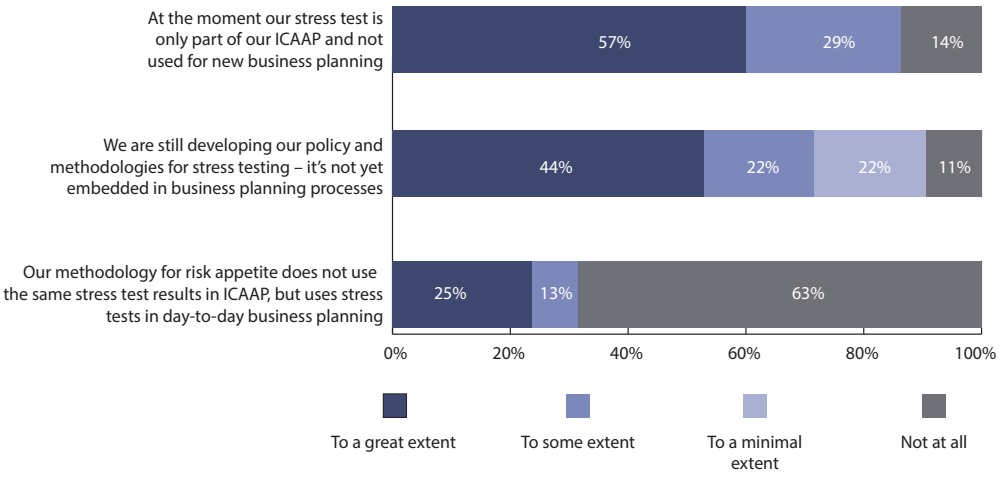


Figure 11: Incorporating stress-testing results into business planning

(Tier-1 Firms)



(Tier-2 Firms)



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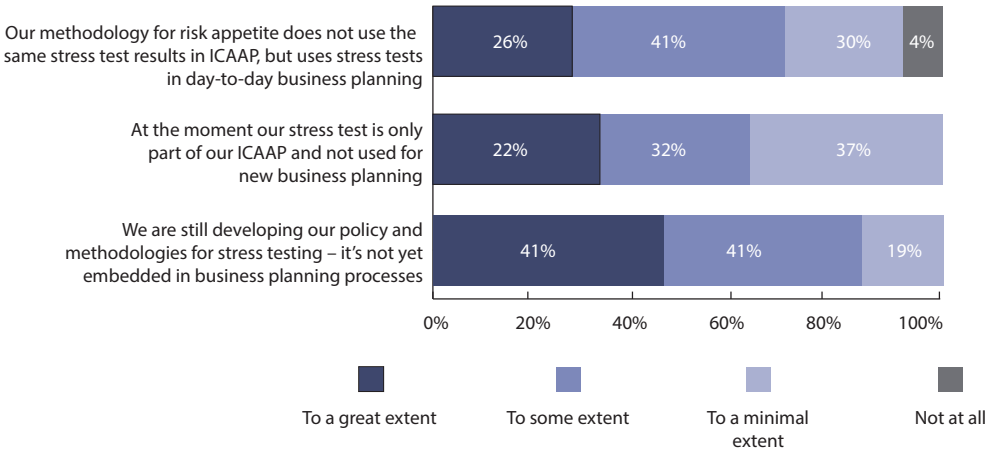

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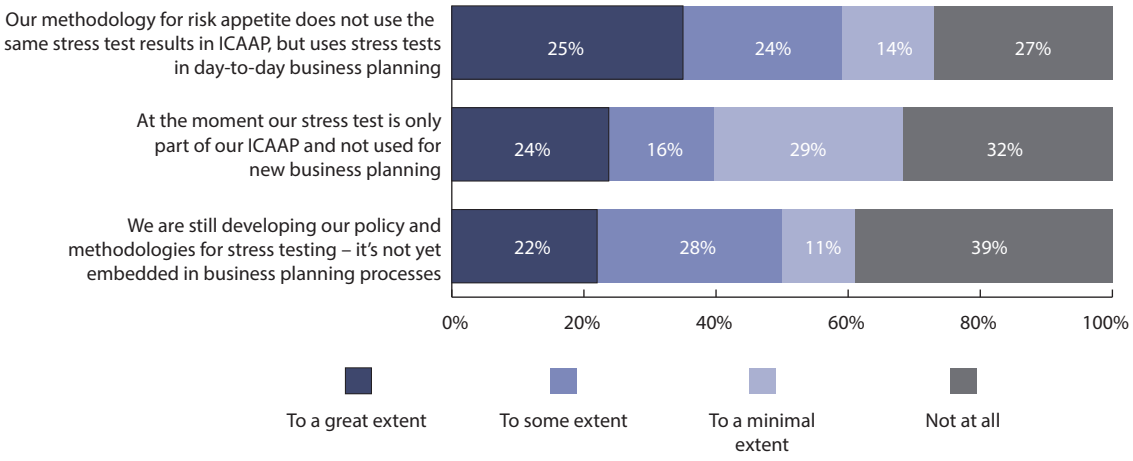
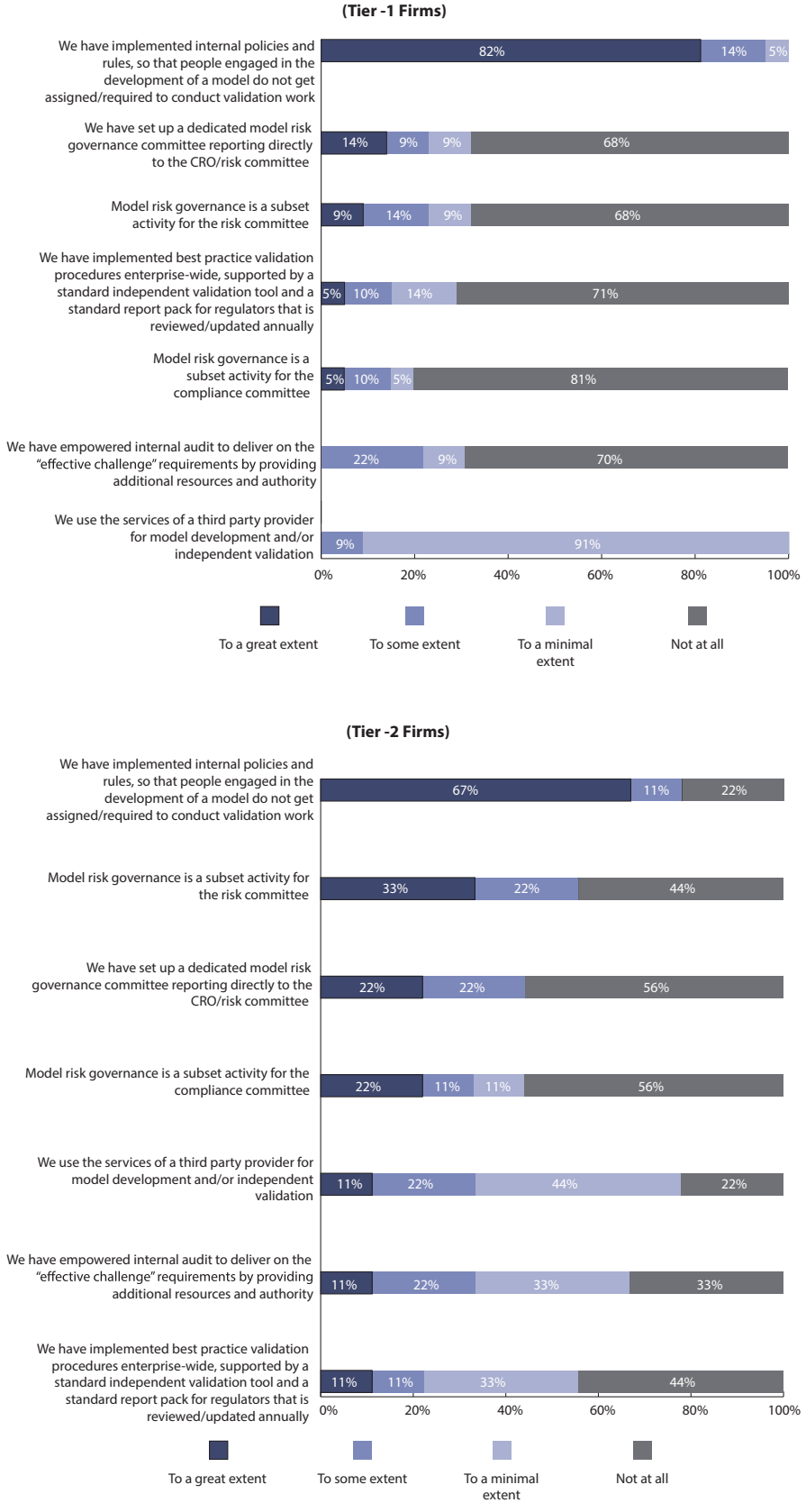


Figure 12: Model risk management oversight and control



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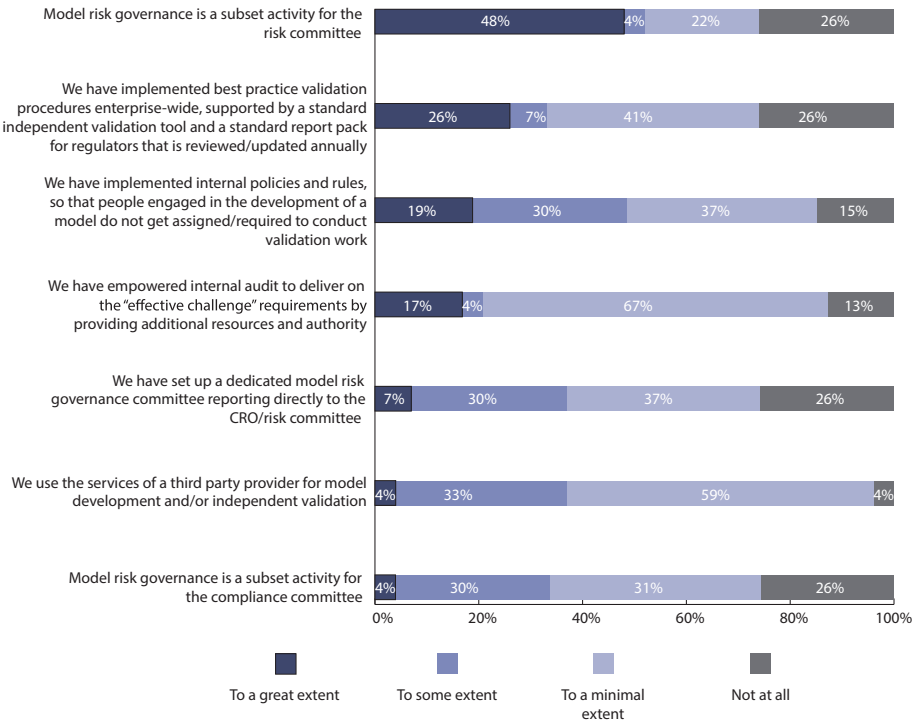

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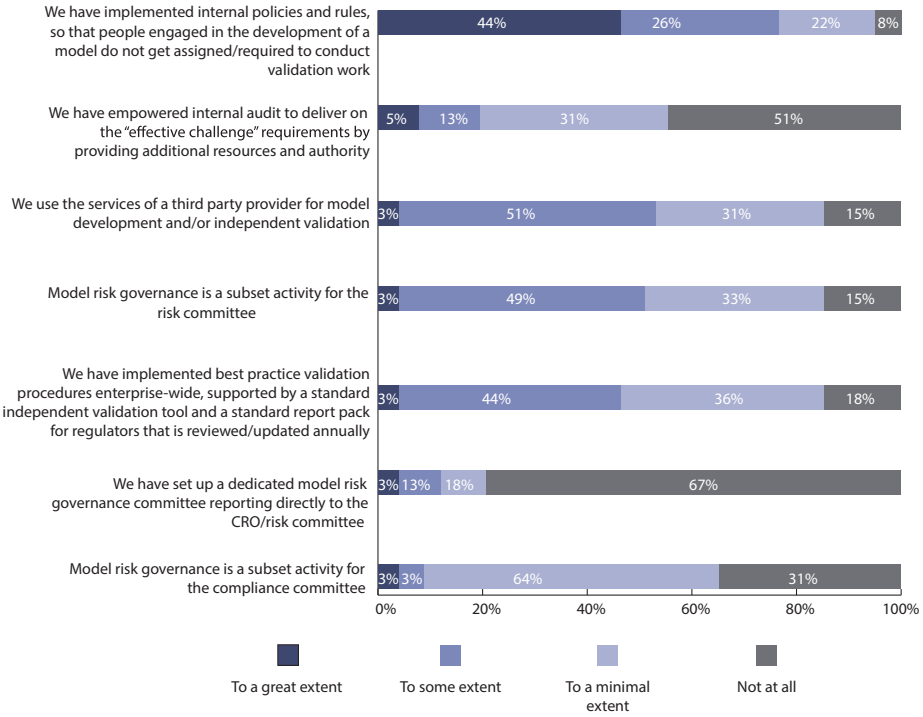
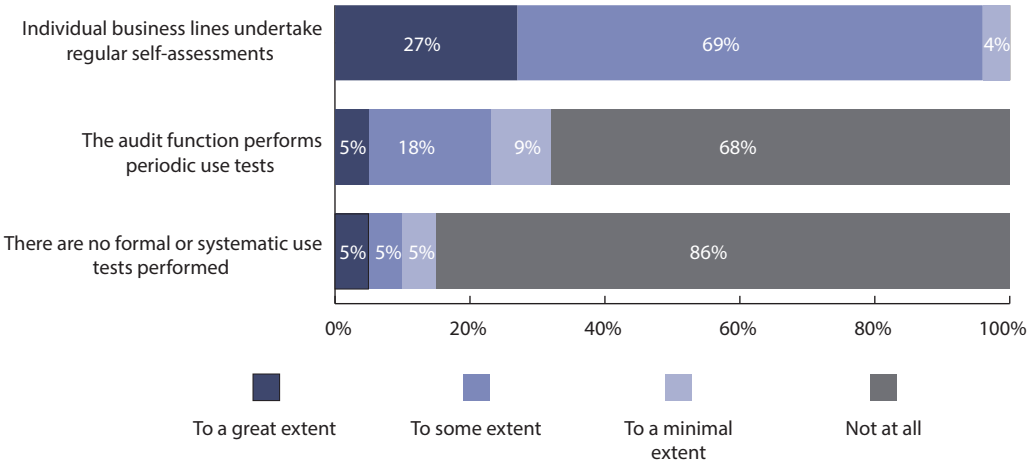
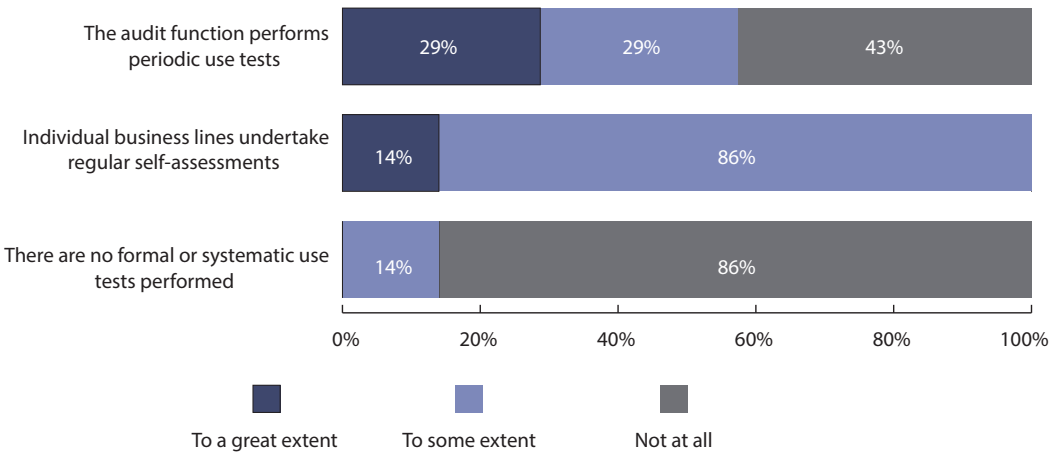


Figure 13: Who in your business is entrusted with ensuring compliance with these requirements and how are you achieving effective embedding?

(Tier -1 Firms)



(Tier -2 Firms)



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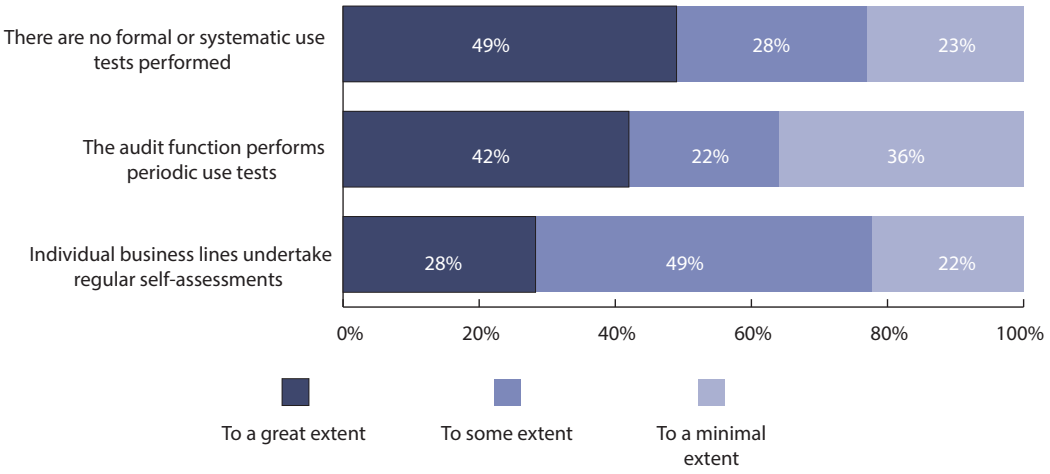

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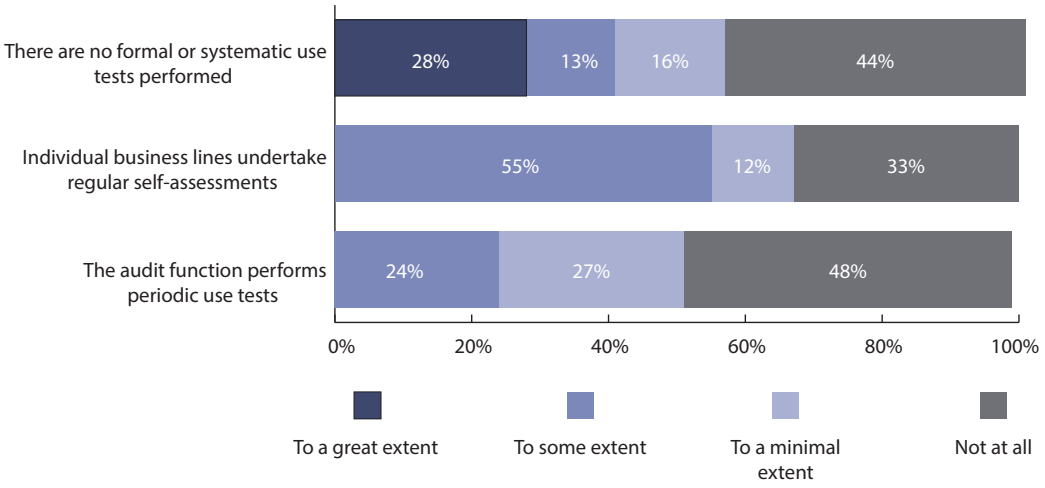
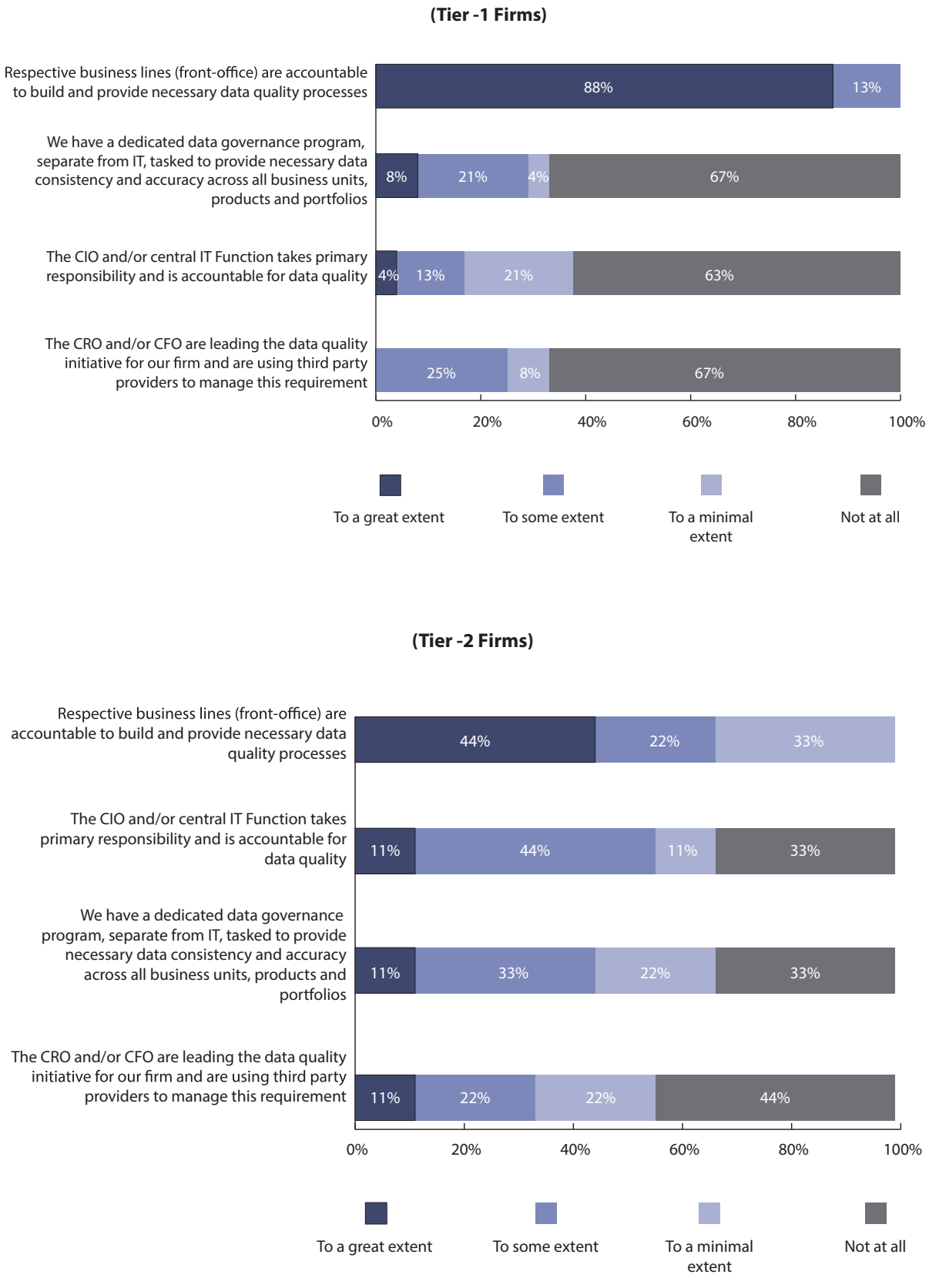


Figure 14: Approaches to mitigate data quality challenges



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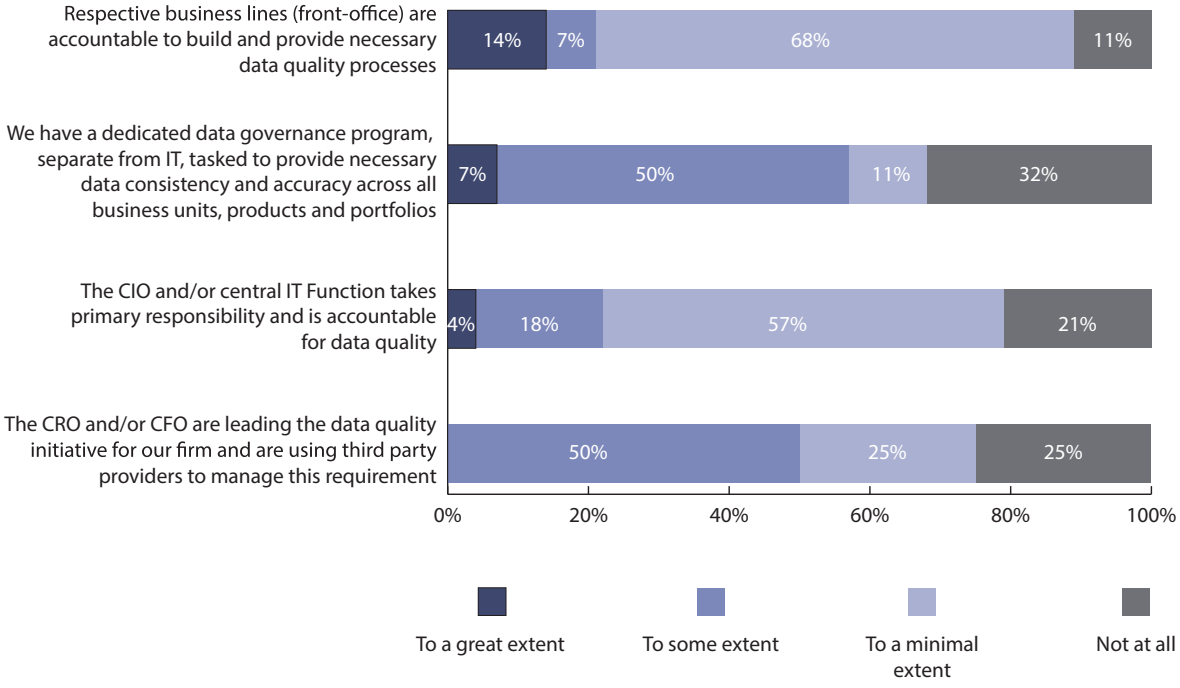

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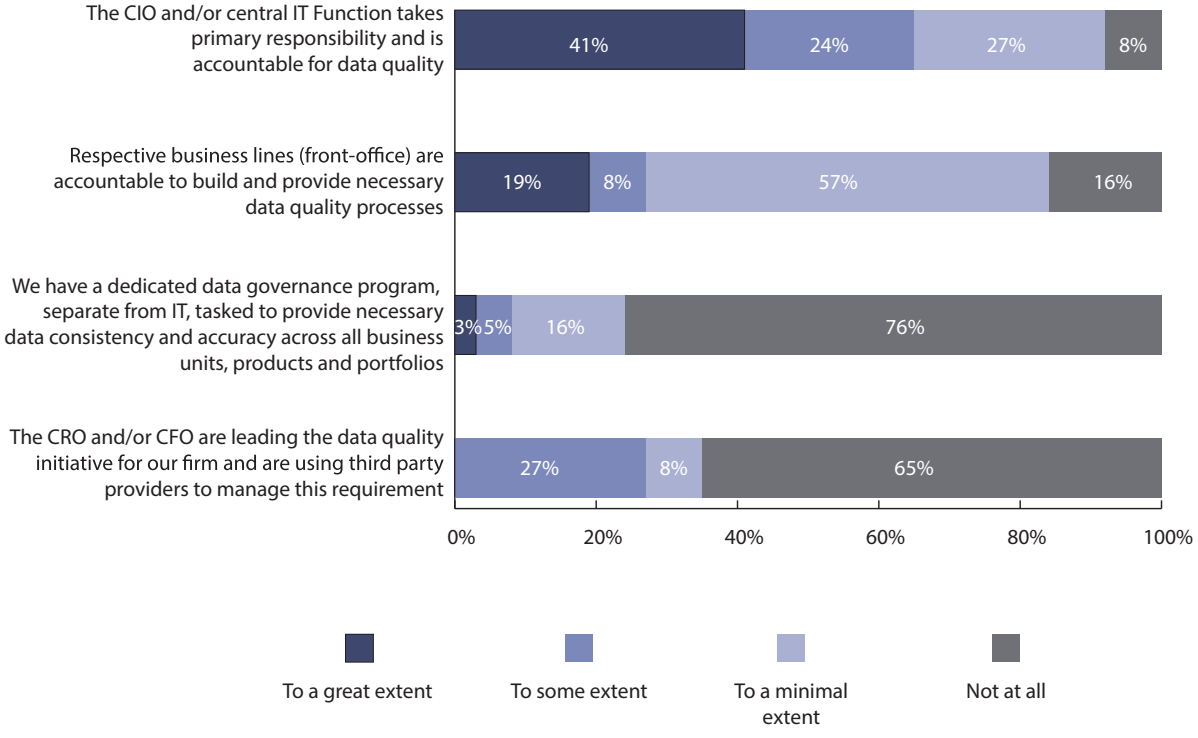


Figure 15: Distribution of the respondents by geography

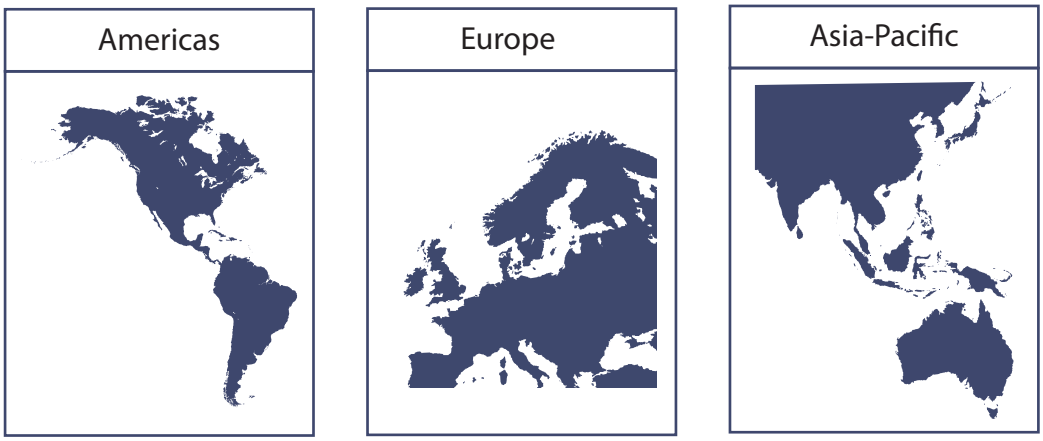
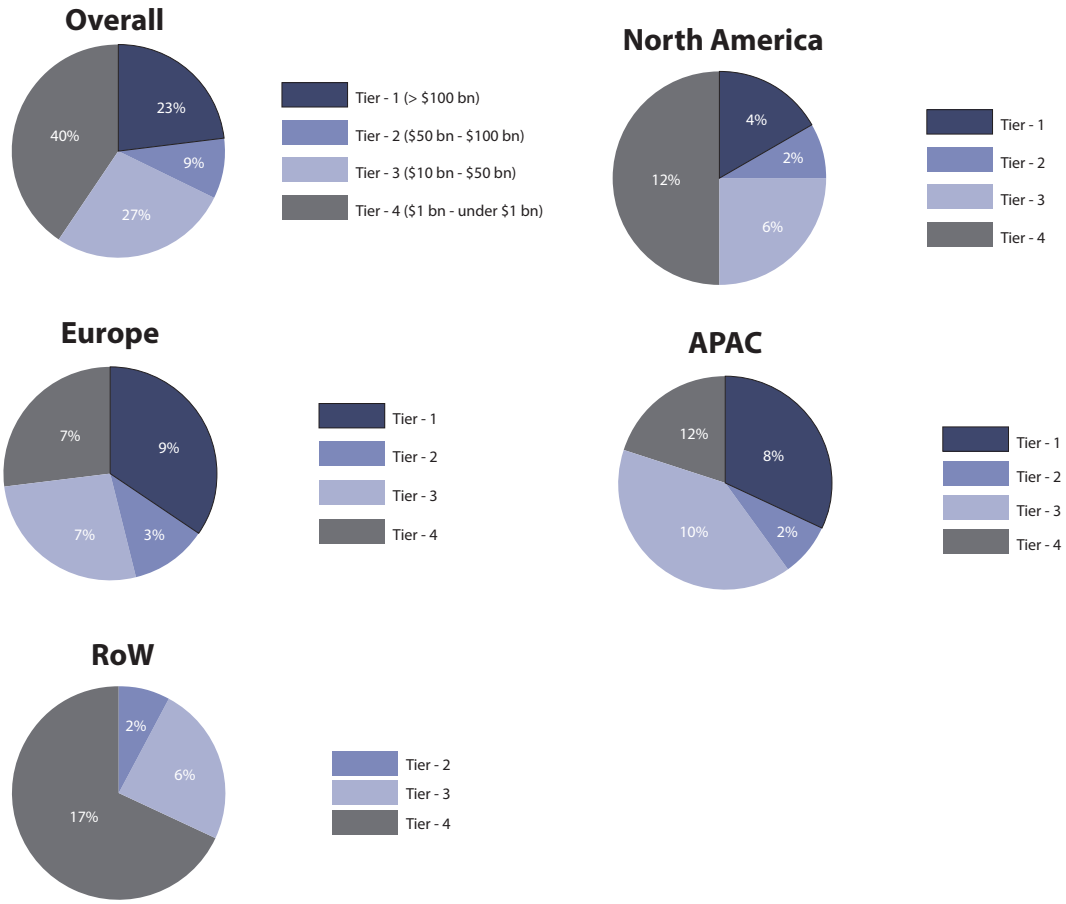


Figure 16: Distribution of respondents by tier



11- How to use research and services from Chartis

In addition to our flagship industry reports, Chartis also offers customized information and consulting services. Our in-depth knowledge of the risk technology market and best-practice allows us to provide high quality and cost-effective advice to our clients. If you found this report informative and useful, you may be interested in the following services from Chartis.

For risk technology buyers

If you are purchasing risk management software, Chartis's vendor selection service is designed to help you find the most appropriate risk technology solution for your needs.

We monitor the market to identify the strengths and weaknesses of the different risk technology solutions, and track the post-sales performance of companies selling and implementing these systems. Our market intelligence includes key decision criteria such as TCO (total cost of ownership) comparisons and customer satisfaction ratings.

Our research and advisory services cover a range of risk and compliance management topics such as credit risk, market risk, operational risk, GRC, financial crime, liquidity risk, asset and liability management, collateral management, regulatory compliance, risk data aggregation, risk analytics and risk BI.

Our vendor selection services include:

- Buy vs. Build decision support
- Business and functional requirements gathering
- Identification of suitable risk and compliance implementation partners
- Review of vendor proposals
- Assessment of vendor presentations and demonstrations
- Definition and execution of Proof-of-Concept (PoC) projects
- Due diligence activities

For risk technology vendors

Strategy

Chartis can provide specific strategy advice for risk technology vendors and innovators, with a special focus on growth strategy, product direction, go-to-market plans, and more. Some of our specific offerings include:

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- Strategy sessions focused on aligning product and company direction based upon analyst data, research, and market intelligence
- Advice on go-to-market positioning, messaging, and lead generation
- Advice on pricing strategy, alliance strategy, and licensing/pricing models

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- Participation on a "Panel of Experts" at a global user conference for a leading ERM (Enterprise Risk Management) software vendor
- Custom research and thought-leadership paper on Basel 3 and implications for risk technology
- Webinar on Financial Crime Risk Management
- Internal education of sales team on key regulatory and business trends and engaging C-level decision makers

12- Further Reading

- Model Risk Management Solutions 2014
- RiskTech100® 2015

For all of these reports see: www.chartis-research.com