Turning regulatory stress testing into competitive advantage
The unprecedented scale of regulatory reform continues to challenge the banking industry. More recently, stress testing has become one of the primary prudential regulatory tools in the drive to enhance the resilience of the banking sector. And this extends well beyond informing required capital levels.

The qualitative expectations associated with regulatory stress testing enable supervisors to peer into the souls of the banks. This introduces many new challenges for the industry. Most notably, firms are not certain about the exam question that they are being asked to respond to because regulatory expectations continue to evolve.

This paper presents our view on how firms should go beyond meeting today’s challenge – passing the stress tests quantitatively and qualitatively – to what they could be doing to integrate stress testing more fully into their business planning and risk management processes. Firms that get this right will establish a competitive advantage that will be difficult to match.
### Executive summary

<table>
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<tr>
<th>Consider a future state where stress testing is a key tool that enables the business rather than constrains it</th>
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<tr>
<td>• In this future state, stress testing is integral to the way firms are managed including: setting risk appetite, defining business and strategic plans, and setting the capital plan.</td>
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<td>• Stress testing delivers a rich set of metrics across the business, drives closer collaboration across functions, increases efficiency and control, and enables strategic risk-taking.</td>
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<th>But this is currently only an aspiration for most firms</th>
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<td>• Firms are at different stages of maturity in the development of their stress testing capabilities. Enhancements will have to be accelerated and prioritised to turn this aspiration into a reality.</td>
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<td>• Since the financial crisis, new regulatory stress test requirements have driven more fundamental change, but more needs to be done.</td>
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<th>Firms will have to make significant improvements in time for 2015 stress tests and beyond</th>
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<td>• In conducting the 2014 stress tests, many firms relied on tactical and manual solutions, resulting in inefficient and error-prone processes.</td>
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<td>• Lack of planning due to short time scales meant that focus remained solely on stress test execution. As a result, many firms derived limited business benefits from the process.</td>
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<td>• Firms will have to make a step change in their stress testing capabilities to meet heightening regulatory expectations and to realise tangible business benefits. This will require substantial investment.</td>
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<th>But the journey towards the target state is not necessarily a straight line</th>
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<td>• A number of important themes emerge in developing a more integrated and mature stress testing model. These include defining a strategic vision, operating model considerations, enhancing projections processes, aligning related or similar activities and fuller integration across the business.</td>
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<td>• These aspects will need to be prioritised appropriately, taking into consideration current stress testing capability, evolving regulatory expectations and other competing change programmes.</td>
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In this new world, firms deploy robust stress testing capabilities to support multiple processes, with related activities fully aligned and integrated. More specifically, stress testing is integral to the way firms are managed, including: setting risk appetite, defining business and strategic plans, conducting material risk assessments, approving new products, informing pricing and portfolio management decisions, establishing incentives, setting the capital plan and recovery and resolution planning.

Stress testing is an important component of risk governance and plays a key role in the measurement of risk appetite. As a result, appetite in relation to stress testing execution is clearly defined. As is the firm’s ambition in relation to future state stress testing capability (to meet continually evolving expectations). Credible enhancement plans to achieve this aspiration are already in flight. The stress testing operating model is tailored to the structure and strategy of the firm and reflects the importance of cross-functional and extensive business involvement.

Enterprise-wide stress testing uses consistent platforms across the organisation, supported by workflow technology that enables efficient review and approval of results. More specifically, stress testing is technology-enabled, highly automated and comprised of sophisticated tools that can run bottom-up or top-down bespoke or regulatory defined scenarios with minimal manual intervention. Highly skilled resources focus on analysis and developing insight including advising on the appropriateness and plausibility of results.

Stress testing results are accessible to the board and senior management via advanced reporting tools, enabling a much greater confidence in, and understanding of, the firm’s risk profile.
The benefits of this new model are numerous and significant. Some of these are described more fully below:

| Strategic planning | Firms have the ability to conduct sensitivity analysis and run scenarios to inform the viability and financial implications of a range of business planning decisions.  
| | Senior management and the board have greater confidence in the projected outcomes and the need for pre-emptive actions to manage risk exposures.  
| | Greater clarity exists over the viability of potential mitigating actions. In turn, responses to future events can be implemented more quickly and with greater certainty.  

| Enables strategic risk-taking | Potential opportunities to grow revenues within agreed risk tolerances are clearly defined through deeper and more accurate insights into business unit and portfolio risk profiles.  
| | This could then inform decisions about capital allocation, expansion into businesses that are not yet fully explored and new product development.  

| Risk-adjusted pricing and performance management | Stress tests deliver a rich set of metrics across the business to enable firms to measure business performance more accurately and with a risk-adjusted lens.  
| | This means pricing decisions could be informed more fully by expected default rates and portfolio performance under base and stressed scenarios.  

| Risk and finance collaboration | Closer collaboration between risk and finance teams that draw upon the insights and strengths of the respective areas enhances the credibility of the projected outcomes.  
| | In addition, close collaboration enhances efficiency, reduces cost (by avoiding duplication), improves control (through clear roles and responsibilities), and strengthens the relationship with regulators (through higher quality responses and joined-up messages).  

| Data quality, processes and controls | Data quality issues with broader application are identified more quickly through consistent focus on reconciled and aligned granular risk and finance data.  
| | Processes are redesigned, simplified and automated to reduce the risk of error and to enable further consistency.  
| | This drives the creation of a firm-wide controls framework, initially to support stress testing, but ultimately to deliver broader business benefits.  

In focus: Blurring the lines between risk and finance to achieve clarity  
Financial institutions need quick access to accurate and actionable information to support both business decisions and reporting to regulators. These needs are amplified in the current environment of flat interest rates and constraints on capital and liquidity. In focus: Blurring the lines between risk and finance to achieve clarity elaborates on PwC’s view that executives should undertake a formal assessment of how risk and finance in their organisations should operate in the future.
Stress testing enhancements will have to be accelerated and prioritised to turn this aspiration into reality. But in order to ensure enhancements are appropriately prioritised, decisions have to be informed by a robust and honest assessment of current stress testing capabilities. So how do firms currently measure up?

Stress testing is not a new concept. Firms have used forecasting and scenario analysis for business planning and risk management purposes for many years – with mixed success. Typically, processes were siloed, business lines lacked consistency and forecast balances were not sufficiently robust. More recently, firms have started to use stress tests to inform risk management and capital allocation decisions. But the use of adverse or extreme case projections for risk management purposes is still in its infancy. In our experience, the stress testing capabilities of firms are at different stages of maturity. Some organisations have recognised the opportunity to derive greater business benefits from stress testing and have already prioritised enhancements to achieve this.

Since the financial crisis, new regulatory stress test requirements have driven more fundamental change. The eight UK banks that participated in the recent Prudential Regulation Authority (PRA) concurrent stress tests can attest that the exercise represented a step change in frequency and complexity, requiring much greater cooperation across functions and geographies. In addition to running comprehensive and detailed exercises, firms had to demonstrate the robustness of both quantitative and qualitative aspects of their stress tests. This is consistent with the experience of the US banks under the Comprehensive Capital Analysis and Review (CCAR), where the qualitative assessment is on capital planning as a whole, of which stress testing is a key component. It is clear that current approaches are no longer sufficient. Significant change is required.

The complexity and enterprise-wide nature of the recent regulatory stress tests demanded cross-functional and cross-territory collaboration between teams with limited prior stress testing experience. Planning activities were affected by the relatively short timescales, which meant roles and responsibilities were not clearly defined or communicated. This gave rise to confusing and convoluted approaches and a lack of transparency across the end-to-end process.

Firms devoted a disproportionate amount of time to running and modelling projections. As a result, insufficient time was available to evaluate judgements, analyse results and to think through mitigating management actions in a meaningful way. Some firms relied on tactical and manual solutions, resulting in inefficient and error-prone processes that had to be rerun. In some instances, multiple times over. Significant reliance was placed on senior management to identify basic...
errors, whereas this time could have been used more effectively, e.g. to develop deeper business insights based on the projected outcomes.

Many firms derived limited business benefit from the 2014 regulatory stress tests. Despite this, only a handful have started to articulate a strategic vision to develop more robust and integrated stress testing capabilities. We remain convinced that firms will have to make a step change in their stress testing capabilities to meet evolving regulatory expectations and to realise tangible business benefits. This will require substantial investment, particularly in relation to technology and people. And it will also require careful prioritisation as firms will be expected to show demonstrable progress each year.

Prioritisation decisions will depend on a firm’s current stress testing capability, its strategic objectives in relation to stress testing execution and the regulatory environment. Four broad categories could be used to describe the spectrum of stress testing capabilities: At risk (inefficient and unstable); Basic (manual processes and controls); Sustainable (reliable and controlled); and Target (high-performing business enabler). The results of our January 2014 industry survey (Passing the Stress Test) confirmed most firms felt their approaches were adequate, with the majority of responses falling into the Basic or Sustainable categories. At that stage we commented that firms were setting the bar too low. Following the 2014 regulatory stress tests, many firms agree further enhancement is required.
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<th>At Risk</th>
<th>Basic</th>
<th>Sustainable</th>
<th>Target</th>
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<tr>
<td>Inefficient unstable stress testing process with material deficiencies</td>
<td>Adequate issue awareness with manual processes and control</td>
<td>Operationally robust, repeatable, reliable and controlled</td>
<td>High performing, market leading, enterprise-wide business enabler</td>
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**Model**

- Siloed stress testing approach
- Ad hoc planning for consolidated stress testing exercises
- Coordinated business and corporate stress testing approach
- Integrated business and corporate approach
- Comprehensive coverage and alignment of stress testing efforts
- IT-enabled strategy focused on creating value for business and corporate function
- Integrated framework fully aligned to Basel, ICAAP, contingency, recovery and resolution planning

**Governance**

- Structures remain inconsistent and are based on ‘who can do it’ rather than ‘who should do it’
- Skills and capabilities requirements loosely defined
- Consistent structures exist with clear functional boundaries between risk, finance and LOB
- Some functions are centralised
- Skills and capability requirements are well-defined and pursued
- Stress testing committee and working group
- Centralised and organised stress testing unit to increase accountability and drive expertise
- Stress testing fully aligned to strategic planning and performance evaluation
- Highly skilled resources focused on analysis vs. result production
- Leverage shared services to deliver routine, high-volume transaction processing when necessary

**Process**

- Scenario analysis, loss forecasting, aggregation and reporting processes are informally documented, not standard and disconnected
- Issues are partially known and managed reactively
- Standard policies and procedures are well-documented and maintained
- Ad hoc efforts to standardise and automate procedures
- Activities are performed manually and consume excessive resources
- Outsource of systemic scenario generation
- Stress testing committee and working group
- Centralised and organised stress testing unit to increase accountability and drive expertise
- End-to-end process approach to standardisation and simplification
- Integrated revenue, loss, balance sheet and RWA forecasting
- Continuous process improvement and ongoing formalised documentation

**Infrastructure – technology**

- Multiple databases with no common structure or reliable interfaces
- Heavy reliance on ad hoc reporting to provide information
- Significant data manipulation to support stress testing needs
- Streamlined inventory of risk and finance applications participate in stress testing process
- Data validation controls in place to ensure completeness and reconciled information to GL/disclosures
- Automation of balance-sheet aggregation and reporting steps in stress testing process
- Model and data quality governance and controls in place
- Financial and risk applications (scenarios, loss forecasting, balance-sheet aggregation) fully integrated into a common stress testing platform
- Ability to expand functionality and link to other areas (RWA, ICAAP, ALM, etc.)
- Flexible functionality (e.g. what if and sensitivity analysis)
A number of important themes emerge in developing a more integrated and mature stress testing capability. These include defining a strategic vision, stress testing operating model considerations, enhancing projections processes, aligning related or similar activities and fuller integration across the business. These aspects will need to be prioritised appropriately, taking into consideration current stress testing capability, evolving regulatory expectations and other competing change programmes.

**Strategic vision**

Firms should articulate their overarching vision and strategy for stress testing, to provide clear direction for the near term and the longer term objective. The vision describes the board’s longer term aspiration for the firm’s stress testing capability, relative to peers. Market-leading capabilities could be a source of competitive advantage. But this will require significant investment, often at the expense of other change programmes.

The strategy should describe how the firm plans to conduct regulatory stress testing in the more immediate term and how this contributes to the longer term vision. From a qualitative perspective, the primary objective for firms is a robust end-to-end stress testing process that minimises delivery risk. But trade-off decisions will need to be made on the incremental benefits (and marginal delivery risk reductions) from targeting best-in-class capabilities. The strategy must define where firms are prepared to accept less than perfect solutions (such as non-modelled projections processes) with clear rationale that aligns to the vision. Firms should also articulate which mitigating controls and processes reduce the risks associated with the trade-off decisions.

From a quantitative perspective, a key enabler of the strategy will be the embedding of stress testing objectives within the broader risk appetite framework. Firms should reflect a greater emphasis on stressed outcomes through their existing risk appetite measures (e.g. the definition of a minimum stressed CET1 threshold). And these should be supplemented by the addition of specific stressed metrics into risk appetite (e.g. leverage ratio).

Collectively, the vision and appetite should inform enhancement prioritisation decisions – including decisions about specific requirements that will not be fully met, particularly in the short term.

**Operating model**

Multiple factors influence the design of the target stress testing operating model. These include current governance arrangements, the structure and geographical reach of the business and location of expert resources. Most notably, the operating model should consider where projections specialists reside, as well as risk and finance oversight arrangements currently in place.
In practice, many firms apply a mixed model. For example, net interest income and some balance-sheet projections might be run centrally, while loss projections are run by specialists in the business. Mixed models might also apply as an interim measure, particularly where the target stress testing operating model is dependent on successful implementation of technology solutions or increased headcount.

Advanced operating models include independent, fully empowered teams that sit alongside execution functions to review and challenge important aspects of the stress test. These teams provide the board and senior management with additional comfort over the robustness and effectiveness of the stress test.

We expect stress testing operating models will remain in flux for some time. But firms must define a compelling narrative for the target operating model at the outset, supported by a clear roadmap. This will enable proactive and transparent dialogue with internal and external stakeholders including the regulator.

**Enhancing projections processes**

Running multiple complex and interlinked projections processes is one of the most challenging aspects of enterprise-wide stress testing. Getting this right requires prioritised investment and dedicated focus.

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<th>Role of centre/group</th>
<th>Centralised</th>
<th>Decentralised</th>
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<tr>
<td></td>
<td>• Runs stress test projections</td>
<td>• Ensure consistency and adherence to group-wide standards and stress testing policies and procedures</td>
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<td>• Aggregate results and perform group-level review</td>
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<tr>
<th>Role of business units/geographies</th>
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<th>Decentralised</th>
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<tr>
<td></td>
<td>• Review, challenge and confirmation of projected results, drawing on their deep understanding of the manner in which portfolios behave under stress</td>
<td>• Run stress test projections</td>
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<th>When is it most suitable</th>
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<td></td>
<td>• Geographically concentrated businesses with less diverse product ranges, or where stress testing skills reside in one location</td>
<td>• Federated, diverse business models</td>
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<th>Typical advantages</th>
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<td></td>
<td>• Reduced inconsistencies and greater control</td>
<td>• Greater application of local expertise, arguably enabling higher quality outputs</td>
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<tr>
<td></td>
<td>• Turnaround times for projections processes are typically shorter</td>
<td>• Enables the use of existing structures and processes</td>
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<th>Potential disadvantages</th>
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<th>Decentralised</th>
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<td></td>
<td>• Central projections processes could lack sufficient detail</td>
<td>• Could give rise to increased operational risk</td>
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<td></td>
<td>• Lack of engagement with the business, resulting in missed opportunities for broader application or fuller integration</td>
<td>• Greater likelihood of inconsistent approaches</td>
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<td></td>
<td></td>
<td>• Longer turnaround times for projections processes</td>
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**We expect stress testing operating models will remain in flux for some time. But firms must define a compelling narrative for the target operating model at the outset, supported by a clear roadmap.**
Firms should look to leverage existing business as usual models (used for capital estimation or risk management purposes) in developing a stress testing projections capability. Where this is the case, these business-as-usual models should also be subject to testing and validation for use under stress, including the use of relevant calibration data. This allows firms to confirm that existing models, processes and infrastructure will operate effectively during a stress event. Firms may use a combination of modelled or non-modelled approaches. But approaches should be systematic and repeatable, conceptually robust (both historically and prospectively), and empirically supported (over a sufficient time horizon). And judgements should be well-founded economically. In some cases a non-modelled approach may be preferable, e.g. where significant expert judgement is required. Stress testing models should be subject to the same level of documentation, review, validation and governance as business-as-usual-models.

Firms should also consider using a combination of projections approaches, e.g. primary and challenger models, to provide a broader perspective on the range of potential outcomes. For instance, leading firms are looking to develop top-down model frameworks, in terms of which forecasts can be created, based on macro-level factors to provide directional analysis on the scale of impacts.

In advancing their projections processes, firms should consider four dimensions: operational complexity, internal consistency, nature of projections approaches, and judgements and overlays. Key objectives for each of these aspects would include:

• **Addressing operational complexity** – a consistent projections framework, with minimum standards and supporting guidelines, established to provide greater control over processes and enable more efficient production of results.

• **Promoting internal consistency** – greater cross-functional collaboration to align projections approaches. This would enable more effective analysis and interpretation of results, and also the review and challenge of movements in related variables (e.g. expected losses and impairments).

• **Nature of projections approaches** – limited use of non-modelled approaches with clear rationale when these are used, documented as part of a comprehensive inventory of approaches (modelled and non-modelled), methodologies and key judgements.

• **Managing judgements and overlays** – decisions on key judgements should be clearly and consistently documented, in line with policies and standards that are fully embedded and consistently applied. Judgements should also be well-founded economically.

**Alignment**

In designing the target operating model, firms should consider the extent to which regulatory stress testing could be aligned more closely with other stress tests or scenario analyses already being conducted. Ideally, regulatory stress testing should not be a separate exercise. It could be just one output from a single system generating projections across a range of bespoke scenarios of varying severity. Although the various stress tests may be performed for different purposes, they typically rely on common systems and data feeds. In many instances, the same teams are also involved. The current disjointed approach to running multiple stress tests is not efficient or cost-effective. Ultimately, this could lead to low staff morale and impact retention of key talent.
Some aspects of the stress test could be aligned with relative ease, such as data extraction and reconciliation processes, parts of scenario expansion and also mitigating actions.

- **Data extraction and reconciliation** – The credibility of projected stress test results is reliant on quality input data, where a lot can be done to enhance the robustness and consistency of the projected results from various stress tests. This starts with using data from recognised and authenticated source systems. But it also extends to associated extraction and reconciliation processes.

Dedicated data warehouses could be used to store risk and finance data, to be referenced for a variety of stress tests. Importantly, data would be extracted from the relevant source systems only once, reducing the likelihood of inconsistencies and errors. Further efficiencies could be realised through automated extraction and reconciliation processes between source systems and the stress testing data repositories.

Where data is not immediately available at the required level of granularity, judgement should be applied in a disciplined and controlled manner. Consistency between various stress tests could be achieved through an established and embedded framework that enables management to evaluate the criticality of the specific data item. This would then inform the nature of the remediation approach and the level of judgement that would be appropriate.

- **Scenario expansion** – Some firms have started to build a reference library of performance under various economic scenarios to use across a variety of stress tests. Some of these reference points reflect actual historical experience, while others reflect the results of previous stress tests. This information can be used to calibrate management’s expectation for the projected outcome, based on the severity of the prescribed scenario. Having a clear view of the expected outcome enables more robust review and challenge, focused attention on exceptions or outliers, prioritisation of relevant mitigating actions and proactive discussions with the board.

- **Mitigating actions** – Management should have a consistent and transparent view of planned responses to a variety of adverse outcomes. This should include a reasonable expectation of the speed of execution and the resulting impact on the most important capital metrics. Some of this information is already available in the Recovery and Resolution Plan. But further analysis is required to develop the additional information required. This should then enable quick decisions on the most appropriate responses under various adverse scenarios, irrespective of the purpose for which the stress test is conducted. This should enhance the robustness and credibility of the results and support positive interactions with the board and the regulator.
Fuller integration

What is integrated stress testing? A simple definition might be: The application of enterprise-wide stress testing capabilities to drive core business-as-usual activities including strategic planning, capital allocation decisions and risk management.

Most firms agree that regulatory stress tests provide useful insights to run the business – highlighting areas of opportunity, as well as potential vulnerabilities. But there is currently a lack of integration with broader business planning processes. We expect this will change. In particular, with regulation having an ever-increasing impact on strategy and stress testing playing a more prominent supervisory role, it is difficult to envisage an outcome where strategic planning continues to occur in isolation from regulatory stress testing.

Fuller integration with strategy and business planning processes is currently in its infancy. For instance, insights from regulatory stress tests should also be used to inform decisions relating to portfolio rebalancing, pricing, new business ventures, remuneration policies and dividend distributions.

Regulatory stress testing has had a more positive impact on risk management practices, but opportunities still exist for fuller integration. Most notably, insights could be used to inform risk limits, underwriting decisions, portfolio deep dives and portfolio management actions.

Continuous improvement, evidenced annually

Implementing and embedding the strategic vision will take time and regulators already accept this is a multiyear journey. But firms will be required to demonstrate continuous improvement each year. Consequently, firms should define a clear roadmap to the aspirational end state including how greater alignment and integration will be achieved. Firms should also articulate how qualitative and quantitative risks will be mitigated in the interim.

Delivering against key milestones is critically important to the credibility of the change programme, which in turn should enhance the firm’s reputation with the regulator. It will also enable firms to derive incremental benefits over the duration of the programme.
Firms with aspirations to develop leading stress testing practices will have to go beyond explicit regulatory expectations. Leading firms will aim to integrate regulatory stress testing fully with strategy and risk frameworks, leverage insights for business planning purposes and optimise projections processes to create more time for analysis, review and challenge of stress testing outcomes. Firms that do not successfully address all of these aspects place themselves at risk of qualitative failure against the heightened expectations of global regulators. But firms that get this right will be well-placed to derive maximum business benefits from stress testing. And they will establish a crucial competitive advantage.
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