WHITE PAPER

Is It Still Worth It?

Internal Wholesale LGD Models Under Basel 3.5

This white paper examines whether banks should continue using internal Loss Given Default (LGD) models amid Basel 3.5's stricter regulations. Despite reduced regulatory benefits and increased validation challenges, these models remain crucial for internal purposes like stress testing and capital allocation. The paper discusses balancing the Standardized Approach with Internal Ratings-Based methods, addressing data scarcity, and utilizing tools like MathWorks' Modelscape to manage models effectively in the new regulatory landscape.

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Introduction

The banking regulatory environment is undergoing major changes with Basel 3.5—also known as Basel IV—introducing new, stricter requirements for calculating capital reserves. These changes raise an important question: Is it still worth it for banks to maintain and develop internal Loss Given Default (LGD) models for calculating risk-weighted assets (RWAs)?

Even if advanced models lose their status as primary tools for approved regulatory capital calculations, they remain crucial for other aspects of banking operations. Stress testing, internal capital allocation, and Risk-Adjusted Return on Capital (RAROC) assessments continue to depend on sophisticated modeling capabilities. Moreover, these models play a vital role in providing insights for strategic planning, enhancing banks' ability to respond proactively to emerging risks. They help institutions understand where capital is being consumed and how effectively it is being used across various business lines, leading to better decision-making.

This paper examines the continued role of internal models under Basel 3.5, focusing on their strategic use beyond regulatory approval, especially for assessing economic capital, managing operational risk, and making data-driven business decisions. Basel 3.5 creates a challenging environment, but it also offers opportunities for banks that can leverage internal models effectively. In this context, internal models still offer unique advantages, particularly in improving risk sensitivity and optimizing capital allocation, which are critical for maintaining profitability and ensuring a resilient risk posture.

In the evolving landscape of Basel 3.5, banks must balance the use of both the Standardized Approach and the Internal Ratings-Based (IRB) Approach. This complex environment often requires institutions to leverage a variety of models—ranging from Foundation IRB to Advanced IRB—depending on the specific requirements of different portfolios and the associated regulatory demands. This duality means banks are likely to operate in a mixed-model world, employing advanced models where feasible while relying on simpler approaches for certain exposures. The challenge lies in ensuring that the right models are used effectively for the right purposes, maintaining a balance between compliance, risk sensitivity, and operational efficiency.

This dual approach requires strategic judgment regarding where advanced models can provide the most value and where the simplicity of the Standardized Approach is preferable. Advanced models offer a deeper level of insight into portfolio risks, but they are also resource-intensive and subject to strict validation requirements. The key for banks will be to align their modeling strategies with broader business objectives, optimizing both regulatory capital and internal capital usage.

The paper also explores the impact of data scarcity, regulatory burdens, and the evolving approach to capital adequacy on the viability of internal models. Further, it explors newer modeling techniques like machine learning (ML) and "feeder" models that can enhance data

quality and feature engineering but face regulatory challenges when applied directly in approved models. Finally, we consider MathWorks' Modelscape platform, highlighting how its capabilities can support banks in managing both standardized and internal models within this shifting regulatory environment.

Internal Models vs. Standardized Approach: Key Differences

Under Basel regulations, banks have two main approaches to calculate RWAs for credit risk: the Standardized Approach and the Internal Ratings-Based (IRB) Approach. These methodologies offer distinct advantages and challenges.

The Standardized Approach

The Standardized Approach is a prescriptive model where regulators set risk weights for exposures based on the asset class. This method's simplicity and the ease of cross-bank comparison make it a popular choice, particularly for smaller firms. However, it does not account for the specific characteristics of individual borrowers or collateral, potentially leading to over- or underestimation of risk. As a result, banks could face inefficient capital allocation that either hampers profitability or exposes them to undue risks.

The Internal Ratings-Based (IRB) Approach

The IRB Approach, comprising Foundation (F-IRB) and Advanced (A-IRB) levels, allows banks to calculate some or all risk components internally. Under F-IRB, banks estimate Probability of Default (PD), while LGD and EAD are prescribed by regulators. A-IRB permits banks to develop internal models for all key risk components, offering higher customization and more precise risk assessments. However, Basel 3.5's increased compliance requirements and rigorous validation processes have made the IRB Approach less attractive, particularly for smaller institutions or those with limited modeling resources.

Basel 3.5 introduces constraints like the output floor, which limits capital reductions achievable via internal models, diminishing their attractiveness. This prompts banks to weigh whether the added complexity and cost of internal models can be justified when balanced against limited regulatory capital benefits.

Challenges for Internal Models: Data Scarcity and Low-Frequency Events

One of the most pressing challenges for internal models, particularly under Basel 3.5, is the lack of sufficient data for low-frequency, high-impact exposures, such as large corporates or sovereign entities. For these portfolios, historical default data is scarce, complicating the development of statistically robust LGD models. Without sufficient default and recovery history, banks face difficulties meeting validation standards and convincing regulators of the accuracy of their estimates.

This data scarcity results in increased uncertainty around model estimates, which can lead to overcapitalization or under-preparedness for financial stress. The European Banking Authority (EBA) has emphasized that in cases of insufficient data, increased conservatism must be applied to LGD estimates, particularly in downturn scenarios. This regulatory stance often pushes banks to opt for the simplicity and regulatory predictability of the Standardized Approach, especially for portfolios where robust internal models are challenging to develop and validate.

Anecdotal Insights and Data Solutions

Anecdotally, many banks have struggled with validating internal models for low-default segments. This often forces a reevaluation of the viability of these models under the current regulatory environment. One potential solution is data pooling, where banks collaborate to share default data across similar exposures, though this raises privacy and standardization challenges. Other techniques involve ML-driven "feeder" models that support data preparation and feature engineering, creating enriched datasets that can strengthen the modeling process while staying within regulatory limits.

Basel 3.5's Impact on Internal Models

Basel 3.5 introduces several new regulatory measures that reshape the landscape for internal risk models, impacting both their usage and attractiveness:

Output Floor and Its Implications

The output floor introduced by Basel 3.5 caps the minimum RWAs calculated using internal models at 72.5% of those calculated under the Standardized Approach. This restriction directly reduces the potential capital savings that banks can achieve by using internal models, undermining the value proposition of internal modeling for many institutions. Particularly for smaller banks or those that struggle with the high costs of developing and maintaining internal models, the limited potential for capital efficiency gains makes the Standardized Approach increasingly attractive.

Stricter Validation Requirements

The Basel 3.5 framework places increased emphasis on validation, requiring extensive historical data, robust statistical analysis, and frequent backtesting. These requirements pose a challenge, particularly for low-default portfolios. In cases where data is limited or costly to gather, internal models become difficult to justify, often resulting in a shift towards simpler, regulator-defined risk weights that provide more predictable compliance outcomes.

Shift Toward the Standardized Approach

The combined effects of stricter validation requirements and the output floor are encouraging a broader shift away from internal models towards the Standardized Approach. This trend is driven by both the rising costs of model development and validation and the reduced flexibility in achieving capital efficiency. Additionally, standardization improves comparability between institutions—a priority for regulators in the post-crisis era of increased transparency and systemic risk control.

The Role of Advanced Models in Internal Capital Allocation and Stress Testing

While Basel 3.5 has reduced the attractiveness of internal models for approved regulatory calculations, their utility for internal purposes remains significant. Advanced models continue to play a vital role in areas like stress testing, RAROC, and internal capital allocation.

RAROC and Internal Models

RAROC (Risk-Adjusted Return on Capital) calculations are critical for determining the profitability of individual business lines or products in relation to the capital they consume. Advanced internal models provide a nuanced risk assessment that supports these calculations, helping banks optimize capital deployment and align their business strategies with risk-adjusted returns. Unlike regulatory capital, economic capital assessments benefit from more flexible modeling approaches, allowing banks to utilize complex models without the stringent validation requirements imposed by regulators.

Capital Overlays for Systemically Important Institutions

Basel 3.5 also includes specific provisions for large, systemically important financial institutions. Banks deemed "Too Big to Fail" face additional capital overlays, which act as multipliers to their calculated capital requirements. Even if internal models produce reliable estimates, these overlays add an extra layer of conservatism, often negating the benefits of more precise risk modeling. Banks must therefore carefully assess the cost-effectiveness of their internal models in light of these additional capital buffers.

Machine Learning, Feeder Models, and Data Pre-Processing

Emerging modeling techniques, including ML-driven "feeder" models, are increasingly employed to enhance the quality of inputs for risk models. These feeder models are used to preprocess data, identify correlations, and generate feature sets that support more robust

modeling. Regulators are generally reluctant to approve black-box models like ML for use in regulatory capital calculations due to concerns about transparency and explainability. However, for internal purposes such as economic capital assessments, RAROC, and other business decision processes, banks are free to utilize these advanced techniques more extensively. This flexibility allows banks to benefit from enhanced data quality and sophisticated modeling internally, while still adhering to regulatory requirements for capital models.

Stress Testing as a Core Tool

Stress testing remains a cornerstone of Basel 3.5's risk management framework, serving as a critical means for banks to demonstrate the robustness of their portfolios under adverse scenarios. For banks using internal models—whether Foundation IRB or Advanced IRB—stress tests must prove that these models accurately reflect risk even in extreme market conditions. Stress testing is also essential for low-frequency event portfolios, allowing banks to simulate worst-case scenarios and understand potential vulnerabilities despite limited historical default data.

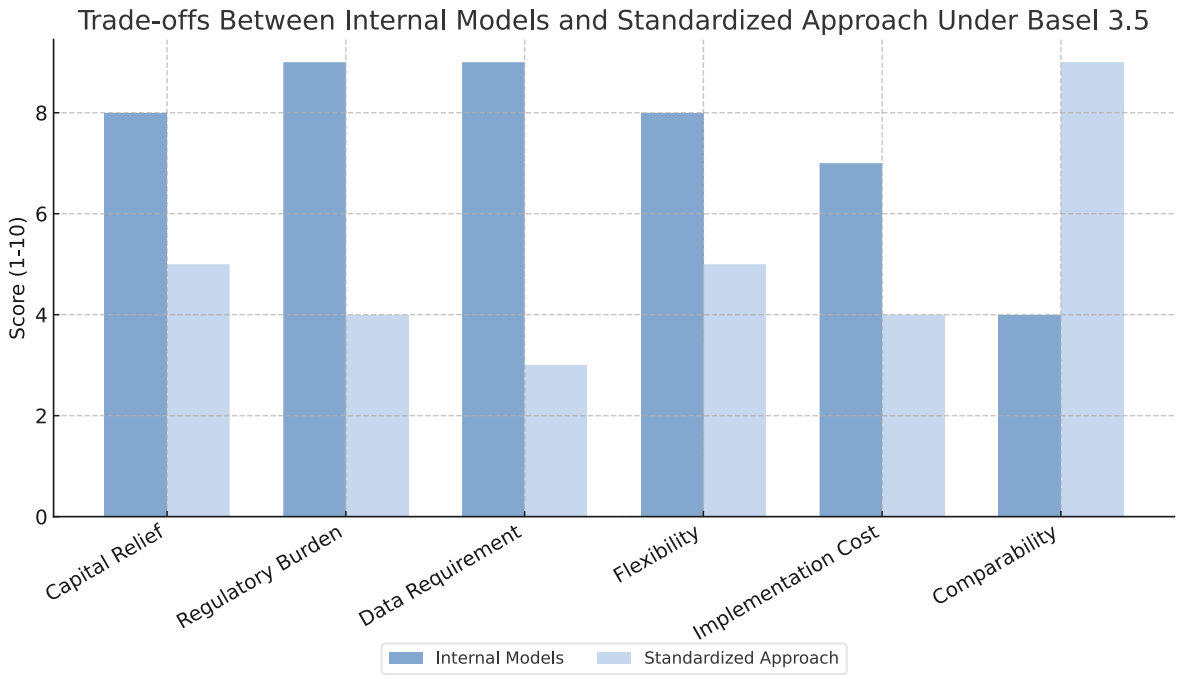
Regulatory Differences Across Jurisdictions

The implementation of Basel 3.5 varies significantly across different regions, complicating the landscape for multinational banks. Key differences include:

- **European Union (EU)**: The EU aims to phase in Basel 3.5 beginning in 2025, with certain allowances for SME portfolios and low-risk mortgages. This approach seeks to strike a balance between regulatory robustness and economic growth by maintaining access to credit for smaller businesses.
- **United States**: The U.S. implementation also begins in 2025, but its focus will be on large, systemically important banks. These institutions face potentially higher capital requirements under Basel 3.5, driven by additional layers of regulatory oversight.
- **United Kingdom (UK)**: Post-Brexit, the UK will likely adopt a more tailored approach, leveraging regulatory freedom to better suit the needs of its banking sector. This flexibility may lead to greater variance in how Basel 3.5 is implemented compared to EU counterparts.
- **Asia-Pacific (APAC)**: Adoption rates differ widely across APAC, with financial centers like Singapore and Hong Kong proactively aligning with Basel 3.5, while larger economies such as China and India may face delays.
- **Emerging Markets**: Emerging markets are expected to lag, potentially implementing modifications that better reflect local economic conditions. For multinational banks, managing capital across jurisdictions becomes increasingly challenging, with inconsistent regulatory timelines and standards adding to compliance complexity.

Balancing Complexity and Capital: Strategic Considerations

The decision to continue using internal models or to switch to the Standardized Approach hinges on several factors, including operational scale, the cost of compliance, and the strategic importance of risk sensitivity.



Source: Survey estimates across a number of global and national banks.

For smaller institutions, the compliance burden associated with internal models may not justify the benefits, especially given Basel 3.5's output floor and validation rigor. However, for larger banks, the IRB Approach offers a deeper understanding of risk and the potential for more optimized capital allocation, supporting strategic goals.

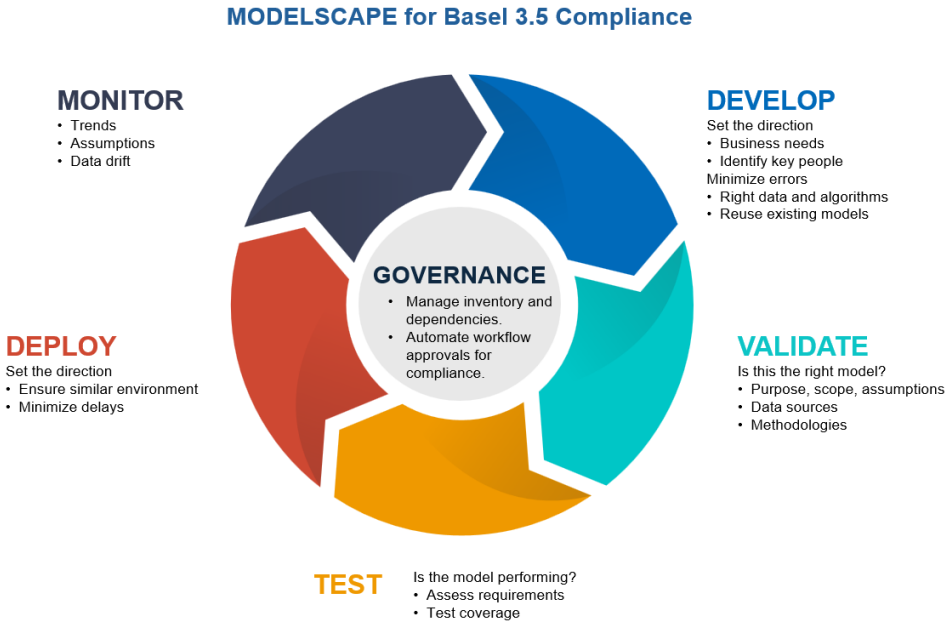
Stress testing plays a central role in this decision. It provides insights into model resilience, helping banks determine whether the complexity of maintaining internal models is justified. For portfolios with low-frequency defaults, stress testing offers a practical method to understand potential risk impacts, supplementing traditional models and supporting internal decision-making processes.

How MathWorks Can Help

MathWorks' Modelscape platform offers comprehensive support for banks navigating Basel 3.5, aiding both internal model management and standardized approaches. In an environment where banks must juggle multiple models, each with distinct regulatory and strategic purposes, Modelscape's integrated capabilities provide a seamless way to manage these complexities.

1. **Governance**: Modelscape assists with model inventory management, version control, and governance workflows, ensuring compliance with evolving standards and providing transparency critical for maintaining model credibility. By supporting both IRB and standardized models, it allows banks to effectively manage a hybrid modeling environment.
2. **Development**: The platform supports a wide range of programming languages, including Python, R, and SAS, allowing banks to leverage their existing technical expertise. This flexibility reduces the barriers to adapting new modeling techniques within the evolving Basel landscape. Whether developing advanced internal models for stress testing or simpler models for compliance with the Standardized Approach, Modelscape helps streamline the development process.
3. **Validation**: Automated validation frameworks simplify compliance by tracking model lineage and generating documentation needed for regulatory review. This is crucial for meeting Basel 3.5's validation demands while reducing administrative burdens. Modelscape's validation tools help ensure that the right models are used in the appropriate contexts, maintaining consistency across complex, multi-model environments.
4. **Testing**: Integrated testing tools, compatible with CI/CD pipelines, enable thorough model performance assessments before deployment. This ensures robustness and reliability, minimizing risk during implementation. Banks managing both standardized and IRB models benefit from consistent, rigorous testing, which is essential for operational resilience.
5. **Deployment**: Scalable deployment capabilities support both internal and standardized models, allowing for consistent integration into bank operations and ensuring compliance. By automating deployment, Modelscape helps banks efficiently manage multiple model types, minimizing the risk of errors and improving the speed of regulatory reporting.
6. **Monitoring**: Real-time model monitoring allows stakeholders to track ongoing performance, identify issues, and make adjustments proactively, crucial for maintaining effective risk management practices. With multiple models in play, monitoring becomes vital to ensure each model's continued appropriateness and compliance in a dynamic regulatory environment.

By providing these capabilities, Modelscape helps banks manage the complexities of Basel 3.5, ensuring compliance while supporting flexibility and operational resilience in their risk management frameworks. The ability to manage both standardized and advanced internal models through a unified platform allows banks to maintain agility in the face of evolving regulatory demands and competitive pressures.



Conclusion

The introduction of Basel 3.5 has reshaped the landscape for internal LGD models, reducing their role in regulatory capital calculations while emphasizing their value in internal risk management. While smaller institutions may lean towards the Standardized Approach to minimize compliance costs, larger banks with sophisticated modeling capabilities can benefit from maintaining internal models for stress testing, capital allocation, and RAROC.

The decision between internal models and the Standardized Approach must align with each bank's strategic goals, operational capabilities, and regulatory context. Stress testing will continue to play a critical role in validating internal models' relevance, providing a bridge between regulatory compliance and strategic capital management. In this evolving environment, maintaining agility and aligning model use with institutional goals will be key to navigating the challenges presented by Basel 3.5.

Learn More

- MathWorks Modelscape
- What Is Basel IV?
- Basel Regulatory Framework