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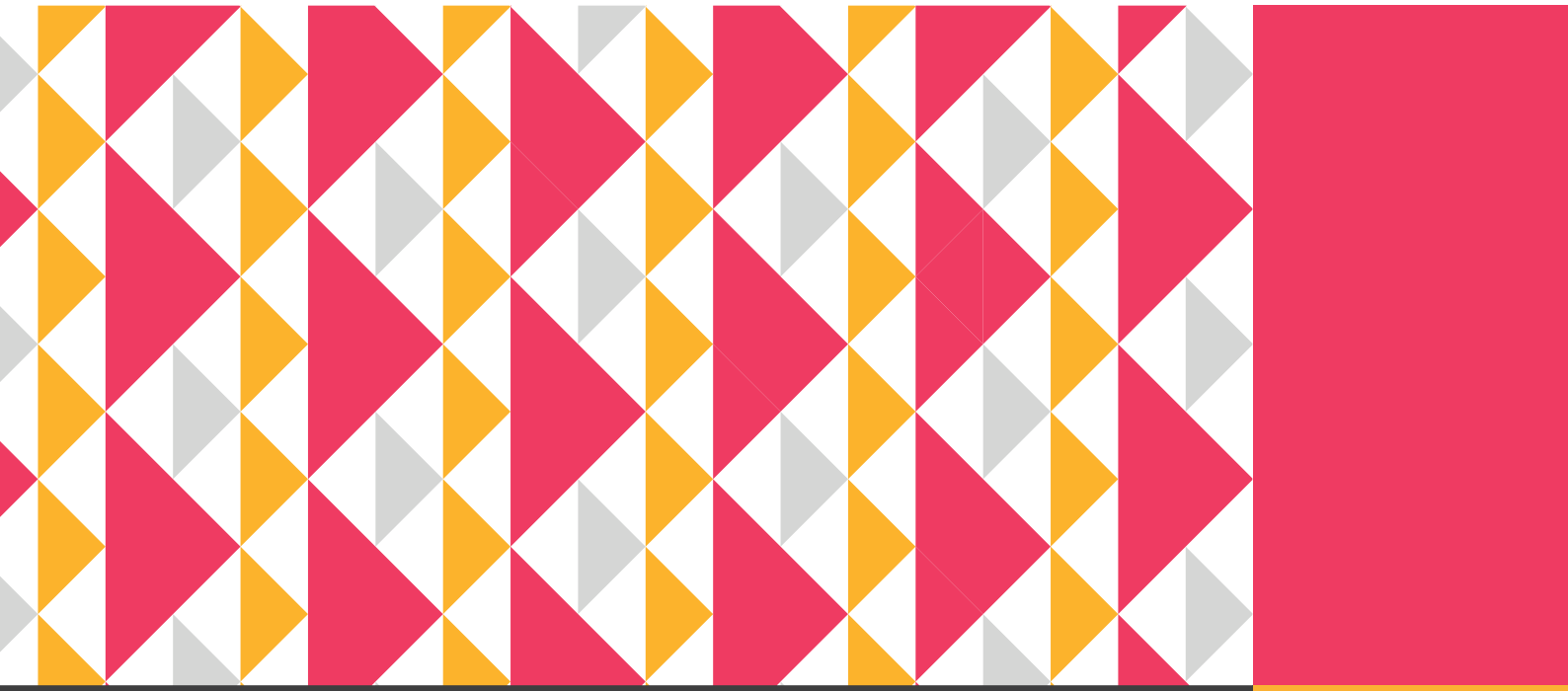

Overcoming the challenges of Model Validation in the LIBOR Transition

pwc.co.uk/LIBOR-transition

The context

The journey to RFRs

As from the end of December 2021, Financial Institutions (FI's) will no longer be compelled to submit LIBOR rates, as the market transitions to risk-free rates (RFRs) such as SONIA. Other LIBOR deadlines will become apparent before then, an example being the Bank of England has said that by the end of Q3 2020 that all new issuance of sterling LIBOR-referencing loan products expiring after end-2021 should cease by the close of Q1 2021.

To avoid disruption, all banks, insurers, and asset and wealth managers need to meet these deadlines, ensuring they remove all remaining dependencies on LIBOR by the start of 2022. It's a tight timeframe. The transition has pervasive impacts that must be dealt with across your products and operations, and regulators have consistently stressed that the final deadline will not be pushed back.

Model validation: a complex, high-volume and business-critical task…

Overall, LIBOR reform represents the largest and most complex change that has faced FI's since the introduction of the euro – and addressing its impact on models is arguably the most complex aspect of the whole exercise. A significant number of banks' current models involve LIBOR, meaning they will need to be remediated, recalibrated and revalidated.

These models affect a wide range of business-critical areas, from pricing to risk management to capital adequacy calculations. Yet given the urgency of focusing on other aspects such as contract remediation, the implications for models have only become a major focus in the past few months. And while some FI's have set up dedicated workstreams for LIBOR models, others are treating it as a side-of-the-desk task for other areas of their LIBOR programmes.

…that could overload your potentially already stressed resources

Any FI that is failing to pay sufficient attention to models in its LIBOR transition will face growing risks. As the importance and regulation of FI's' models have grown in recent years, the various teams responsible for validating them have been under intensifying pressure to test and validate ever more models, and do this faster and at lower cost. All while using largely manual-based processes and struggling with a shortage of relevant talent.

Model validation teams are often stretched to full capacity and beyond, with growing backlogs of models requiring validation. Now LIBOR reform is set to ratchet up the pressure even further. Add the impacts of COVID-19 – which has increased the market stresses on models, while also disrupting operations and personnel – and it's clear why some model validation teams will struggle with the transition. Yet the LIBOR deadlines mean that, starting from as soon as Q3 2020, they're facing a new wave of remediated models requiring validation, potentially increasing their workload by a further 30%.

How we can help

The message is clear: some FI's' LIBOR programmes could face a problematic bottleneck in model validation. So we've created a solution to help clear the logjam. By setting up specialist onshore and offshore teams, and developing dedicated technology, processes and frameworks, we've built a platform to collaborate effectively with you in delivering model validation services. While LIBOR-related model validation is a significant challenge for all FI's, it's one that we're well positioned and qualified to help you meet.

LIBOR reform and its impacts on models

LIBOR is deeply entrenched across your institution's front-to-back suite of models, with potentially several thousand models requiring amendment and validation. The impact of LIBOR reform is amplified by the fundamental change in mechanics from forward-looking LIBOR to backward-looking RFRs: for example, one result of this shift is the "fallbacks" do not work in every situation – even for simple products such as forward rate agreements – and may break post-conversion. Our view on the most significant implications for models across four key areas below:

1

Trading products

- **Cash products**: Compounding and new conventions may trigger coupon settlement disputes, while uncertainties in fallbacks will make marking fair value much more complex.
- **Derivatives**: Backwards-looking fallbacks may be incompatible with existing trade types like FRAs, Libor-in-Arrears swaps and range accruals. Also, fallbacks are set to transform vanilla trades like cap/floors into exotic payoffs. And CCP discounting updates may create a need to compensate counterparties holding swaptions.
- **Valuation adjustments (XVAs)**: Illiquidity in non-linear RFR calibration instruments may create problems for exposure engines. Funding valuation adjustment (FVA) will now use the RFR curve as its base.

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Banking Book

- **Treasury and ALM**: Funds transfer pricing (FTP) updates will now reference RFRs as the funding curve, and inputs to FTP involving IR risk and liquidity will need to be reviewed. Existing models and infrastructure may need updating to handle multicurve environments.
- **IRRBB**: The new way of formulating basis risk from the introduction of RFRs will require assessment before feeding ICAAP. Cash flow discounting will now involve RFR curves.
- **Credit models**: Depending on the balance between expert judgement and statistical rigour, LIBOR may be an input into scorecard models. There are also impacts for discounting with loss given default (LGD) models.

3

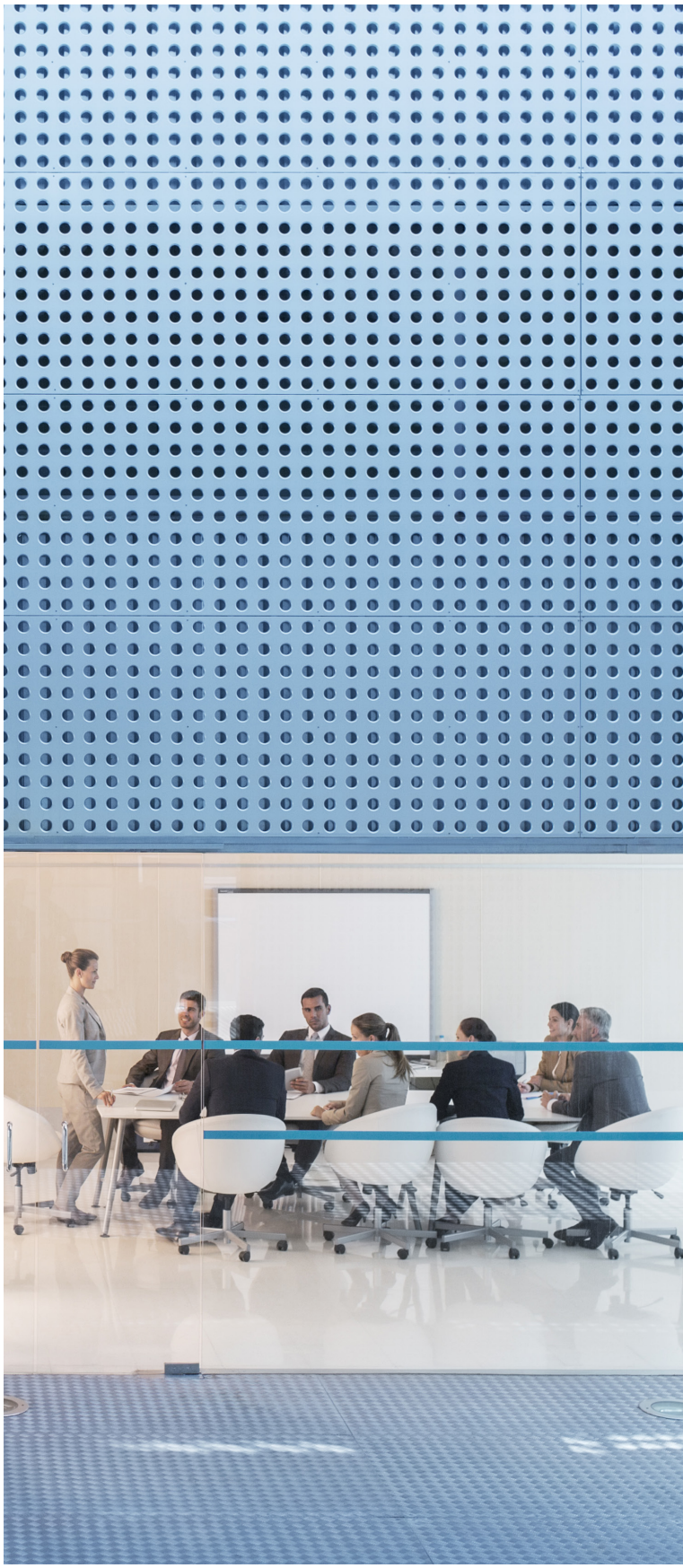
Risk Management and Capital

- **Internal models approaches (IMA)**: Insufficient time series history with RFR may lead to increases in RNIV or non-modellable risk factors (NMRF). There is also a lack of observability through sufficiently long stress periods for sVaR.
- **Internal model methods (IMM)**: The margin period of risk (MPOR) may increase due to limited liquidity in new – and potentially legacy – instruments.
- **Prudent valuation (PruVal)**: The increased complexity in modelling from fallback products such as caps will increase AVA model risk.
- **Capital adequacy (CCAR, ICAAP)**: Regression models require both a time series to show past relationships (e.g LIBOR) and a forecastable variable (e.g. SOFR).

4

Governance and oversight

- Regulatory: Updates to regulatory capital models incur a requirement to notify regulators, who are also pressing FI's to prepare and execute robust model update plans.
- External dependencies: Dynamic management of external dependencies is required to reflect changes in markets, vendors and timelines.
- Timing: Given additional factors such as COVID-19 and remote working, it's vital to have clear prioritisation and execution timelines for model remediation and validation.



Our solution…

Our LIBOR model validation platform is designed to take the burden off your internal teams – while collaborating closely and openly to keep you constantly informed and fully in control. We apply the concept of "augment plus", combining specialist global teams – both onshore and offshore – with specially-developed technology tools and frameworks to manage and share the workflow of model validation and testing. All of this is delivered in a fast and transparent way.

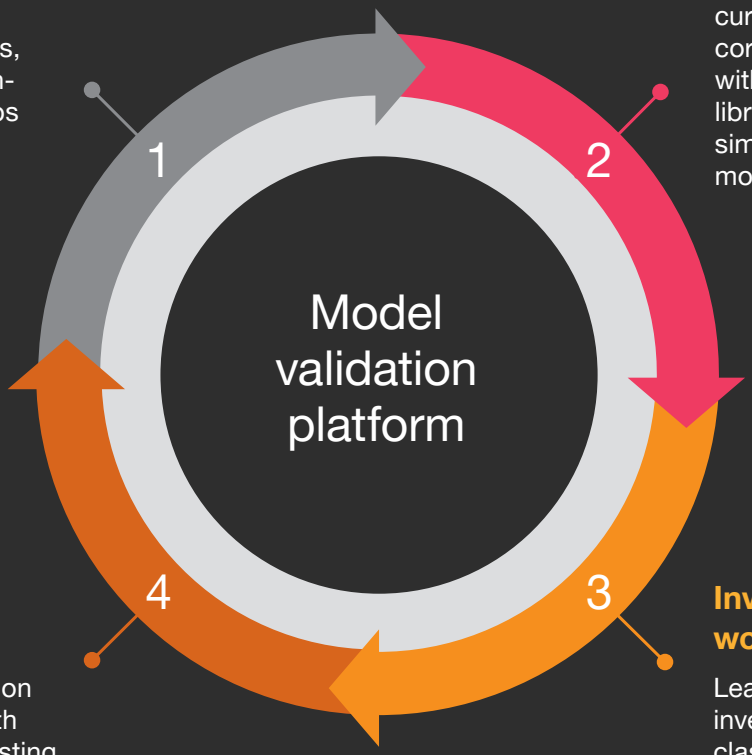
A key differentiator of our solution is our strong point of view on model validation, built up through years of engagement with model risk professionals across our banking clients. Our platform applies the resulting insight, defining clearly what type of validation and testing is required for a particular model and guiding resources through the process. As well as delivering our solution in collaboration with your in-house teams, we can also offer it as a fully-outsourced managed service. The model validation platform at the heart of our solution consists of four key components:

Framework and procedures

A best-in-class validation framework, approach, procedures and templates, complete with jurisdiction-based validation test steps tailored to asset classes and products.

Analytics tools and libraries

Including off-the-shelf curves, surfaces and correlation factors, together with pre-coded pricing libraries, and ready-to-use simulation and regulatory model codes.



Documentation and reporting

Automated model validation document generation, with automated updating of testing reports, interactive model dashboards and alerts, and model look-up by ownership, function, departments, priority, risk category, and more.

Inventory and workflow

Leading-edge model inventory management and classification, with model hierarchy management and feeder models setup, repository of documents and approvals, and end-to-end governance workflow.

…and the benefits for you

By engaging PwC to help address your model validation needs arising from LIBOR reform, you'll gain business benefits including:

Why PwC?

By engaging PwC to help address your model validation needs arising from LIBOR reform, you'll gain business benefits including:

An integrated global platform

We bring together and integrate the right people, technology and frameworks to take the strain off your model validation teams, and address the bottleneck through LIBOR-to-RFR model remediation. Our expert onshore teams are supported by our high-quality, high-throughput delivery centres across the world, ensuring the optimal combination of speed, accuracy and cost-effectiveness.

An Offshore Delivery Centre

Our Offshore Delivery Centre, consisting of 70 full time employees, have been trained and technologically enabled to help with the volume challenge of testing, documenting and validating the full suite of models impacted by the LIBOR Transition.

Deep understanding of the challenges around models

We've invested time and effort in engaging with key stakeholders – across front office, risk, model validation, internal audit and more – in many of the world's largest banks, to truly understand the challenges that LIBOR reform raises around models. This investment has brought us unrivalled insight into types of service and support you need.

A strong point of view – embodied in our model validation framework

Our insight has enabled us to develop a clear and strong point-of-view on the validation and testing required for each type of model. We've embedded this point of view into our platform, which provides robust guidance on the review process and testing required, supported by standardised documentation and reporting.

Technology leadership

We're acknowledged leaders in developing and delivering bank-specific technology solutions ranging from electronic bank account management to data models and workflows for LIBOR document types. We've applied these proven capabilities to develop technology that elevates the speed, quality, reliability and transparency of model validation.

Front-to-back insight into LIBOR best practices and regulatory expectations

As a major global professional services firm working with the largest global banks, we've amassed a deep pool of market insight both into model risk management work and the entirety of bank's LIBOR programmes. We also have strong relationships with financial services regulators.

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RITM3148142