

With you today



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- 1. High level status on ARRs
- 2. Market updates
- 3. Impacted areas & industry readiness
- 4. Approach for impact assessment





Alternative reference rates:

ARRs have been defined in several jurisdictions

Working Groups in each jurisdiction have recommended robust ARRs to transition away from existing IBORs. The ARR benchmarks are overnight whereas current use of IBORs is largely in term rates.

Jurisdiction			()	•	
Rate administrator	Bank of England	Federal Reserve Bank of New York	European Central Bank	SIX Swiss Exchange	Bank of Japan
Working group	Working Group on Sterling Risk-Free Reference Rates	Alternative Reference Rates Committee	New Working Group on RFR for the Euro area (NWG)	National Working Group on Swiss Franc reference rate	Study Group on Risk- Free Reference Rates
ARR	Reformed Sterling Overnight Index Average (SONIA)	Secured Overnight Financing Rate (SOFR)	Euro Short-Term Rate (ESTER)	Swiss Average Rate Overnight (SARON)	Tokyo Overnight Average Rate (TONAR)
Description	 Unsecured Fully transaction-based Encompasses a robust underlying market Overnight, nearly risk-free reference rate Includes a volume-weighted trimmed mean 	 Secured Fully transaction-based Encompasses a robust underlying market Overnight, nearly risk-free reference rate that correlates closely with other money market rates Covers multiple repo market segments, allowing for future market evolution 	 Encompasses a robust underlying market 	 Secured Became the reference interbank overnight repo on August 25, 2009 Secured rate that reflects interest paid on interbank overnight repo 	 Unsecured, transaction-based benchmark for the robust uncollateralized overnight call rate market The Bank of Japan calculates and publishes the rate on a daily basis using information provide by money market brokers known as Tanshi As an average, weighted the volume of transactions corresponding to the rate
Published	Yes daily at 9am (GMT/BST)	Yes daily at 8.30am (EST/EDT)	From October 2019 daily at 9am (CET) now pre-ESTER	Yes, three times a day (12.00pm, 4pm, 6pm CET/CEST)	Yes, final results published 10am (JST)

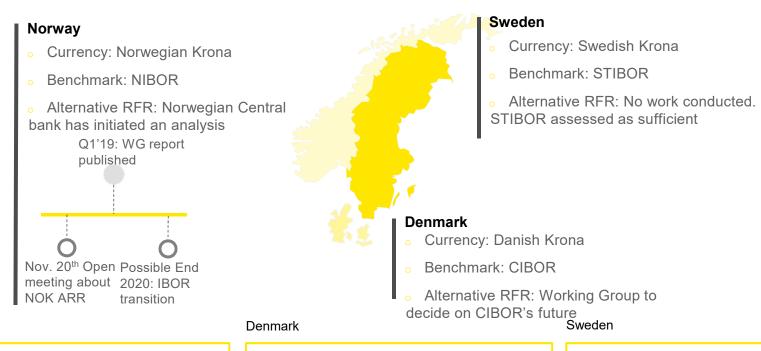


Nordic IBORs:

attention but no decisions so far

As of October 2018, the Scandinavian financial authorities have different agendas regarding the future of IBOR.

Nordic scope



Norway

The Norwegian benchmark rate, NIBOR, is managed by "Norske finansielle Referanser AS". Norges Bank has initiated a working group in order to develop a new benchmark rate. A consultation paper on possible ARRs has been published, and will be discussed at an open meeting on 20th November.

The Danish benchmark rate, CIBOR, is managed by "Finans Danmark". Finans Danmark has initiated a working group to follow international developments.

The Swedish benchmark rate, STIBOR, is managed by the Swedish Bankers' Association (sw. Svenska bankföreningen). A working group has been established, no time-line published.



^{*}Source: Norges bank, April 2018



Latest market updates:

UK banks asked for a transition plan, Europe decided an ESTER

UK

- On Sept 19, the Prudential
 Regulatory Authority and
 Financial Conduct Authority sent
 a letter to the CEOs of large
 London banks and insurance
 companies¹
- Letter must be answered by December 14th, 2018
- Requested information:
 - Assessment of key risks associated with LIBOR discontinuation and planned actions
 - Identification of the Senior Manager(s) responsible for governance and transition plan development
- Regulators pushing for Pillar 2 add on for basis risk created during the transition

US

- Developments in SOFR market:
 - Jul 18: first floating rate note referencing SOFR
 - Aug 18: Barclays issues \$525 million asset backed commercial paper referencing SOFR
 - Aug 18: Credit Suisse becomes the first bank to issue SOFR-linked debt
 - Aug 18: MetLife issues \$1 billion bond linked to SOFR
- FASB added SOFR as hedging rate

Europe

- ESTER recommended alternative EUR rate, but
 - It will be published from October 2019,
 - little time to move over to the new rate
- Discussion on postponing
 Benchmark Regulation
 application date to after 2020
- Nordics have kicked-off work on Nordic IBORs

¹Link to the Letter: https://www.fca.org.uk/publication/correspondence/dear-ceo-letter-transition-from-libor-banks.pdf





High level impacted areas:

Several areas are impacted across the organization

The below outlines potential challenge areas and considerations associated with IBOR transition, which should serve as the core foundation for impact assessments.

1

Product

- A holistic view of current IBOR uses in an organization is a prerequisite for robust impact analysis and transition planning.
- Institutions should identify the complete scope and size (e.g., notional) of IBOR currencies (e.g., USD, GBP) and tenors (e.g., overnight, term) referenced by product type.

2

Market liquidity

- Availability and liquidity in derivatives, money markets and other cash products will be required to facilitate term fixings in alternatives ARRs.
- Institutions should consider the breadth of their IBOR usage, prioritize the critical tenor needs and evaluate liquidity impacts accordingly.

3

Risk management

- Mechanisms will be required to mitigate potential pricing variations and value transfer uncertainty (e.g., term premium, credit spread).
- Institutions need to assess the depth of impacts on risk and pricing models, processes and hedging strategies.
- Capital requirements impact (e.g. IRRBB, FRTB)

4

Data & technology infrastructure

- The transition to alternative ARRs is expected to require significant changes across business processes, data and technology infrastructure.
- Operational crossdependencies (e.g., proprietary vs. vendor systems, FMUs) should be appropriately incorporated in implementation plans.

Financials & balance sheet

- Balance sheet, P&L and risk exposures may be impacted as a result of the transition to alternative ARRs.
- Institutions may consider conducting pro-forma analysis on the financial impacts to further inform transition strategies.

6

Legal

- Contract amendments
 (volume and complexity)
 and client outreach are
 anticipated to be among
 the main legal challenges.
- Careful consideration should also be given to interdependencies between structured products and embedded derivatives.

7

Tax

 Downstream impacts on taxation may involve revaluation of tax assets and liabilities, potentially resulting in acceleration of payments.

8

Accounting

 Policy, process and system changes may be required to enable application of the alternative ARRs to the current fair value measurement and hedge accounting frameworks.

9

Governance & controls

- Individual transactions should be reviewed to identify legal responsibilities and requirements to enable the transition.
- Robust cross-functional governance models should be defined to oversee transition efforts and modifications to existing control frameworks.



Regulatory

 Institutions should consider potential regulatory implications associated with the transition, including any cross-dependencies with current regulatory requirements (e.g., customer protection).



Industry readiness

Work has started: program plan & governance main focus

Market participants continue to support the transition to alternative ARRs by mobilizing resources and assessing their exposure to IBORs. Currently, the industry is progressing at different levels across the key areas outlined below.

Peers	readiness map*	Program mobilization	Impact assessment	Program governance	Program implementation
UK & US	 UK banks need to deliver a quantitative assessment of the key risks and planned mitigation actions and identify Senior Managers responsible for the actions by 14th December 				
	Most banks are actively working to complete required actions				
	European banks have been starting mobilizing				
Europe	Some banks have performed an impact assessment				
Nordics	Nordic banks are drawing their attention toward the IBOR transition theme They typically have not started performing the impact assessment yet but are starting mobilizing	impact ass	e high level essment by Q4 2018		



Proposed transition framework

A structured cross-function approach is needed

A successful IBOR transition requires a well-planned approach running across the organization and predefined business criteria to identify your organization's overall exposure to IBOR-linked products, contracts, business processes (including data and technology) and enterprise-wide models.

IBOR transition program

Project mobilization and scoping



Confirm impact assessment scope



stakeholders



Review internal documentation



Establish project operating assumptions



Review, confirm and socialize project plan



Establish project governance

Deliverables

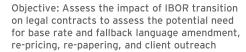
- Project plan
- Project governance
- IBOR impact assessment
- Key operating assumptions

Impact assessment



Product

Objective: Assess the impact of IBOR transition on products and financial instruments based on exposure, maturity profile, and product features (e.g., optionality)



- **Build Product Inventory**
- Extract IBOR data attributes1
- Impact assessment by product
- Validate assessment with core business lines
- Prioritize contract inventory based on product assessment
- Confirm sampling approach
- Confirm key contract features
- Extract features to structured DB
- Run Analytics/MI

Accelerators

- Balance sheet exposures: Treasury system(s)
- Off-balance sheet exposures: Risk system(s)
- ► EY Contract Digitization Asset and Capabilities (OCR + ML)

Deliverables

- ► IBOR Product Master, including product Inventory of IBOR impacted products by line of business
- ► IBOR Contract Master, including contract Inventory of IBOR impacted contracts by LOB and products



Contract

Business process

Objective: Assess the impact of IBOR transition on core business line and enterprise level processes - leverage existing process catalogue and EY IBOR impact assessment criteria

Objective: Assess the impact of IBOR transition on enterprise-wide model inventory for both quantitative and qualitative impact - leverage existing first and or second line inventories and EY IBOR model evaluation criteria

- ► Leverage existing process catalogue + EY process
- Validate EY assessment criteria
- Determine IBOR impact
- Key data and application impact
- ▶ Leverage existing 1st and or 2nd line inventories to
- confirm models in scope Review evaluation criteria to determine materiality classifications
- Review inventory based on criteria and obtain model owner sian-off

▶ Internal Process Catalogue

1st and/or 2nd line model

EY evaluation criteria and

representative impacted model

► EY Process Catalogue

inventories

inventory

- ► IBOR Process Master. including impacted processes identified via evaluation criteria. Includes level of impact by processes
- IBOR Model Master, including inventory of impacted models based on evaluation criteria and materiality

IBOR Transition Program governance and organization



Models

Terms of Reference/Mandate



Recommendations for program Governance



Resource & Cost Estimate up to 2021



IBOR Business Case



Risks and Issues

Deliverables

IBOR assessment executive summary

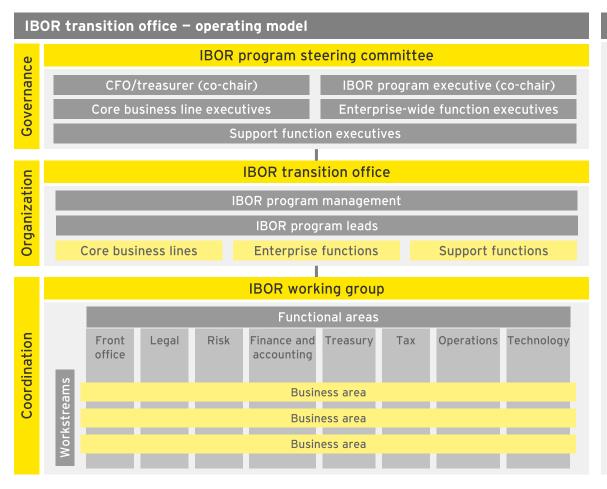


Program governance & organization structure

¹Example: product type, exposure, limit, maturity date, currency, base rate, spread, repricing tenor, optionality (prepayment), linked transactions (hedges), etc.

Illustrative governance structure

The key to an effective transition will be a robust governance structure that oversees the design and implementation of IBOR transition efforts. Governance should be under the auspices of the board and is typically led by treasury or global markets.



Key considerations

- ► The IBOR transition office should be responsible for the coordination of all IBOR transition activities with internal and external stakeholders
- The IBOR transition office should have, at minimum, a deep understanding of the firm's businesses and corporate functions, expertise in IBOR-based products and contracts, and strong program change management skills
- ► The IBOR transition office should provide centralized strategy, steering and oversight, while sponsors from the businesses and functional areas should own and drive workstream execution
- ► The expected size of the program could vary over time; initial staffing may range from few centralized IBOR transition office resources with significantly more full-time resources required as the program scales up to a size comparable to other large programs (e.g., RRP)

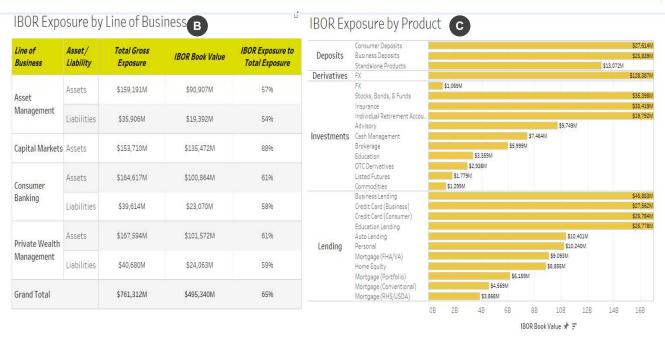




Product

To assess a firm's financial exposure to IBORs, EY has developed a dynamic reporting tool that can produce views of exposure to IBOR-linked products across each LoB, legal entity and currency.





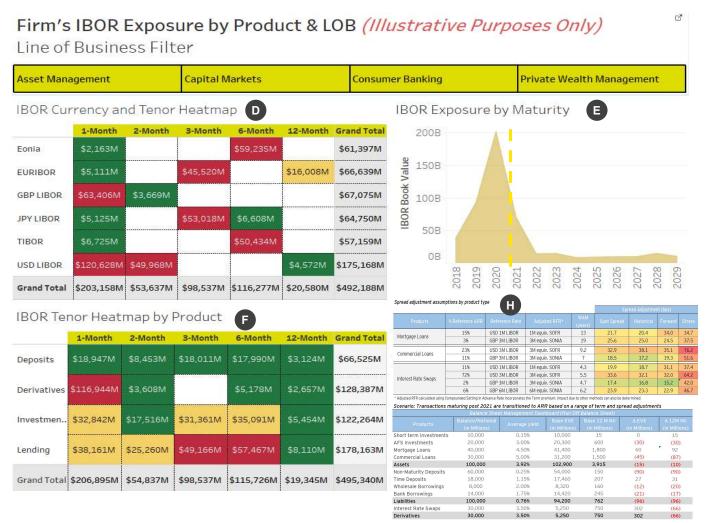
Overview of functionality

- A Line of business, legal entity and counterparty filters: The dashboard can be filtered to view exposure details for a specific LoB, legal entity, or counterparty.
- B LOB reporting: There are also drilldown dashboards for each LoB to view more granular exposure data.
- exposure is also reported across each product within the product hierarchy. The tool allows you to drill down into the L1 products to view more granular details. Further, B & C are linked, so the products that comprise a specific LOB can be drilled into.



Product

To assess a firm's financial exposure to IBORs, EY has developed a dynamic reporting tool that can produce views of exposure to IBOR-linked products across each LoB, legal entity and currency.



Overview of functionality

- Pate indices: The dashboard provides a view of exposure across each rate index and tenor. This table can be filtered by product or LoB as needed
- E Contractual maturity: the percentage of IBOR exposure expected to roll off prior to end-2021 can be viewed
- F Product drill-down: the exposure across tenors and maturity buckets for various products can be further drilled into. These views are linked, so Tenor and Maturity for a specific product can be viewed
- H NII, EVE Scenario Dashboards: financial impact under various scenarios (e.g. no repricing of legacy portfolios, transition of all legacy portfolios or transition of part or various parts of legacy portfolios)



Modeling is a high impact area that should be considered and used to inform the process assessment work.

Illustrative model-level impact assessment

Illustrative firm-wide impact assessment summary

Impact assessment when developing new models using alternative RFRs and updating existing models that use IBOR rate/volatility inputs should consider:

- Elements of the model that require updates to determine the effort level. In the table below nearly all the elements of the basis curve model would need to be updated whereas only certain elements of the Wholesale LGD model would require modification
- ▶ Dependencies between models (e.g., interest rate swaption model is contingent on curve bootstrapping and vol calibration feeder models)

	Tier	Feeder	Effort	Conceptual	Implementation	Model Inputs	Model Testing				Ongoing	Documentation	
Model Name		Model	Level	soundness			Diagnostic	Sensitivity	Scenario	Stress	Outcomes Analysis	Ongoing Monitoring	Update
Basis Curve Algorithm	1	Yes	High	High	High	High	High	High	High	High	High	High	High
Wholesale LGD Model	1	No	Low		Low	Low		Low					Low

		*						
▶ Below is a representative impact by core business line and enterprise function:								
	Impact	Est % of impacted models	Example models					
Core business lines								
Consumer Banking	High	74%	Loan level loss forecast; LGD					
Commercial Banking	High	71%	Loan forecasting; issuer default					
Capital Markets	High	63%	IR simulation; MR VaR					
Private Bank and Wealth Management	Medium	34%	Retail liquid secured PD					
Enterprise Functions								
Treasury	High	68%	Net interest income; PPNR					
Corporate Risk	High	64%	Callable bond; wholesale forecast					

55%

Medium

Impact considerations

- Potential replacement of macroeconomic variables
- Availability of historical data for replacement macroeconomic variables
- Re-validation of models for conceptual soundness and performance
- Updated sensitivity analysis
- Revised model and controls documentation
- Up/downstream impacts of models

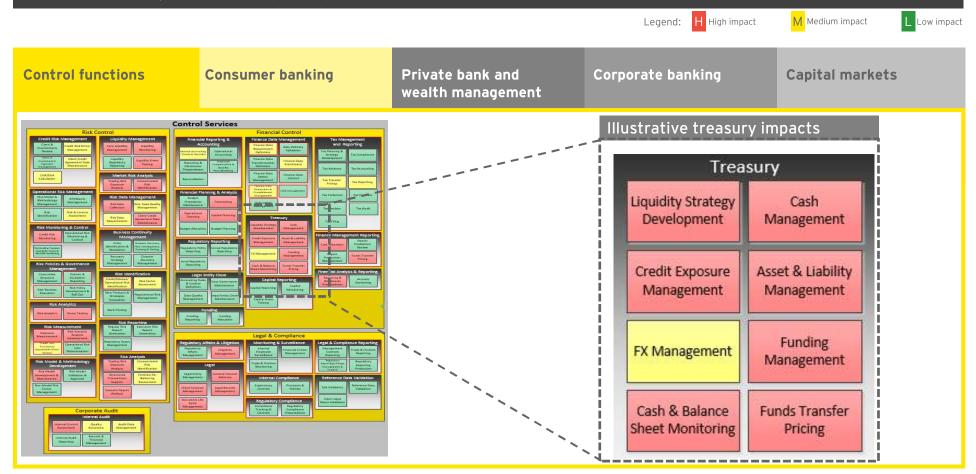


Finance

LIBOR yield; Muni-LIBOR basis

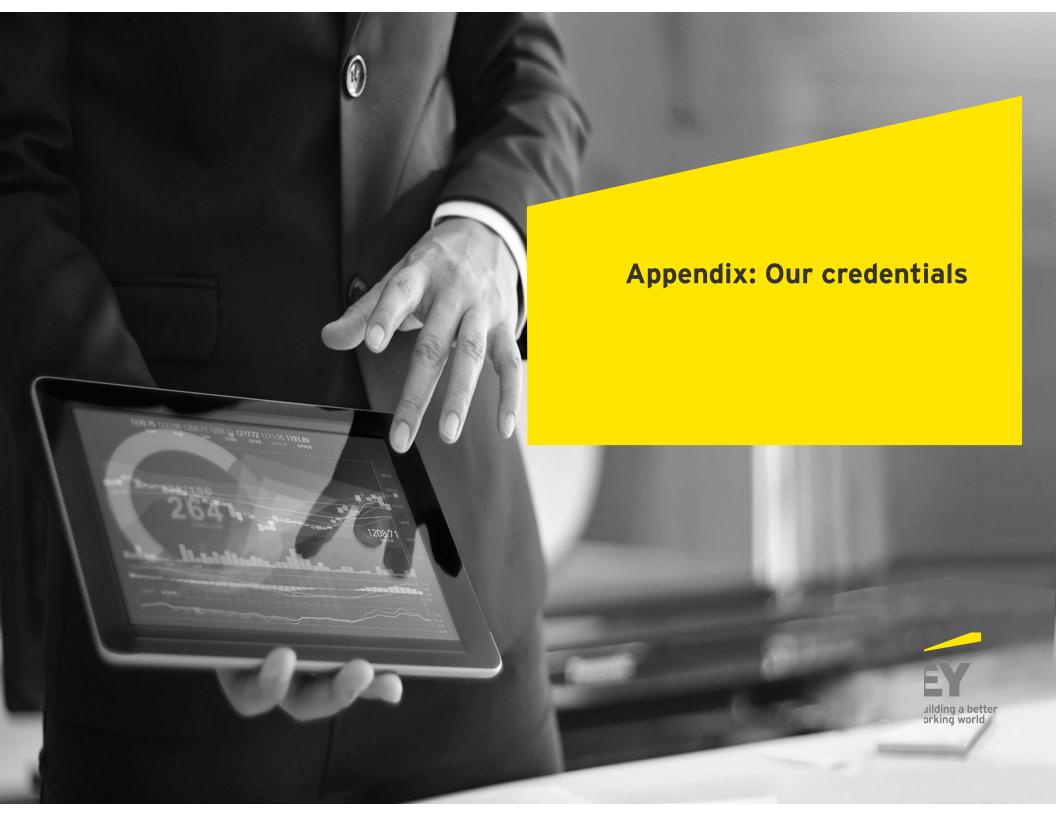
Business processes

EY has developed an initial view on the business processes that will be impacted by the IBOR transition. The below dashboard outlines a summary view of the impacted processes.



Our reporting tool provides the functionality to drill down into more granular views to understand the unique drivers of impact for each process.





IBOR Transition Qualifications

Trade association IBOR transition support



EY supported ISDA, AFME, ICMA, and SIFMA with a large-scale project focused on gathering important information with regards to transitioning financial market contracts and products from IBORs to ARRs (alternative reference rates).

Kev Work Products

IBOR Global Benchmark Transition Roadmap

EY developed the Roadmap which centralizes publicly available information published by the global regulatory bodies and RFR working groups regarding transition planning progress with respect to major IBORs denominated in G5 currencies.

IBOR Global Benchmark Survey EY administered a global industry-wide survey to gather important information with regards to the transition from IBORs to alternative RFRs. The survey involved in-person interviews and electronic surveys with 154 market

participants in 24 countries.

IBOR Global Benchmark Transition Report EY developed the Report that summarizes the views of institutions that participated in the survey globally, and outlines the potential global market implications of transitioning from interbank offered rates (IBORs) to alternative reference rates.

Scope of work

The project focused on major IBORs across G5 currencies						
IBOR	Alternative RFR					
► GBP LIBOR	 Reformed Sterling Overnight Index Average (SONIA) 					
▶ USD LIBOR	Secured Overnight Financing Rate (SOFR)					
► EUR LIBOR, EURIBOR	► Euro Short-Term Rate (ESTER)					
► CHF LIBOR	Swiss Average Rate Overnight (SARON)					
► JPY LIBOR, JPY TIBOR, Euroyen	► Tokyo Overnight Average Rate (TONA)					
Reviewed a comprehensive suite of products						

ш			
▶	OTC derivatives	▶	Bonds and floating rate notes
▶	Exchange traded derivatives	\triangleright	Short term instruments
▶	Loans	▶	Securitized products

153 participants across 6 market segments were surveyed...

- ► Commercial banks, investment banks
- ▶ Retail banks, GSEs, banking and finance associations, non-bank lenders
- Asset managers, pension funds, hedge funds, other regulated funds, insurance/reinsurance companies, supranationals
- ► Non-financial corporates
- ► CCPs, exchanges, benchmark administrators, rating agencies
- ▶ Law firms



EY and ISDA co-sponsored 3 IBOR transition industry roundtables in NY, London and Switzerland



EY also hosted a technical panel discussion for Women in Derivatives with ISDA and the FRB

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IBOR Transition Credentials

Market leading position in the industry



EY holds a leading market position in supporting global institutions in conducting enterprise-wide assessments to adequately prepare for the discontinuation of IBORs. EY is also playing an important role in supporting global regulators and trade association in conducting client outreach and increasing client awareness and education.

Enterprise-wide IBOR transition impact assessment (products, contracts, business processes and models)

- Supporting global banks and institutions in conducting a comprehensive IBOR transition impact assessment to identify the overall exposure to IBOR-linked products, contracts, business processes (including data and technology) and enterprise-wide models
- Assessing products and financial instruments based on exposure, maturity profile, and product features

Enterprise IBOR transition program mobilization, governance structure and communication plan

- ► Assisting in developing a governance framework to oversee, manage and run an effective IBOR transition program
- Assisting in defining the internal program governance structure including executive committee membership, IBOR transition management team, key stakeholders, cross-functional teams, and program workstreams
- Assisting in developing internal and external communication plan for consistent messaging
- Drafting a transition readiness document inclusive of a product, contract and process assessment framework

Member of the Alternative Reference Rate Committee (ARRC) Outreach working group

- · EY is a member of the US Alternative Reference Rates Committee (ARRC) Outreach working group
- The Outreach working group serves as a forum to coordinate and track planning across cash and derivatives products and deliver recommendations for addressing risks in contract language, orderly transitions on a voluntary basis and actions that would facilitate such transitions

Member of the Sterling Risk Free Rate Working Group Communication and Outreach working group

- EY is a member of the Sterling Risk Free Rate Working Group Communication and Outreach working group
- The working group is focused on defining and implementing a communication and outreach plan in order to raise greater awareness of the transition amongst relevant market participants for SONIA adoption

Accounting and financial reporting

- Assisted management in thinking through the impact of an IBOR transition on a variety of products including derivatives, floating-rate loans, floating-rate securities. VIEs and securitization vehicles, floating-rate debt and insurance products
- Provided industry perspective on establishing appropriate governance and control over benchmark submission processes, based on industry peers and regulators' insights
- Evaluated potential changes the FASB could make to the existing accounting framework in order to provide transition relief



- Technical understanding of the key IBOR transition challenges applicable to enterprise-wide functions and businesses
- Industry perspective on transition planning and readiness across broad range of market participants
- Understanding of the potential effects of IBOR transition on a wide variety of products, processes and contracts
- Identification of potential transition relief that the FASB or SEC could provide in order to simplify the IBOR transition process

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