

€STR-based forward-looking term structure

Presentation to the Working Group on euro risk-free rates

Who we are

- FTSE Russell is a leading global provider of benchmarks, analytics, and data solutions with multi-asset capabilities.
 - Approximately \$16 trillion is currently benchmarked to FTSE Russell indexes.
 - FTSE Russell has a well established and robust governance framework designed to meet the requirements of the IOSCO Principles for Financial Benchmarks and the European Benchmark Regulation (EU BMR).
 - FTSE International Limited is authorized as a benchmark administrator under EU BMR.
 - FTSE Russell is the benchmark administrator for the Tradeweb FTSE Gilt Closing Prices.
- FTSE Russell is wholly owned by the London Stock Exchange Group (LSEG).
- LCH is also a subsidiary of LSEG and is a leading Rates and multi-asset clearing house, including a strong market presence in the clearing of OTC Rates Derivatives

Forward-looking Term Rate Status

Partnership Approach

- FTSE Russell has been working with key partners¹ to:
 - Establish benchmark design principles covering forward-looking term rates across currencies
 - Evaluate existing order book data, where available, to inform methodologies and understand market structure changes needed to support certain methodologies
 - Define an appropriate two-part definition including an underlying interest and a detailed statement of methodology
 - Develop appropriate procedures and governance arrangements for the evolution of forward-looking term rates
 - Undertake client outreach and formulate licensing approach.

Key Findings

- Spot OIS contracts represent the best measure of forward-looking term rates.
- Futures could play a supporting role in the absence of OIS liquidity.
- Forward-looking term rate robustness could be significantly improved through the trading of spot OIS on central limit order books (CLOBs).

¹Tradition, TP ICAP and LCH

Benchmark Design Principles

- Forward-looking term rates must be compliant with the IOSCO Principles for Financial Benchmarks and EU Benchmark Regulation.
- To ensure this is the case, we have established benchmark design principles.

Design Principle	Description
Anchored in transactions, or executable data, where possible	The methodology must be biased in the direction of tangible / observable transactions or executable data above all other available market raw material
Resilient and reliable, particularly in times of market stress	The methodology must be able to produce a reliable rate in times of extreme market stress, particularly when there is a shortage of available market data
Robust to potential manipulation	The methodology design must protect the rate from manipulation attempts, and be able to identify and highlight suspicious activity
Derived from transparent methodologies and processes, which are publicly available	The methodology used must be clear, transparent and comprehensible to market participants
Allow for data sources and methodologies to evolve, transparently, over time	The methodology must be able to appropriately utilise underlying market data in an objective and structured manner, recognising data sources may change over time
Devoid of expert judgement on behalf of the Index provider	To the extent possible, the methodology must avoid the use of expert judgement. In all circumstances, expert judgement on behalf of the index provider is avoided
Designed with appropriate fallback arrangements	In the event that RFR-derived term rates can no longer be produced, appropriate fallback rates/mechanisms should be defined

Input Data: Derivative Markets

- Forward-looking term rates can be created from derivative markets referencing overnight RFRs (in this case €STR). Available markets and contract types have strengths and weaknesses for the construction of robust benchmarks.
- We plan to consult with market participants to understand their methodology preferences further.

Market	Description	Strength(s)	Weakness(es)	High Level Methodology
OIS	Interest rate swaps in which daily compounded RFR is exchanged for a fixed interest rate.	<ul style="list-style-type: none"> Reference period alignment. 	<ul style="list-style-type: none"> Executed transactions in spot contracts may be insufficient in isolation to calculate robust forward-looking term rates on all trading days. 	<p>Transactions: Volume-weighted average price (VWAP) of eligible transactions.</p> <p>Quotes: Create an aggregated central order book from contributing trading venues and find the weighted average rate at top of order book.</p>
Futures	Various contracts with differing specifications have been launched across futures exchanges.	<ul style="list-style-type: none"> Highly standardised and can consolidate liquidity. 	<ul style="list-style-type: none"> Reference period misalignment. A yield curve model is needed. This requires assumptions to be made and introduces model risk. Current market size. 	<p>Transactions: VWAP of eligible transactions and contracts. Use these as inputs to model an RFR curve.</p> <p>Quotes: Weighted average rate at top of order book for each futures contract. Use these as inputs to model an RFR curve.</p>
Hybrid	A combination of both futures and OIS can be used to construct forward-looking term rates.	<ul style="list-style-type: none"> Maximises the use of available data sources. 	<ul style="list-style-type: none"> Benchmark production may be more complex and less transparent. The combining of input data may be subjective. 	A methodology to either prioritise or combine OIS and futures data.

Market Structure Developments & Implications

Development of CLOBs

- CLOBs for EONIA OIS are well established.
- We expect liquidity on CLOBs to develop for €STR OIS, particularly as €STR OIS becomes eligible for clearing.

Benefits of CLOBs

- The creation and use of the CLOB gives the reference price desirable attributes:
 - Transparency
 - Irrefutable Liquidity
 - A cleared rather than credit based market
 - Provision by an independent MiFID II regulated MTF

Conflicts of Interest

- The fact that all prices are tradable helps to ensure genuine liquidity.
- The methodology also has a number of layers of defence to mitigate potential conflicts of interest.
- Ongoing surveillance and monitoring on venue and across venues would also be established.

Next Steps

- 1) Broad Market Engagement
- 2) Consultation on Methodology

Important information

© 2019 London Stock Exchange Group plc and its applicable group undertakings (the "LSE Group"). The LSE Group includes (1) FTSE International Limited ("FTSE"), (2) Frank Russell Company ("Russell"), (3) FTSE Global Debt Capital Markets Inc. and FTSE Global Debt Capital Markets Limited (together, "FTSE Canada"), (4) MTSNext Limited ("MTSNext"), (5) Mergent, Inc. ("Mergent"), (6) FTSE Fixed Income LLC ("FTSE FI") and (7) The Yield Book Inc ("YB"). All rights reserved.

FTSE Russell® is a trading name of FTSE, Russell, FTSE Canada, MTSNext, Mergent, FTSE FI, YB. "FTSE®", "Russell®", "FTSE Russell®", "MTS®", "FTSE4Good®", "ICB®", "Mergent®", "The Yield Book®" and all other trademarks and service marks used herein (whether registered or unregistered) are trademarks and/or service marks owned or licensed by the applicable member of the LSE Group or their respective licensors and are owned, or used under licence, by FTSE, Russell, MTSNext, FTSE Canada, Mergent, FTSE FI, YB. FTSE International Limited is authorised and regulated by the Financial Conduct Authority as a benchmark administrator.

All information is provided for information purposes only. All information and data contained in this publication is obtained by the LSE Group, from sources believed by it to be accurate and reliable. Because of the possibility of human and mechanical error as well as other factors, however, such information and data is provided "as is" without warranty of any kind. No member of the LSE Group nor their respective directors, officers, employees, partners or licensors make any claim, prediction, warranty or representation whatsoever, expressly or impliedly, either as to the accuracy, timeliness, completeness, merchantability of any information or of results to be obtained from the use of the FTSE Russell Products or the fitness or suitability of the FTSE Russell Products for any particular purpose to which they might be put. Any representation of historical data accessible through FTSE Russell Products is provided for information purposes only and is not a reliable indicator of future performance.

No responsibility or liability can be accepted by any member of the LSE Group nor their respective directors, officers, employees, partners or licensors for (a) any loss or damage in whole or in part caused by, resulting from, or relating to any error (negligent or otherwise) or other circumstance involved in procuring, collecting, compiling, interpreting, analysing, editing, transcribing, transmitting, communicating or delivering any such information or data or from use of this document or links to this document or (b) any direct, indirect, special, consequential or incidental damages whatsoever, even if any member of the LSE Group is advised in advance of the possibility of such damages, resulting from the use of, or inability to use, such information.

No member of the LSE Group nor their respective directors, officers, employees, partners or licensors provide investment advice and nothing contained in this document or accessible through FTSE Russell Products, including statistical data and industry reports, should be taken as constituting financial or investment advice or a financial promotion.

Past performance is no guarantee of future results. Charts and graphs are provided for illustrative purposes only. Index returns shown may not represent the results of the actual trading of investable assets. Certain returns shown may reflect back-tested performance. All performance presented prior to the index inception date is back-tested performance. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. However, back-tested data may reflect the application of the index methodology with the benefit of hindsight, and the historic calculations of an index may change from month to month based on revisions to the underlying economic data used in the calculation of the index.

This publication may contain forward-looking assessments. These are based upon a number of assumptions concerning future conditions that ultimately may prove to be inaccurate. Such forward-looking assessments are subject to risks and uncertainties and may be affected by various factors that may cause actual results to differ materially. No member of the LSE Group nor their licensors assume any duty to and do not undertake to update forward-looking assessments.

No part of this information may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the applicable member of the LSE Group. Use and distribution of the LSE Group data requires a licence from FTSE, Russell, FTSE Canada, MTSNext, Mergent, FTSE FI, YB and/or their respective licensors.

About FTSE Russell

FTSE Russell is a leading global index provider creating and managing a wide range of indexes, data and analytic solutions to meet client needs across asset classes, style and strategies. Covering 98% of the investable market, FTSE Russell indexes offer a true picture of global markets, combined with the specialist knowledge gained from developing local benchmarks around the world.

FTSE Russell index expertise and products are used extensively by institutional and retail investors globally. For over 30 years, leading asset owners, asset managers, ETF providers and investment banks have chosen FTSE Russell indexes to benchmark their investment performance and create investment funds, ETFs, structured products and index-based derivatives. FTSE Russell indexes also provide clients with tools for asset allocation, investment strategy analysis and risk management.

A core set of universal principles guides FTSE Russell index design and management: a transparent rules-based methodology is informed by independent committees of leading market participants. FTSE Russell is focused on index innovation and customer partnership applying the highest industry standards and embracing the IOSCO Principles. FTSE Russell is wholly owned by London Stock Exchange Group.

For more information, visit ftserussell.com.

To learn more, visit ftserussell.com; email info@ftserussell.com; or call your regional Client Service Team office:

EMEA

+44 (0) 20 7866 1810

North America

+1 877 503 6437

Asia-Pacific

Hong Kong +852 2164 3333

Tokyo +81 3 4563 6346

Sydney +61 (0) 2 8823 3521