Benchmark Reform

CARR stakeholder presentation

Version April 8, 2019

Background

- Confidence in the reliability and robustness of major interest rate benchmarks was undermined by attempted market manipulation, false reporting and declining liquidity in the interbank unsecured market.
- G20 tasked the Financial Stability Board (FSB) to undertake a review of widely used benchmarks globally in February 2013.
- The FSB created the Official Sector Steering Group (OSSG), comprised of senior officials from central banks and regulatory agencies in June 2013 to conduct this review:
  - Focus was on the three major interbank offered rate (IBOR) benchmarks (LIBOR, EURIBOR and TIBOR)
  - Work was supported by a Market Participants Group of global buy- and sell-side institutions
- The International Organization of Securities Commissions (IOSCO) published its Principles for Financial Benchmarks in July 2013.

Background

- In 2014, the FSB recommended a series of steps to strengthen the existing key IBOR benchmarks, and to promote the development and adoption of alternative nearly risk-free reference rates (RFRs) where appropriate:
  - Reform IBORs by making them more transaction based
  - Develop viable RFRs to potentially replace IBORs for certain types of transactions (e.g., derivatives which constitute the largest segment of products referencing IBORs)
- In July 2017, the Financial Conduct Authority (FCA) announced that they will no longer compel LIBOR panel member banks to contribute to the benchmark after the end of 2021.
- Most of the work globally so far on RFRs has been with respect to developing alternative *overnight* risk-free benchmarks. However, many jurisdictions began assessing their options for developing term RFRs.

Evolution of benchmark reform

Feb. 2013
G-20 tasks FSB to improve oversight and governance frameworks of benchmarks

June 2013
FSB establishes OSSG

July 2013
IOSCO publishes its Principles for Financial Benchmarks

July 2014
FSB Report: Reforming Major Interest Rate Benchmarks is published

Nov. 2014
ARRC formed

Mar. 2015
Working group on Sterling RFR formed

June 2016
EU BMR comes into force (effective Jan. 2018)

Apr. 2017
Reformed SONIA selected as preferred Sterling RFR

June 2017
SOFR selected as preferred USD RFR

July 2017
Andrew Bailey announces that FCA would not compel banks to submit LIBOR quotes after 2021

Sept. 2017
Working group created to identify EUR RFR

Mar. 2018
CARR created

Apr. 2018
SOFR published

Reformed SONIA published

July 2018
Recommended “enhanced CORRA” as the RFR

Sep. 2018
WG on euro RFR recommends €STR as the RFR

Sep. 2018
Size and Scope subgroup report published.

Dec. 2018
ISDA Fallback Consultation results published

Jan / Feb. 2019
Enhanced CORRA Consultation paper published.

Fallback Principles published

Global RFR Initiatives

Key global RFRs

Jurisdiction	RFR	Description
US	Secured overnight financing rate (SOFR)	Secured overnight repo rate Calculated by FRBNY
UK	Reformed Sterling overnight Index Average (SONIA)	Unsecured overnight rate Calculated by Bank of England
Europe	Euro short-term rate (€STR)	Unsecured overnight rate Calculated by ECB (October 2, 2019)
Japan	Tokyo overnight average rate (TONA)	Uncollateralized call rate Calculated by Bank of Japan
Switzerland	Swiss Average Rate Overnight (SARON)	Secured overnight rate Published by SIX Swiss Exchange
Australia	Interbank overnight cash rate (Cash Rate)	Unsecured overnight rate Calculated by the Reserve Bank of Australia

Global RFR Initiatives: United States

- The Alternative Reference Rate Committee (ARRC) recommended the Secured Overnight Financing Rate (SOFR) in June 2017 as the preferred U.S. dollar overnight RFR:
  - Broad-based overnight repo rate
  - Over $900 billion of transactions underlying the rate
  - The Federal Reserve Bank of New York began publishing the SOFR in April 2018
- ARRC was reconstituted in March 2018 to focus on implementing its transition plan for SOFR, including developing a term rate and addressing fallback language:
  - 1- and 3-month SOFR futures launched in May 2018
  - LCH and CME began clearing SOFR swaps in July and October 2018 respectively. LCH is using the Effective Fed Funds Rate for discounting and calculating the price alignment interest for SOFR swaps, while CME is using SOFR for both
    - LCH plans to switch to SOFR for discounting and PAI in the second half of 2020

Global RFR Initiatives: United States

- First SOFR linked floating rate note issued by Fannie Mae on July 26, 2018 (similar in structure to existing FRNs linked to Effective Fed Funds):
  - A large number of transactions from a variety of issuers, up to a 3 year term, have been completed
  - Key features include:
    - interest calculated in arrears based on the average SOFR over the period, payable quarterly
    - lock out period initially 4 days; 2 days for recent issues
- FASB approved SOFR to be hedge accounting compliant, effective as of December 15, 2018.
- Term reference rate(s) based on SOFR derivatives expected to be produced, at the latest, by the end of 2021.

Global RFR Initiatives: United Kingdom

- The Working Group on Sterling Risk-Free Reference Rates recommended the reformed Sterling Overnight Index Average (SONIA) in April 2017 as the preferred alternative RFR for GBP:
  - Overnight unsecured rate
  - Increased the number of transactions in the calculation of SONIA by including transactions arranged both via brokers and negotiated bilaterally
  - The Bank of England began publishing the reformed SONIA in April 2018
- Established a subgroup in the fall of 2017 to develop a term risk-free rate to potentially replace GBP LIBOR in some cash products:
  - In July, launched a public consultation to develop a term SONIA RFR based on firm OIS quotes on regulated, electronic trading platforms

Global RFR Initiatives: United Kingdom

- Summary of the consultation responses:
  - A term rate would facilitate the transition for some cash market segments
  - Current SONIA-referencing derivatives markets were seen as capable of providing the basis for a term rate, but would need a step change before such a measure would be sufficiently robust
  - An alternative way forward could be to use a consistent methodology with inputs from both futures contracts and OIS swaps contracts
  - Building a robust term rate would benefit from further development and growth in OIS and SONIA futures markets
  - Finding ways to avoid the systematic usage of term rate in derivatives markets will be essential as term rates develop
  - International consistency across currencies was viewed as desirable
- Expected to have a term rate by the second half of 2019.

Global RFR Initiatives: United Kingdom

- 1- and 3-month SONIA futures contract launched since December 2017:
  - ICE started publishing indicative 1-, 3-, 6-month SONIA futures based term RFRs in October 2018
- First SONIA linked floating rate note issued by EIB on June 22, 2018:
  - GBP FRN market has fully transitioned to reference SONIA, with all major GBP FRN investors having the capability to invest in SONIA FRNs
  - A large number of transactions from a variety of issuers, up to a 7 year term, have been completed
  - Key features:
    - interest calculated in arrears based on the daily compounded SONIA over the period, payable quarterly
    - 5 day observation lag
- LCH's SONIA cleared overnight index swap volumes in March exceed those of GBP LIBOR interest rate swaps for the first time ever.

Global RFR Initiatives: Europe

- The European Money Markets Institute (EMMI) concluded that the Euro Overnight Index Average (EONIA) may no longer be compliant with EU Benchmark Regulation:
  - EONIA may still be used as a reference rate until the end of 2021
- Following a consultation, the Working Group on Euro Risk-Free Rates recommended in September the euro short-term rate (€STR) as the RFR:
  - Reflects the wholesale euro unsecured overnight borrowing costs of euro area banks
  - ECB to publish €STR on October 2, 2019
- Recommended a transition plan from EONIA to €STR:
  - EONIA will be calculated as €STR plus a spread based on a simple average with an observation period of at least 12 months, combined with a two sided 15% trimming mechanism
  - The OIS (tradable) quotes-based methodology as the €STR-based forward-looking term structure methodology as a fallback to Euribor-linked contracts

Global RFR Initiatives: Japan

- The Study Group on Risk-free Reference Rates recommended the Tokyo Overnight Average Rate (TONA) as the preferred alternative RFR for JPY:
  - Uncollateralized overnight rate
- Established a "Cross-industry Committee on Japanese Yen Interest Rate Benchmarks" in July 2018:
  - The Committee will conduct necessary deliberations with aims to facilitate market participants and interest rate benchmark users to appropriately choose and use JPY interest rate benchmarks in ways suited to the characteristics of financial instruments and financial transactions
  - Subgroup for the Development of Term Reference Rates was also established

Global RFR Initiatives: Switzerland

- The National Working Group on Swiss Franc Reference Rates recommended the Swiss Average Rate Overnight (SARON) as the preferred alternative RFR for CHF. SARON replaced the Tomorrow/Next Indexed Swaps (TOIS) benchmark:
  - Secured overnight rate
  - SARON has been in use since Jan 1, 2018
- Recommended a compounded 'in arrears' SARON rate as an alternative to a term CHF Libor rate:
  - Depending on the need for cash flow certainty, an 'in arrears' or an 'in advance' option may be best suited for loans / deposits
- Eurex launched 3-month SARON Futures contracts in October 2018.

Global RFR Initiatives: Fallback language

- The International Swaps and Derivatives Association (ISDA) is currently developing amended fallback language for the 2006 ISDA definitions for the three key benchmarks (LIBOR, EURIBOR and TIBOR), as well as for several other currency benchmarks:
  - Fallbacks are provisions in legal documents in the event of a material change to or cessation of the referenced benchmark
- ISDA recently published results of a consultation for the potential fallback methodology for GBP, CHF, JPY and AUD derivatives linked to their respective IBORs:
  - The proposed fallback is to designated overnight RFR in each currency
  - Term adjustment: compounded setting in arrears
  - Spread adjustment:
    - Historical mean/median approach
    - The exact parameters are still to be determined
  - ISDA is expected to consult on the fallback language for USD LIBOR, CDOR and HIBOR in April/May
- RFR working groups, together with various trade associations, are reviewing and developing more robust fallback language for cash products.

Canadian RFR Initiatives

Canadian Alternative Reference Rate Working Group

- Bank of Canada announced the creation of the Canadian Alternative Reference Rate Working Group (CARR), sponsored by the Canadian Fixed-Income Forum (CFIF), in March 2018.
- Main objectives:
  - Review and enhance the existing Canadian overnight risk-free rate, the Canadian Overnight Repo Rate Average (CORRA)
  - Assess the need for and if required, seek to develop a Canadian term risk-free rate benchmark that is robust, reliable and resilient to market stress and manipulation

The term risk-free rate would act as a complementary reference rate for the Canadian market and would operate alongside the Canadian Dollar Offered Rate (CDOR).

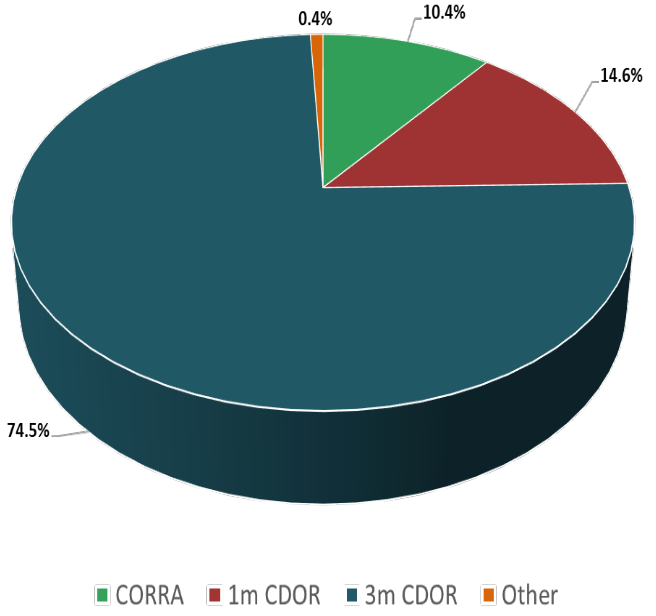
Canadian Alternative Reference Rate Working Group

- Organization:
  - Membership composition is meant to capture all aspects of benchmark usage:
    - Co-chairs: Bank of Canada and CIBC
    - Members: Big-6 Canadian banks, foreign bank, insurance companies, pension funds and institutional asset managers
    - Observers: CDCC, LCH, TMX (Montreal Exchange)
  - Advisory subgroups will be established to focus/study specific issues and will reach out to, and seek feedback from, a wide range of stakeholders
  - Bank of Canada provides secretariat functions
  - Monthly, in-person meetings

Size and Scope of CORRA / CDOR

- Scope subgroup published a report on the estimated notional value of securities that reference CORRA / CDOR.

Product	Outstandings (CAD billions)
OTC Interest Rate Derivatives	10,737
Exchange Traded Derivatives	1,089
Business Loans	60
Consumer Loans	1
Deposits	22
Bonds	137
Securitized Products	131
Others	26
Bankers Acceptances	103
Total	**12,307**



Source: CARR data survey, OSC (trade repository data), TMX, Bloomberg.

Current CARR subgroups

- Alternative rates subgroup:
  - Identify and evaluate options for an alternative Canadian risk-free or nearly-risk free overnight reference rate; subgroup recommends an enhanced CORRA as the preferred Canadian RFR
- Fallback language subgroup:
  - Develop robust fallback language for non-derivatives products or contracts (i.e. floating rate notes, securitizations, hybrid capital notes and bank loans)
- Transition subgroup:
  - Provide the underlying framework to transition toward the widespread use of CORRA as a reference rate in Canadian dollar financial products
- Term risk-free rate subgroup:
  - Assess the need for a Canadian term risk-free rate benchmark. If required, develop the methodology and specifications for the term rate

Alternative rates subgroup

- Recommended enhancing CORRA as the preferred overnight Canadian RFR.
- Developed a methodology and specifications for calculation enhancements to ensure that CORRA is as robust as possible.
- Consultation paper on proposed enhancements published February 26th 2019.
- Consultation period is open until April 30th 2019.
- Review consultation feedback and provide a final recommendation for the enhancements to CORRA.

Fallback language subgroup

- Published fallback language principles for cash products in early 2019.
- Currently developing draft fallback language for cash products. The proposed language will be based on:
  - published CARR fallback language principles;
  - international fallback language best practices, and;
  - responses to the initial ISDA fallback consultation, as well as the upcoming USD LIBOR, CDOR and HIBOR consultation.
- Proposed fallback language expected to be published in Q2 2019.

Transition subgroup

- Provide the underlying framework to help transition toward the widespread use of CORRA as a reference rate in Canadian dollar financial products.
- Develop broad communication/consultation plan for the transition.
- Proposed workstreams:
  - Production of enhanced CORRA
  - Calculation convention for cash products
  - Futures products/conventions
  - Swap market conventions

Term risk-free rate subgroup

- Assess the need for a term risk-free rate benchmark in the Canadian dollar cash market through soliciting feedback from a broad range of market participants.
- If required, develop methodology and specifications for the Canadian term risk-free rate benchmark, including which maturities should be published.
- Proposed workstreams:
  - Determine necessity for term benchmark
  - Architecture of term benchmark
  - Adoption of term benchmark

Proposed enhancements to CORRA

Alternative rates subgroup’s objectives for enhancing CORRA

- Enhancements to CORRA should satisfy the below criteria:
  - rate should remain risk-free
  - rate should be calculated from more volume than CORRA today
  - rate should represent General Collateral (GC) funding
  - rate should be simple and easy to explain
- Subgroup considered consistency with existing CORRA in the evaluation of the preferred Canadian RFR.

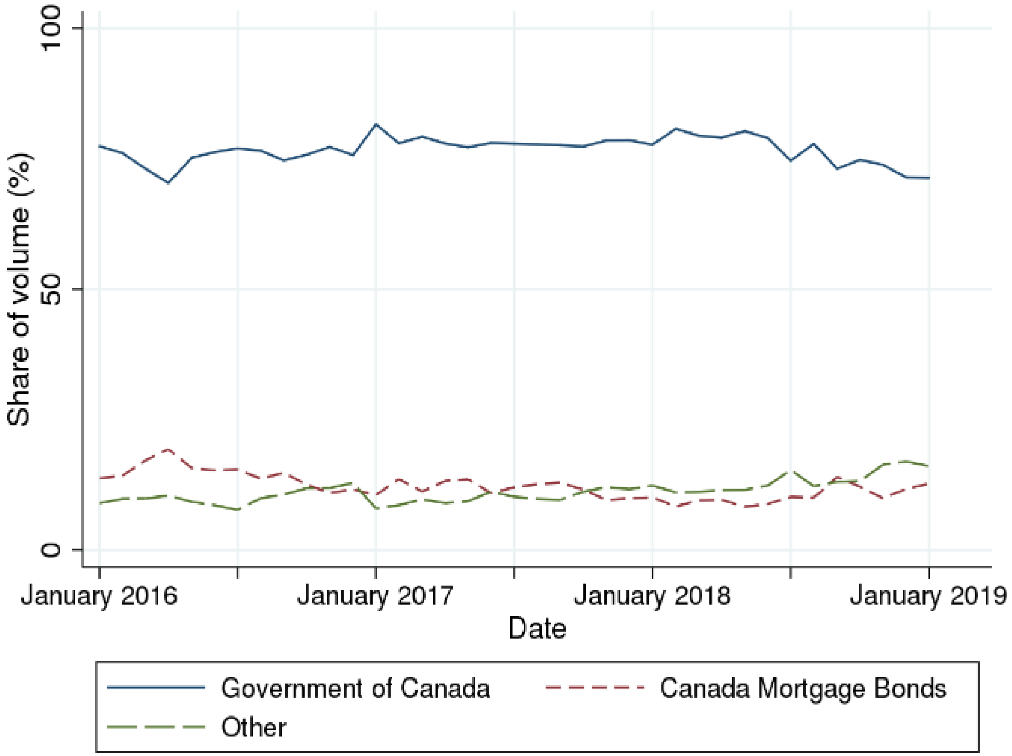
Enhancements focused on creating a larger set of transactions upon which daily CORRA calculations would be based in order to increase CORRA’s reliability, robustness and representativeness.

Proposed enhancements to the CORRA calculation

	Current CORRA	Proposed enhancements to CORRA
Securities and currency	Transactions involve only GoC bonds or GoC treasury bills and are settled in Canadian dollars.	
Counterparty types	Inter-dealer General Collateral repo transactions conducted through three inter-dealer brokers.	GoC repo transactions conducted between any two unaffiliated counterparties and where data can be sourced. Repos conducted with the Bank of Canada or as part of the Receiver General auctions are excluded.
Term and time to settlement	Transactions are for an overnight term for same-day settlement (i.e., trades that are agreed to and settled on T+0).	
Rate calculation	Volume weighted average of eligible trades.	Trimmed volume weighted median of eligible transactions. • Lowest volume weighted 25^{th} percentile of trades trimmed to remove influence of “specials” from the calculation.
Floor rate	CORRA is set at the Bank of Canada target rate if daily eligible repo volume is less than $500M.	TBC

Recommendation to only include GoC bill and bond repos

Share of repo volumes by collateral type



Source: MTRS

- Total overnight repo volumes for all collateral types, with same-day settlement of the opening leg, range between $40 and $55 billion per day (reported to Market Trade Reporting System).
- For GoC collateral, the range is $30 to $40 billion per day (before applying any filters – discussed later).
- The subgroup recommended a focus on GoC bills and bonds because they represent the largest share of this volume and fit today's definition of GC and CORRA.
  - Including other collateral types may also introduce new sources of variability to the rate.

Recommendation to expand universe of trades beyond inter-dealer

- The subgroup recommended that the CORRA calculation capture as much of the underlying overnight GoC repo market as possible.
- Transaction universe broadened to include all overnight GoC repo trades between all unaffiliated counterparties:
  - Analysis showed an important share of volume would be lost by focusing only on inter-dealer trades
  - No conclusive difference in rates was seen in trades between inter-dealer trades and those between dealers and unaffiliated clients
  - Inter-affiliated repo trades could be subject to other pricing factors, such internal transfer pricing and including them was not consistent with global best practices

Recommendation to only include spot overnight repo trades

- The subgroup recommended that only overnight repo trades with an opening leg on t+0 and a closing leg on t+1 should be included.
  - Tom-next trades make up an increasing share of overnight repo trades, but have been excluded because they are often executed based on delivering specific collateral and may skew rates lower or may affect the rate around Bank of Canada meeting dates.
  - Open repos, i.e. those without a fixed maturity date, that can be terminated by either party with a one day notice, have been excluded due to factors that bias open repo rates higher.

Recommendation to eliminate the impact from "specials"

- The large transaction set, proposed for enhancing CORRA, exhibits mean and median daily rates that trend below existing CORRA and the Bank of Canada target rate.
- The subgroup attributed this trend to "specials" being included in the data.
- The subgroup opined that "specials" typically do not provide information on general collateral funding conditions and should therefore be excluded.
  - "Specials" are motivated by the need to source specific securities rather than to source cash.
- However, there is no industry accepted definition of "specials" or means to easily identify them in the data.

Current CORRA vs. average of all GoC overnight repo transactions

January 2016–December 2018

Spread to target rate (basis points)	Current CORRA	Average of all GoC transactions
Mean	0.1	-2.3
Standard deviation	2.2	1.6

Proposed four methodologies to correct for “specials”

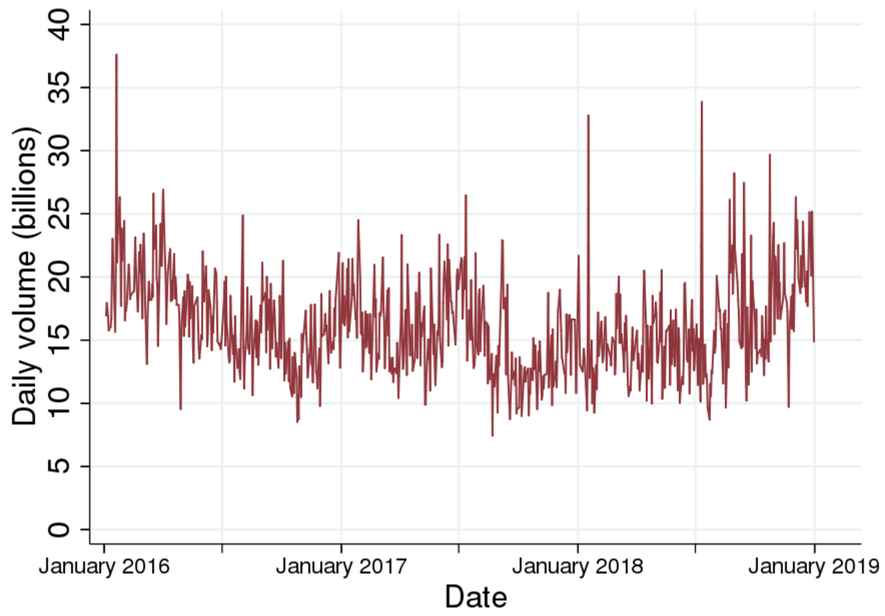
- The subgroup identified the need to correct for “specials” in enhancing CORRA.
- Four filter methodologies were proposed:
  1. No filter at all: Final rate includes “specials” and general collateral transactions
  2. “Trimmed median”: Drop a fixed lower percentile of trades each day by rate
  3. “Bond-rate method”: Drops a variable number of trades each day based on the rate at which a bond is pledged
  4. “Mixture method”: Separate the distributions of “specials” and general collateral
- The Trimmed median and Bond-rate method were shortlisted by the subgroup as the options to consider.

Recommendation to use the Trimmed median with a 25% filter

- The subgroup found consensus on its recommendation of a Trimmed median:
  - The low volatility in the resulting rate using this approach was seen as positive: hedgers will benefit from a rate that more closely tracks the Bank of Canada overnight rate and issuers will benefit from stability in payments
  - In a market with extreme levels of “specials”, the rate will trend lower to reflect a different nature of funding
  - The Bond-rate approach was seen as too complex
  - The Trimmed median is simple and consistent with the US approach for SOFR
- The proposed calibration is to trim the bottom 25th percentile of transactions each day to account for “specials”:
  - This calibration was based on historical analysis that looked at the spread and volatility of CORRA under the enhanced calculation to the Bank of Canada overnight target rate and to the current CORRA calculation
  - The selection of the “25th” percentile was based on optimizing between maximizing volume and minimizing dispersion around the target rate

A substantial increase in CORRA's robustness

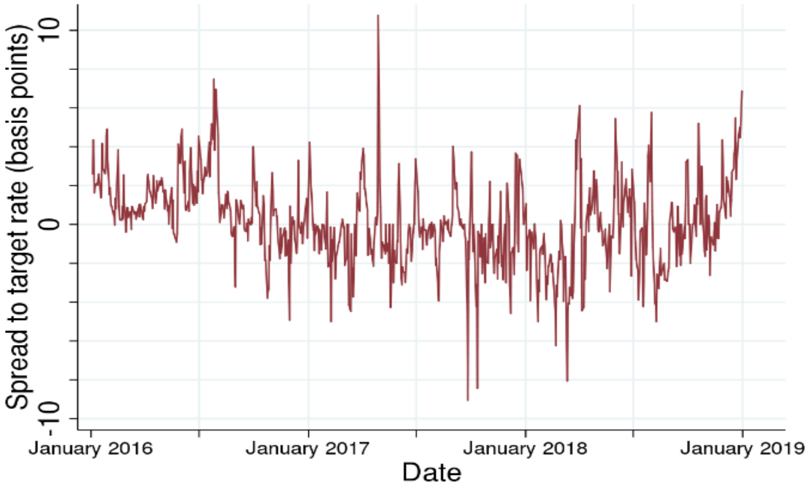
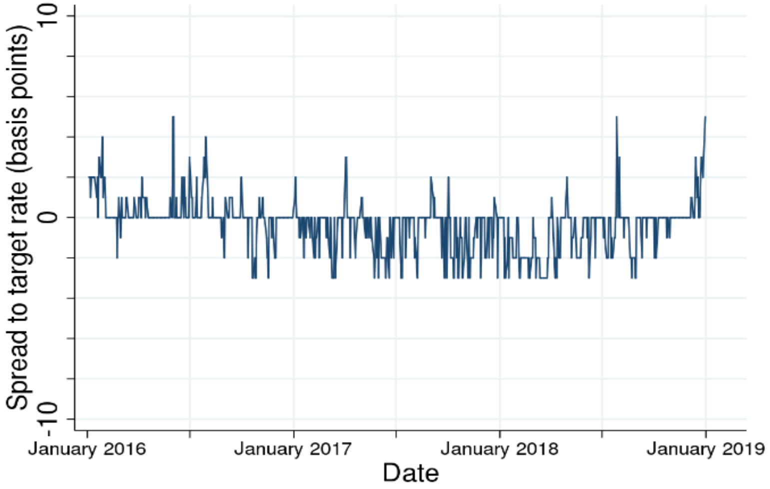
Unaffiliated overnight GoC repo volume



Source: MTRS

- The proposed enhancements result in CORRA being based on approximately $10 to 20 billion in daily repo transactions instead of the current $1 to 5 billion. On average we expect the underlying volume to increase by approximately fivefold.
- CORRA is currently set at the Bank of Canada's target rate on those dates that the eligible daily repo volume is below $500 million. This occurred on 10 occasions in 2018. Under the proposed enhancements the minimum daily CORRA repo volume would have been approximately $9 billion in 2018, or at least18 times higher than seen under the current methodology.

A reduction in CORRA's volatility

Current CORRA	CORRA with the proposed enhancements
	

Comparison of current CORRA and CORRA with the proposed enhancements

January 2016–December 2018

Spread to target rate (basis points)	Current CORRA	CORRA with the proposed enhancements
Mean	0.1	-0.3
Standard deviation	2.2	1.3

Source: MTRS

Consultation questions

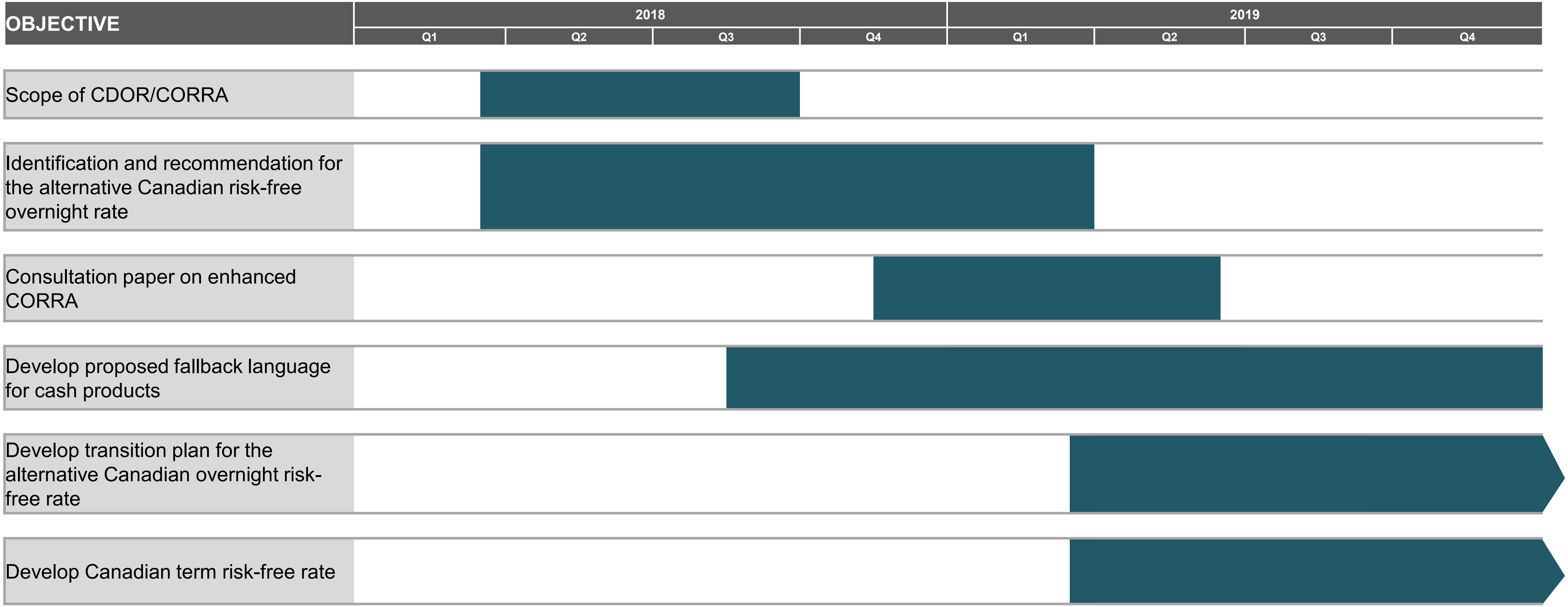
- Question 1:
  Do you support expanding the trades used for the calculation of an enhanced CORRA to include repo transactions between all unaffiliated counterparties, but excluding those relating to repos conducted with the Bank of Canada or as part of the Receiver General auctions? If you do not support this, please explain why.
- Question 2:
  Do you support including only overnight repos for same-day settlement in an enhanced CORRA? If you do not support this, please explain why.
- Question 3:
  Do you agree with the proposal to limit the calculation of an enhanced CORRA to repos in Canadian dollars and that involve Government of Canada securities only? If you disagree, please explain why.
- Question 4:
  Do you agree with CARR's recommendation of using a 25 per cent trimmed median methodology for calculating the enhanced CORRA? If you disagree, please explain why.
- Question 5:
  Do you believe that the differences between the proposed enhanced CORRA and the current CORRA are material enough to impact the transition to the enhanced rate? If yes, please explain why.
- Question 6:
  Are there any other considerations pertaining to the calculation methodology that you believe CARR should discuss?

Next steps for enhancing CORRA

- Consultation open until April 30th, 2019.
- CARR to review consultation feedback and provide final recommendations to CFIF on enhancements.
- Transition to an enhanced CORRA calculation is expected to take place in H1 2020.
- Make historical data available to market participants:
  - Existing CORRA data is currently available back to August 1997
  - Enhanced CORRA data will be made available for analytical purposes back to January 2016
- No longer referring to "existing" CORRA and "enhanced" CORRA

CORRA = CORRA

Current Timelines*



* These timelines reflect the current workplan and are subject to change.

Stakeholder Engagement

- Broad outreach across the range of stakeholders, including through:
  - Participation in CARR subgroups
  - CARR roundtables/webinars
  - Industry input/feedback on CARR Consultation papers
- Information on CARR's activities including the terms of reference, membership, meeting dates, agendas and summaries will be available on the CARR website.
- Stakeholder presentation will be updated with relevant new information.
- Market participants interested in contributing to these efforts are invited to email CARR-WG@bankofcanada.ca with their contact details.

Appendices

Committees working on interest rate benchmark reform

Jurisdiction	Committees	Link
US	Alternative Reference Rate Committee (ARRC)	https://www.newyorkfed.org/arrc
UK	The Working Group on Sterling Risk-Free Reference Rates	https://www.bankofengland.co.uk/markets/transition-to-sterling-risk-free-rates-from-libor
Europe	Working group on euro risk-free rates	https://www.ecb.europa.eu/paym/initiatives/interest_rate_benchmarks/WG_euro_risk-free_rates/html/index.en.html
Japan	Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks	https://www.boj.or.jp/en/paym/market/jpy_cmte/index.htm/
Switzerland	National Working Group on Swiss Franc Reference Rates	https://www.snb.ch/en/ifor/finmkt/fnmkt_benchm/id/finmkt_reformrates

Other useful links

Organization	Description	Link
International Swaps and Derivatives Association, Inc. (ISDA)	• ISDA is working to develop robust fallback language for derivatives contracts that reference certain key IBORs • Detailed presentation on issues around benchmark reform: ISDA roadmap document and Global Benchmark Transition Report • Results of consultation on benchmark fallbacks • Charts on adjustment options	https://www.isda.org/category/legal/benchmarks/
Financial Stability Board - Official Sector Steering Group (OSSG)	• International policy developments on benchmark reform • Background reports on benchmark reform	http://www.fsb.org/work-of-the-fsb/policy-development/additional-policy-areas/financial-benchmarks/

Other useful links

Organization	Description	Link
Financial Conduct Authority (FCA)	• The FCA is the competent authority responsible for authorization and registration of EU benchmark administrators, recognition of third country administrators, endorsement of third country benchmarks, enforcement, and supervision of benchmark administrators, users, and contributors in the UK.	https://www.fca.org.uk/markets/benchmarks
ICE Benchmark Administration (IBA)	• Administrator of LIBOR	https://www.theice.com/iba
Canadian Securities Administrators (CSA)	• Proposed benchmark regulation in Canada	https://www.osc.gov.on.ca/en/SecuritiesLaw_ni_20190314_25-102_designated-benchmarks.htm