

Consultation Paper—Enhancements to the Canadian Overnight Repo Rate Average

Executive summary

- In March 2018 the Canadian Fixed-Income Forum launched the [Canadian Alternative Reference Rate Working Group](#) (CARR) to review and enhance the existing Canadian overnight risk-free rate (RFR) benchmark, the Canadian Overnight Repo Rate Average (CORRA), as well as to assess the need for and potentially develop a Canadian dollar term RFR benchmark. CARR formed the Alternative Rates subgroup specifically to evaluate options for enhancing CORRA.
- In July 2018, after reviewing several options, the Alternative Rates subgroup recommended and CARR agreed that the subgroup should focus on enhancing the current CORRA benchmark. Enhancements would focus on creating a larger set of transactions upon which daily CORRA calculations would be based to increase CORRA's reliability, robustness and representativeness. The proposed enhancements have been developed with a specific focus on ensuring CORRA's compliance with the [Principles for Financial Benchmarks](#) published by the International Organization of Securities Commissions (IOSCO).
- Enhancing the existing Canadian overnight RFR, rather than introducing a new rate, is expected to ease the Canadian markets' transition to the benchmark and support its usage.
- CARR recommends that an enhanced CORRA be based on all overnight repo transactions, where data can be obtained, that use Government of Canada bonds and treasury bills as collateral, including both inter-dealer and dealer-to-client trades, but excluding inter-affiliated trades.
- CARR also recommends that an enhanced CORRA be based on the trimmed median repo rate of daily transactions that meet the above criteria; the trimmed median is computed after removing the lower volume-weighted 25th percentile of transactions by repo rate (with the intent to exclude transactions that aim to source a specific security, "specials," rather than general collateral funding transactions).
- The proposed enhancements to CORRA would result in a rate that is less volatile and closer to the Bank of Canada's target for the overnight rate than the current CORRA, on average (see **Table 3**).
- CARR expects that the publication of an enhanced CORRA will align with current market practices for CORRA, specifically with respect to the timing of publication.
- While Canada is considered a "multi-rate" jurisdiction, having both the Canadian Dollar Offered Rate (CDOR) and CORRA as existing benchmarks, enhanced CORRA may evolve into the main financial reference rate in the future.

Objectives of this consultation

This consultation aims to solicit views on CARR's recommended approach to an enhanced CORRA methodology. The target audience is market participants who actively use products that reference current Canadian interest rate benchmarks.

The consultation paper details transactions that CARR recommends be included in an enhanced CORRA calculation, as well as the proposed calculation methodology to remove the influence of specials and promote an enhanced CORRA that reflects a general collateral funding rate and not the demand for specific securities.

This consultation focuses only on an enhanced CORRA methodology for the overnight RFR; CARR is scheduled to work on issues of transition to an enhanced CORRA and term rates through 2019. Please see CARR's recent [stakeholder presentation](#) for further details. Also, specific details relating to the production and administration of an enhanced CORRA are not covered in this consultation paper.

Instructions

Please submit your responses to the consultation questions below, along with any other comments, to CORRAConsultation@bank-banque-canada.ca by April 30, 2019. A consultation response template can be found in Appendix A. A summary of consultation responses will be made publicly available.

CARR will hold industry roundtables starting in late-March/early-April to discuss the proposed enhancements to CORRA and raise awareness of the global benchmark reforms. Interested market participants are asked to submit their information to the above e-mail.

Background

Global benchmark reform

Interest rate benchmarks are a cornerstone of the global financial system and are used by market participants to price a wide range and large volume of financial products and contracts. Thus, confidence in and the effectiveness of those benchmarks are essential to maintaining the efficiency, stability and fairness of the global financial system.

In 2012, vulnerabilities in several survey-based interbank offer rates (IBORs) were exposed. At the request of the G20, the Financial Stability Board (FSB) established the Official Sector Steering Group in 2013 to advise the FSB on recommendations to (i) strengthen existing IBORs, and (ii) promote the development of alternative RFRs that could be used, especially for derivative contracts. The primary focus of this work was on the three most referenced global interest rate benchmarks: LIBOR, TIBOR and Euribor.

It is expected that both existing and new or modified benchmarks would adhere to international regulatory standards, including the IOSCO 2013 [Principles for Financial Benchmarks](#). A key piece of the IOSCO principles is to encourage the use of transaction-based benchmarks instead of survey-based measures such as LIBOR.

In July 2017, the United Kingdom Financial Conduct Authority (FCA) announced that it would no longer use its powers to compel LIBOR panel member banks to submit LIBOR quotes after the end of 2021.¹ With this condition gone, there is a risk that banks that currently submit LIBOR quotes will stop providing them or that benchmark administrators and regulators end their publication. This event reinforced a global push for robust RFRs to be in place to ensure that (i) market participants have a suitable alternative reference rate against which to benchmark new contracts, and (ii) appropriate fallback reference rates exist for legacy LIBOR-linked contracts to be priced against.

Domestic context

CARR was launched by the Canadian Fixed-Income Forum in March 2018 to review and enhance the existing Canadian overnight RFR benchmark, CORRA, as well as to assess the need for and potentially develop a Canadian dollar term RFR benchmark. As part of this work, CARR formed the Alternative Rates subgroup to evaluate options for enhancing CORRA. CARR wanted to ensure that the views of a broad array of potential benchmark users were considered in the development of an enhanced CORRA methodology, so both CARR and the Alternative Rates subgroup include market participants representing buy-side firms, sell-side firms and market infrastructure providers. CARR is co-chaired by senior representatives from the Bank of Canada and CIBC.

While there are global efforts to transition activity toward overnight RFR benchmarks, CARR's work differs somewhat from that of some of its peer working groups since CARR is not preparing for an imminent discontinuation of CDOR.²

¹ Since April 2013, the FCA has been responsible for regulating LIBOR and its administrator, the ICE Benchmark Administration.

² CDOR is different from most other global IBOR benchmarks because it is not directly tied to interbank lending. While it is a quote-based measure, these quotes are based on actionable lending rates offered by banks to their clients through banker's acceptance (BA) facilities and is thus grounded in a large and growing BA market. For further details

Instead, it is looking to enhance the existing overnight rate to better align with the IOSCO principles and to potentially develop a term RFR (i.e., a rate without the liquidity and credit risk components embedded in CDOR). As markets increasingly transition globally toward using RFRs as their primary benchmarks, it is expected that Canadian financial products will also increasingly transition to using enhanced CORRA.

Background on current CORRA and an enhanced CORRA

CORRA is a measure of the average cost of Canadian dollar overnight general collateral funding. It is the volume-weighted average rate of overnight general (non-specific) Government of Canada (GoC) collateral repo transactions, conducted onscreen through designated inter-dealer brokers.³

While the current CORRA broadly reflects overnight funding rates, it is based on the relatively small number of general collateral repo transactions conducted through inter-dealer brokers.⁴ CARR's view is that an overnight RFR that reflected broader funding conditions would deliver on the objectives of increasing robustness and reliability and be better aligned with international standards.

In July 2018, CARR determined that an enhanced CORRA best met [the criteria](#) it laid out for a domestic overnight RFR. The enhancements to CORRA would focus primarily on increasing the transaction volumes upon which CORRA is based with the aim of improving the robustness and representativeness of the measure. The goal of this work is to strengthen CORRA rather than replace it with a completely new rate. CARR's view is that enhancing an existing overnight RFR rather than introducing a new one will also ease the transition to the enhanced rate. A smooth transition to an enhanced CORRA could, for example, imply that CORRA ceases to be published under the current methodology one day and begins to be published under an enhanced CORRA methodology the next day, with negligible market impact. The desire for a seamless transition is visible in the approach the United Kingdom followed in reforming its RFR rate, the Sterling Overnight Index Average (SONIA).

Please see "[Update from CARR Alternative Rate Subgroup on Potential Alternatives to CORRA](#)" for further details on an enhanced CORRA, the other rates considered, and the criteria used to select from among the various options.

Data sources and limitations

While we believe the analysis presented in this consultation is robust, it is subject to several important data limitations and assumptions. The final published enhanced CORRA could deviate from the analysis presented here and will depend on the ultimate data source selected for the calculation. Time-series data for an enhanced CORRA, going back to January 2016, will be made available on the CARR website when an enhanced CORRA is adopted.

The Alternative Rates subgroup conducted its analysis using two data sources. Analysis leading to the final recommendation was done using data derived from the Market Trade Reporting System 2.0 (MTRS 2.0).⁵ MTRS 2.0 data include transactional counterparty-level data, but they are available only from January 2016. Longer-term analysis, specifically to determine some of the parameters of the methodology, was done using data from the Canadian

on the BA market and CDOR, please refer to the Bank of Canada staff discussion paper "[A Primer on the Canadian Bankers' Acceptance Market](#)." Any proposed material changes to the CDOR methodology, if they were deemed necessary in the future, would be put forward for consultation by Refinitiv which, via its designated administrator for regulated benchmarks Thomson Reuters Benchmark Services Limited (TRBSL), is the CDOR administrator.

³ See Refinitiv's [CORRA methodology guide](#) for further details on the calculation of the current CORRA.

⁴ Currently, CORRA is set at the Bank of Canada's target rate on those dates that the daily volume of inter-dealer general collateral volume is less than \$500 million. This occurred on 10 occasions in 2018.

⁵ Member dealers of the Investment Industry Regulatory Organization of Canada (IIROC) and Canadian government securities distributors have been required to report granular, transaction-based data to IIROC's MTRS system since November 2015, when IIROC Rule 2800C came into effect. The updated, more granular data capture (referred to as MTRS 2.0) officially succeeded the previous version of MTRS in January 2018. The original MTRS only captured aggregated trading data, whereas MTRS 2.0 requires detailed, transaction-level reporting.

Depository for Securities Limited (CDS) and the Canadian Derivatives Clearing Corporation (CDCC). However, CDS and CDCC data do not allow us to identify and remove inter-affiliate trades, as outlined in the recommended approach.

Proposed methodology

Principles and methodology

The Alternative Rates subgroup deliberated on the objectives against which methodology decisions should be weighed. The proposed methodology for an enhanced CORRA is based on the following four objectives, which were endorsed by the broader CARR:

- (i) The rate should be risk-free.
- (ii) It should represent overnight, general collateral funding.
- (iii) It should be derived from more volume than CORRA is today.
- (iv) It should be simple and easy to explain.

From these principles, the Alternative Rates subgroup developed the methodology summarized in Table 1 below.

Table 1 – Summary of proposed methodology for an enhance CORRA

	Description of methodology for an enhanced CORRA
Counterparty types	Transactions are 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).
Securities and currency	Transactions involve only GoC bonds or GoC treasury bills and are settled in Canadian dollars.
Rate calculation	<p>The final rate will be computed as the daily trimmed volume-weighted median (trimmed median) of eligible transactions defined above.</p> <ul style="list-style-type: none"> • The trimmed median is computed after removing the lower volume-weighted 25th percentile of transactions by repo rate from the set of eligible repos listed above (with the intent to exclude transactions that aim to source a specific scarce security, “specials,” rather than funding).

A discussion on the recommended transactions to be included in an enhanced CORRA and the calculation methodology to compute the final rate follows below. For an overview of other methodologies considered by CARR and the Alternative Rates subgroup, please see **Appendices B and C**.

Counterparties

CARR proposes that all repo transactions between unaffiliated counterparties, where data can be sourced, be included in an enhanced CORRA. In CARR’s view, by expanding the set of counterparties beyond the inter-dealer segment, an enhanced CORRA would provide a more robust and representative measure of overnight funding conditions. Transactions between affiliated counterparties were removed to ensure a clearer alignment with the IOSCO principles; removing these trades also reduces the influence of other pricing factors that may be present in inter-affiliate trades (e.g., internal transfer pricing).

Repos conducted with the Bank of Canada as part of its monetary policy framework are proposed to be excluded. Overnight repo and overnight reverse repo operations represent open market operations that are intended to reinforce the target for the overnight rate and therefore may not provide information on broad market funding

conditions. Repos conducted as part of Receiver General auctions by the Bank of Canada on behalf of the Government of Canada are also proposed to be excluded because participants pay additional fees for participation that may affect the repo rates submitted at auction, and because a broader basket of collateral than GoC securities is accepted by the Government of Canada in these repos.

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.

Term and time to settlement

CARR proposes that only overnight repos (those with opening and closing legs on consecutive business days) conducted for same-day settlement on transaction date (T) be included in the final rate calculation. Forward repos (those with opening legs initiated at T+1 or further in the future) are proposed to be excluded since they may not represent overnight funding conditions on the calculation date for an enhanced CORRA. Rates on forward repos may differ from overnight funding rates since they introduce expectations of future rates at the time of negotiation. One of CARR's principles for developing an enhanced CORRA is that the rate should represent funding transactions for an overnight term, just as CORRA does currently.

CARR also considered whether to include open repos that are cancellable by either party on a day's notice as eligible transactions, but decided against doing so due to differences among institutions on whether open repo rates are set in the same manner as overnight repo rates.

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.

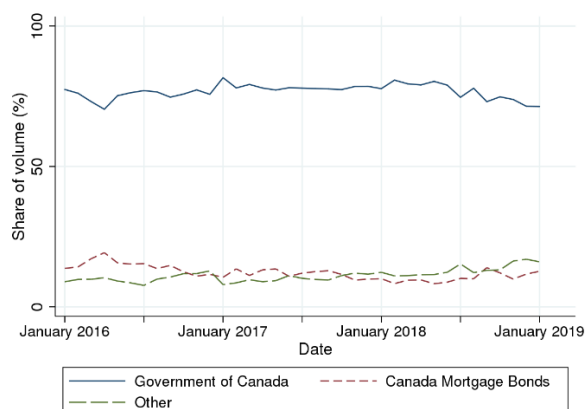
Securities and currency

CARR proposes that only repo transactions collateralized by GoC bonds or treasury bills be included in an enhanced CORRA rate. The Alternative Rates subgroup examined the merits of including various types of government collateral (including GoC bonds, Canada Mortgage Bonds and provincial bonds). The subgroup concluded that adding non-GoC securities could add additional sources of variability in the rate. The benefit of additional transaction volume was deemed insufficient to offset these deficiencies.

GoC securities represent the highest-quality collateral in the Canadian market since they are highly liquid and present the lowest default risk; they are accepted as "general collateral." They also make up by far the largest component of overnight same-day settled repo volume in Canada, accounting for approximately 75 per cent of repo volume (see **Chart 1**) and approximately \$30–40 billion in daily transactions.

Chart 1 shows monthly average daily trading volumes as a share of total overnight volume for repos collateralized by GoC bonds and treasury bills, Canada Mortgage Bonds, and all other collateral. The volumes include only repos for same-day settlement. The data include both inter-affiliated trades and unaffiliated trades to highlight the relative volume shares of each collateral type in the repo market.

Chart 1: Share of repo volumes by collateral type



Source: MTRS 2.0

Only repos involving cash in Canadian dollars are proposed to be included in the final rate calculation. Foreign currencies introduce new risk factors that may affect the repo rate and are therefore contrary to the objective of an enhanced CORRA being risk-free.

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.

Calculation methodology

CARR proposes that enhanced CORRA be calculated as a daily trimmed median. The proposed methodology would be a two-step process, first removing the lowest 25th percentile of eligible transactions by volume-weighted rate, and then taking the volume-weighted median rate from the remaining transactions to generate an enhanced CORRA. Trimming a lower percentile is recommended to remove the influence of “specials” on the final rate calculation. This can be seen in **Table 2**; the volume-weighted average repo rate of all repos using GoC collateral is below CORRA over the 2016–18 comparison period. Therefore, the Alternative Rates subgroup focused on methodologies that sought to mitigate the impact of these specials (e.g., when there is a shortage of a specific collateral). The decision to trim the bottom 25th percentile of daily repos by rate was reached because it produced a rate that, based on historical analysis, was very close on average to the existing CORRA, as well as to the Bank of Canada’s target rate. The resultant rate also displayed low volatility when compared with other possible values of the filter threshold. A higher proportion of specials was observed in Canada in the 2013–15 period, and the Alternative Rates subgroup therefore did further analysis of its methodology during this time frame. Please see **Appendix C** for a detailed description.

Table 2 shows both the current CORRA and the volume-weighted average repo rate of all transactions for an enhanced CORRA (without any adjustment for specials). Both are shown as the difference between the rate and the Bank of Canada target rate (spread to target rate). The Bank of Canada target rate is used simply as a common basis for evaluation.

Table 2: Current CORRA vs. average of all transactions

	January 2016–December 2018	
Spread to target rate (basis points)	Current CORRA	Average of all transactions
Mean	0.1	-2.3
Standard deviation	2.2	1.6

Source: MTRS 2.0

Specials are not an issue in the current calculation methodology for CORRA, which is based only on general collateral repos conducted through inter-dealer brokers (i.e., electronic trading platforms where dealers trade among themselves). On these platforms, specific and general collateral repos are distinct trade types, allowing the calculation to be limited to only general collateral repos. Most repos are not conducted on inter-dealer broker platforms and contain no such labels, making the identification of specials more difficult.

The trimmed median approach is also robust to different market conditions since the median is relatively insensitive to rates on the extreme right or left of the distribution of repo rates. A trimmed mean approach would tend to be more volatile as it would be more influenced by factors such as outlier rates and high proportions of specials. The trimmed median leads to an enhanced CORRA that better represents broad general collateral funding conditions while capturing broad-based shifts in funding conditions, which is one of the core principles of an enhanced CORRA. Further, the approach harmonizes an enhanced CORRA with the new US risk-free rate, the Secured Overnight Financing Rate (SOFR), which uses a similar methodology.⁶

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.

Comparison of current CORRA and enhancements to CORRA

We estimate that with the proposed enhancements to CORRA, the underlying daily volume for the calculation could increase fivefold, with an enhanced CORRA being based on \$10–20 billion in daily repo transactions instead of the current estimate of approximately \$1–5 billion. We anticipate that the minimum volumes used to calculate an enhanced CORRA will be at least 10 times higher than the minimum volumes under the current CORRA methodology.

Table 3: Comparison of current CORRA and the recommended enhanced version

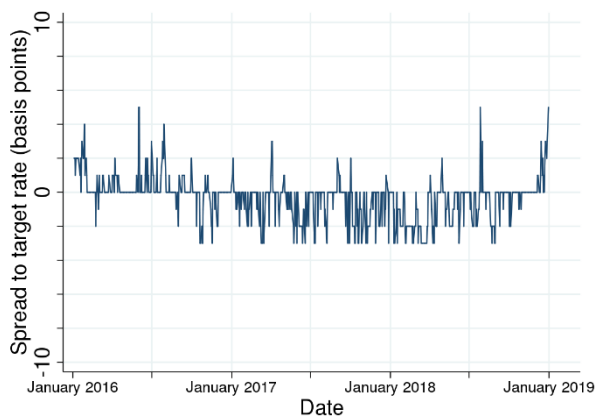
	January 2016–December 2018	
Spread to target rate (basis points)	Current CORRA	Recommended approach to an enhanced CORRA
Mean	0.1	-0.3
Standard deviation	2.2	1.3

Source: MTRS 2.0

Table 3 shows the mean spread and standard deviation (in basis points) of CORRA and an estimate of the recommended enhanced CORRA relative to the Bank of Canada’s target rate, which is used to provide a basis of comparison. Compared with current CORRA, an enhanced CORRA is less volatile and more closely tracks the Bank of Canada target rate regardless of the dataset used. **Chart 2** and **Chart 3** provide visual time-series data of CORRA and the subgroup’s estimate for an enhanced CORRA.

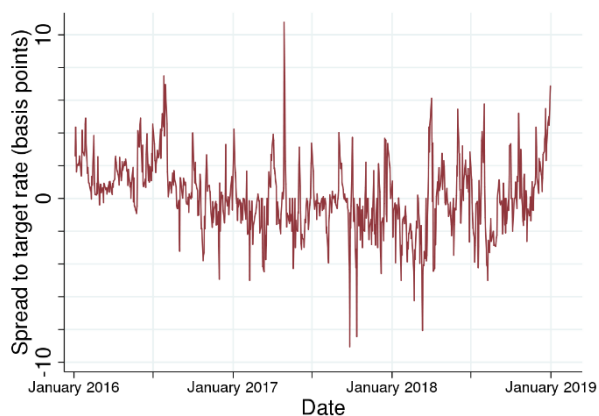
⁶ Please see the Federal Reserve Bank of New York’s webpage, “[Additional Information about the Treasury Repo Reference Rates](#)” for additional information on SOFR and its companion rates.

Chart 2: Recommended approach for an enhanced CORRA



Source: MTRS 2.0

Chart 3: Current CORRA



Source: MTRS 2.0

General questions

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?

Concluding remarks

CARR asserts that the proposed enhancements to CORRA meet the objectives CARR set out to design an improved overnight RFR that increases the reliability, robustness and representativeness of the measures. CARR also believes the proposed enhancements would strength CORRA's adherence to IOSCO's Principles for Financial Benchmarks.

References

International Organization of Securities Commissions (IOSCO). 2013. "Principles for Financial Benchmarks, Final Report." July

Canadian Alternative Reference Rates Working Group. 2018. "Update from Alternative Rates Subgroup on Potential Alternatives to CORRA." July.

Canadian Alternative Reference Rates Working Group. 2018. "Benchmark Reform, CARR Stakeholder Presentation." November.

Auger D., and K. McRae. 2018. "A Primer on the Canadian Bankers' Acceptances Market." Bank of Canada Staff Discussion Paper. June.

Federal Reserve Bank of New York. "Additional Information about the Treasury Repo Reference Rates"

Thomson Reuters. 2016. "Canadian Overnight Repo Rate Average (CORRA) Methodology Guide." March.

Appendix A: Response Form for Consultations on Proposed Enhancements to CORRA

Respondent name: _____

Title: _____

Contact email: _____

Organization name: _____

Organization type: _____

Instructions

The Canadian Alternative Reference Rates Working Group (CARR) is seeking respondents' views on the proposed enhancements to CORRA outlined in the accompanying consultation document. Please e-mail a PDF of your response using this template to CORRAConsultation@bank-banque-canada.ca no later than April 30th, 2019 with the subject line "CORRA Consultation Responses". All responses will be confidential. CARR will publish an anonymized summary of comments on the CARR website after the consultation period closes. We ask respondents to coordinate their responses across their organization to provide a single response per institution.

If you have any questions regarding the consultation, e-mail CORRAconsultation@bank-banque-canada.ca.

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?

Appendix B: Alternative eligible transaction criteria that were considered for an enhanced CORRA

Term and time to settlement

The Alternative Rates subgroup and CARR had a substantive discussion on including a specific type of forward repo trade, known as tomorrow-next (or tom-next), in an enhanced CORRA but decided against it because tom-next trades are used primarily to source specific collateral and may also introduce expectations of future interest rates. Given that tom-next trades frequently reflect the rate on borrowing against specific collateral, their associated repo rate was largely below that of general collateral. See **Box 1** for further discussion on tom-next trades.

Box 1: Tom-next trades and an enhanced CORRA

A tom-next repo trade is an overnight repo trade that is executed on T+0, with the opening leg of the transaction settling on T+1 (tomorrow), and the closing leg of the transaction settling on T+2 (next). If tom-next trades were to be included in an enhanced CORRA, they would be based on the *settlement of the opening leg* (i.e., tom-next trades executed on T+0 and settled on T+1 would be included alongside same-day overnight repos executed and settled on T+1).

The Alternative Rates subgroup considered tom-next trades because of their large share in the overall repo market. Before 2013, tom-next trades made up 5 per cent of overnight repo volumes. This share increased sharply in late 2013 and early 2014 to close to 40 per cent. The increase in tom-next share mostly occurred in a single regime shift due to the introduction of afternoon auctions for specific collateral by the inter-dealer brokers. Tom-next trades have maintained a 30 to 45 per cent share since this initial shift.

The Alternative Rates subgroup also considered whether to include open repos in the enhanced CORRA calculation. Open repos are transactions without a fixed maturity date and which are instead terminated when either party to the transaction gives notice within a minimum notice period. CARR estimates that over \$5 billion open repos are outstanding between Canadian market participants on a given day. The subgroup concluded that practices and treatment with respect to open repos differ across institutions, notably with respect to whether rates are set in the same manner as transactions that are done on an overnight basis. There are also differences in the reporting methodology between institutions for these types of trades and therefore it is currently more difficult to identify these trades as overnight transactions. As a result, the subgroup concluded that open repos should be excluded from an enhanced CORRA.

Appendix C: Calculation methodology for an enhanced CORRA

As mentioned previously, CARR sought to reduce the influence of “specials” in the calculation of an enhanced CORRA to ensure that the resultant rate reflects general collateral funding conditions. In discussion, CARR members noted that the level of specialness can vary over time in terms of the number of bonds trading on special and the magnitude of the spread between these bonds trading on special and general collateral rates. Therefore, CARR considered other methodologies that would trim a variable fraction of transaction volume each day corresponding to an estimated level of specialness. The analysis for this methodology was done using data from CDS and CDCC to capture the period of high specialness in the GoC market that occurred in 2013 to 2015, a period not covered by the MTRS 2.0 data.⁷ Two dynamic approaches were considered.

The first dynamic approach applied a statistical technique to fit a bimodal distribution each day to estimate parameters of the special and general collateral distributions (a Gaussian mixture model). This approach was not pursued because of its lack of transparency and complexity in implementation.

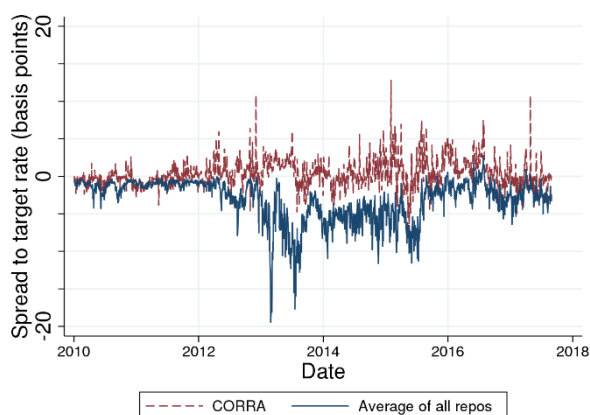
⁷ The data capture the period January 2010 to August 2017 for overnight repos using GoC bonds and treasury bills as collateral for same-day settlement. Transactions with outlier rates owing to anomalies in the data have been removed.

The second dynamic approach to account for specials (called the “bond-rate method”) was considered more closely (see **Box 2** for an explanation of the bond-rate method’s calculation methodology). It is based on identifying the range of general collateral repo rates each day using repos from a set of bonds that was unlikely to include specials. Most of the CARR and the subgroup discussion on methodology focused on comparing this bond-rate method and the trimmed median. The bond-rate method was not recommended for several reasons:

- CARR members felt that the trimmed-median approach better represented general funding conditions than did the bond-rate approach.
- Also, the predominant use cases for an enhanced CORRA would be (i) as an input to issuance costs and (ii) as an instrument market participants use to hedge or speculate on the direction of the Bank of Canada’s policy rate. Neither of these use cases called for daily variation reflecting small changes in funding conditions; therefore, a rate that more closely tracked the Bank of Canada’s target rate was preferable.
- During periods of extreme and unprecedented specialness, the bond-rate method would continue to reflect a CORRA close to the Bank of Canada’s target rate. Members believe that in these extreme conditions, specialness may begin to characterize the nature of general collateral funding and should, therefore, be reflected in CORRA.
- The approach was also seen as more difficult for an administrator to govern and more complex to explain to market participants.
- It would drop more transaction volume than the trimmed median, even in a low-specialness environment.

The charts below show the difference between a rate and the Bank of Canada target rate (spread to target rate) for CORRA and the two calculation methods, trimmed median and the bond-rate method. The Bank of Canada target rate is used simply as a common basis for evaluation. Observations are daily and in basis points. Limitations in the CDS and CDCC data prevent us from removing the inter-affiliated trades from the analysis.

Chart C-1: Current CORRA and average of all repos



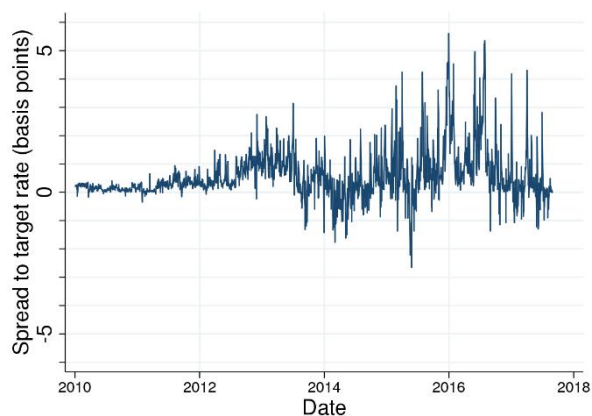
Source: CDS/CDCC

Chart C-2: Trimmed median



Source: CDS/CDCC

Chart C-3: Bond-rate method



Source: CDS/CDCC

Box 2: Calculation steps for a dynamic method to eliminate special repos

For eligible repos transacted on a given day,

- (i) Calculate each bond's volume-weighted average repo rate.
- (ii) Sort the bonds by their average repo rate and identify bonds in the upper volume-weighted 70th percentile by average repo rate. Call these the *least special* bonds.
- (iii) From the set of all transactions involving the *least special* bonds, calculate the lower volume-weighted 10th percentile repo rate and call this the *cut off*.
- (iv) From all repos above the *cut off*, calculate volume weighted average.

The intuition behind the methodology is to first identify the range of general collateral repo rates from bonds that are likely trading only as general collateral. Steps (i) and (ii) identify the bonds that are likely trading only as general collateral. Step (iii) identifies a lower level of rates at which these bonds trade. Step (iv) calculates a final rate based on only the general collateral trading range for that day.