TMX THE FUTURE IS YOURS TO SEE.

CGF Five-Year Government of Canada Bond Futures

Mapping the possibilities

The 2018 revitalization of the 5-year futures contracts (CGF®) and the new development efforts and liquidity enhancement measures taken by the Montréal Exchange with regards to this product should create additional flow, open interest, and liquidity in the contract. In this paper we present twelve different ways that various types of fixed income managers can utilize 5-year futures[1].

Cash / Real Money Portfolios

Duration Adjustment

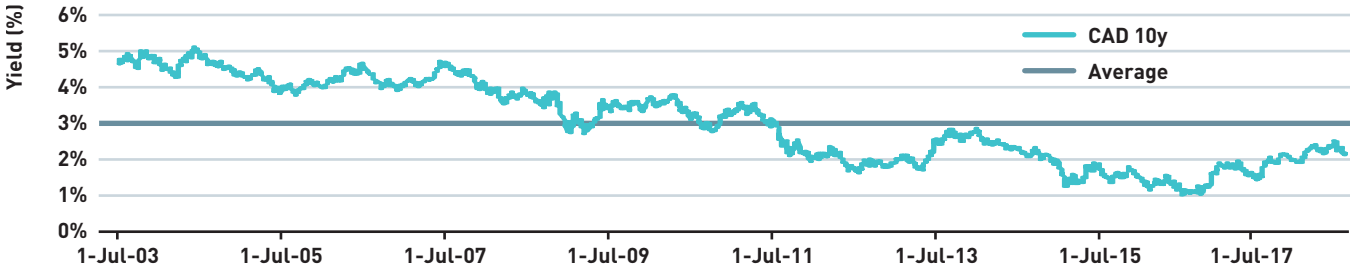
Managers of cash portfolios can utilize enhanced liquidity in the CGF to adjust duration in the derivatives space rather than incurring the higher costs of trading the cash market. With futures contracts, duration adjustments can be made with little or no impact on the cash position or benchmark calculation, and without the need for repo/reverse repo financing.

Example Structure:

A Portfolio Manager that currently replicates his/her bond benchmark but believes Canada bond yields will continue to normalize to higher levels in coming years can reduce duration of the portfolio in order to outperform the benchmark. As shown in Figure 1, 10y Canada bond yields have risen about 100 basis points from the lows of the 3rd quarter of 2016 but are still at least 100 basis points below the average level of the last 15 years.

- Sell 397 contracts CGBU18
- Buy 500 contracts CGFU18[2]
- Reduces portfolio DV01 by $19,500 so the portfolio would outperform its benchmark by that amount for each 1 basis point parallel increase in rates[3].

FIGURE 1
10y Canada Bond Yield



Source: BMO Capital Markets[4] Fixed Income Sapphire database

1. Prices and yields are as of early July 2018. The example structures are constructed to demonstrate how futures could be utilized.
2. 500 CGFU18 and 397 CGBU18 represent $59.916 million notional each. Market value or other weightings can also be appropriate for some portfolios.
3. DV01 is a linear approximation and does not account for convexity differences between CGF and CGB® contracts. As rates move higher or lower, a prudent Portfolio Manager will adjust the size of the CGF and CGB positions as needed.
4. BMO Capital Markets is a trade name used by BMO Financial Group for the wholesale banking business of Bank of Montreal, BMO Harris Bank N.A. (member FDIC), Bank of Montreal Ireland plc., and Bank of Montreal (China) Co. Ltd and the institutional broker dealer businesses of BMO Capital Markets Corp. (Member SIPC) in the U.S., BMO Nesbitt Burns Inc. (Member Canadian Investor Protection Fund) in Canada and Asia and BMO Capital Markets Limited (authorized and regulated by the Financial Conduct Authority) in Europe and Australia. "BMO Capital Markets" is a trademark of Bank of Montreal, used under license.

Replace 5y Bonds with CGF[5] to Achieve Leverage/Capital Efficiency

Some cash bond Portfolio Managers can generate and utilize leverage either within the portfolio or in other areas of their firm. Inexpensive leverage can be created by replacing the 5-year (or 10-year) component of a cash bond portfolio with the same amount of DV01 in CGF (or CGB) contracts and then "lending" the cash generated to other areas of the fund or utilizing it for additional bond purchases.

Example Structure:

A portion of a cash bond portfolio is shown in Figure 2. The manager can choose to generate leverage in the portfolio by replacing the DV01 of the portfolio holdings that mature between 3 and 7 years from today, knowing that most holdings in this maturity bucket will be correlated to each other. He/she could thus sell the holdings shown and replace the basket DV01 with the same amount of DV01 from CGF contracts as a "dirty hedge" to the missing bonds. Doing so would introduce $83.7 million of leverage to the portfolio[6] that could be loaned to other areas of the firm or utilized as a leveraged bond purchase strategy.

- Sell the holdings in Figure 2
- Buy 668 CGFU18 contracts
- No change in portfolio exposure[7] but additional cash is generated.

FIGURE 2
Portion of a Cash Bond Portfolio

							Portfolio		
ISSUER	**Coupon**	**Maturity**	**Years**	**Price**	**Accrued**	**DV01**	**Holdings (Nominal Value in C$)**	**MV (Market Value in C$)**	**Holdings DV01 (in C$)**
CAN	0.75%	1-Sep-21	3.1	96.148	0.271	2.958	15,000,000	14,462,885	4,436
CAN	0.50%	1-Mar-22	3.6	94.614	0.181	3.380	13,875,000	13,152,782	4,690
CAN	2.75%	1-Jun-22	3.9	102.597	0.301	3.777	11,250,000	11,576,067	4,249
CAN	1.00%	1-Sep-22	4.1	95.808	0.362	3.853	11,250,000	10,819,085	4,334
CAN	1.75%	1-Mar-23	4.6	98.549	0.633	4.364	7,500,000	7,438,641	3,273
CAN	1.50%	1-Jun-23	4.9	97.237	0.164	4.553	7,500,000	7,305,104	3,415
CAN	2.00%	1-Sep-23	5.1	99.485	0.723	4.832	6,750,000	6,764,059	3,262
CAN	2.50%	1-Jun-24	5.9	102.083	0.274	5.575	6,000,000	6,141,418	3,345
CAN	2.25%	1-Jun-25	6.9	100.713	0.247	6.401	6,000,000	6,057,575	3,841
								83,717,615	34,846

Source: CanDeal, Bank of Canada

5. An in-depth analysis of a similar strategy is available in the article "CGB-Driven Leverage & Credit Overlay" published February 2018.
6. Minus margin amounts posted for the futures position (representing about 1.75% of the CGF market value).
7. Except micro-exposure due to under/over performance of neighbour bonds and the deviations expected from 3-5 and 5-7 exposure due to the "dirty hedge".

Hedge Anticipated New Issue Purchases

Cash portfolios that normally employ a yield pickup strategy utilizing a spread product can "park" cash inflows in deposit accounts while obtaining duration cheaply from CGF contracts while they wait for new issue allocations. As issuance occurs, the yield hedge in CGF can be closed while cash to pay for purchased provincial, agency or corporate bonds is always available.

Create Spread Trades[8]

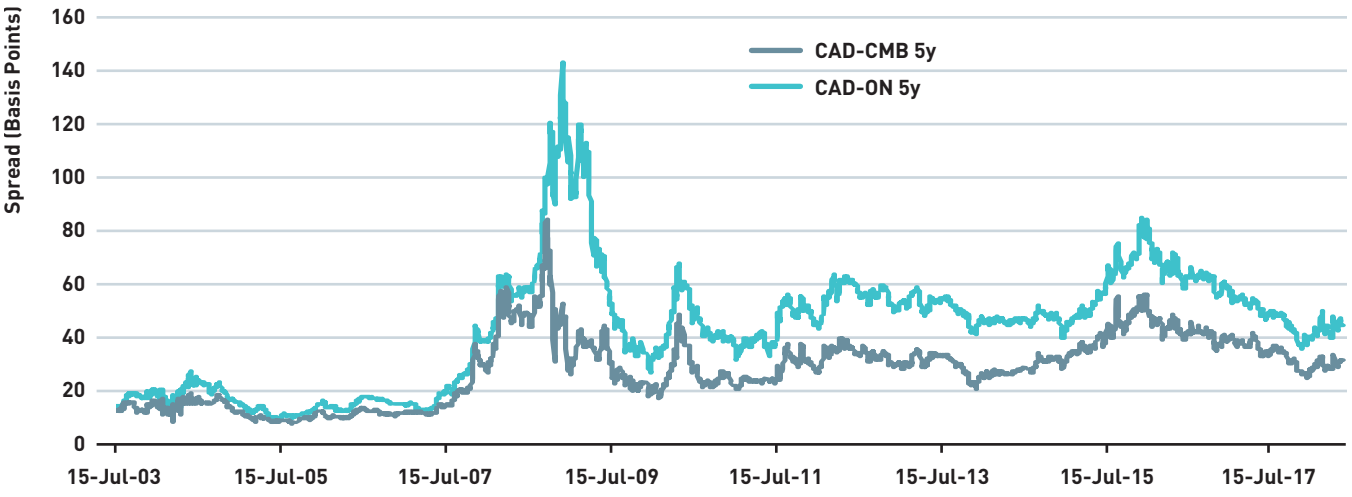
Some cash Portfolio Managers have investment guidelines that prohibit shorting bonds and thus are not able to participate in pure spread trades. If those guidelines don't prohibit the use of futures contracts, managers can create spread trades in provincial, corporate, and agency bonds by buying the spread product outright and hedging the interest rate exposure purely in futures rather than by shorting bonds.

Example Structure:

A Portfolio Manager may believe that 5-year Ontario spreads, show in Figure 3, are too pessimistic about the new provincial government elected in early June and its ability to curtail deficits quickly. An Ontario spread trade could be created without shorting bonds (i.e. without the need for a borrowing program for the short, without utilizing large amounts of balance sheet to participate in the repo market, and without risking a repo squeeze on a short bond position) by buying an Ontario 5-year bond and selling the equivalent DV01 amount of CGF contracts.

- Buy $21.67MM ONT 2.85% June 2, 2023
- Sell 191 contracts CGFU18
- Creates a $10,000 DV01 Ontario spread tightening position with financing costs established up front and no need to borrow bonds.

FIGURE 3
CMB and Ontario Spreads



Source: BMO Capital Markets[9] Fixed Income Sapphire database

8. See "Hedging Provincial Bonds with CGB" published May 2018
9. See note 4

Simplify a CMB Overlay Strategy

Some managers can create overlay portfolios to gain semi-permanent exposure to a risk factor. These overlay strategies typically involve financing risk, use large amounts of balance sheet, and are labor intensive. Using a single futures contract to hedge a portfolio of Canada Mortgage Bonds, for example, can simplify an overlay strategy considerably.

Example Structure:

A Portfolio Manager has constructed the overlay portfolio in Figure 4 to obtain exposure to Canada Mortgage Bond spreads. Since this is an overlay portfolio, it would require financing each long position by borrowing cash/lending the bond and each short position by borrowing the bond/lending cash for some term. The fully financed portfolio would be 16 positions in total, each of which must be valued, monitored, and risk-assessed each day. Large portfolios could easily exceed a hundred line items just to get simple exposure to CMB spreads and each transaction to reduce or add[10] to a CMB spread position requires at least four trades[11].

FIGURE 4

POSITION	Issue	Price	Yield	Issue DV01	Position DV01
25,000,000	CMB 1.150 12/15/2021	96.048	2.389%	3.11	7,785
-27,217,000	CAN 0.750 09/01/2021	95.875	2.157%	2.86	-7,785
25,000,000	CMB 1.750 06/15/2022	97.526	2.429%	3.59	8,974
-24,449,000	CAN 2.750 06/01/2022	102.083	2.175%	3.67	-8,974
25,000,000	CMB 3.150 09/15/2023	102.912	2.536%	4.82	12,052
-25,554,000	CAN 2.000 09/01/2023	98.883	2.235%	4.72	-12,052
25,000,000	CMB 2.900 06/15/2024	101.743	2.576%	5.44	13,601
-24,975,000	CAN 2.500 06/01/2024	101.300	2.259%	5.45	-13,600
	Total Portfolio				0

Source: CanDeal

10. Since CMB's are issued up to several times per year, managers often sell off aged holdings and replace them with new issues to capture additional spread. This regular activity can generate large amounts of work effort to refinance the portfolio for even the smallest changes.
11. Buy/sell the Canada Mortgage Bond, do the opposite with the Canada hedge bond plus cancel the remaining term of the repo and reverse repo used to finance the two positions. The line item transactions for a single trade can exceed four if the financing was arranged through different counterparties or for different terms, multiplying the total work.

Using a single CGF contract to hedge an entire strategy[12] can simplify the portfolio in Figure 4. If we examine the simplified portfolio in Figure 5, we can see the Canada hedge bonds are dispensed with entirely in favor of a single CGF futures hedge to eliminate the portfolio DV01. To be fully financed, the CGF-hedged portfolio would still require an additional four positions to lend the CMB for cash that are not shown in the table, but the simplified portfolio requires only nine positions in total. Further, the portfolio in Figure 5 would use far less balance sheet at most institutions and is not subject to any financing risk, aside from potential positive surprises if the long CMB positions were to experience a repo squeeze. Trading in and out of positions to manage the spread exposure or capture new issue cheapness requires fewer transactions as well.

A small amount of slope risk is introduced in Figure 5 which is a trade-off for the simplification and reduced cost of utilizing a single instrument. A 5-year cash bond could also be used as the single instrument hedge, but the slope risk would remain and the balance sheet reducing benefit of utilizing a futures contract would be lost. In today's environment, futures appear to be the more efficient portfolio hedge for overlay strategies.

FIGURE 5

POSITION	Issue	Price	Yield	Issue DV01	Position DV01
25,000,000	CMB 1.150 12/15/2021	96.048	2.389%	3.11	7,785
25,000,000	CMB 1.750 06/15/2022	97.526	2.429%	3.59	8,974
25,000,000	CMB 3.150 09/15/2023	102.912	2.536%	4.82	12,052
25,000,000	CMB 2.900 06/15/2024	101.743	2.576%	5.44	13,601
-832	CGFU18 (CF=0.8345)	117.440	2.219%	5.10	-42,393
	Total Portfolio				19

Source: CanDeal

12. Or, additionally, a CGB contract if the term to maturity of the CMB is closer to 8 years.

Leveraged Manager / Fast Money

Slope Trades[13]

Additional liquidity in a CGF contract will make pure slope trades far less complicated to execute and hold. For instance, a 5y-10y steepener may be attractive to leveraged portfolios currently as the slope of this segment has plunged to levels not seen since 2007 as shown in Figure 6.

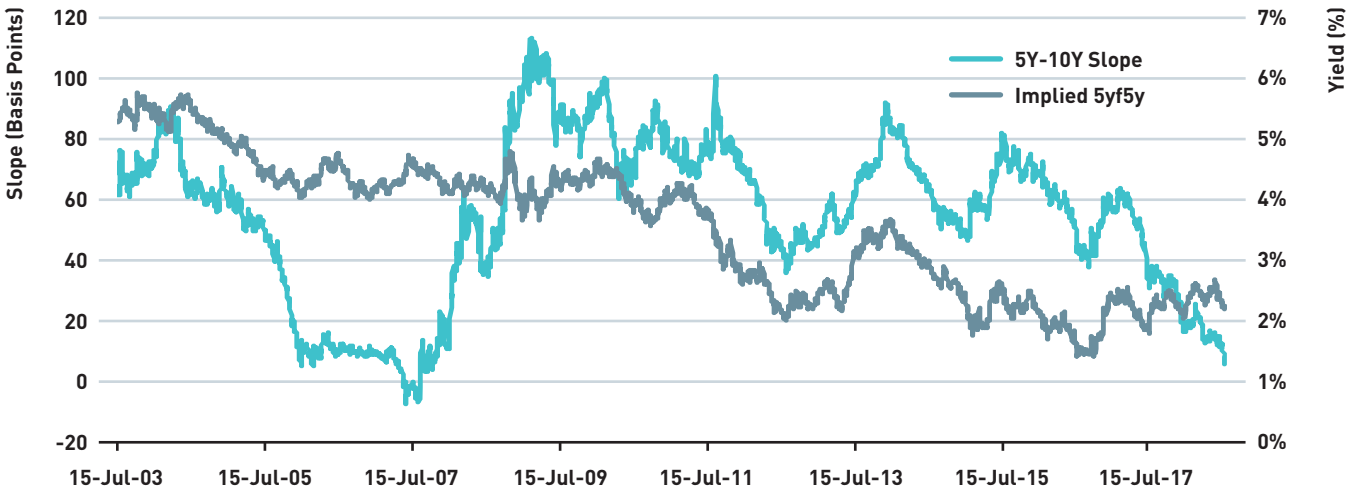
Using a proxy for the 5-year forward 5-year rate, also shown in Figure 6, we can see that current pricing implies that 5-year rates starting in 5 years will be near the 2% level – historically very low and associated only with extremely low interest rates and quantitative easing in developed markets.

Example Structure:

In futures, a 5y-10y steepener can be created by simply buying CGF contracts and selling a DV01-weighted amount of CGB contracts with no need for bond shorts, repo/reverse programs to finance the trade, and very little balance sheet usage when compared to swaps or the cash bond market. Swap spread risk is also avoided.

- Sell 87 contracts CGBU18
- Buy 191 contracts CGFU18
- Efficiently creates a 5y-10y steepening position of $10,000 DV01.

FIGURE 6
Canada 5Y-10Y Slope & Implied 5-Year Forward 5-Year Rate



Source: BMO Capital Markets[14] Fixed Income Sapphire database

13. See "Yield Curve Trades" published June 2017 and "CGB-10y Steepener" published November 2017.
14. See note 4

Futures Basis[15]

Leveraged managers familiar with the relative value calculations and analysis of the price difference between a futures contract and its cheapest-to-deliver basket can transact trades in futures basis in order to capture additional returns[16]. These trades can also be utilized as a method to take a directional position on Bank of Canada rate hikes/cuts over the life of the contract.

Example Structure:

In Figure 7, we calculate the relative value between the CGFU18 contract and its delivery basket using prices from July 11, 2018, the day the Bank of Canada raised the overnight rate from 1.25% to 1.5%. Briefly, Net Basis is the amount, in dollars, representing by how much a bond is more expensive relative to the futures contract under the assumption that the bond is borrowed at the indicated repo rate on average. The Implied Repo Rate is the yield an investor will earn by buying the bond with borrowed money, selling the futures contract (long the basis), then delivering the bond into the contract on the final delivery date.

As we can see in Figure 7, a return of only 1.31% on a long basis trade when overnight money is returning 1.5% indicates that the contract is cheap relative to the bond. An investor wishing to participate in futures basis might instead choose to sell the basis (sell the bond, buy the futures contract) in order to capture some of the cheapness of the futures contract relative to the cheapest-to-deliver, assuming he/she was confident of obtaining a 1.5% financing rate on the cash loaned against the borrowed bond short.

- Sell $23.97MM CAN 1.75% March 1, 2023
- Buy 200 contracts CGFU18
- Establishes a short basis position that will also profit if the Bank of Canada hikes again[17] before the last delivery date of the contract.

FIGURE 7
CGF Delivery Basket - Front Month Contract

First Delivery Date 4-Sep-2018
Last Delivery Date 28-Sep-2018
CGF Price 118.030

COUPON	Maturity Date	Bid	Yield	CF	Gross Basis	GC Repo	Net Basis	Implied Repo
1.75%	1-Mar-2023	98.5830	2.073%	0.8345	0.087	1.50%	0.033	1.31%
2.00%	1-Sep-2023	99.5300	2.097%	0.8294	1.636	1.50%	1.533	-5.90%

Source: CanDeal, Montréal Exchange

15. A detailed example of this trade but using CGB is contained in "Hawkish Bank of Canada Trade in CGB" published November 2017.
16. See "Implied Repo Analysis" published October 2016.
17. A very unlikely event at this juncture.

Cross-Currency Trades[18]

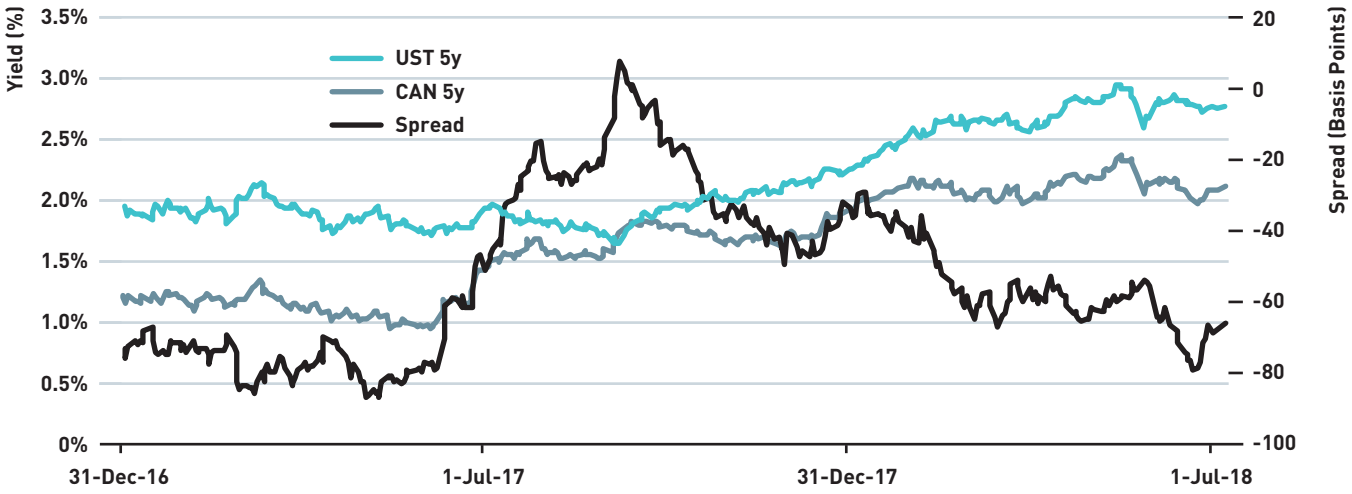
Active investors can easily express views on the relative levels of interest rates in Canada versus the USA, Europe, UK, etc. in the 5y sector of the yield curve by utilizing CGF contracts in combination with 5-year contracts on other exchanges.

Example Structure:

An active manager examines the yield spread between Canada and US 5-year constant maturity bonds in Figure 8 and notes that markets now imply the Federal Reserve will continue hiking rates but that the Bank of Canada will pause its monetary policy tightening. The 5-year bond yield spread has fallen 65 basis points from September 2017 and a manager who disagrees with the notion that Canadian yields can remain far below US yields could capture some value by selling the CGF contract on Montréal Exchange against buying the 5-Year T-Note (FV) contract on CME.

- Sell 191 CGFU18
- Buy 169 FVU18
- Creates a $10,000 CAD per basis point spread narrowing trade in Canada versus UST 5-year yields with no need to run repo/reverse programs in both currencies, incur high balance sheet charges, or risk repo squeezes on the short position.

FIGURE 8
CAN-USD 5y Government Bond Spread



Source: BMO Capital Markets[19] Fixed Income Sapphire database

18. A very unlikely event at this juncture.
19. See note 4

Invoice Spreads[20]

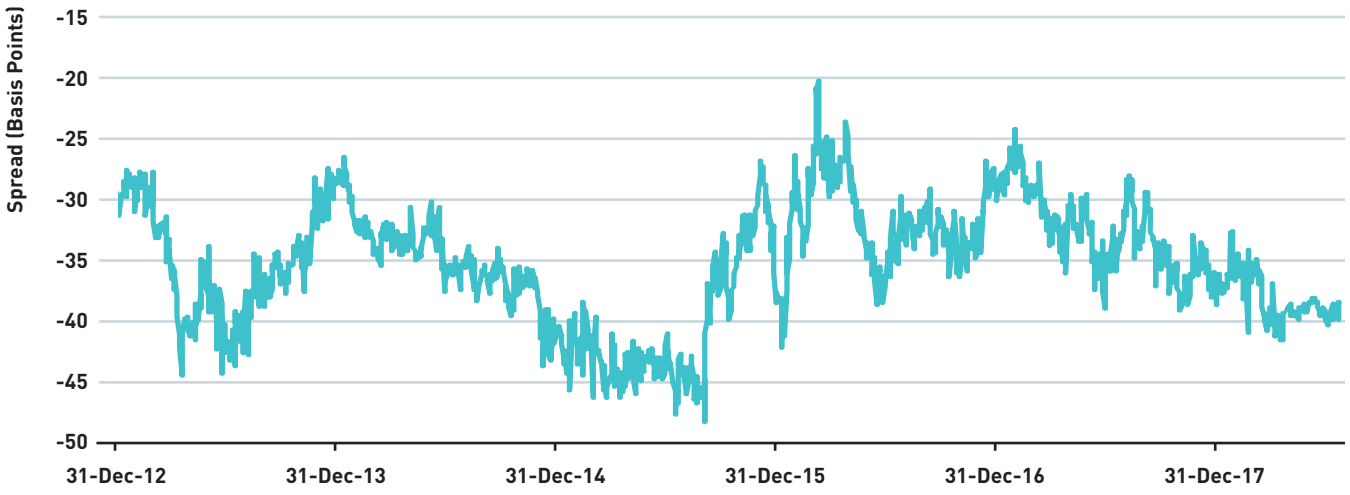
Active investors can utilize 5-year futures in Invoice Spread trades by transacting an exchange for risk trade with a dealer of Canadian swaps. In this structure, the investor gains exposure to widening or tightening of swap spreads without the risk of repo squeezes or the costs associated with maintaining a repo financing desk.

Example Structure:

In Figure 9, we show the 5-year constant maturity swap spread for the last five years. Although approximately average for the full time period, spreads are actually quite expensive (lower on the chart) relative to the norm since 2015. An investor who believes spreads will tighten from the current -40 to a more normal level of -35 or higher, could use CGF contracts paired with a forward starting swap to gain exposure to such a move.

- Sell 191 contracts CGF
- Receive fixed on $22.9MM CAD from September 28, 2018[21] to March 1, 2023[22]
- Establishes a $10,000 per basis point forward spread tightening trade with less balance sheet usage than the same trade in bonds (for most portfolios), with no need to run a repo program or risk financing squeezes.

FIGURE 9
Canada 5Y Swap Spreads



Source: BMO Capital Markets[23] Fixed Income Sapphire database

20. For a more detailed example, see "CGF Invoice Spread" published October 2016 and "Seasonal Mortgage Trade" published April 2017.
21. The last delivery date of the active futures contract.
22. The maturity of the cheapest-to-deliver bond.
23. See note 4

Single 5y Hedge Instrument for Relative Value

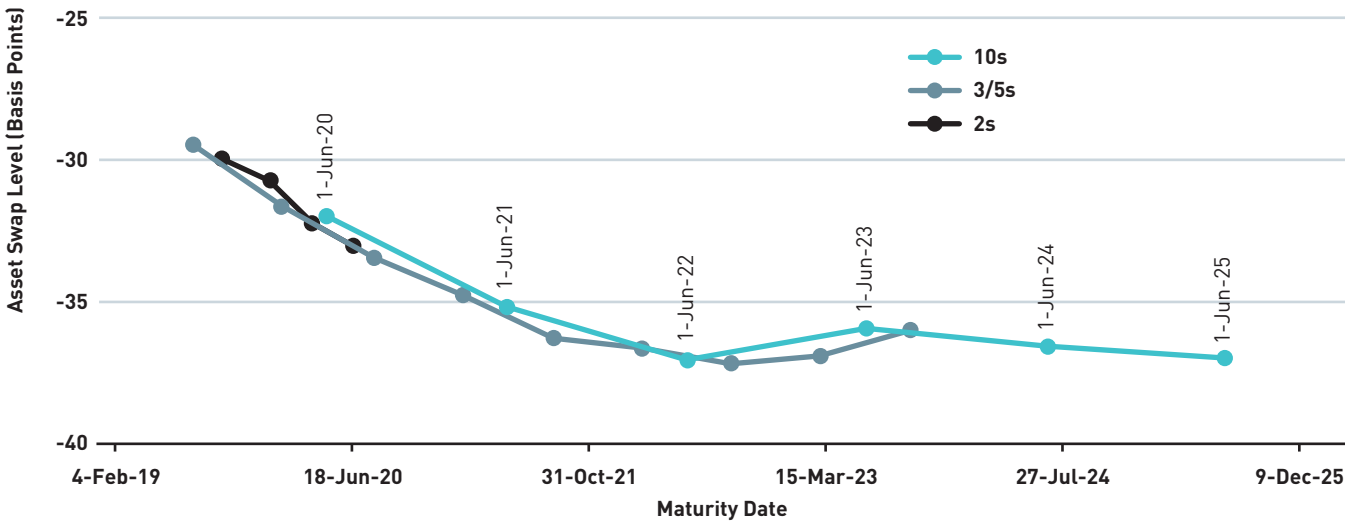
A leveraged portfolio that seeks to capture a few basis points of relative value from time to time[24] can programmatically monitor the relative value of various bonds. As certain bonds become abundant or scarce, their relative value vis-à-vis neighbour bonds will vary depending on liquidity demands for each particular bond. A nimble Portfolio Manager can buy relatively cheap issues and/or sell relatively expensive issues in the 5y sector while maintaining a single hedge instrument to eliminate outright interest rate risk.

Example Structure:

In Figure 10, a Portfolio Manager using swap spreads to evaluate relative value between Canada bond issues notes that the 1.5% June 1, 2023 is a few basis points cheap relative to the rest of the sector. He/she could buy that bond while hedging with a short position in CGF in order to eliminate any outright interest rate risk. These relative value opportunities occur in both directions, rich and cheap, where the Portfolio Manager could constantly seek to "harvest" basis points as the opportunities arise while keeping hedging costs low by utilizing a single instrument to manage DV01 risk.

- Buy $21.97MM CAN 1.5% June 1, 2023
- Sell 191 contracts CGFU18
- A $10,000 DV01 relative value play on the price discrepancy between very old 10-year bonds and the CGF contract (and it's cheapest to deliver bond).

FIGURE 10
Canada Bond Asset Swap Spreads



Source: BMO Capital Markets[25] Fixed Income Sapphire database

24. The 5-year contract can also serve as the hedge instrument for a bank market-making desk using this identical strategy.
25. See note 4

Auction Setups

Active investors can utilize the methodology described in the section above during and before government bond auctions as dealing desks cheapen[26] portions of the yield curve before a scheduled issue date. Nimble managers can often purchase intraday as the new issue bond or its neighbours cheapens, while hedging with CGF (for 3s and 5s) or CGB contracts (for 10s)[27]. Relative prices will often revert in the hours or days following the auction, generating a few basis points of outperformance.

Issuers

Alternative Interest Rate Lock

Corporate issuers planning a 5-year bond issue in the near future but who, for some reason, can't issue immediately could utilize 5-year futures contracts to lock the interest rate (but not the spread) for their anticipated bond sale. Similar to any rate hedge or a rate lock contract, futures contracts allow an issuer to hedge future bond sales but without requiring a repo desk, undue amounts of cash, or an ISDA agreement.

Example Structure:

A corporate treasury notices that rates are compellingly low but anticipates that they will move higher before the company can next issue bonds. While waiting for approval to complete an upcoming bond issue of 5y maturity, the treasury could hedge all or part of that issuance by selling CGF contracts. When the company does issue, it closes the CGF position simultaneously as the rate hedge is no longer needed.

26. In anticipation of holding large inventories after the bond auction.

27. For bonds with maturities more than a year or two from the cheapest-to-deliver of a contract, a regression-weighted hedge is preferable. It is constructed by weighting the hedge with the regression coefficient between the purchased instrument and the hedge over a recent time period.

Kevin Dribnenki writes about fixed income derivatives and opportunities in Canadian markets. He spent over 10 years managing fixed income relative value portfolios as a Portfolio Manager first at Ontario Teachers' Pension Plan and then BlueCrest Capital Management. During that time he managed domestic cash bond portfolios as well as international leveraged alpha portfolios and has presented at several fixed income and derivatives conferences. He received a BA in Economics from the University of Victoria, an MBA from the Richard Ivey School of Business, and holds the Chartered Financial Analyst designation.

For more information:

T: +1 514 871-3501
irderivatives@tmx.com

m-x.ca/futures

W-ED-STR-CGFMappingthepossibilitiesE - 53e691c54cd