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CGZ Two-Year Government of Canada Bond Futures

MONTRÉAL EXCHANGE

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# CGZ: A Use Case for Portfolio Managers

## Introduction

The December launch of the 2-year physical delivery Government of Canada bond futures contract on the Montréal Exchange (the CGZ® contract), with a liquidity provision commitment from key industry partners, has created another point on the Canadian derivatives yield curve for market participants to utilize. In this paper, we identify several potential uses for the CGZ contract for both leveraged portfolios and cash portfolios. We categorize the strategies by Hedging and Alpha potential but note that, in many cases, both types of trade can often occur in cash portfolios, and both can sometimes occur in leveraged relative value portfolios. Figure 1 lists the potential strategies and identify which type of client would be most interested in each type of trade. The remainder of the paper describes the strategies and, in some cases, constructs example trades to demonstrate how a typical portfolio manager may use the CGZ contract as it becomes a liquid trading point.

**FIGURE 1**

| | CASH/ REAL MONEY | SPECULATIVE/ LEVERAGED | ISSUERS | INTERNATIONAL CLIENTS |
|---|---|---|---|---|
| 2-YEAR SECTOR REPLACEMENT | X | | | X |
| DURATION MANAGEMENT/FORWARDS | X | X | | X |
| FULL PORTFOLIO HEDGING | X | X | | X |
| INTRADAY HEDGING | X | X | X | X |
| RATE LOCK | | | X | |
| SPREAD TRADES | X | X | | X |
| SLOPE | X | X | | X |
| BUTTERFLY - 50/50 & REGRESSION | X | X | | X |
| FUTURES BASIS | X | X | | |
| CROSS CURRENCY | | X | | X |
| INVOICE SPREAD | | X | | |
| ALGORITHMS | | X | | X |

# Hedging Potential

## 2-Year Sector Replacement

One obvious use for the 2-year contract is as a replacement for government bond holdings in the 2-year sector of a bond portfolio. In this respect, the 2-year CGZ contract is an even more attractive instrument than the 5-year or 10-year contracts, since more cash may be generated for other purposes[1] while retaining the duration exposure, since the notional amounts of shorter-term bonds are usually much larger.

In Figure 2, we construct a hypothetical portfolio of outstanding Government of Canada bonds maturing between 2 and 30 years from the present, weighted by market value outstanding. The figure shows only the bonds in a hypothetical $100 million portfolio that fall in the 1 to 3-year maturity range. If the portfolio manager decides that these bonds are so correlated in the current interest rate environment that they could be treated as a single 2-year bond, he or she could greatly reduce the number of portfolio line items and cash invested by replacing each of the bonds with a weighted amount of CGZ contracts. Most often, the process used would involve performing a linear regression analysis on each bond versus the cheapest-to-deliver (CTD) bond of the futures contract. The column named Beta shows the regression coefficients and we have calculated the total DV01[2] and CGZ futures equivalent DV01[3] for this sector of the portfolio.

**FIGURE 2**

| PORTFOLIO NOTIONAL | ISSUER | COUPON | MATURITY | YIELD | DV01 | BETA | TOTAL DV01 | FUTURES EQUIVALENT DV01 |
|---|---|---|---|---|---|---|---|---|
| 1,733,000 | CDA | 1.500% | 01-Feb-22 | 0.210% | 2.000 | 1.48 | 347 | 514 |
| 2,744,000 | CDA | 0.500% | 01-Mar-22 | 0.212% | 1.213 | 1.54 | 333 | 511 |
| 2,888,000 | CDA | 1.500% | 01-May-22 | 0.219% | 1.393 | 1.25 | 402 | 505 |
| 1,834,000 | CDA | 2.750% | 01-Jun-22 | 0.201% | 1.495 | 1.41 | 274 | 387 |
| 30,000 | CDA | 9.250% | 01-Jun-22 | 0.221% | 1.588 | 1.41 | 5 | 7 |
| 4,332,000 | CDA | 0.250% | 01-Aug-22 | 0.232% | 1.624 | 1.05 | 703 | 738 |
| 3,639,000 | CDA | 1.000% | 01-Sep-22 | 0.219% | 1.723 | 1.19 | 627 | 749 |
| **5,343,000** | **CDA** | **0.250%** | **01-Nov-22** | **0.255%** | **1.874** | **1.00** | **1,001** | **1,001** |
| 2,455,000 | CDA | 0.250% | 01-Feb-23 | 0.288% | 2.118 | 1.00 | 520 | 522 |
| 3,552,000 | CDA | 1.750% | 01-Mar-23 | 0.278% | 2.248 | 1.36 | 799 | 1,083 |
| 2,051,000 | CDA | 1.500% | 01-Jun-23 | 0.268% | 2.497 | 1.80 | 512 | 920 |
| 341,000 | CDA | 8.000% | 01-Jun-23 | 0.288% | 2.731 | 1.80 | 93 | 167 |
| 5,848,000 | CDA | 2.000% | 01-Sep-23 | 0.304% | 2.773 | 1.46 | 1,622 | 2,371 |
| **36,790,000** | | | | | | | **7,238** | **9,476** |

Source: BMO Capital Markets[i] Fixed Income Sapphire database, Bank of Canada

1 Via the leverage inherent in derivatives.

2 Dollar value of a 1-basis point move. Expressed in this paper as a generic "cents per $100 of notional bond" or a Total DV01, which refers to a total dollar change in a position (i.e. the notional amount of the position multiplied by the generic DV01 and divided by 100).

3 The bond DV01 multiplied by the regression coefficient.

As shown in Figure 3, the manager could replace the full list of 1 to 3-year bonds with a single line item of CGZ by purchasing 460 contracts to replicate this entire sector of the portfolio. This generates just under $38 million of cash, including accrued (not shown) to be applied to other assets or sectors of the curve, or held as a liquidity reserve. Of course, this approach introduces some risk of deviating from the benchmark, but this should remain minimal as the Bank of Canada continues to execute its extraordinary monetary policy measures in 2021.

**FIGURE 3**

| CONTRACT CODE | CONTRACTS | CTD COUPON | CTD MATURITY | DV01 /CONTRACT | TOTAL DV01 |
|---|---|---|---|---|---|
| CGZH21 | 460 | 0.250% | 01-Nov-22 | 2.059 | 9,470 |

Source: Montréal Exchange

## Duration Management/Forwards

Another way to use the CGZ contract is for duration management. Let us return to the above example, but this time rather than selling the 2-year sector of bonds and buying futures contracts, the manager instead sells 460 CGZ contracts and simultaneously buys 460 5-year contracts (CGF®). Doing this would shift the duration of the portfolio higher and, equally, would introduce a long position in the 2yf3y interest rate[4] to the portfolio.

Although we will not construct an example to show this here, the transaction is similar to the idea of going short on the 5yf5y rate as described in our recent publication "The Collapse of Long-Term Forward Yields."[5] It should be noted that, absent the portfolio of bonds described in the first section, the strategy of buying CGF and selling CGZ in equal contract amounts is identical to the trade that a leveraged relative value client might execute in order to speculate on the direction of near-term forwards; in this case the 2yf3y rate.

## Full Portfolio Hedging

In a process similar to the section above on hedging the 2-year sector of a Canada bond portfolio, the CGZ contract can be traded, along with the 5-year CGF futures and 10-year CGB® futures contracts that trade on the Montréal Exchange, to create a full portfolio[6] hedging strategy using futures.

The process for implementing a full portfolio replication strategy would closely mirror the strategy outlined for the 2-year sector. Bonds of 1 to 3-year maturity are replaced with the CGZ contract, bonds of 3 to 6-year maturity are replaced with the CGF contract, and bonds of 7 to 13-year maturity are replaced with the CGB contract.[7] Since the 10-30 slope has more potential for movement in the current yield curve environment, it is probably less accurate to hedge the 30-year bonds with the CGB contract, so the portfolio may not be entirely replicated with futures until more liquidity develops in 30-year Government of Canada bond futures (LGB®). Figure 4 lists the bonds, colour-coded to each CTD bond in bold with the regression coefficients and DV01 results. In this example, longer term bonds (no colour in the figure) are not replaced by a derivative.

4 2yf3y is the 3-year interest rate starting in 2 years or the "2-year forward, 3-year rate."

5 https://www.m-x.ca/f_publications_en/cgf_cgb_collapse_long-term_forward_yields_en.pdf

6 Meaning up to the 10-year point (approximately).

7 A more complex, but often better hedge can be created by using multiple linear regression on each bond which generates three regression coefficients: one for each futures contract.

**FIGURE 4**

| PORTFOLIO NOTIONAL | ISSUER | COUPON | MATURITY | YIELD | DV01 | BETA | TOTAL DV01 | FUTURES EQUIVALENT DV01 |
|---|---|---|---|---|---|---|---|---|
| 1,733,000 | CDA | 1.500% | 01-Feb-22 | 0.210% | 2.000 | 1.48 | 347 | 514 |
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| **5,343,000** | **CDA** | **0.250%** | **01-Nov-22** | **0.255%** | **1.874** | **1.00** | **1,001** | **1,001** |
| 2,455,000 | CDA | 0.250% | 01-Feb-23 | 0.288% | 2.118 | 1.00 | 520 | 522 |
| 3,552,000 | CDA | 1.750% | 01-Mar-23 | 0.278% | 2.248 | 1.36 | 799 | 1,083 |
| 2,051,000 | CDA | 1.500% | 01-Jun-23 | 0.268% | 2.497 | 1.80 | 512 | 920 |
| 341,000 | CDA | 8.000% | 01-Jun-23 | 0.288% | 2.731 | 1.80 | 93 | 167 |
| 5,848,000 | CDA | 2.000% | 01-Sep-23 | 0.304% | 2.773 | 1.46 | 1,622 | 2,371 |
| 1,720,000 | CDA | 2.250% | 01-Mar-24 | 0.317% | 3.308 | 0.57 | 569 | 324 |
| 1,733,000 | CDA | 0.250% | 01-Apr-24 | 0.353% | 3.266 | 0.57 | 566 | 323 |
| 1,978,000 | CDA | 2.500% | 01-Jun-24 | 0.331% | 3.587 | 0.67 | 709 | 475 |
| 2,320,000 | CDA | 1.500% | 01-Sep-24 | 0.356% | 3.774 | 0.74 | 875 | 652 |
| 2,498,000 | CDA | 1.250% | 01-Mar-25 | 0.390% | 4.258 | 0.88 | 1,064 | 938 |
| 1,892,000 | CDA | 2.250% | 01-Jun-25 | 0.391% | 4.622 | 1.00 | 874 | 878 |
| 308,000 | CDA | 9.000% | 01-Jun-25 | 0.411% | 5.354 | 1.00 | 165 | 166 |
| **6,859,000** | **CDA** | **0.500%** | **01-Sep-25** | **0.448%** | **4.664** | **1.00** | **3,199** | **3,199** |
| 2,022,000 | CDA | 0.250% | 01-Mar-26 | 0.505% | 5.101 | 1.03 | 1,031 | 1,064 |
| 1,945,000 | CDA | 1.500% | 01-Jun-26 | 0.468% | 5.551 | 1.17 | 1,080 | 1,269 |
| 2,129,000 | CDA | 1.000% | 01-Jun-27 | 0.518% | 6.452 | 0.82 | 1,374 | 1,122 |
| 523,000 | CDA | 8.000% | 01-Jun-27 | 0.538% | 7.977 | 0.82 | 417 | 341 |
| 1,949,000 | CDA | 2.000% | 01-Jun-28 | 0.577% | 7.702 | 0.95 | 1,501 | 1,428 |
| **1,776,000** | **CDA** | **2.250%** | **01-Jun-29** | **0.642%** | **8.809** | **1.00** | **1,564** | **1,564** |
| 1,531,000 | CDA | 5.750% | 01-Jun-29 | 0.659% | 10.069 | 0.99 | 1,542 | 1,530 |
| 6,383,000 | CDA | 1.250% | 01-Jun-30 | 0.726% | 9.363 | 0.98 | 5,976 | 5,879 |
| 2,166,000 | CDA | 0.500% | 01-Dec-30 | 0.776% | 9.433 | 0.96 | 2,043 | 1,970 |
| 1,731,000 | CDA | 5.750% | 01-Jun-33 | 0.863% | 15.446 | 0.97 | 2,674 | 2,599 |
| 1,694,000 | CDA | 5.000% | 01-Jun-37 | 1.003% | 20.112 | NA | 3,407 | |
| 1,998,000 | CDA | 4.000% | 01-Jun-41 | 1.128% | 23.480 | NA | 4,691 | |
| 2,354,000 | CDA | 3.500% | 01-Dec-45 | 1.222% | 27.339 | NA | 6,436 | |
| 2,152,000 | CDA | 2.750% | 01-Dec-48 | 1.270% | 28.106 | NA | 6,048 | |
| 4,450,000 | CDA | 2.000% | 01-Dec-51 | 1.293% | 28.080 | NA | 12,495 | |
| **90,901,000** | | | | | | | **67,540** | **35,196** |

**2-year sector** **5-year sector** **10-year sector** **30-year sector**

Source: BMO Capital Markets[i] Fixed Income Sapphire database, Bank of Canada

In Figure 5, we have calculated the number of contracts required to closely replicate each of the colour-coded sections of Figure 4. Figure 5 shows that most bonds in the portfolio can be replicated[8] with just three modest positions in futures contracts, potentially freeing up $82.5 million in cash from a portfolio with a total value of $100 million.

8 Assuming yield relationships from the regression lookback (2 months) hold during the holding period for this hedging trade.

**FIGURE 5**

| CONTRACT CODE | CONTRACTS | CTD COUPON | CTD MATURITY | DV01 /CONTRACT | TOTAL DV01 |
|---|---|---|---|---|---|
| CGZH21 | 460 | 0.250% | 01-Nov-22 | 2.059 | 9,470 |
| CGFH21 | 156 | 0.500% | 01-Sep-25 | 5.935 | 9,258 |
| CGBH21 | 147 | 2.250% | 01-Jun-29 | 11.209 | 16,477 |

Source: Montréal Exchange

### Intraday Hedging

The fast and easy execution of futures contracts relative to bonds, and especially relative to swaps, means they are the ideal instrument for intraday hedging. For example, imagine a Portfolio Manager knows that he or she will receive a cash inflow to the portfolio that needs to be invested today. However, the security selection process can sometimes be a slow one, so the cash needs to be "parked" temporarily in a highly correlated instrument so that it does not cause underperformance if market developments occur before a suitable security is selected for the portfolio. As with CGF and CGB, CGZ can be utilized by bond managers, or even managers of money market portfolios, to immunize cash positions against market movements while decisions are being made.

### Rate Lock

Similar to the idea of intraday hedging, issuers of corporate bonds can utilize CGZ as a way to "lock in" the underlying government bond rate on a pending corporate issue if that rate appears attractive and the corporate treasury wants to avoid the uncertainty of interest rates moving before the new issue is brought to market. This approach would not hedge the credit spread of the issue; rather it would hedge the underlying interest rate portion of the corporate bond yield.

A rate lock transaction, from the perspective of the issuer of a 2-year corporate bond, would involve selling the equivalent DV01 of the CGZ contract that it plans to issue in the near future, and then buy back those CGZ contracts simultaneously with the pricing of the corporate bond issue. The gain or loss on the contracts will offset any gain or loss incurred via interest rate (but not spread) movements between the time of the rate lock and the time that the issue is priced. An issuer normally pays the bank that is pricing and marketing their issue to conduct this transaction on its behalf, of course, but the bank will normally just hedge in the market, probably by selling futures contracts, assuming that liquidity is available in that product.

## Opportunistic/Alpha Generation Potential

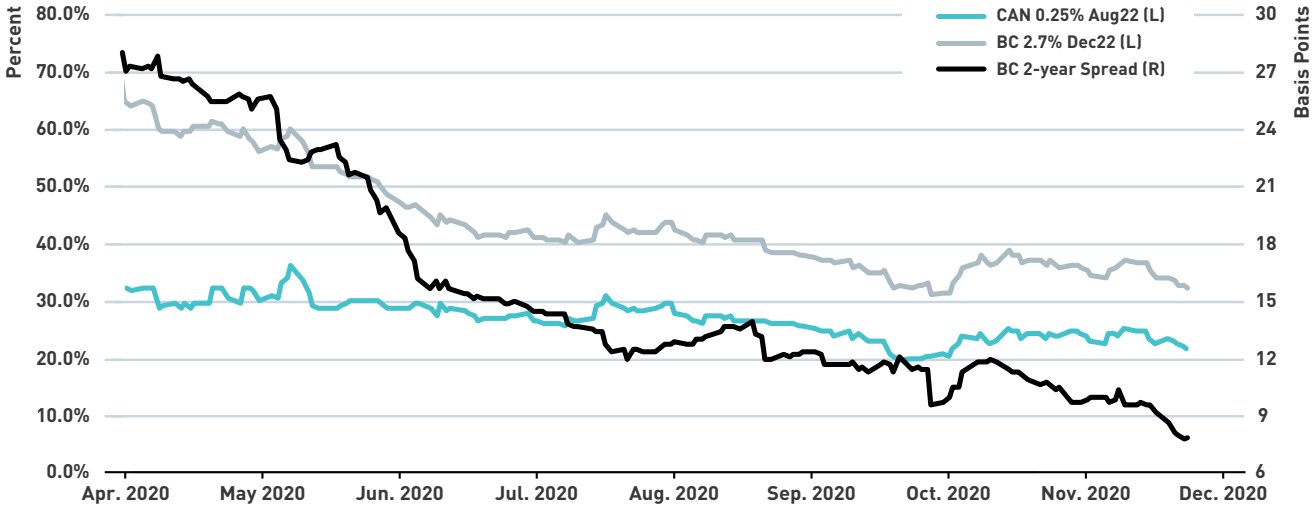
### Spread Trades

Active managers may also choose to utilize CGZ to create credit spread trades in portfolios. Different types of portfolios will have different mandates and constraints, but in many cases even cash bond portfolios may express spread widening or tightening views. This is especially true when constructing spread trades with futures contracts, because doing so relieves the portfolio of the need for securities lending/borrowing on the repo market.

For example, a Portfolio Manager who owns British Columbia (BC) 2-year bonds may have observed that BC bond spreads relative to Canada bonds have tightened since the pandemic scare in March 2020, as shown in Figure 6, and decide that the yield pickup over Canada bonds is simply too small. Perhaps he or she anticipates that the New Democratic Party majority win in the election held October 24, 2020 will result in the left-leaning party spending more on social programs than other parties would have, thereby requiring more bond issuance, resulting in wider spreads on BC bonds. The portfolio manager could enter into a spread widening position by selling BC bonds from the portfolio and replacing the interest rate risk with CGZ. Any resulting spread widening on this bond would no longer affect the value of the portfolio, which would outperform.

**FIGURE 6**

## BC 2y Yield v. CAN 2y Yield




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

Figure 7 shows the trade construction for a $50 million notional position in BC 2.7% Dec22 bonds. The manager can immunize the (short) interest rate risk from selling this position by buying 500 contracts of CGZH21 futures. Of course, a leveraged relative value manager could take the same position without owning the original bonds, and the transactions would be identical. This relative value manager can avoid the cost and hassle of funding the long exposure to Canada bonds achieved via CGZ, but must arrange to borrow the BC bond to deliver into his or her sale on the repo market.

**FIGURE 7**

| POSITION | INSTRUMENT | CTD/BOND COUPON | CTD/BOND MATURITY | FUTURES CONVERSION FACTOR | DV01 | TOTAL DV01 |
|---|---|---|---|---|---|---|
| 500 | CGZH21 | 0.250% | 01-Nov-22 | 0.9101 | 2.057 | 10,283 |
| -50,000,000 | BC | 2.700% | 18-Dec-22 | NA | 2.055 | -10,276 |
| | | | | | | 7 |

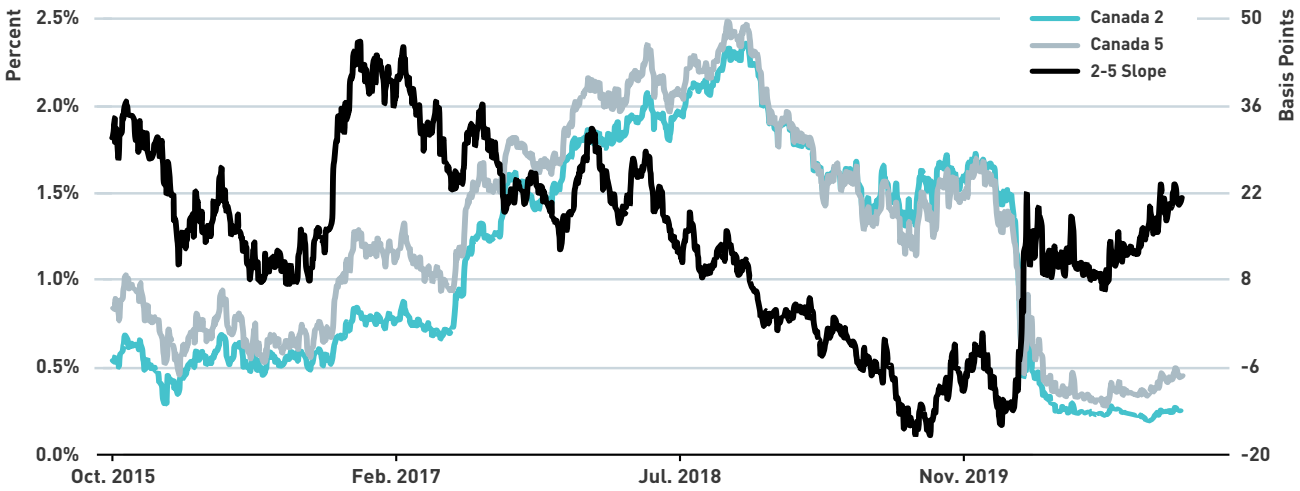
Source: BMO Capital Markets[i] Fixed Income Sapphire database, Montréal Exchange

## Slope

A liquid CGZ contract can be extremely useful for exploiting opportunities in the Canada government bond yield curve. This would occur, of course, in a similar fashion to the 5-10 slope trade using CGF and CGB futures. In Figure 8, we plot the slope between the 2-year and 5-year constant maturity Canada bond yields for the five years leading up to October 2020. As shown in the figure, both 2-year and 5-year yields are at exceptionally low levels, and the 2-5 slope has recently been inverted at -13 basis points before returning to positive territory. One theory about the rebound in 2-5 slope is that the fiscal policy response to the 2020 pandemic may re-ignite inflation which, given the Bank of Canada's commitment to low overnight rates, would cause 5-year rates to rise faster and higher than 2-year yields, thus steepening the curve to levels not seen in recent years.

**FIGURE 8**

## Canada 2y & 5y Bond Yield




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

A Portfolio Manager who wished to express this view could buy 2-year futures and sell an equal interest rate risk amount of 5-year futures without the needing to pay in cash or execute bond transactions. The manager would simply transact the positions shown in Figure 9 to attain a steepening position (or bias) in his or her portfolio of $10,000 per basis point.[9] The position shown is established at +20.0 basis points, so a move higher to +40, a value similar to the start of 2017, would result in a $200,000 gain for the portfolio. The 2-5 slope trade can also be executed conveniently by using the standard curve spread listed on the Montréal Exchange, with the 3 CGZ, 1 CGF fixed ratio of contracts.[10]

**FIGURE 9**

| POSITION | TICKER | CTD COUPON | CTD MATURITY | FUTURES CONVERSION FACTOR | DV01 /CONTRACT | TOTAL DV01 |
|---|---|---|---|---|---|---|
| 488 | CGZH21 | 0.250% | 01-Nov-22 | 0.9101 | 2.051 | 10,007 |
| -169 | CGFH21 | 0.500% | 01-Sep-25 | 0.7859 | 5.924 | -10,012 |
| | | | | | | -6 |

Source: BMO Capital Markets[i] Fixed Income Sapphire database, Montréal Exchange

## Curvature Trade - Butterfly

The CGZ contract can also be used to construct curvature trades that use (almost) no cash in a portfolio. Three futures contracts can be used to construct a 2-5-10 futures butterfly trade to exploit opportunities presented by the shape of the yield curve. Curvature trades, as the name implies, seek to profit from changes in the curvature of the yield curve by structuring a position that is long (short) a bond with a maturity date that occurs between two other bonds that are sold (bought). With futures contracts, of course, financing short positions is not necessary, effectively simplifying execution and maintenance of the trade is simplified as well.

The starting point for curvature opportunities is usually a 50/50 butterfly trade: weightings that often suffice for "micro-butterfly" positions, where the bond maturities are within one year of each other. However, for "macro" butterflies such as a 2-5-10, more complex weighting schemes are usually employed. They sometimes include a requirement that the sum of the cash outlay be constrained to zero. Of course, when using futures, the cash outlay is only the margin amount, which is minimal at the inception of the trade, so creating cash-neutral trades is generally unnecessary. We will examine a 50/50 butterfly construction as well as a modification to regression weight the butterfly.

Figure 10 shows a hypothetical construction in which an investor is short the body of a 50/50 weighted 2-5-10 butterfly, using CGZH21, CGFH21, and CGBH21 contracts. The percentage DV01 of each leg of the butterfly is in the last column, while the DV01 itself is to its immediate left. In this construction, the DV01 of each of the long positions in CGZ and CGB contracts (the wings) is one half that of the short CGF position (the body); this ensures that the net DV01 is zero. Given the absence of switch risk in any of the contracts, this futures butterfly would behave much like using the underlying bonds but with less trade maintenance.

9 In all our examples, the DV01 amount is closely matched but not identical due to the need to round figures to whole contracts.

10 Standard curve spread available and listed on the Montréal Exchange: 3CGZ-1CGF

**FIGURE 10**

| POSITION | TICKER | CTD COUPON | CTD MATURITY | FUTURES CONVERSION FACTOR | DV01 /CONTRACT | TOTAL DV01 | PERCENT WEIGHTS |
|---|---|---|---|---|---|---|---|
| 488 | CGZH21 | 0.250% | 01-Nov-22 | 0.9101 | 2.051 | 10,007 | 50.0% |
| -338 | CGFH21 | 0.500% | 01-Sep-25 | 0.7859 | 5.924 | -20,025 | -100.0% |
| 86 | CGBH21 | 2.250% | 01-Jun-29 | 0.7587 | 11.587 | 9,965 | 49.8% |
| | | | | | | -53 | -0.3% |

Source: BMO Capital Markets[i] Fixed Income Sapphire database, Montréal Exchange

The 50/50 butterfly trade can also be executed conveniently by using the standard curve butterfly listed on the Montréal Exchange.[11] The 6 CGZ, 4 CGF, 1 CGB fixed ratio of contracts allows for standardized execution and results in the positions shown in Figure 11, which is within a couple percentage points of the correct weights for a 50/50 butterfly at current yields. A manager could either keep these weights or adjust the trade by a few contracts as needed.

**FIGURE 11**

| POSITION | TICKER | CTD COUPON | CTD MATURITY | FUTURES CONVERSION FACTOR | DV01 /CONTRACT | TOTAL DV01 | PERCENT WEIGHTS |
|---|---|---|---|---|---|---|---|
| 600 | CGZH21 | 0.250% | 01-Nov-22 | 0.9101 | 2.051 | 12,304 | 51.9% |
| -400 | CGFH21 | 0.500% | 01-Sep-25 | 0.7859 | 5.924 | -23,698 | -100.0% |
| 100 | CGBH21 | 2.250% | 01-Jun-29 | 0.7587 | 11.587 | 11,587 | 48.9% |
| | | | | | | 193 | 0.8% |

Source: BMO Capital Markets[i] Fixed Income Sapphire database, Montréal Exchange

Figure 12 shows a typical regression weighted construction for a 2-5-10 bond butterfly designed to eliminate any inherent directionality in the 50/50 structure. We used linear regression to determine that the regression coefficient between 2-5 and 5-10 is 0.935; 5-10 moves 0.935 basis points for every 1 basis point move in 2-5. We then used this coefficient to weight the wings such that the wings and body still sum to zero direct interest rate risk, but the 5-10 portion of the butterfly is also slightly overweighted relative to the 2-5 portion. The resulting trade involves buying 586 CGZH21, selling 420 CGFH21 and buying 111 CGBH21, a butterfly trade with $25,000 DV01 in the body, and this trade would be free of both directional interest rate risk and slope risk.[12] It will yield a profit if the curvature of the 2-10 yield curve increases, or the curve becomes more concave to the origin.

**FIGURE 12**

| POSITION | TICKER | CTD COUPON | CTD MATURITY | FUTURES CONVERSION FACTOR | DV01 /CONTRACT | TOTAL DV01 | PERCENT WEIGHTS |
|---|---|---|---|---|---|---|---|
| 586 | CGZH21 | 0.250% | 01-Nov-22 | 0.9101 | 2.051 | 12,016 | 48.3% |
| -420 | CGFH21 | 0.500% | 01-Sep-25 | 0.7859 | 5.924 | -24,883 | -100.0% |
| 111 | CGBH21 | 2.250% | 01-Jun-29 | 0.7587 | 11.587 | 12,862 | 51.7% |
| | | | | | | -4 | 0.0% |

Source: BMO Capital Markets[i] Fixed Income Sapphire database, Montréal Exchange

11 Standard curve butterflies available and listed on the Montréal Exchange: 6CGZ-4CGF+1CGB.

12 Assuming rates behave as they have in the past year; the lookback period that we used to calculate the regression coefficient.

## Futures Basis

A futures basis trade is the simultaneous sale of futures contracts and purchase of the cheapest-to-deliver bond, in equivalent DV01 amounts. This arbitrage trade is often utilized by dealing desks seeking the cheapest hedge to recent flows but, in less severe interest rate environments, is also used by speculators to profit from cash/derivative mispricing, potential overnight rate moves, and mispricing of the embedded delivery options in the contracts.

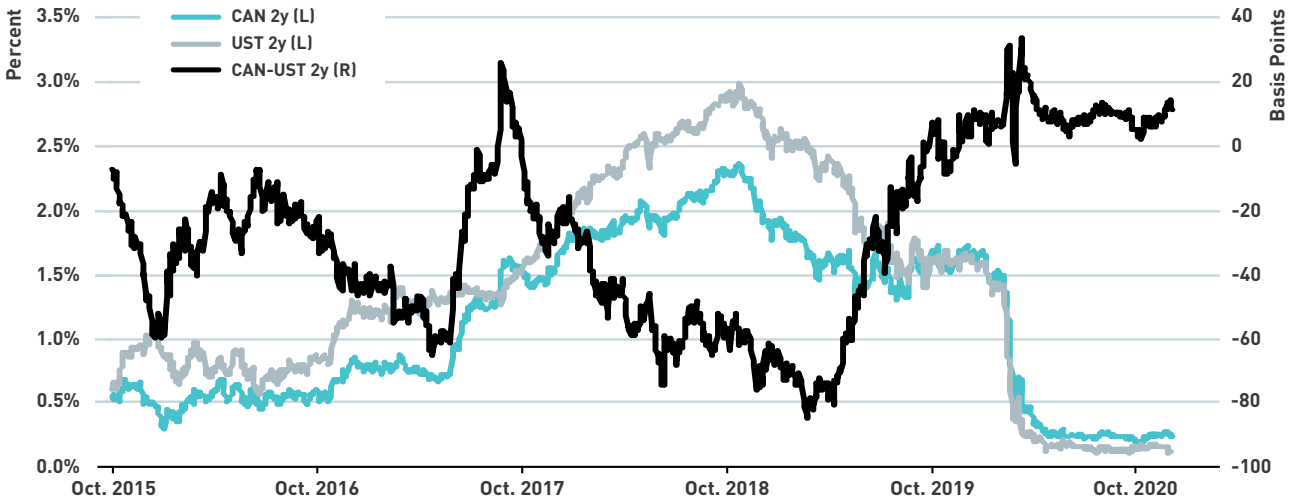
Similar to the CGB and CGF, futures basis will also be possible in 2-year futures and could be profitable if used correctly in appropriate account types. In the near future, speculators may be unlikely to spend much time looking at futures basis as a trade with profit potential, since low rates, flat curves and the Bank of Canada's promises to keep overnight rates low for the foreseeable future have resulted in broad agreement on the fair value of most physical delivery bond futures contracts. As a result, we will not construct a trading example here, but rather refer readers to an example[13] from 2016 published by the Montréal Exchange. Interested readers could also refer to the paper published for the re-launch of the CGF contract in 2018[14] in which we constructed an example of a CGF basis trade.

## Front-End Cross Currency

Another excellent use for a liquid 2-year futures contract would be to enter strategies that seek to capitalize on changes in the spread between interest rates in other countries and Canada, much like an investor can buy or sell CGB contracts against the equivalent Ultra-10-year contract trading in the United States. Although the Canada/US cross-currency trade is certainly the most popular, a strategy can also be created in which an investor speculates on (or hedges) Canadian yields against other currencies.

Figure 13 shows a plot of the 2-year bond yield in Canada and the USA, on the left axis, and the spread between the two on the right axis. As one can easily see, since 2015, the "normal" relationship between the two yields has been one where Canadian 2-year bonds have had a considerably lower yield than US bonds, with the spread between the two ranging from -80 to +30 basis points. As the figure shows, this spread is currently +10 basis points, such that a reversion to the recent mean, if it happens, would result in an increase in US 2-year yields relative to Canada's by perhaps as much as 30-40 basis points over the medium term.

**FIGURE 13**
**CAN 2y Yield v. UST 2y Yield**




Source: BMO Capital Markets[i] Fixed Income Sapphire database, Federal Reserve

A manager who shares this view could implement a strategy in which he or she buys Canadian 2-year futures and sells the equivalent DV01 amount[15] of US 2-year futures contracts. For a $15,000 CAD DV01 position, this results in the positions shown in Figure 14, after accounting for the larger underlying of the American contract[16] and the CAD/USD conversion rate in mid-December 2020. The strategy would be DV01-neutral, so an exogenous factor that affects interest rates in both countries equally would result in a net profit of zero, while only a change in the relative yield levels, or spread, between Canadian and American 2-year bond yields would result in profits or losses. The position shown is established at +10 basis points and would profit by several hundred thousand dollars if the spread between Canadian and US bonds reverted to the average of the last five years, as shown in Figure 13.

13 https://www.m-x.ca/f_publications_en/cgf_z6_en.pdf

14 https://www.m-x.ca/f_publications_en/cgf_mapping_possibilities_en.pdf

15 Be sure to adjust for the higher value of the American dollar by multiplying the local currency DV01 by the exchange rate. We use 1.278 in this example.

16 The deliverable is $200,000 notional of a bond in the delivery basket for TU contracts while the CGZ contract has a deliverable of $100,000 notional.

**FIGURE 14**

| POSITION | TICKER | CTD COUPON | CTD MATURITY | FUTURES CONVERSION FACTOR | DV01 /CONTRACT (CAD) | TOTAL DV01 |
|---|---|---|---|---|---|---|
| 731 | CGZH21 | 0.250% | 01-Nov-22 | 0.9101 | 2.051 | 14,990 |
| -269 | TUH1 | 1.625% | 15-Dec-22 | 0.9285 | 5.573 | -14,991 |
| | | | | | | -1 |

Source: Montréal Exchange, CME Group

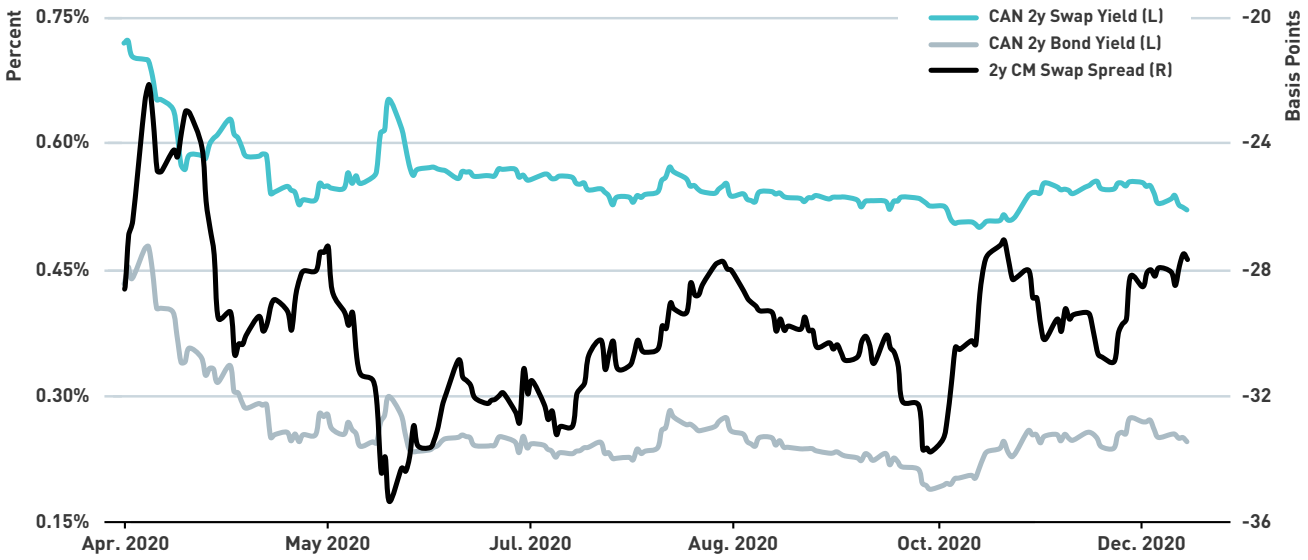
## Invoice Spread

An invoice spread is speculating (or hedging, conceivably) on the level of swap spreads using futures contracts rather than cash bonds. Like the cash bond strategy, in which an account buys a bond and then pays fixed in swaps for the same DV01 amount to establish a spread widener, an investor who executes an invoice spread simply substitutes the active futures contract for the cash bond position, thus avoiding the need to finance a purchase in the cash market or borrow securities in the repo market. A swap spread tightening position is simply the same position transacted in the opposite direction in each security.

For example, Figure 15 shows the 2-year bond and swap yields (left axis) since April 1, 2020 as well as the swap spread (right axis). As seen in the figure, the 2-year bond trades relatively cheap compared to the swap as the spread has reached -28, a level considerably above the norm for the quantitative easing era in Canada. The drop to -34 was caused by the Bank of Canada purchasing bonds in significant quantities, while the swap market remained untouched by the emergency monetary policy measures taken to combat the COVID-19 recession.

**FIGURE 15**

**Canada 2y Bond & Swap Yield**




Source: BMO Capital Markets' Fixed Income Sapphire database

An investor wishing to express a view that swap spreads will widen (go lower in Figure 15) to a level similar to June and October of this year could enter into a position where he or she buys 2-year futures contracts and pays fixed in 2-year swaps. The resulting position is shown in Figure 16 and is constructed, of course, to be DV01 neutral; a move in the overall level of interest rates will result in no profit or loss, but a change in the relative value of swaps versus bonds, specifically a richening of bonds relative to swaps, will generate profits.

It is worth noting that a 2-year swap spread trade can also be executed entirely in derivatives by buying/selling the first 8 BAX® contracts (the whites and reds) against the sale/purchase of CGZ contracts.

**FIGURE 16**

| POSITION | INSTRUMENT | CTD/SWAP COUPON | CTD/SWAP MATURITY | FUTURES CONVERSION FACTOR | DV01 | TOTAL DV01 |
|---|---|---|---|---|---|---|
| 488 | CGZH21 | 0.250% | 01-Nov-22 | 0.9101 | 2.051 | 10,007 |
| -50,400,000 | 2y Swap | 0.521% | 18-Dec-22 | NA | 1.987 | -10,015 |
| | | | | | | -8 |

Source: BMO Capital Markets[i] Fixed Income Sapphire database, Montréal Exchange

## Algorithms

The CGZ contract will also eventually be another potential instrument that can be incorporated into the models of algorithm-driven strategies. We learned during the launch of the CGF contract that minimal open interest is necessary for a trend-following or other algorithmic model to incorporate a new contract. Once the contract is established as a liquid trading point, more and more interest should develop since the 2-year point of most yield curves is typically less correlated with the 10-year point than is the 5-year. Since a liquid bond derivative already exists at the 10-year point in Canada, the CGZ may be incorporated into algorithmic models even more than the CGF.[17]

Of course, we cannot know the significance of a new factor among the hundreds or even thousands of potential inputs and instruments utilized by various numerical models using developed market fixed income instruments, but a liquid CGZ contract may eventually become a trading point for quantitative investors.

17 Especially in times of low inflation and flat curves, like in the past several years, 5-year and 10-year bonds can appear to be substitutes.

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

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