

MONTREAL EXCHANGE

# LGB: A Primer for CGB Users

The launch of the 30-Year Government of Canada Bond Futures (LGB™) brought a much-anticipated liquidity point to the futures curve in Canada. Since the contract specifications are very similar to the 10-Year Government of Canada Bond Futures (CGB™), users of CGB should be able to quickly adapt to using the new contract, especially after recent changes. In this paper we point out some characteristics of the LGB contract that users of CGB may want to take note of before trading the 30-year contract.

## Very Long Term to Maturity

The LGB contract delivery basket consists of Canadian bonds having a maturity greater than 28.5 years which, perhaps it goes without saying, means the contract will be a substitute for very long maturity bonds, normally either the current benchmark long bond in the cash market, the previous benchmark<sup>1</sup>, or even the auction bond<sup>2</sup>. Any of these bonds as the cheapest-to-deliver (CTD) bond would mean that there should be no shortage of bonds to deliver.

For the first contract with adjusted delivery rules<sup>3</sup>, the delivery basket consists of the Canada 2% December 2051 bonds (2051 Bond) and Canada 1.75% December 2053 bonds (2053 Bond), with the 2051 Bond as the likely CTD bond. The 2051 Bond is the current long bond benchmark and the 2053 Bond is the current auction bond. The former has a pandemic-related massive outstanding notional amount of almost \$52 billion, while the 2053 Bond has built already to a \$27 billion notional amount and continues to grow.

## Extension Tension?

The bonds available for the delivery basket are a function of the financing needs of the federal government and the bond issuance policy driven by those financing needs. In the past 30 years, that policy has changed infrequently. It consisted first of a new bond every two years, then changed to a new bond maturity every four years, then was reduced to every three years, and is currently back at a new bond maturity being created in the long end of the yield curve every two years.

Although we can't anticipate the funding needs of the federal government, especially at this time, we have continued the existing policy into the future to create Figure 1, which calculates the term to maturity of existing and hypothetical Canadian long bonds and whether they will be eligible for delivery into LGB contracts. In this scenario, the LGB delivery basket will change every two years with 24 months between bond maturities, which is the current auction policy of the Bank of Canada. The next change in the basket (and cheapest-to-deliver) will be when the LGBM23 gives up active contract status to the LGBU23 in late May 2023. On that date, the cheapest-to-deliver will change from the 2051 Bond to the 2053 Bond<sup>4</sup>, an extension of two years. If funding policy is unchanged<sup>5</sup>, the event would repeat itself in May 2025 for the LGBU25 contract and again in May 2027 for the LGBU27 contract.

1 For example, a scenario where bank dealers decide to switch to a new benchmark long bond when the current benchmark still has a term to maturity of greater than 28.5 years.

2 A less frequent, but very plausible scenario where the Bank of Canada has changed issuance policy to extend the difference between long bond maturity dates.

3 The first LGB contract to which the new delivery specifications will apply is the March 2023 expiry.

4 These statements assume the status quo, for the most part. Many unknowable factors will affect the calculation of cheapest-to-deliver bond for LGBU23, such as interest rate levels, slope of the yield curve, and long bond issuance/buybacks.

5 If the Bank of Canada moves back to maturity dates three years apart due to less funding requirements post-pandemic, the following delivery basket change would be delayed a year.

**FIGURE 1**

CONTRACT	FIRST DAY OF DELIVERY MONTH	EXISTING BOND MATURITY DATES			HYPOTHETICAL BOND MATURITY DATES			
		01-DEC-48	01-DEC-51	01-DEC-53	01-DEC-55	01-DEC-57	01-DEC-59	01-DEC-61
LGBH23	01-Mar-23	25.8	28.8	30.8	32.8	34.8	36.8	38.8
LGBM23	01-Jun-23	25.5	28.5	30.5	32.5	34.5	36.5	38.5
<b>LGBU23</b>	01-Sep-23	25.3	28.3	30.3	32.3	34.3	36.3	38.3
LGBZ23	01-Dec-23	25.0	28.0	30.0	32.0	34.0	36.0	38.0
LGBH24	01-Mar-24	24.8	27.8	29.8	31.8	33.8	35.8	37.8
LGBM24	03-Jun-24	24.5	27.5	29.5	31.5	33.5	35.5	37.5
LGBU24	02-Sep-24	24.3	27.3	29.3	31.3	33.3	35.3	37.3
LGBZ24	02-Dec-24	24.0	27.0	29.0	31.0	33.0	35.0	37.0
LGBH25	03-Mar-25	23.8	26.8	28.8	30.8	32.8	34.8	36.8
LGBM25	02-Jun-25	23.5	26.5	28.5	30.5	32.5	34.5	36.5
<b>LGBU25</b>	01-Sep-25	23.3	26.3	28.3	30.3	32.3	34.3	36.3
LGBZ25	01-Dec-25	23.0	26.0	28.0	30.0	32.0	34.0	36.0
LGBH26	02-Mar-26	22.8	25.8	27.8	29.8	31.8	33.8	35.8
LGBM26	01-Jun-26	22.5	25.5	27.5	29.5	31.5	33.5	35.5
LGBU26	01-Sep-26	22.3	25.3	27.3	29.3	31.3	33.3	35.3
LGBZ26	01-Dec-26	22.0	25.0	27.0	29.0	31.0	33.0	35.0
LGBH27	01-Mar-27	21.8	24.8	26.8	28.8	30.8	32.8	34.8
LGBM27	01-Jun-27	21.5	24.5	26.5	28.5	30.5	32.5	34.5
<b>LGBU27</b>	01-Sep-27	21.3	24.3	26.3	28.3	30.3	32.3	34.3
LGBZ27	01-Dec-27	21.0	24.0	26.0	28.0	30.0	32.0	34.0
LGBH28	01-Mar-28	20.8	23.8	25.8	27.8	29.8	31.8	33.8
LGBM28	01-Jun-28	20.5	23.5	25.5	27.5	29.5	31.5	33.5
LGBU28	01-Sep-28	20.3	23.3	25.3	27.3	29.3	31.3	33.3
LGBZ28	01-Dec-28	20.0	23.0	25.0	27.0	29.0	31.0	33.0
LGBH29	01-Mar-29	19.8	22.8	24.8	26.8	28.8	30.8	32.8

A two-year extension in the CTD and the resulting extension of DV01 and maturity of the CTD for the contract will probably result in volatile rolls between June and September LGB contracts, much like the roll from June to September contracts in CGB created volatility and opportunities<sup>6</sup>, except with less frequency and perhaps more impact. Assuming no change occurs in yields or the yield curve between August 2022 and the May 2023 roll period<sup>7</sup>, the DV01 difference between the LGBM23 and LGBU23 would be over 4 cents<sup>8</sup>, or an extension of just over 11%.

Figure 2 demonstrates one reason why rolling between contracts with a large difference in DV01 can result in volatile roll periods. As the level of yields changes, the fair value of the roll changes rapidly so investors that like to set a fair value bid or offer and wait for the market to come to them can't really do so as the fair value fluctuates throughout the day with every change in yield, including parallel yield curve shifts. As illustrated, a range of 20 basis points intraday (unlikely but not impossible) can change the fair value of the roll between LGBM23 and LGBU23 by almost 90 cents. The same analysis for the now-defunct one-year maturity extension on CGBM21/U21 was a change of just 40 cents for the roll on a DV01 extension of 19%. Managers that can profit from volatility will likely enjoy the June roll in LGB every couple of years.

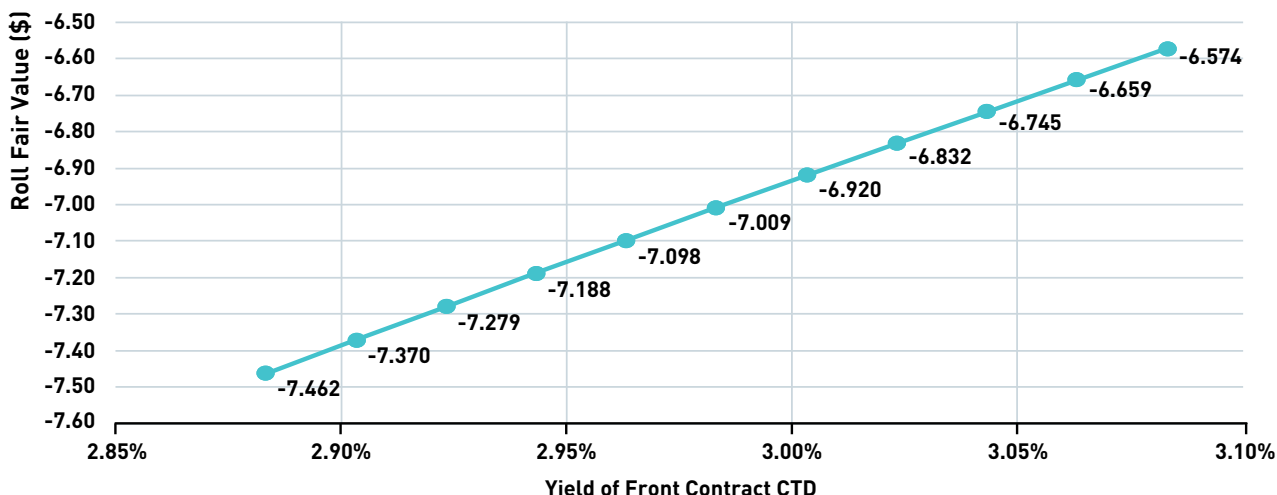
<sup>6</sup> For more on this topic, although no longer applicable to CGB, please refer to “[Jun/Sep CGB Roll: A Roll Unlike the Others](#)” published by Montréal Exchange in April 2021.

<sup>7</sup> The DV01 extension will be large regardless of interest rates level so the interest rate and slope assumptions aren't actually very important.

<sup>8</sup> In this article, DV01 measures are expressed per \$100 nominal value.

FIGURE 2

## LGBM23/LGBU23 Roll Fair Value v. Rate Level, May 25/23



## 5-Cent Minimum Price Fluctuation

The LGB has a minimum price increment of 5 cents per contract versus 1 cent per contract on CGB. For frequent traders of futures, this may seem like a large difference, but for investors with experience trading the long end of the Canadian yield curve, larger bid/offer relative to 10-year bonds will appear normal. In fact, when restated in basis points, the 1 cent price increment on a CGB contract is equal to 0.096 basis point while the 5-cent increment on LGB is equal to about 0.13 basis point due to the much larger DV01 of the LGB contract (more on this below). The net of the above is that LGB trading will be slightly more expensive than CGB transactions at the minimum price increment; trading LGB will be like trading CGB with a 1.4 cent minimum bid/ask spread.

## Implied 6% Coupon Rate & Follow-On Effects

Just like CGB, the LGB contract has an implied 6% coupon rate for the contract when the delivery specifications are established. However, for LGB, the effects of this calculation may have surprising implications for some investors.

### Very Low Conversion Factors

The first, and most important, aspect of using an implied 6% coupon rate to calculate conversion factors when yields are currently around 3% is that the conversion factors for deliverable bonds will initially be very low. In fact, the cheapest-to-deliver bond for the LGBH23 contract will have a conversion factor of just 0.4551, well below the “normal” conversion factors for CGB, which have been around 0.65 to 0.70 in recent years.

### Very High DV01

Following from the very low conversion factors for deliverable bonds on LGB contracts, the DV01 of the contract will be extremely high. If we make the safe assumption that the current cheapest-to-deliver bond is highly likely to remain the CTD, the DV01 of the contract will be the DV01 of the CTD divided by the conversion factor. For the current LGBZ22 contract, the DV01 is around 37 cents, which is more than double the DV01 of the longest maturity Canada 30-year bond, nearly fourfold the DV01 of the CGB contract, over 60% higher than the Canada ultra-long 2064 bond, and 40% higher than the Ultra 30-year US Treasury contract that trades on CME<sup>9</sup>.

### Very High Contract Prices

Since the conversion factor for the cheapest-to-deliver bond is linked to the value of the contract and of the deliverable bond at expiry, normal futures basis levels will result in high prices for the contract. In fact, the LGBZ22 contract trades at a price of over \$180 given current interest rate levels – truly atypical given that none of the bonds in the long end of the yield curve trade over \$100 currently. Beware of fat-finger order entry errors and/or set your software up to catch them!

<sup>9</sup> For purposes of comparison and representativeness, the DV01 of the Ultra 30-year US Treasury contract was measured in USD and not converted to Canadian dollar equivalent.

## Low Switch Risk

As CGB investors know, CTD math favors bonds with higher coupons and shorter maturities at yield levels under 6%. Initial contracts in LGB will almost certainly have little or no switch risk as the 2051 Bond has a 2% coupon, higher than the 1.75% coupon on the 2053 Bond. Figure 3 shows the combination of yield and slope levels that would result in a switch of CTD from the 2051 Bond to the 2053 Bond.

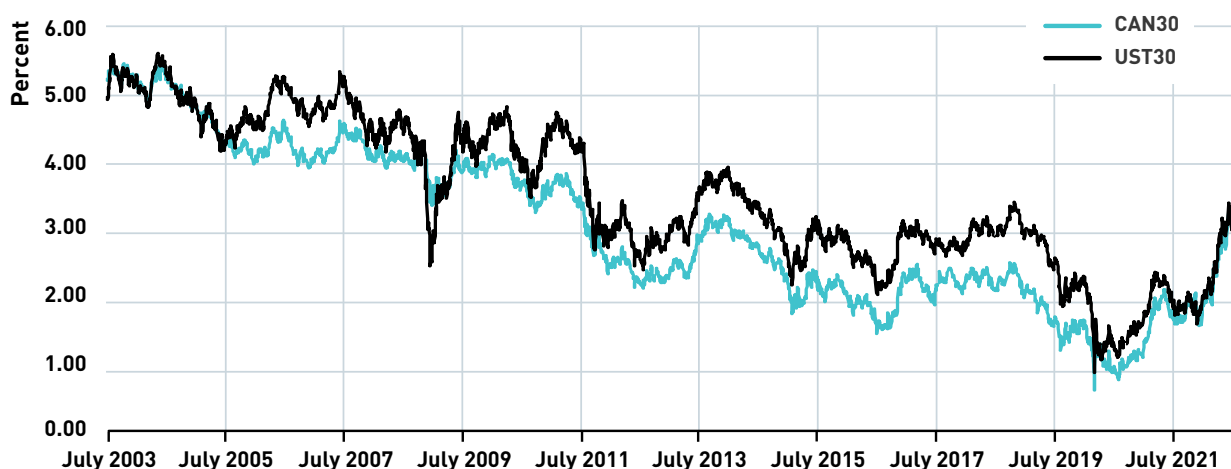
**FIGURE 3**

		Dec51 Yield														
SLOPE	2.58%	2.68%	2.78%	2.88%	2.98%	3.23%	3.48%	3.73%	3.98%	4.23%	4.48%	4.73%	4.98%	5.23%	5.48%	5.73%
-5.0	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51
-4.1	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51
-4.0	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51
-3.8	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51
-3.6	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51
<b>-0.7</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>	<b>Dec51</b>
2.4	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec53
5.6	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec53	Dec53	Dec53
8.7	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec53	Dec53	Dec53	Dec53	Dec53
11.9	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec53	Dec53	Dec53	Dec53	Dec53	Dec53	Dec53
15.0	Dec51	Dec51	Dec51	Dec51	Dec51	Dec51	Dec53	Dec53	Dec53	Dec53	Dec53	Dec53	Dec53	Dec53	Dec53	Dec53

It would take a rise in yields of at least 100 basis points (very unlikely) and a steepening of the long end of the curve by 12 basis points (even more unlikely, given that the spread between benchmark 30-year bonds and auction bonds is rarely higher than a handful of basis points, and the spread tends to decline when yields are higher) to force the 2053 Bond into CTD status. Given that Canadian and US long-term interest rates haven't seen levels approaching 5% for about 15 years, as shown in Figure 4, we can be nearly certain that a CTD switch isn't going to happen for the LGB contracts. Switch risk in LGB contracts can probably be safely ignored for now and will usually price at zero or almost zero value unless interest rates rise by hundreds of basis points.

**FIGURE 4**

## Canada & US 30Y Constant Maturity Bond Yield



Source: BMO Capital Markets' Fixed Income Sapphire database, Federal Reserve (H.15)

## No Timing Options

One category of embedded option in physical delivery futures contracts is timing options. With the recent adjustment to the delivery standards of the LGB contract, all the timing options in this contract cease to exist. The short position cannot choose to deliver at the beginning of the month rather than suffer negative carry to the end of the delivery period, nor elect to wait until the end of the month to profit from positive carry. Shorts cannot speculate on CTD price increases after the settlement price is established for LGB but before the delivery notice deadline at 5:30 pm to exercise a wildcard option<sup>10</sup>. Although rarely discussed and of virtually no value, no end-of-month option exists in the LGB contract either.

Each of the above embedded options exists in other physical delivery contracts because the holder of the short position can choose when to deliver bonds to fulfill their contract obligations. After the adjustment to the delivery standards, delivery notice must be made on the last trading day of the delivery month and delivery completed no later than two business days after. Unlike the 10-year (CGB), 5-year (CGF™), and 2-year (CGZ™) contracts, the short has no embedded options associated with the timing of delivery; only the quality option<sup>11</sup> (a choice to deliver a different eligible bond) remains.

## Summary

In summary, although the 30-year LGB contract shares almost all the characteristics of the 10-year CGB contract, investors should be aware of some potential differences that may be important to them when trading LGB, depending on their investment guidelines and style of trading. Many of the unpopular embedded options have been eliminated from the LGB contract, while the attractive features of a long duration futures contract in Canada have been retained.

<sup>10</sup> For a fuller description of how a Wildcard option exercise works, refer to "[CGB Case Study: Wildcard Option Exercise](#)" published by Montréal Exchange in July 2019.

<sup>11</sup> Also called the switch option.



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