



B Ten-Year Government of Canada Bond Futures

Removing the Bias from 5-10 Steepeners

Investors that are unfamiliar with yield curve trades should refer to the Appendix of this article for a brief introduction to their structure.

Here It Comes Again?

Astute market participants have noticed that 5-10 in constant maturity Canada bond yields has again flattened to near historical extremes over the past few months. A quick glance at Figure 1 which plots the slope of 5-10 over the past 15 years shows that the slope of that segment of the curve has been between 40 and 110 basis points for the past 10 years and, at 45 bps on June 7th, is again approaching the flattest levels observed in a decade.

Figure 1



5-10 DV01-Neutral Steepener

Source: BMO Capital Markets Fixed Income Sapphire database

Such a flattening of the 5-10 yield curve would usually be associated with a pessimistic view of the longer term economy (say 8+ years in the future) relative to the shorter term economy (say the next 3 or 4 years)¹. An unusually flat curve certainly deserves the attention of Portfolio Managers attempting to profit on market anomalies. However, one should note that a DV01-Neutral 5-10 steepener may not be the optimal way to express a yield curve view at the moment due to recent market action and historically low rates.

1. Specifically, one would normally expect short term rates to be rising as a result of central bank action against rising inflation, accompanied with a belief that the economic cycle would eventually end in a (hopefully shallow and short) recession as a result of successful central bank policy.

5-10 is a Short Position in Bonds

Figure 2 also shows the slope of the 5-10 curve on the y-axis but plots the slope relative to the level of 5y bond yields on the x-axis. The two colored areas reveal two different rate regimes; the green a regime of very low interest rates and the orange a regime of more moderate interest rates. In the orange oval, 5-10 tends to rise when interest rates are falling while in the green oval, 5-10 tends to rise when interest rates are falling.

Figure 2



5y Yield v. 5-10 DV01-Neutral Steepener (15-year History)

Source: BMO Capital Marketsⁱ Fixed Income Sapphire database

Currently the market is firmly ensconced in the green area of Figure 2 and 5-10 should not be expected to steepen except in an environment of higher interest rates.

Looking closer at the recent experience, one can observe in Figure 3, which is the same plot but looking back over only the last two years, that a steeper 5-10 curve has been associated with higher rates. In fact, over the past year, observable in Figure 3 as the cluster of observations on the right side of the chart, 5-10 has a correlation of 85% to the yield level of 5y bonds and well over 90% to the yield level of 10y bonds. Prudent investors will recognize that a 5-10 yield curve steepener is, at least for the foreseeable future, simply an expensive² way to express a bearish view on interest rates rather than a savvy exploitation of a market anomaly.

Figure 3

5y Yield v. 5-10 DV01-Neutral Steepener (2-year History)



Source: BMO Capital Marketsⁱ Fixed Income Sapphire database

2. The additional cost associated with trading two fixed income instruments instead of one. A PM could just short 10y bonds in a smaller size and achieve almost the same exposure, for example.

Removing the Short Bias with Regression Weighting

Since a 5-10 steepener with equal DV01 weights is currently subject to a heavy short bias, one good way to reduce or eliminate that bias is by using regression weights instead of equal DV01 weights. In Figure 4 we calculate that the sensitivity of the 10y rate to the 5y rate, obtained by linear regression analysis, is approximately 1.46, depending on the lookback period used in the regression and is relatively stable for lookbacks of 2 months to a full year.

Figure 4

Regression: x = 5y, y = 10 Rate

		5-10 DV01 - Neu	ıtral Steepener	5-10 Regression Weighted Steepener		
OBSERVATIONS	β	5Y DV01	10Y DV01	5Y DV01	10Y DV01	
44	1.53	10	-10	10	-6.5	
66	1.49	10	-10	10	-6.7	
125	1.46	10	-10	10	-6.8	
250	1.25	10	-10	10	-8.0	
all	0.91	10	-10	10	-11.0	

Using 1.46, the regression coefficient calculated in Figure 4 for the past 6 months or 125 trading days, we can construct a regression weighted 5-10 steepener that is short only \$6,800 DV01 of 10y bonds for every \$10,000 DV01 of long 5y bonds. Using these weights will eliminate the short bias to the 5-10 curve trade and strip out the anomalous flatness of the curve from the outright level of interest rates. Using these weights, the time series of the 5-10 slope can be re-plotted as Figure 5. From this new plot we can observe that:

- 1. The "true anomaly" of a flat curve, once the rate bias has been accounted for, is of considerably less magnitude than it appeared in Figure 1; perhaps 4 basis points in total rather than the 20 or so basis points one might have believed without compensating for the implied rate bias.
- 2. Despite the above observation, the 5-10 yield curve still appears quite flat relative to historical norms. The flattest recent point, using this regression weighting, was -1 basis point and it is now at just over +1 basis point.

Figure 5

5y Yield v. 5-10 Regression Wtd Steepener (2-year History)



Source: BMO Capital Marketsⁱ Fixed Income Sapphire database

Risks

Of course, all the usual risks associated with speculative positions apply to a regression weighted 5-10 yield curve steepener. However, there are a few additional risks associated with the regression weights that bear comment.

First, the relationship between 5y rates and 10y rates must be expected to remain the same, at least roughly, for the anticipated trade horizon. In this case, given the very low level of 5y rates, one would expect that an unanticipated rally in fixed income markets would, in fact, flatten the curve and the regression weights would protect the 5-10 steepener from losses. However, the regression weights reflect the past and we should not expect the future to be identical to the past. The relationship between 5y and 10y rates should be closely monitored as the future unfolds.

Second, regression weighting yield curve trades can sometimes result in well-known "rules of thumb" being broken. For example, the changed relative weights of the positions can cause a curve steepening trade to become net negative carry and/ or negative rolldown when one would ordinarily expect the opposite. An investor should always calculate the expected carry and rolldown in fixed income trades but the importance of taking the time to do so is elevated when using regression weights. In the case of the 5-10 regression weighted steepener discussed above, shorting fewer bonds improves the net carry and rolldown of the yield curve trade as shown in Figure 6³.

Figure 6

5-10 Steepener, DV01-Neutral

	YIELD	ASSUMED REP0	BOND DV01	POSITION DV01	1m CARRY (bps)	1m ROLLDOWN (bps)	TOTAL (bps)
GoC OTC 5y	0.956%	0.50%	4.548	10,000	0.8	0.2	1.0
GoC OTC 10y	1.421%	0.50%	9.127	10,000	-0.8	-0.1	-0.9
							0.1
							\$682

5-10 Steepener, Regression Weighted

	YIELD	ASSUMED REPO	BOND DV01	POSITION DV01	1m CARRY (bps)	1m ROLLDOWN (bps)	TOTAL (bps)
GoC OTC 5y	0.956%	0.50%	4.548	10,000	0.8	0.2	1.0
GoC OTC 10y	1.421%	0.50%	9.127	-6,841	-0.6	-0.1	-0.6
							0.4
							\$3,638

Source: CanDeal (bond yields)

CGF and CGB or Bonds?

A 5-10 yield curve trade, DV01-Neutral or regression weighted, can be executed in cash bonds, of course, but doing so can be difficult for some investors due to financing requirements and/or expensive balance sheet usage charges. Using futures contracts, especially for the short position, avoids the risk of repo specials as well as the task of rolling the repo/reverse repo market financing on a regular schedule.

To translate the 5-10 steepener described above into futures contracts, an investor would buy 173 CGFU17⁴ and sell 57 CGBU17⁵. Establishing the position in exchange-traded fixed income instruments would eliminate the financing activities, avoid the potential for repo specials in the 10y bond short⁶, and reduce the execution costs. Investors who need to execute more size than the CGF contract can accommodate could also trade cash 5y bonds against CGB which would still reduce transactions costs and eliminate the potential for surprise costs on the 10y bond short.

^{3.} Figure 6 is calculated using an assumption that overnight repo rates will be equal at 0.50% for each bond. Additionally, the calculations are a simplified, but typically quite accurate, estimate using a "basis points running" methodology.

^{4.} Approximately 4% of the current open interest and about 10% of the trading volume on June $9^{\text{th}}.$

^{5.} DV01 of a futures contract = DV01 of the Cheapest-to-Deliver position divided by the Conversion Factor.

^{6.} An implied repo will, of course, be built into the price of the futures positions but it will be known in advance. For more information, refer to Implied Repo Analysis published by MX in late 2016.

Appendix: A Brief Introduction to Yield Curve Trades

A yield curve trade, sometimes referred to as a slope trade, is a pair of fixed income positions designed to capitalize on nonparallel shifts in the yield curve due to changing macro-economic conditions or expectations. Except for relatively small second order effects, a yield curve position has no profits or losses due to outright changes in the overall level of interest rates.

General Structure

In general, to establish a yield curve position, an investor buys a fixed income instrument with a maturity of x and sells a different maturity fixed income instrument of the same issuer with a maturity of y. The difference between the yield of the instrument with maturity y is referred to as the slope of the yield curve between those two points. A yield curve trade where x<y is referred to as a yield curve steepener and will profit if the slope of the yield curve increases. The opposite trade where x>y is a yield curve flattener and will result in profits for the portfolio manager if the slope of the yield curve decreases.

Weights

An investor trading the yield curve through steepener or flattener trades must decide what relative quantity of the two fixed income instruments to buy and sell which is referred to as the hedge ratio⁷ between the two instruments. Often in yield curve trades, the hedge ratio is set such that the DV01 of the two fixed income instruments is equal but various weighting schemes are possible.

One variant is to use a regression weighted hedge ratio where the amount of the fixed income instrument that is sold is a function of that instrument's historical relationship to the fixed income instrument that is purchased. Regression weighting is essentially a way to recognize and compensate for an implied bias sometimes embedded in equal weight yield curve trades. For example, over the past year, the 5-10 bond curve has tended to steepen when 5y interest rates rise. A DV01-Neutral 5-10 steepener therefore has an implied bias to higher interest rates, assuming that relationship holds⁸ in the future. Establishing a hedge ratio where the amount of 10y bonds is equal to the historical sensitivity of 10y interest rates to 5y interest rates removes the bias implied in a 5-10 DV01-Neutral yield curve trade.

Carry & Rolldown

As with most trades, a prudent Portfolio Manager must assess the carry and expected rolldown of the yield curve trade. In general though, DV01-Neutral yield curve steepening trades are typically positive carry⁹ while flattening trades are typically negative. The carry and rolldown of a regression weighted yield curve trade is naturally a function of the weights and will often be very different from an equal weighted trade; the net carry can even flip from positive to negative or vice-versa in some cases.

Executing in Futures Contracts

Yield curve trades can be established anywhere there is liquidity and appropriate instruments. Typically they are traded on government bond curves, quasi-government bond curves, swap curves, 90d futures curves (front end), and in exchange-traded bond futures. Trading the yield curve using futures contracts on government bonds largely avoids the hassle and secondary effects ¹⁰ one might encounter when trading cash bonds or swaps.

7. Also referred to as the "weighting" of the components of the trade

9. Ensure that financing costs are included. For example, repo differentials if using cash bonds and the repo/reverse markets to finance a leveraged trade.

^{8.} Regression weighting requires more assumptions about market behavior than does the more basic DV01 neutral weighting. What is the proper lookback period for setting the regression weights? Will the past relationship hold for the investment horizon of this trade?

^{10.} Repo specials, difficulty borrowing the bond the investor is short, and spread movements for swaps and non-sovereign bonds, for example.

Full curve: The US Example

Some markets, notably the United States, have full yield curves of tradeable contracts which span many points on the curve between overnight and 30 years. In physical delivery treasury futures alone, for example, one can trade the 2y, 5y, 7y, 10y, 20y, and 30y points meaning any combination of those instruments can be utilized to construct a yield curve trade between the two points.

Canada

Canada's physical delivery futures market reflects its smaller size and fewer active investors but there are tradeable contracts to construct yield curve trades in the front end of the yield curve via BA contracts as well as 5y (CGF)¹¹ and 10y (CGB) physical delivery futures contracts.

11. Investors intending to establish a position of more than, say, \$20,000 DV01 of a CGF contract should examine the scalability of 5y (CGF) positions before executing, particularly when selling, as the 5y contract is not as liquid as the CGB.



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