

CGF as Substitute for 5y Benchmark Bonds

The Historical Experience: 2013-2016

This paper is the second in a series of analyses which will examine the broad performance of fixed income futures contracts relative to cash bond strategies. Various strategies have been examined in stages, starting with a systematic approach to using CGB futures to replicate an all-cash, long-only, strategy in Canada 10y benchmark bonds, and continuing here with an attempt to demonstrate that the aforementioned CGB strategy can be carried over to the CGF contract, despite liquidity concerns with the latter contract.

Summary

The historical performance of replicating a cash position in the Canada 5y benchmark bond using only CGF contracts has been reasonable since 2013; despite limited liquidity in the contract, and the potential for additional transaction costs incurred by rolling a futures position each quarter. Portfolio Managers should be interested in utilizing a futures replication strategy for their 5y bond holdings if they:

- Wish to outperform over medium to long investment horizons or,
- Want to increase cash available for potential withdrawals or,
- Have an interest to leverage bond holdings without running a time-consuming repo program.

Model Description & Modifications

Two total return historical series were calculated to compare their results. To generalize the models, and to reduce the assumptions about investor behavior, the management of the positions is minimized and the systematic strategies operate on very few rules.

Rather than repeat the detailed assumptions of the model here, we refer instead to “CGB as Substitute for 10y Benchmark Bonds”. The 5y replication model is identical except for the following changes.

- **Shorter Time Period.** Due to lack of data on the CGF contract, the time period is reduced to 4 years from 6 years and covers late 2012 to late 2016.
- **Scrubbed Data.** The CGB data was complete and required no adjustment. The CGF data is incomplete for some dates, recording either an End of Day bid or offer of zero. On dates that the recorded End of Day bid or offer is not complete, the Settlement Price is used, minus or plus the preceding days average bid/ask spread. This occurs on only 4 dates in the 2012-2016 dataset, always around the time of the quarterly roll. Since the quarterly roll has remained liquid, we feel that the data adjustment is not only justified, but probably conservative.

A Note on Liquidity & Scalability

Over the period studied, the CGF contract was, and remains, far less active and liquid than the CGB contract¹. This restricts the scalability of a model such as this one, although the number of contracts traded in this study never became restricted due to small volume or open interest. However, the reader should not try to apply this strategy to large 5y benchmark bond holdings (say, greater than \$20-k DV01) unless the usage of the CGF contract improves considerably.

However, if an investor is considering a strategy such as the one described here, consider that a portfolio with a long position in futures contracts always has a “safety valve” if liquidity disappears entirely; namely to simply sit back through the roll period and wait for delivery of the underlying bonds to fulfill the long positions that the portfolio holds. Doing so automatically closes the futures versus bonds portion of the strategy, and the manager is left with, at worst, a slight maturity mismatch even if the worst happens. The existence of this natural “safety valve” for the long position, should offer some reassurance to a manager considering this strategy but concerned about the small open interest for the CGF observed in some periods.

Results

As expected, the CGF strategy has closely tracked a real cash portfolio of 5y benchmark bonds over the 4 years studied. In fact, the results for the 5y version of this historical model are even better than those obtained for the 10y model.

In Figure 1, below, one can see that the CGF strategy to replicate 5y cash bonds has outperformed in each of the years between 2013 and 2016, and resulted in a total outperformance of \$72,000 over the 4 year period. In addition, despite the inherent additional volatility embedded in futures contracts², Figure 2 shows that the Sharpe ratio has also been slightly more attractive. Finally, in Figure 3 we show a plot of the weekly outperformance, and compare it to the level of 5y rates as well as the slope of the 3-5 constant maturity bond curve, in order to draw further conclusions.

Figure 1

YEAR	CGF P(L)	5Y P(L)	Difference
2013	-44,867	-54,080	9,213
2014	541,577	508,568	33,008
2015	500,100	476,444	23,656
2016	-110,452	-117,240	6,778
Total	886,348	813,692	72,655

Figure 2

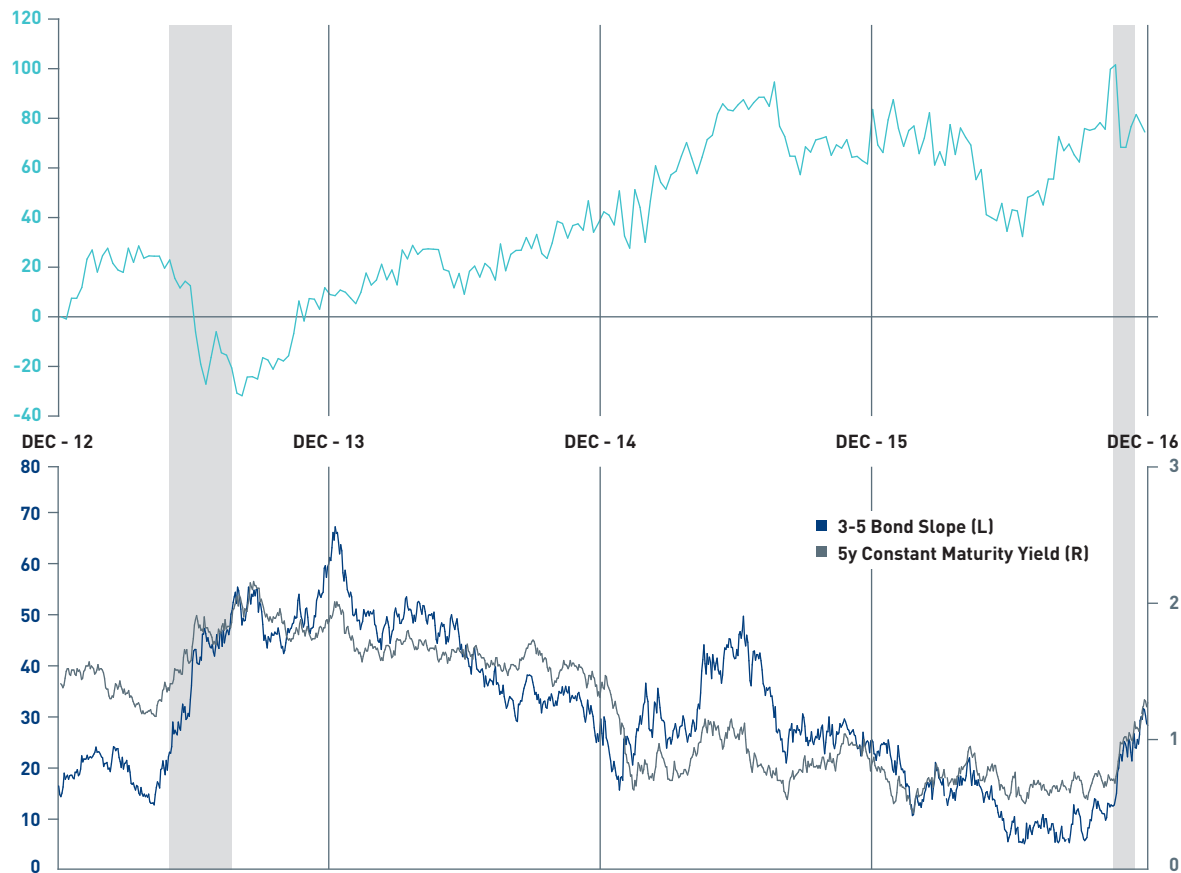
YEAR	CGF Annual Sharpe	5Y Annual Sharpe	Difference
2013	-0.2	-0.2	0.0
2014	2.2	2.1	-0.1
2015	1.4	1.2	-0.2
2016	-0.4	-0.3	0.0
Total	0.72	0.64	-0.1

1. Open interest for the active CGF contract ranged between 4000 and 16,000 versus the 400,000 or more that is common for the active CGB contract.

2. Net basis value embedded in a futures contract changes over time introducing additional volatility over a bond of equivalent DV01

Figure 3

Relative Performance Weekly P(L) (CGF minus 5y Bonds)



Source: BMO Capital Markets' Fixed Income Sapphire database

Sources of Variance

As we did in the CGB model, we have attempted to quantify the sources of variance between the 5y cash bond strategy and the CGF replication strategy. They are listed in Figure 4 and discussed in the paragraphs below.

Figure 4

VARIANCE SOURCE

	CGF Strategy out-performance
3-5 Steepening	12,000
Transation Costs	-33,300
Residual (Net Basis)	93,300
Total	72,000

Term to Maturity / Historical Steepening

Unlike the CGB strategy which suffered from a flattening of the curve during the period under study, the CGF strategy has benefited by about \$12,000 from the steepening of the 3-5 bond curve between 2013 and 2016.

In fact, where the CGB/10y model had distinct risk associated with the >1y maturity difference of the contract relative to the benchmark bond, the CGF contract bears closer resemblance to the 5y benchmark and the CTD was often the 5y benchmark bond over the period studied, making the curve risk associated with the CGF versus the 5y benchmark bond nearly negligible.

However, the CGF strategy does perform poorly in steepening years such as 2013 and 2016 due to the fact that steepening has been associated with rising interest rates, recently due to the historically low overall level of interest rates. When rates rise, the CGF contract often underperforms the 5y bond; essentially Net Basis rises as yields go higher.

Transaction Costs

Due to the wide End of Day bid/offer recorded for the CGF contract on several days, in combination with quarterly rather than semi-annual rolling to a new instrument, the transaction costs calculated for the CGF strategy are significantly higher than those of the 5y benchmark model. The additional \$33,000 of costs is a drag on the performance of the CGF strategy. However, we believe this is a conservative estimate since the model assumes transactions at full bid offer, rather than an exchange of risk as one would do when rolling from the old to new active contract. Rather than make assumptions about execution, we keep the full bid offer transaction costs but note that their magnitude may be overstated, depending on liquidity.

Net Basis (despite Low Yields)

Finally, backing out the residual of the performance difference, gives us the amount of outperformance realized by the CGF strategy, due to systematically buying futures contracts that are cheaper than equivalent bonds; \$93,000 of outperformance in the period examined.

This additional source of outperformance, comes from the positive drift of capturing the discount (essentially selling the Net Basis each quarter) associated with owning CGF contracts rather than the cheapest-to-deliver cash bond.

Conclusions

Several important conclusions can be drawn from this historical modelling exercise:

- Over the medium to long term outlook, a CGF strategy to replicate 5y bonds can outperform even after accounting for lesser liquidity in the CGF contract.
- The positive drift associated with being systematically short the Net Basis, overcomes the additional transaction costs incurred by trading a contract which has suffered from illiquidity and/or wide bid/offer at the close over the period studied. This should serve as some assurance to Portfolio Managers reluctant to trade the CGF contract.
- Since little cash is used⁴ in the CGF strategy, a manager can generate leverage from bond holdings that could be deployed elsewhere if investment guidelines permit. This leverage is generated without the need to conduct frequent and time-consuming repo/reverse repo operations.



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ⁱ 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.

⁴ Some cash is unavailable as it is posted for initial and daily variance margin of the CGF positions

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