

MONTREAL EXCHANGE

Synthetic bond portfolio

Situation

It is possible for an investor to create a synthetic bond portfolio using Government of Canada Bond futures and riskfree money market instruments such as Canada Government T-Bills. It is called a synthetic bond portfolio because bonds are substituted with paired futures and T-Bills positions. The synthetic bond portfolio will react in the same way as a bond portfolio to the different market conditions and interest rate fluctuations. Building a synthetic bond portfolio is closely related to hedging a bond portfolio, but unlike hedging, the investor actually creates a position that will replicate any price changes in the portfolio instead of offsetting them.

The investor can use the CGB contract in order to build a synthetic bond portfolio with the desired characteristics. In the following example, we will demonstrate just how easy it is to create a \$10,000,000 synthetic bond portfolio by using CGB contracts.

Objective

Synthetically create a bond investment with a preset total modified duration.

Strategy

Initial Data:

Date:	April 20, 2001
Total capital to invest:	\$10,000,000
Targeted modified duration of the portfolio:	6.5
Average yield:	5.70%
Average coupon:	6.5%
Value of a basis point:	0.0672
Cheapest bond to deliver:	CAN 6% June 1, 2011
Conversion factor of cheapest:	1
Modified duration of the CGB contract:	7.40
Value of a basis point:	0.0785
The 3-month risk-free rate is:	4.41%
The September CGB contract is priced at:	101.71

A regression using the yield of the portfolio (combination CGBs and T-Bills) and the yield of the cheapest-to-deliver bond produced a beta of 0.93.

Let us determine the hedge ratio:

$$HR = \frac{BPV_{\text{Portfolio}}}{BPV_{\text{CTD}}} \times \text{Yield beta} \times \text{Conversion factor}_{\text{CTD}}$$

$$HR = \frac{0.0672}{0.0785} \times 0.93 \times 1$$

$$HR = 0.7961$$

Number of contracts needed:

$$\frac{\$10,000,000}{\$100,000} \times 0.7961 = 79.61 \text{ ou } 80 \text{ contracts}$$

Investment Action:**Purchase 80 CGB contracts and purchase \$10,000,000 worth of T-Bills yielding 4.41%.**

Date :	June 20, 2001
CGB September contract closed at:	102.15
Average yield of portfolio:	5.69%
Gain on futures (80 x (102.15 – 101.71) x 100 basis points per contract x \$10 per basis point):	\$35,200
Interest on T-Bills \$10,000,000 x (1.044161/365 – 1):	\$72,383
Total gain on synthetic bond portfolio:	\$107,583
Accrued coupon interest 0.065 x (61/365) x \$10,000,000:	\$108,630
Gain on bond portfolio 6.5 x (0.0570 – 0.0569) x \$10,000,000:	\$6,500
Total gain on bond portfolio:	\$115,130

Results

Even if comparable, the performance of the synthetic portfolio may differ from that of the bond portfolio since variations in the parameters can cause measurable changes. Furthermore, although it is impossible to buy fractions of futures contracts, other financial instruments may be similarly or otherwise limited. The investor will benefit by observing changes in his position and managing it dynamically as his view on the market evolves.