MONTRÉAL EXCHANGE

Cross hedging: Hedging a portfolio of Canada Mortgage Bonds (CMBs)

A portfolio manager that manages a portfolio of $20 million of Canada Mortgage Bonds (CMBs) issued by the Canada Housing Trust is concerned about a potential increase in interest rates. So, the manager decides to hedge the portfolio using bond futures contracts to protect the portfolio from losing value if interest rates do rise. However as there is no exchange-traded futures contract listed on CMBs, the manager will need to cross-hedge the portfolio of CMBs.

In a cross-hedge, the manager looks for a futures contract that offers the highest possible correlation to the portfolio (as measured by the coefficient of determination $r2$) and the closest price sensitivity to the portfolio (as measured by the dollar value of a basis point). Based on an evaluation of available research data, the manager decides to use the CGF contract to cross-hedge the portfolio of CMBs.

Strategy

The portfolio manager hedges the portfolio of CMBs against a rise in interest rates by selling a specific number of CGF contracts. The manager constructs a cross-hedge using the CGF contract as it exhibits a very high correlation ($r2$ of 96%) and exhibits a very close price sensitivity to the portfolio of CMBs (a DV01 of $44.38 per $100,000 nominal value for the CGF contract compared to a DV01 of $44.30 per $100,000 nominal value for the portfolio of CMBs).

Notwithstanding the fact that the CGF contract is highly correlated to the portfolio of CMBs, the manager will need to consider the impact of the two different markets on the hedged portfolio. Specifically, the manager will need to construct the cross-hedge to take into account the yield relationship between the cash instrument (the CMBs) and the futures market (the CGF contract). Consequently, the manager must adjust the resulting hedge ratio by a factor (determined from a regression analysis of yield changes of the CGF contract on CMBs) to reflect the less than perfect correlation relationship between the two instruments.

Setting:

Price of the CGF contract (per $100 nominal value)	$118.73
CTD bond	Can 2% June 1, 2016
DV01 of the CGF contract (per $100 000 nominal value)	$44.38
DV01 of the portfolio of Canada Mortgage Bonds (per $20,000,000 nominal value)	$8,600
Hedge ratio factor adjustment (yield beta factor determined from a regression analysis)	0.75

Step 1

Determine the number of CGF contracts (hedge ratio) to sell to hedge the portfolio of CMB bonds by using the price sensitivities of the CGF contract and the portfolio of CMBs (that is, the ratio of the DV01 of the two instruments).

$$\frac{\text{CMB portfolio DV01}}{\text{CGF contract DV01}} = \frac{\$8,600}{\$44.38} \approx 193.78 \text{ contracts}$$

Step 2

Since the manager is cross-hedging the portfolio of CMBs, the manager adjusts the hedge ratio computed in Step 1 (193.78 contracts) by a factor adjustment determined from a regression analysis of yield changes of the CGF contract (based on the cheapest-to-deliver bond) on CMBs.

193.78 contracts × 0.75 yield beta factor adjustment ≈ 145.34 contracts

Therefore, the manager is required to sell 145 CGF contracts to hedge the portfolio of CMBs.