Bond portfolio duration adjustment

Adjusting the total modified duration of a portfolio to investor specifications is quite simple with the help of futures. By buying or selling futures, it is possible to increase or decrease the total modified duration of the portfolio. An investor forecasting a rise in interest rates may want to reduce the duration of his portfolio. Given the following situation, here's how they could achieve their adjustment.

SETTING:

Value of bond portfolio	$20,000,000
Total modified duration of the portfolio	6.721
Yield of the portfolio	7.737%
Targeted modified duration of the portfolio	4
Price of the CGB contract	139.95
CTD bond	Can 3.25% June 1, 2021
DV01 of the CTD bond (per $100,000 notional)	89.84
Conversion factor	0.8148
DV01 of the CGB contract	109.65

First, let's determine the dollar value of a basis point:

For the current portfolio:
20,000,000 × 6.721 × 0.0001 = $13,442

For the targeted portfolio:
20,000,000 × 4 × 0.0001 = $8,000

Difference between the actual DV01 and the targeted DV01 of the portfolio:
13,442 − 8,000 = $5,442

Therefore, the number of contracts that must be sold to obtain the desired duration is calculated as follows:

$$\frac{\$5,442}{\$109.65} \approx 49.63, \text{ or } 50 \text{ contracts}$$