

Example:

How the Deposit Franchise Offsets Losses on Long-term Bonds when Interest Rates Increase

Suppose a bank has deposits with a deposit rate beta = 1/3. This means when the interest rate goes up by 3% they expect to have to increase their average deposit rate by 1%.

To be hedged to interest rate risk, the bank should invest its portfolio as follows:

1. Hold 1/3 (equal to the deposit beta) in short-term/floating-rate assets, i.e., assets whose payouts go up one-for-one with the short-term rate f (Fed funds rate). This holding will hedge the bank's exposure to the short rate.
2. Invest 2/3 in long-term fixed rate assets whose payout does not change. This gives a constant income stream to pay the fixed operating costs of running the bank.

Initial conditions:

Suppose $f = 0\%$ today, deposit rate = 0% and the rate on 5-year bonds is 3% .

The bank's non-interest expenses (i.e., operating costs) are a constant 1.5% of assets.

Interest income = $(1/3)*f + (2/3)*3\% = (1/3)*0 + (2/3)*3\% = 2\%$.

Interest expense = 0% (deposit rate).

Net Interest Margin (NIM) = interest income – interest expense = $2\% - 0\% = 2\%$.

Return on Assets (ROA) = NIM – operating cost = $2\% - 1.5\% = 0.5\%$.

Scenario: The fed raises f to 3% :

Suppose f increases to 3% .

Suppose the rate on 5-year bonds increases to 5% (as you'll see, nothing below depends on this number).

The bank's interest income is = $(1/3)*f + (2/3)*3\% = (1/3)*3\% + (2/3)*3\% = 3\%$.

The bank's interest expense is = deposit rate = deposit rate beta * $f = 1/3*3\% = 1\%$.

What happens to the bank's NIM and ROA now that rates have gone up?

Net Interest Margin (NIM) = interest income – interest expense = $3\% - 1\% = 2\%$ (unchanged)

Return on Assets (ROA) = NIM – operating cost = $2\% - 1.5\% = 0.5\%$ (unchanged)

→ NIM and ROA are unchanged → the bank is hedged to the interest rate increase

Why does this work?

The key is that the deposit rate only went up by 1% even though the short-term rate went up by 3% . The difference saves the bank 2% on all of its deposits.

This is the value of deposits and the deposit franchise. It is one of the key things that makes a bank a bank. The bank maintains the deposit franchise by providing service to its customers.

Doing this is expensive: it is why the bank has fixed 1.5% per year operating costs.

Important Takeaways:

1. The value of the banks' long-term bonds went down when rates increased, so how is the bank hedged?

Answer: Because the value of the banks' deposit franchise went *up* by the same amount

To see this note that the bonds value went down from a value of \$100 (they are initially par bonds with a 3% coupon) to \$91.34 after the 5-year rate increased to 5%. Thus, the loss on the bonds is \$8.66.

The deposit franchise went from earning \$0 per year to earning \$2 per year. Since this will also happen for 5 years, the present value of this stream of \$2 profits discounted at 5% is also \$8.66.

→ The loss on the bonds is canceled out by the gain on the deposit franchise.

2. Because the bank knows that the deposit franchise will benefit if the interest rate increases, the bank can hold the long-term bonds.
3. To be able to pay its operating costs, the bank *needs* to hold some long-term bonds. If the bank had held all short-term assets and π remained at 0, the bank would have not had any income to pay its operating costs.
4. If the bank were to mark to market its bond holdings, then it should also mark to market the value of its deposit franchise. The deposit franchise is intangible so this is tricky from an accounting viewpoint. The practice has instead been to not mark to market either the bond holdings or the deposit franchise.
5. For the deposit hedge to work, the bank must have a good estimate of its deposit beta and it must maintain its deposit base—its customers. If the depositors run from the bank then this will obviously harm the bank's deposit franchise and the hedge won't work. Similarly, if the bank ends up having to pay much more on its deposits than it anticipated then it will also not work well. Knowing your deposit base and what deposit rates you will have to pay is one of the key parts to running a bank.