
Immunization

Veronesi, Chapter 3

Tuckman, Chapter 7

Asset-Liability Management

- Suppose you have liabilities or obligations consisting of a stream of fixed cash flows you must pay in the future.
 - Bond defeasance
 - Pension liabilities
 - Insurance liabilities
- How can you structure an asset portfolio to fund these liabilities?

Dedication

- The only completely riskless approach is to construct an asset portfolio with cash flows that exactly match the liability cash flows.
- This funding method is called *dedication*.
- This approach may be infeasible or excessively costly.
- In some situations, risk managers may want more flexibility.

Immunization

- Consider a more flexible but more risky approach, called *immunization*:
 - The liabilities have a certain market value.
 - That market value changes as time passes and as interest rates change.
- Construct an asset portfolio with
 - the same market value and
 - the same duration as the liabilities
 - so that the asset value tracks the liability value over time.
- Can include derivatives as well as fixed cash flows.

Typical Duration Mismatches

	Assets	Liabilities
Commercial banks (+)	Long-term loans	Short-term deposits
Insurance companies (-)	Short-term bonds	Long-term commitments
Pension funds (-)	Medium-term bonds	Long-term commitments
Corporations (+)	Long-term projects	Short-term debt

From Veronesi, p. 97.

Duration/Market Value Matching

- Change in value \sim -dollar duration x change in rates
- Matching the dollar duration of assets and liabilities means matching their changes in value if all rates change by the same amount—hedges against parallel yield curve shifts.
- Matching market value means liabilities are fully funded.
- Hedging against parallel shifts is really just a first step.

Structuring an Asset Portfolio

- Suppose your liabilities have market value of \$100M and duration of 6.
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- You want to structure an asset portfolio with the same market value and duration.
 - Construct an asset portfolio with just two securities:
 - A bond with price \$110 and duration 8
 - A CMO with price \$70 and duration 4
 - **Class Problem:** What are the number of units of the bond and CMO, N_1 and N_2 , in the immunizing asset portfolio?

Simply Dollar Duration Matching

- Suppose your liabilities have dollar duration of 100M and your assets have dollar duration 500M
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- You want to leave your existing assets in place and close the gap by selling forward contracts (or swaps, or futures).
 - Suppose each contract has present value zero and dollar duration of 10M.
 - **Class Problem:** How many contracts must you sell to give your net position zero dollar duration?