Chapter 11

Managing Bond Portfolios

Duration/Price Relationship

- Price change is proportional to duration and not to maturity

$\Delta P/P = -D \times [\Delta y / (1+y)]$

$D^* = D / (1+y)$: *modified duration*

$\Delta P/P = - D^* \times \Delta y$

So, D^* represent interest rate elasticity of bond's price.

11.2 Passive Bond Management

Interest Rate Risk

Interest rate risk is the possibility that an investor does not earn the promised ytm because of interest rate changes.

A bond investor faces two types of interest rate risk:

1. Price risk: The risk that an investor cannot sell the bond for as much as anticipated. An increase in interest rates reduces the sale price.

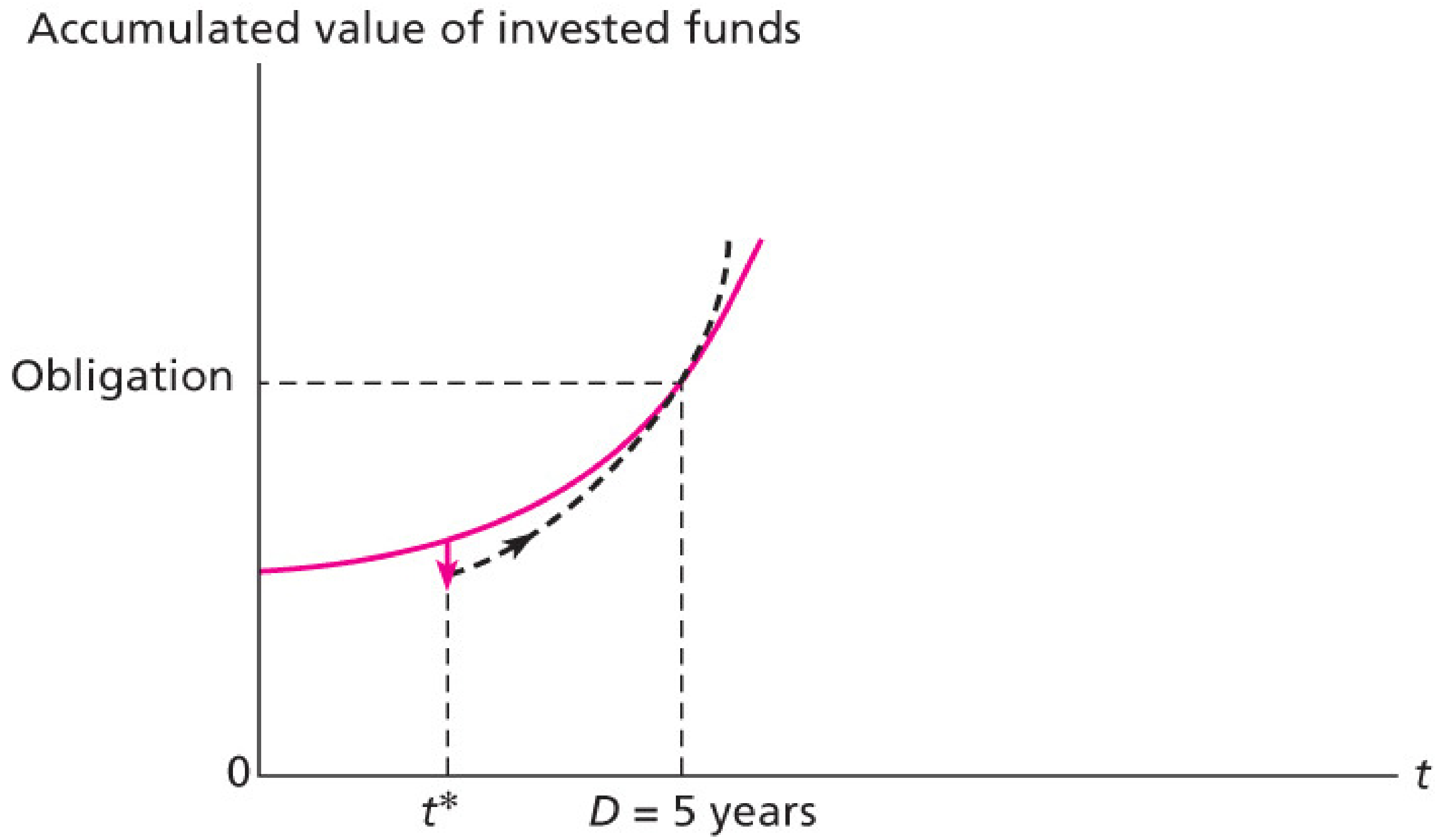
2. Reinvestment risk: The risk that the investor will not be able to reinvest the coupons at the promised yield rate. A decrease in interest rates reduces the future value of the reinvested coupons.

The two types of risk are potentially offsetting.

Immunization

- Immunization: An investment strategy designed to ensure the investor earns the promised YTM.

Growth of Invested Funds
1. Target Date Immunization

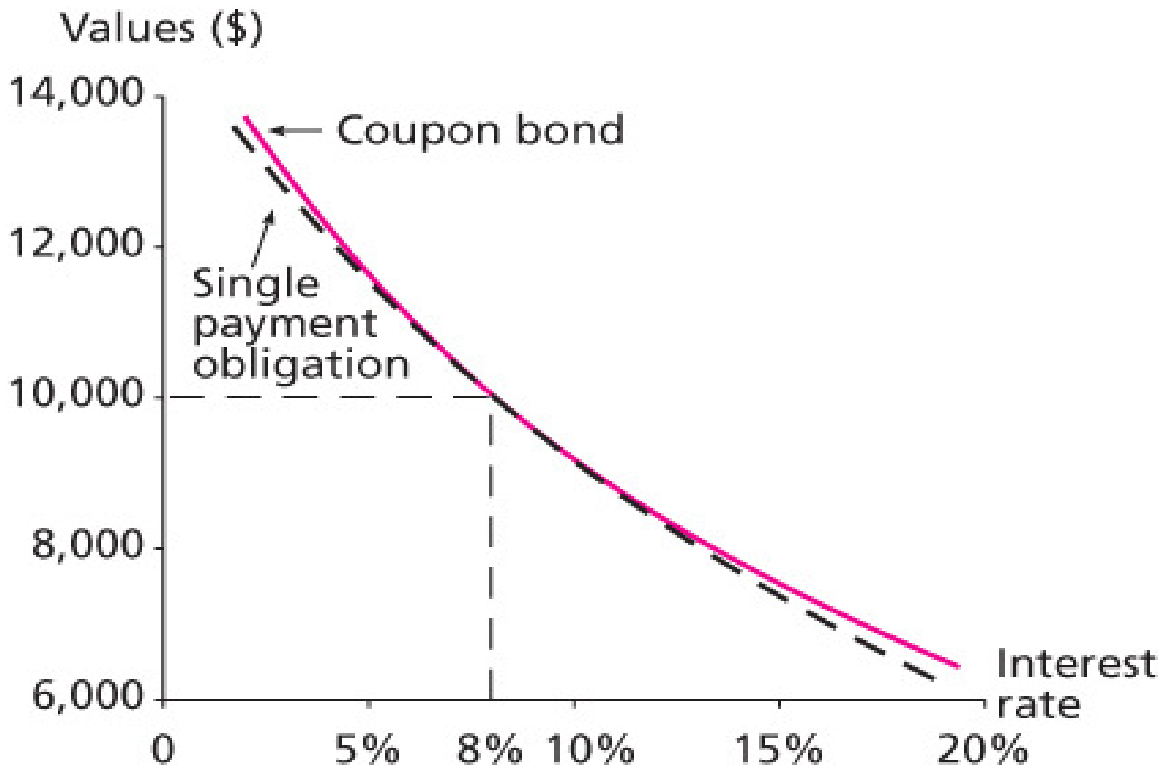


Immunization

2. Net worth immunization

- The equity of an institution can be immunized by matching the duration of the assets to the duration of the liabilities.

Figure 11.4 Immunization



Cash Flow Matching and Dedication

- Cash flow from the bond and the obligation exactly offset each other
  - Automatically immunizes a portfolio from interest rate movements

- Not widely pursued, too limiting in terms of choice of bonds

- May not be feasible due to lack of availability of investments needed

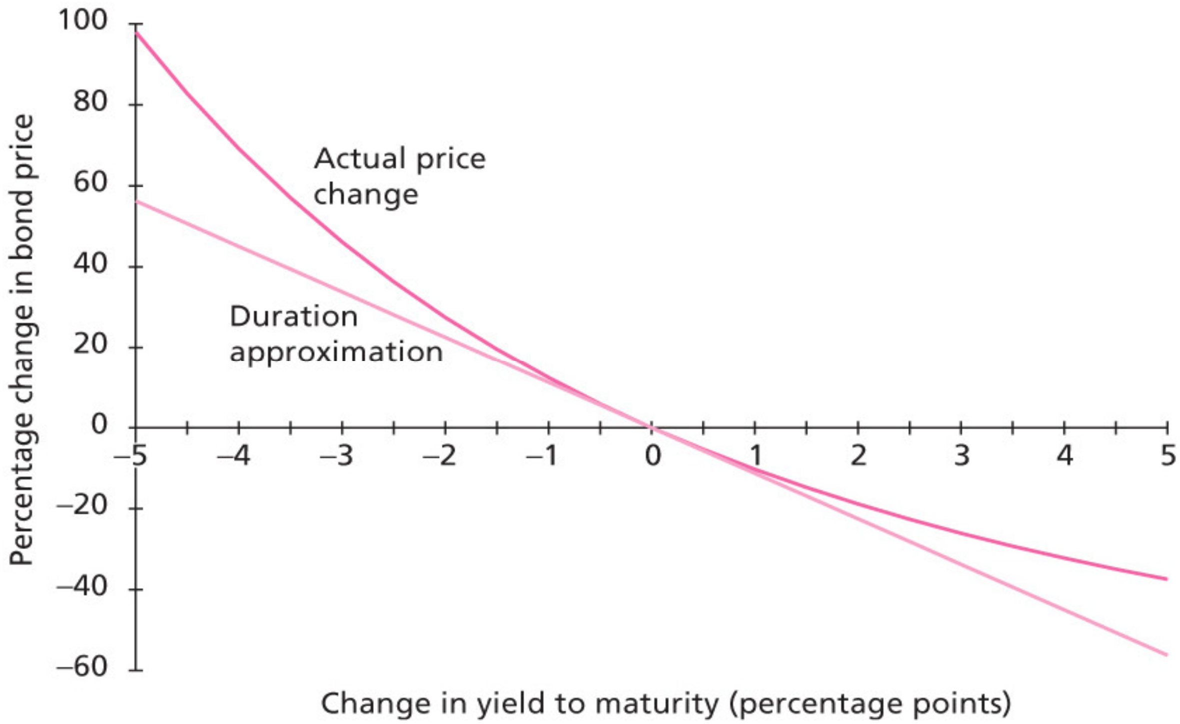
11.3 Convexity

The Need for Convexity

- Duration is only an approximation

- Duration asserts that the percentage price change is linearly related to the change in the bond's yield
  - Underestimates the increase in bond prices when yield falls
  - Overestimates the decline in price when the yield rises

Pricing Error Due to Convexity



Convexity: Definition and Usage

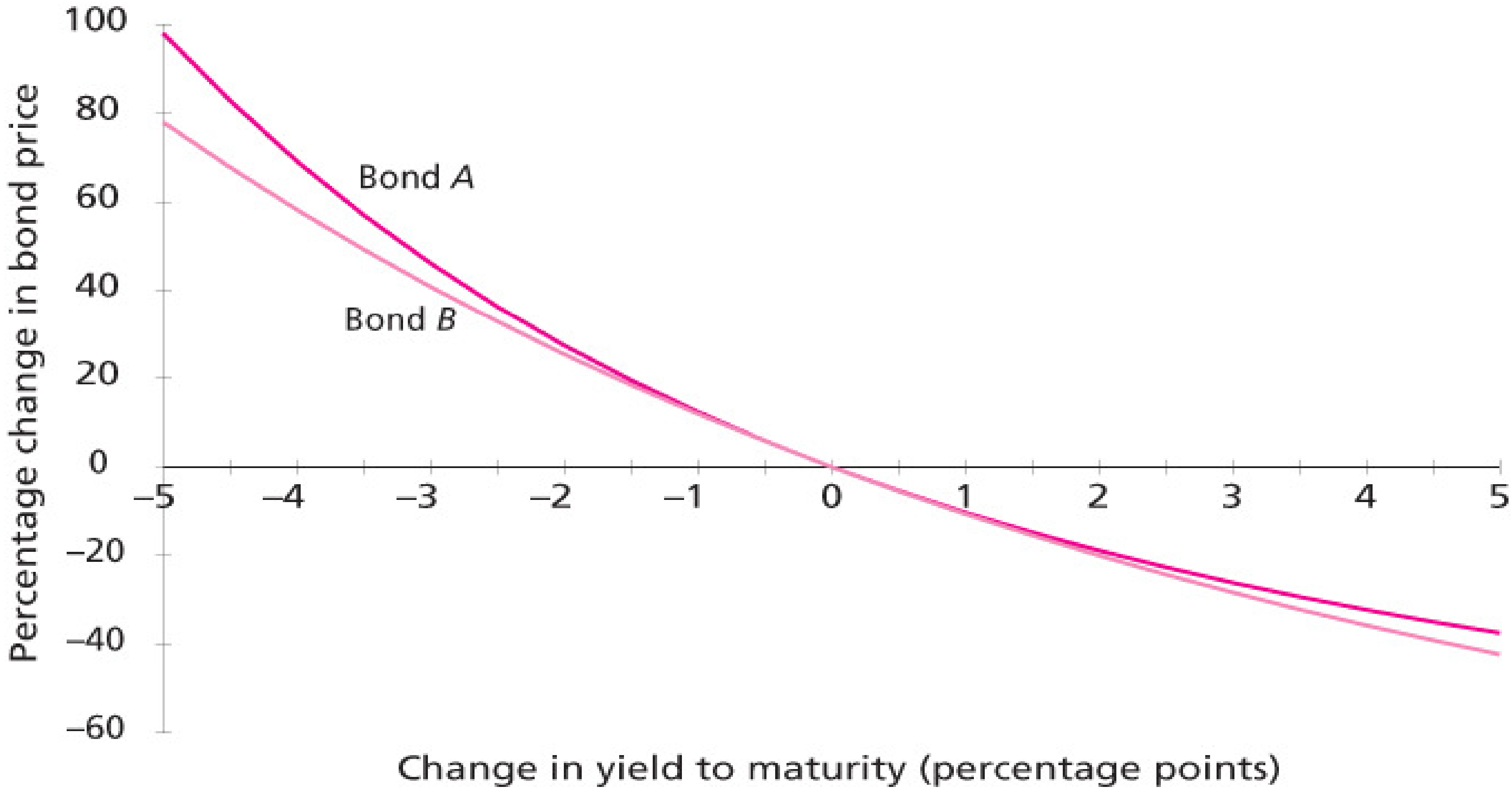
$$\text{Convexity} = \frac{1}{P \times (1+y)^2} \sum_{t=1}^{n} \left[\frac{CF_t}{(1+y)^t} (t^2 + t) \right]$$

Where: CF_t is the cash flow (interest and/or principal) at time t and y = ytm

The prediction model including convexity is:

$$\frac{\Delta P}{P} = -D \times \frac{\Delta y}{(1+y)} + \left[1/2 \times \text{Convexity} \times \Delta y^2 \right]$$

Convexity of Two Bonds



Chapter 13

Equity Valuation

Valuation Methods

- Book value
  - Value of common equity on the balance sheet
  - Based on historical values of assets and liabilities, which may not reflect current values
  - Some assets such as brand name or specialized skills are not on a balance sheet

  - Is book value a floor value for market value of equity?

Valuation Methods

- Market value
  - Current market value of assets minus current market value of liabilities
    - Market value of assets may be difficult to ascertain
  - Market value based on stock price
  - Better measure than book value of the worth of the stock to the investor.

Valuation Methods (Other Measures)

- Liquidation value
  - Net amount realized from sale of assets and paying off all debt
  - Firm becomes a takeover target if market value stock falls below this amount, so liquidation value may serve as floor to value

Valuation Methods (Other Measures)

- Replacement cost
  - Replacement cost of the assets less the liabilities
  - May put a ceiling on market value in the long run because values above replacement cost will attract new entrants into the market.
  - Tobin's Q = Market Value / Replacement Cost; should tend toward 1 over time.

13.2 Intrinsic Value Versus Market Price

Expected Holding Period Return

- The return on a stock investment comprises cash dividends and capital gains or losses
  - Assuming a one-year holding period

$$\text{Expected HPR} = E(r) = \frac{E(D_1) + [E(P_1) - P_0]}{P_0}$$

Required Return

- CAPM gave us required return, call it k:
- k = market capitalization rate

$$k = r_f + \beta\left[E(r_M) - r_f\right]$$

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- If the stock is priced correctly
  - Required return should equal expected return

=

$$\text{Expected HPR} = E(r) = \frac{E(D_1) + \left[E(P_1) - P_0\right]}{P_0}$$

Intrinsic Value

Intrinsic Value

- The present value of a firm's expected future net cash flows discounted by a risk adjusted required rate of return.
- The cash flows on a stock are?
  - Dividends (D_t)
  - Sale price (P_t)
- Intrinsic Value today (time 0) is denoted V_0 and for a one year holding period may be found as:

$$V_0 = \frac{E(D_1) + E(P_1)}{1+k}$$

Intrinsic Value and Market Price

- Market Price
  - Consensus value of all traders
  - In equilibrium the current market price will equal intrinsic value

- Trading Signals
  - If $V_0 > P_0$
  - If $V_0 < P_0$
  - If $V_0 = P_0$

Buy
Sell or Short Sell
Hold as it is Fairly Priced

13.3 Dividend Discount Models

For now assume price = intrinsic value

Basic Dividend Discount Model

Intrinsic value of a stock can be found from the following:

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t}$$

V_0 = Intrinsic Value of Stock
D_t = Dividend in time t
k = required return

What happened to the expected sale price in this formula?

- Why is this an infinite sum?
- Is stock price independent of the investor's holding period?

Basic Dividend Discount Model

Intrinsic value of a stock can be found from the following:

V_0 = Intrinsic Value of Stock
D_t = Dividend in time t
k = required return

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t}$$

- **This equation is not useable because it is an infinite sum of variable cash flows.**
- Therefore we have to make assumptions about the dividends to make the model tractable.

No Growth Model

- Use: Stocks that have earnings and dividends that are expected to remain constant over time (zero growth)

$$V_0 = \frac{D}{k}$$

  – Preferred Stock
    - A preferred stock pays a $2.00 per share dividend and the stock has a required return of 10%. What is the most you should be willing to pay for the stock?

$$V_0 = \frac{\$2.00}{0.10} = \$20.00$$

Constant Growth Model

- Use: Stocks that have earnings and dividends that are expected to grow at a constant rate forever

$$\mathbf{V_0} = \frac{\mathbf{D_0} \times (\mathbf{1} + g)}{\mathbf{k - g}}; g = \textbf{perpetual growth rate in dividends}$$

- A common stock share just paid a \$2.00 per share dividend and the stock has a required return of 10%. Dividends are expected to grow at 6% per year forever. What is the most you should be willing to pay for the stock?

$$V_0 = \frac{\$2.00 \times 1.06}{0.10 - 0.06} = \$53.00$$