Interest Rates (2/15/2011) Econ 310-008

Equations

- **$PV = FV/(1 + i)^n$** — simple loan
- $PV = FP/(1 + i)^1 + FP/(1 + i)^2 + FP/(1 + i)^3 + \ldots + FP/(1 + i)^n$ — fixed-payment loan
- **$i = (F - P)/P$** — discount bond
- **$PV = FV/(1 + i)^n + C/(1 + i)^1 + C/(1 + i)^2 + \ldots + C/(1 + i)^n$** — coupon bond
  - $FV/(1 + i)^n$ — PDV of bond selling price
  - $C/(1 + i)^1 + C/(1 + i)^2 + \ldots + C/(1 + i)^n$ — PDV of coupon payments
- $P_C = C/i_C$ — consol
- $R = i_C + g$ — rate of return
- **$i = r + \pi^e$** — fisher equation

Definitions

- ***interest rate*** – the price of time (not the price of money); price paid for rental of funds
- ***yield to maturity*** – interest rate that equates the present value of payments received from a credit market instrument with its value today
- ***present discounted value (PDV)*** – today's value of future payment
- ***cash flows*** – cash payments to holder of a security
- ***bond*** – debt security with periodic payments for a specified period of time
- ***simple loan*** – lender provides funds to borrower; at the maturity date the principal plus additional interest is due
- ***fixed-payment loan*** – lender provides funds to borrower; funds are repaid by making the same payment every period with part of the principal plus interest for a set number of years
- ***discount bond (zero-coupon bond)*** – bought at a price below face value; face value repaid on maturity date
- ***coupon bond*** – pays the owner of the bond a fixed interest payment (coupon payment) every period until the maturity date when face value is repaid
- ***consol (perpetuity)*** – a coupon bond with no maturity date and no repayment of principal

Variable definitions

- PV ≡ present value
- FV ≡ future value (or CF for cash flow)
- C ≡ coupon payment
- i ≡ interest rate
- n ≡ time to maturity (usually in years)
- R ≡ rate of return
- i_C ≡ current yield
- g ≡ rate of capital gain
- i ≡ nominal interest rate
- r ≡ real interest rate
- π^e ≡ expected inflation
- P_B ≡ price of bonds
- B^S ≡ supply of bonds
- B^D ≡ demand for bonds
- L^S ≡ supply of loanable funds
- L^D ≡ demand for loanable funds

Principles

- rise in interest rates → fall in bond prices: $i\uparrow \rightarrow P_B\downarrow$
- prices and returns are more volatile for long term bonds than short term bonds
- even bonds with huge interest rates can have negative returns if interest rates rise
- when holding periods don't match maturity periods, there is interest rate risk
- some factors influence both supply and demand (e.g., expected inflation)
- bond price and the interest rate are inversely related, so when we see bond price go down that means interest rate goes up
- Keynes talked about the liquidity effect.
- Friedman rebutted him by noticing the other secondary effects.

Types of credit market instruments

- simple loan
- fixed-payment loan (fully amortized loan)
- discount bond (zero-coupon bond)
- coupon bond

Determinates of Bond Supply

- profitability of investments: I profitability$\uparrow \rightarrow B^S\uparrow$
- expected inflation: $\pi^e\uparrow \rightarrow B^S\uparrow$
- government deficit: $(G - T)\uparrow \rightarrow B^S\uparrow$

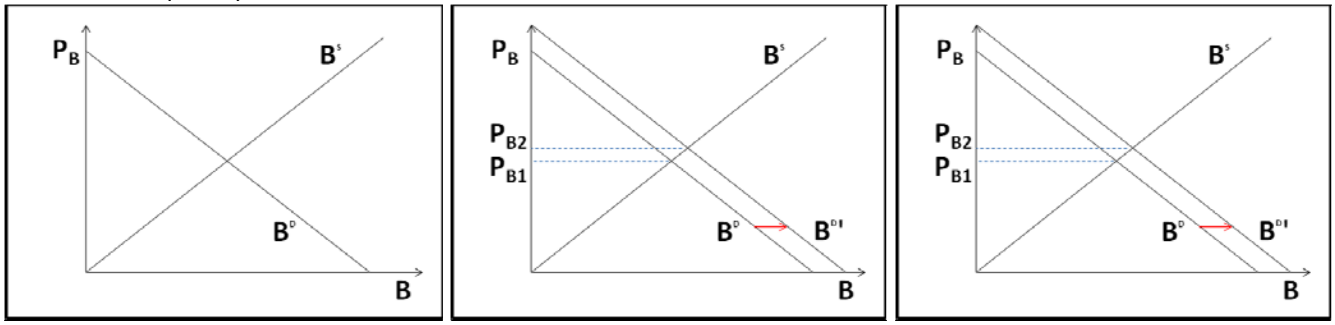
Determinates of Bond Demand

- wealth: $W\uparrow \rightarrow B^D\uparrow$
- expected returns: $R^e\uparrow \rightarrow B^D\uparrow$
- risk or uncertainty: risk$\uparrow \rightarrow B^D\downarrow$
- liquidity: liquidity$\uparrow \rightarrow B^D\uparrow$

Effects on interest rate

- liquidity effect: $M^S\uparrow \rightarrow i\downarrow$
- income effect: $M^S\uparrow \rightarrow W\uparrow, y\uparrow \rightarrow i\uparrow$
- price-level effect: $M^S\uparrow \rightarrow P\uparrow \rightarrow i\uparrow$
- fisher effect: $M^S\uparrow \rightarrow \pi^e\uparrow \rightarrow i\uparrow$

Bond market (stock):



Loanable funds market (flow):