

TA Info

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1 Review, Chapter 4

1.1 Present value

If you are entitled to a stream of cash flow, CF_1, CF_2, \dots, CF_n for n periods, and you know the interest rate is i , we can calculate the present value of this bond using the following formula:

$$PV = \frac{CF_1}{1+i} + \frac{CF_2}{(1+i)^2} + \dots + \frac{CF_n}{(1+i)^n} \quad (1)$$

How should we interpret present value? For a lender/saver, the present value is the amount she would be willing to pay for an asset that returns the given cash flow. For a borrower, it's the amount he can borrow today if he pays it back with the given payments over time.

1.2 Yield to maturity

If we know the current price of an asset (PV) and the future cash flow from an asset we can compute and implied interest rate from 1. This is the **Yield to maturity**. Using this, we can compare the performance of differently structured assets.

- Simple loans: YTM = simple interest rate
- Fixed-payment loans: $LV = \frac{FP}{1+i} + \frac{FP}{(1+i)^n} + \dots + \frac{FP}{(1+i)^n}$
- Coupon bond: $P = \frac{C}{1+i} + \frac{C}{(1+i)^n} + \dots + \frac{C}{(1+i)^n} + \frac{F}{(1+i)^n}$
 - If sold at face value ($P = F$) then YTM is coupon rate.
 - Price of coupon bond and YTM are *negatively* related. Higher price \Rightarrow lower YTM
 - If $P > F$, then YTM is less than the coupon rate
- Perpetuity/consol (Pays fixed payments forever): $P = \frac{C}{1+i} + \frac{C}{(1+i)^2} + \dots = \frac{C}{i}$
- Discount bond $P = \frac{F}{1+i^n}$, so for a 1-year maturity ($n = 1$) we have $i = \frac{F-P}{P}$

Rate of return is the sum of payments plus the change in security's value as a fraction of current price of the asset. Put another way: $R = \text{YTM} + \text{asset price growth rate}$

- Return on a bond held for from t to $t + 1$:

$$R = \frac{C + P_{t+1} - P_t}{P_t} = \underbrace{\frac{C}{P_t}}_{\text{current yield}} + \underbrace{\frac{P_{t+1} - P_t}{P_t}}_{\text{capital gain rate}}$$

Rate of return will typically differ from YTM on account of price fluctuations.

1.3 Maturity and Volatility of Bond Returns: Interest-rate Risk

Longer-term bonds are more volatile than shorter-term ones. (Why?)

1.4 Real vs. Nominal Interest Rates

Fisher equation: Nominal interest is real interest plus inflation rate $i = r + \pi$

1.5 Some Useful Formulae

Geometric sums: for $-1 < r < 1$

$$1 + r + r^2 + r^3 + \dots + r^n = \frac{1 - r^{n+1}}{1 - r}$$

$$1 + r + r^2 + r^3 + \dots = \frac{1}{1 - r}$$

2 Preview, Chapter 5

Change in **Quantity Demanded** (movement along a demand curve)

vs.

Change in demand (shift of demand curve)

2.1 Bond market

Suppliers of bonds: Borrowers/spenders

Demanders of bonds: Lenders/savers

2.1.1 Demand for bonds increases (shifts right) when

- Wealth (total resources, including all assets, owned by an individual) goes up
- Expected rate of return (return expected over next period) of **other** assets relative to bonds goes **down**
- **Expected** price of bonds in the future goes up
 - Expected inflation falls
 - Expected interest rate fall
- Risk of **other** assets relative to bonds goes **up**
- Liquidity (ease and speed with which an asset can be converted to cash) of bonds goes up relative to other assets

2.1.2 Supply of bonds increases (shifts right) when

- Expected future profit opportunities increases
- Expected inflation increases
- Government deficit increases

2.1.3 Note:

- Bond **prices** are negatively correlated with **interest rates** (see YTM equation)
- Fisher effect: If expected inflation increases, the demand for bonds decreases, and the supply of bonds increases
 ⇒ Prices fall/interest rates rise

3 Practice questions

1. A situation in which the quantity of bonds supplied exceeds the quantity of bonds demanded is called a condition of *excess supply*. Because people want to sell _____ bonds than others want to buy, the price of bonds will _____.
 - (a) more; fall
 - (b) fewer; fall
 - (c) more; rise
 - (d) fewer; rise

Answer: (A). Excess supply is when people want to sell more than people want to buy at the given price. To restore equilibrium, the price must **fall** the reduce the *quantity* supplied and increase the *quantity* demanded.

2. A factor that could cause the supply of bonds to increase (shift to the right) is:
 - (a) a decrease in expected inflation.
 - (b) a decrease in government deficits.
 - (c) expectations of more profitable investment opportunities.
 - (d) a business cycle recession.

Answer: (C). If firms expect more profitable investment opportunities in the future, they will want to borrow more (sell more bonds) to raise the funds to take advantage of those opportunities.

3. Other things being equal, an increase in the default risk of corporate bonds shifts the demand curve for corporate bonds to the _____ and the demand curve for Treasury bonds to the _____.
 - (a) left; left
 - (b) left; right
 - (c) right; right
 - (d) right; left

Answer: (B). Lenders will be willing to purchase fewer corporate bonds at all prices (demand shifts left) because corporate bonds are less valuable (higher risk). At the same time, Treasury bonds are now **relatively** less risky, so demand for them increases at all prices (demand shifts right)

4. Everything else held constant, if the expected return on U.S. Treasury bonds falls from 8 to 7 percent, and the expected return on corporate bonds falls from 10 to 8 percent, then the expected return of corporate bonds _____ relative to U.S. Treasury bonds and the demand for corporate bonds _____.
 - (a) rises; falls
 - (b) falls; falls
 - (c) rises; rises
 - (d) falls; rises

Answer: (B). Corporate bond return falls 20% while Treasury bond return falls only 12.5%. Thus relative to Treasury bonds, the return on corporate bonds falls, and thus demand falls as well.

5. During a recession, the supply of bonds _____ and the supply curve shifts to the _____, everything else held constant.
 - (a) increases; left
 - (b) increases; right
 - (c) decreases; right
 - (d) decreases; left

Answer: (D). Supply of (corporate) bonds falls (supply shifts left), because profit opportunities fall. Because the question doesn't specify the type of bond, you could also make an argument for (B), because government borrowing typically increases in a recession, so government bond supply would increase.

6. A bond with default risk will always have a _____ risk premium, and an increase in its default risk will _____ the risk premium.
- (a) positive; raise
 - (b) positive; lower
 - (c) negative; raise
 - (d) negative; lower

Answer: (A). To make up for the risk, a risky asset must pay a **higher** interest rate (positive risk premium), in order to attract lenders away from lower risk alternative assets. The higher the risk, the higher the risk premium.