

Stock Valuation

Corporate Structure

- Most firms in the US are organized as limited liability corporations.
- There is no one that “owns” the firm and who is liable if the firm’s actions cause harm.
- The corporation is a “black-box” which generates cash flows.
- The corporation is defined by:
 - The contracts or rules that govern the **distribution** of the firms cash flows
 - The contracts or rules that govern its **control rights**

The Value of a Corporation

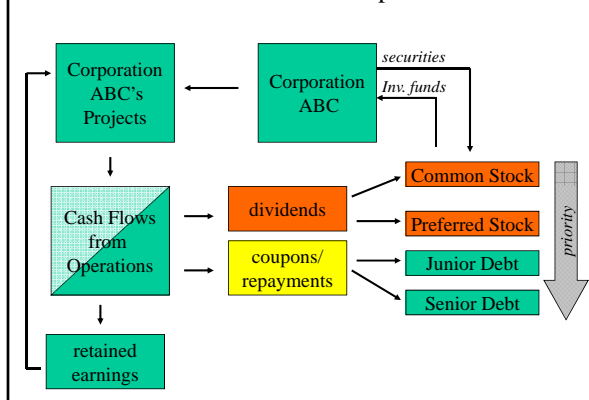
- A corporation’s **Capital Structure** is the set of securities it has issued to raise funds
- The typical securities are
 - Senior debt, Junior debt, Preferred stock & Common stock.
- The value of each of these securities is given by the PV of the share of the future cash flows that they will receive.
- The value of the corporation is the PV of all future cash flows generated by its assets. Which equals the sum of the values of all of its securities.
- For example the value of firm ABC would be

$$V(\text{ABC}) = V(\text{Senior Debt}) + V(\text{Junior Debt}) + V(\text{Preferred Stock}) + V(\text{Common Stock})$$

Priority in the Division of Cash Flows

- Senior and Junior Debt are often coupon bonds
- Senior debt has the highest **priority**: if the firm has to liquidate, the senior debtholders have the first claim on the firm’s assets.
- Preferred Stock is paid a fixed, pre-specified dividend.
- Common stock dividend can only be paid when the debtholders and preferred stock holders have been paid.
- When firms earn more profits than are necessary to pay the debt and preferred dividends, then all the **residual** goes to the stockholders (the **residual claimants**)

The Flow of Funds in a Public Corporation



What about control rights?

- Common stock holders (or equity holders) are the residual claimholders, they also have the residual control rights.
- Major issues are decided by equity holders based on a one-share one-vote system.
- Less important issues are decided by the board of directors, whose members are elected by the common stock holders.
- The management, appointed by the board, is obligated to act in the best interest of share holders.
- Debt holders have the control right spelled out in the **bond covenants** (or US Bankruptcy Code)
- The bond covenants specify that the control of the firm reverts to the bond holders in the event that the firm does not pay a coupon or principal payment on its debt or violates a debt covenant.

Calculating firm value: Firm ABC's debt has 20,000 coupon bonds outstanding. These bonds are currently trading at a price of \$10,000/bond. In addition, there are 12M shares of ABC outstanding, currently trading at a price of \$12/share. What is present value of ABC's future cash flows according to the market?

The total **Market Value** of ABC's debt is:

The total market value of ABC's stock is:

The total market value of ABC and the PV of future cash flows is:

Common Stock Dividends

Terminology: The process of paying dividends involves four key dates

- **Announcement Date:** when the firm publicly announces the date and the amount of the dividend.
- **Ex-Date:** if buy the share before, you will receive the dividend (the share is sold **cum-dividend**). If you buy on or after, you will not receive the dividend (the share is sold **ex-dividend**).
- **Record Date:** when the company checks its records to see who to send the dividend checks to.
- **Payment Date:** when the firm actually pays the dividend (a week or so after the record date).

At open on the ex-date the price falls by (approximately) the amount of the dividend – if it did not, there would be an arbitrage opportunity.

Dividends and Capital Gains



Calculating the return on common stock

- The owner of common stock earns returns in two ways
 - Price appreciation or **Capital Gains**
 - **Dividends**
- Between time 0 and time 1 the total return on a common stock is:

$$r_{0,1} = \underbrace{\frac{P_1 - P_0}{P_0}}_{\text{Capital Gains Return}} + \underbrace{\frac{D_1}{P_0}}_{\text{Dividend Return}}$$

Example: (*General Motors*) On January 22, 2002, GM closed at \$48.48 per share. On January 21, 2003, GM was trading at \$37.55 pre share. During that time, GM paid a \$2 dividend (just prior to January 21, 2003).

- If you had held GM over this period, what would your total return have been?
- What part of your return was due to the dividend, and what part to the capital gain?
- What was GM's dividend yield on January 22, 2002.

Example: Actually, GM paid quarterly dividends of \$0.50 on:

- (1) February 12, 2002 (P = \$50.77)
- (2) May 15, 2002 (P=\$66.40)
- (3) August 14, 2002 (P=\$45.71)
- (4) November 12, 2002 (P=\$33.95)

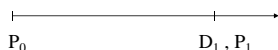
All of the above prices are the first *ex-dividend* price. Calculate the total return from holding GM over this year if all dividends are reinvested into GM's stock.

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Stock Valuation

Today Ex-Date 1



Notation:

- P_0 is the current price per share of the stock today ($t=0$) of firm "ABC"
- $E(P_1)$ is the expected ex-dividend price to be in one year
- $E(D_1)$ is the expected dividend to be paid in one year
- r^* is the return investors expect to earn on stocks comparable in risk to the stock of firm "ABC" over this period.

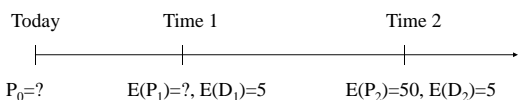
Example: If the expected price $E(P_1)=\$50$, the expected dividend $E(D_1)=\$5$ and the investors expected return is $r^*=0.10$ then the price must be...

What if the price of ABC were \$49.50? Then you could earn return...

Investors would rush to sell the other comparable stocks and buy ABC, pushing the price up to \$50

Where do we get $E(P_1)$????

$P_0 = \text{PV of all future dividends}$



We can find out the price at time 1 by using the price at time 2...

Now that we have the price at time 1 we can find the current price...

$$P_0 = \frac{E(P_1) + E(D_1)}{1 + r^*} = \frac{\left(\frac{E(P_2) + E(D_2)}{1 + r^*} \right) + E(D_1)}{1 + r^*} = \frac{E(D_1)}{1 + r^*} + \frac{E(D_2)}{(1 + r^*)^2} + \frac{E(P_2)}{(1 + r^*)^2}$$

If we continue this forever...

Using the price at Time N, P_N ...

$$P_0 = \sum_{t=1}^N \frac{D_t}{(1 + r^*)^t} + \frac{P_N}{(1 + r^*)^N}$$

Taking N to infinity gives us the formula,

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + r^*)^t}$$

So ... the current price is the PV of all future dividends.

The Gordon Growth Model

Assumptions:

- The share price is the PV of all future dividends
- Dividends are paid yearly. The next dividend is one year from now and is expected to be D_1
- Dividends are expected to grow at rate g forever.
- r^* (the expected return on comparable firms) will remain constant at r where $r > g$ (r is called **discount rate, cost of capital and market capitalization rate**).

Under these assumptions the current share price is the PV of a growing perpetuity:

$$P_0 = \frac{D_1}{r - g}$$

Example: ABC is expected to pay a \$5 dividend in one year.

Thereafter dividends are expected to **grow at a rate of 5%** per year indefinitely. The appropriate discount rate for ABC is 10%. What should ABC's price be?

What if $g = 9\%$?

What if $g = 1\%$?

The Dividend Yield

We can rearrange the Gordon Growth Model equation to give the expected return on a stock as a function of the dividend yield and growth rate.

$$P_0 = \frac{D_1}{r - g} \Rightarrow r - g = \frac{D_1}{P_1}$$
$$\Rightarrow r = g + \frac{D_1}{P_1}$$

The expected return on a stock equals the dividend yield plus the dividend growth rate.

Example: As of January, 2003, the expected dividend yields of GM and Microsoft were 5.33% and 0.29%, respectively. Assuming that investors' expected returns of 12% on both Microsoft and GM, and assuming a constant dividend growth rate, what "g" were investors expecting for the two firms?

$$r = g + \frac{D_1}{P_1} \Rightarrow g = r - \frac{D_1}{P_1}$$

Microsoft growth

GM growth