VALUING STOCKS

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WHY IS IT IMPORTANT TO HAVE A THEORY OF THE VALUATION OF COMMON STOCKS?

- MANAGERS SHOULD BE MAKING DECISIONS WHICH INCREASE SHARE PRICE
  - NEED TO UNDERSTAND HOW SHARE PRICE IS DETERMINED
- CASES WHERE WE CANNOT DIRECTLY OBSERVE STOCK PRICE
  - WE ARE TRYING TO VALUE
    - A DIVISION OF A COMPANY
    - PRIVATELY HELD FIRM FOR POSSIBLE SALE

STOCKS & STOCK MARKET

Common Stock - Ownership shares in a publicly held corporation.

Secondary Market - market in which already issued securities are traded by investors.

Dividend - Periodic cash distribution from the firm to the shareholders.

P/E Ratio - Price per share divided by earnings per share.

STOCKS & STOCK MARKET

Book Value - Net worth of the firm according to the balance sheet.

Liquidation Value - Net proceeds that would be realized by selling the firm's assets and paying off its creditors.

Market Value Balance Sheet - Financial statement that uses market value of assets and liabilities.

IF I AM GOING TO HOLD A STOCK FOREVER

- **PRICE OF THE STOCK**
  =PV(EXPECTED FUTURE DIVIDENDS)

VALUING COMMON STOCKS

Dividend Discount Model - Computation of today's stock price which states that share value equals the present value of all expected future dividends.

$$P_0 = \frac{Div_1}{(1+r)^1} + \frac{Div_2}{(1+r)^2} + \ldots + \frac{Div_H + P_H}{(1+r)^H}$$

H - Time horizon for your investment.

VALUING COMMON STOCKS

Example

Current forecasts are for XYZ Company to pay dividends of $3, $3.24, and $3.50 over the next three years, respectively. At the end of three years you anticipate selling your stock at a market price of $94.48. What is the price of the stock given a 12% expected return?

VALUING COMMON STOCKS

Example

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$$PV = \frac{3.00}{(1+.12)^1} + \frac{3.24}{(1+.12)^2} + \frac{3.50+94.48}{(1+.12)^3}$$

$$PV = \$75.00$$

LET'S SEE HOW MUCH SOMEONE WILL PAY FOR THE STOCK TODAY

- HOW MUCH SHOULD THE PERSON WHO BUYS IT FROM ME PAY FOR THE STOCK NOW (P_0)

- IF SHE IS GOING TO RECEIVE A DIVIDEND AT THE END OF THE PERIOD (DIV_1)
- AND THEN SHE IS GOING TO SELL IT

(AT A PRICE P_1)?

$$
\begin{aligned}
P_0 &= \frac{\mathrm{DIV}_1 + P_1}{1+r} \\
&= \frac{\mathrm{DIV}_1 + \dfrac{\mathrm{DIV}_2 + P_2}{1+r}}{1+r} \\
&= \frac{\mathrm{DIV}_1}{1+r} + \frac{\mathrm{DIV}_2}{(1+r)^2} + \frac{P_2}{(1+r)^2}
\end{aligned}
$$

WE HAVE NOW SUCCEEDED IN RELATING TODAY'S PRICE TO:

- EXPECTED DIVIDENDS IN YEARS 1 AND 2, DIV1 AND DIV2
- EXPECTED PRICE AT END OF YEAR 2, *P*2

- WE CAN REPEAT THE PROCESS

LET'S SEE HOW MUCH SOMEONE WILL PAY FOR THE STOCK IN TWO YEAR'S TIME

- HOW MUCH SHOULD THE PERSON PAY FOR THE STOCK IN TWO YEAR'S TIME (*P2*)
- IF SHE IS GOING TO RECEIVE A DIVIDEND AFTER ONE YEAR (DIV3)
- AND THEN SHE IS GOING TO SELL IT
- (AT A PRICE *P3*)?

$$P_0$$

$$= \frac{\mathrm{DIV}_1}{1+r} + \frac{\mathrm{DIV}_2}{(1+r)^2} + \frac{P_2}{(1+r)^2}$$

$$= \frac{\mathrm{DIV}_1}{(1+r)} + \frac{\mathrm{DIV}_2 + \dfrac{\mathrm{DIV}_3 + P_3}{(1+r)}}{(1+r)^2}$$

$$= \frac{\mathrm{DIV}_1}{1+r} + \frac{\mathrm{DIV}_2}{(1+r)^2} + \frac{\mathrm{DIV}_3}{(1+r)^3} + \frac{P_3}{(1+r)^3}$$

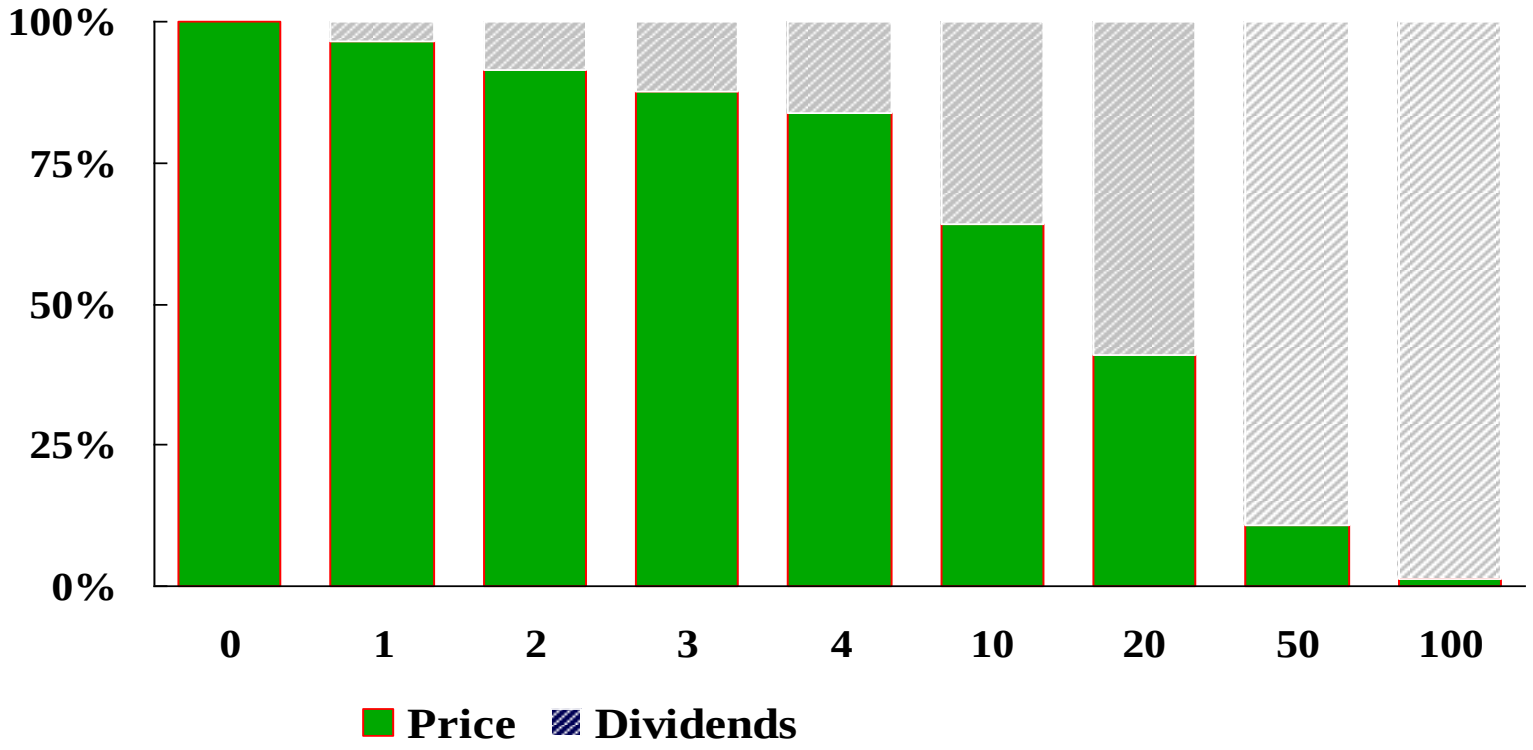
$$P_0 = \frac{DIV_1}{1+r} + \frac{DIV_2}{(1+r)^2} + \frac{DIV_3}{(1+r)^3} + \ldots\ldots + \frac{DIV_H + P_H}{(1+r)^H}$$

$$= \sum \frac{DIV_H}{(1+r)^H} + \frac{P_H}{(1+r)^H}$$

- NOW THE PRICE OF THE STOCK IS OBVIOUSLY INDEPENDENT OF THE TIME HORIZON, H.
- AS WE GO OUT FURTHER IN TIME, MORE OF THE PRICE IS ACCOUNTED FOR BY THE DIVIDEND TERMS, SO THAT THE PRESENT VALUE OF THE TERMINAL PRICE BECOMES LESS IMPORTANT.

AS WE GO OUT FURTHER IN TIME, PRESENT VALUE OF THE DIVIDEND TERMS INCREASES AND THE PRESENT VALUE OF THE TERMINAL PRICE DECLINES

DIVIDENDS INCREASE BY 10% A YEAR
CAPITALIZATION RATE IS 15%



1. BY CONSIDERING HOW MUCH A BUYER WILL PAY FOR THE STOCK
<u>WHEN IT IS REPEATEDLY SOLD</u>,
WE FIND THAT THE STOCK PRICE IS THE PV OF ALL FUTURE DIVIDENDS.

2. WE OBTAIN THE SAME RESULT INDEPENDENTLY OF THE ASSUMPTIONS WE MAKE ABOUT THE LENGTH OF SUCCESSIVE HOLDING PERIODS.

VALUING COMMON STOCK

If we forecast no growth, and plan to hold out stock indefinitely, we will then value the stock as a PERPETUITY.

$$Perpetuity = P_0 = \frac{Div_1}{r} or \frac{EPS_1}{r}$$

Assumes all earnings are paid to shareholders.

VALUING COMMON STOCK

Constant Growth - A version of the dividend growth model in which dividends grow at a constant rate *(Gordon Growth Model)*.

VALUING COMMON STOCK

Example- continued

If the same stock is selling for $100 in the stock market, what might the market be assuming about the growth in dividends?

$$\$100 = \frac{\$3.00}{.12 - g}$$

$$g = .09$$

Answer

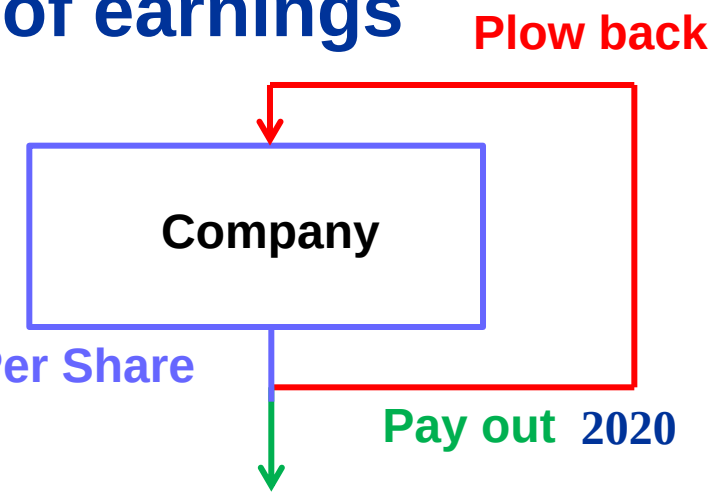
The market is assuming the dividend will grow at 9% per year, indefinitely.

VALUING COMMON STOCK

- If a firm elects to pay a lower dividend, and reinvest the funds, the stock price may increase because future dividends may be higher.

Payout Ratio - Fraction of earnings paid out as dividends

Plowback Ratio - Fraction of earnings retained by the firm.



VALUING COMMON STOCK

Equity (“capitaux propres” in french)

Equity = Assets – Liabilities

For example, if someone owns a car worth $15,000 (an asset), but owes $5,000 on a loan against that car (a liability), the car represents $10,000 of equity.

ROE : Return on Equity in %

ROE = 100 x Net income / Share holder Equity

VALUING COMMON STOCK

Growth can be derived from applying the return on equity to the percentage of earnings plowed back into operations.

g = return on equity X plowback ratio

"g" can also be estimated from historical growth rates in:

- dividends
- eps (earnings per share)

ESTIMATING THE CAPITALIZATION RATE OR REQUIRED RATE OF RETURN

If dividends are expected to grow at a constant rate, g

$$P_0 = \frac{DIV_1}{r - g}$$

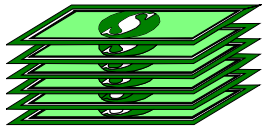
$$\text{so that} \quad r = \frac{DIV_1}{P_0} + g$$

MARKET CAPITALIZATION RATE
=DIVIDEND YIELD, (D_1/P_0)
+
EXPECTED RATE OF GROWTH IN DIVIDENDS, g

VALUING COMMON STOCK

Example

Our company forecasts to pay a $5.00 dividend next year, which represents 100% of its earnings. This will provide investors with a 12% expected return. Instead, we decide to plow back 40% of the earnings at the firm's current return on equity of 20%. What is the value of the stock before and after the plowback decision?



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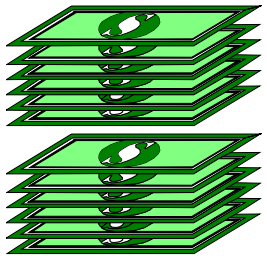
No Growth

$$P_0 = \frac{5}{.12} = \$41.67$$

With Growth



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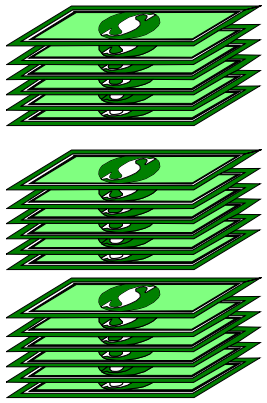

No Growth

$$P_0 = \frac{5}{.12} = \$41.67$$

With Growth

$$g = .20 \times .40 = .08$$

$$P_0 = \frac{3}{.12 - .08} = \$75.00$$

VALUING COMMON STOCK

Example - continued

If the company did not plowback some earnings, the stock price would remain at $41.67. With the plowback, the price rose to $75.00.

The difference between these two numbers (75.00-41.67=33.33) is called the Present Value of Growth Opportunities (PVGO).

VALUING COMMON STOCK

Present Value of Growth Opportunities (PVGO) - Net present value of a firm's future investments.

Sustainable Growth Rate - Steady rate at which a firm can grow: plowback ratio X return on equity.

SUPERNORMAL GROWTH

FIRM MAY HAVE A CURRENT HIGH RATE OF GROWTH WHICH CANNOT BE SUSTAINED

- **SUPERNORMAL GROWTH**

DO NOT USE THE SUPERNORMAL GROWTH RATE IN CALCULATING

- **COST OF EQUITY**
- **FAIR MARKET PRICE**

SUPERNORMAL GROWTH

- DIVIDEND DIV0 AT t=0 GROWING AT A SUPERNORMAL GROWTH RATE gS TO DIVt AT t, AND THEN GROWING AT A NORMAL GROWTH RATE gn
- WHAT IS THE PRICE OF THE STOCK TODAY?

PRICE TODAY, P_0 =

PV OF DIVIDENDS IN SUPERNORMAL GROWTH PERIOD

+ PV OF CONSTANT GROWTH DIVIDENDS

SUPERNORMAL GROWTH

$$P_0 = \frac{DIV_1}{1+r} + \frac{DIV_2}{(1+r)^2} + \frac{DIV_3 + P_3}{(1+r)^3}$$

$$DIV_1 = DIV_0(1+g_s)$$

$$DIV_2 = DIV_0(1+g_s)^2$$

$$DIV_2 = DIV_0(1+g_s)^3$$

$$P_3 = \frac{DIV_4}{r - g_n}$$

INCOME V.S. GROWTH STOCKS

- **Investors in utility stocks expect dividend income. Hence, a high payout ratio of about 40%-50% is normal.**

- **Technology stocks can have zero payout ratio (eg. Google, Apple..).**

New Economy v.s. Old Economy Stocks

- New economy stocks have high P/E
- Old economy stocks have high Div/P

(Autumn 1999)

	P/E	Div/P
Admiral	77.8	0.2
Lynx Group	44.7	0.8
Cable & Wireless	75.4	0.9
B.T.	36.8	1.6
Power Gen	8.7	8.6
UU	7.3	7.1
Hyder Water	3.7	19.8

Problems with DGM

- Theoretical
  - Relationship between current and future dividends (M&M) and share price
  - Determinants of dividend growth
- Practical
  - Accounting information
  - Accounting earnings v.s. economic earnings
  - Economic Value Added, Cash flow Return on Equity

DIVIDENDS IRRELEVANT?

- In 1950s 9/10 US companies paid dividends
- Today only 1/5 US company pays dividend
- Higher capital gains tax?
- Share buybacks?
- Fashion in bull market?
- Stock market still punishes companies trimming or suspending dividends by 6% and 25% drop in share price respectively.

P/E ratio and DGM

Divide each side of 2nd equation by EPS_1

$$P_0 = \frac{DIV_1}{r - g}$$

$$P_0 = \frac{(1 - plowback)EPS_1}{r - (plowbackxROE)}$$

$$\frac{P_0}{E_1} = \frac{(1 - plowback)}{r - (plowbackxROE)}$$

FCF and PV

Valuing a Business

The value of a business is usually computed as the discounted value of FCF out to a *valuation horizon (H).*

- **The *valuation horizon* is sometimes called the terminal value and is calculated like *PVGO.***

$$PV = \frac{FCF_1}{(1+r)^1} + \frac{FCF_2}{(1+r)^2} + \ldots + \frac{FCF_H}{(1+r)^H} + \frac{PV_H}{(1+r)^H}$$

FCF and PV

- Free Cash Flows (FCF) should be the theoretical basis for all PV calculations.
- FCF is a more accurate measurement of PV than either Div or EPS.
- The market price does not always reflect the PV of FCF.
- When valuing a business for purchase, always use FCF.

FCF and PV

Valuing a Business

$$PV = \underbrace{\frac{FCF_1}{(1+r)^1} + \frac{FCF_2}{(1+r)^2} + \ldots + \frac{FCF_H}{(1+r)^H}}_{\textbf{PV (free cash flows)}} + \underbrace{\frac{PV_H}{(1+r)^H}}_{\text{PV (horizon value)}}$$

FCF and PV

Example

Given the cash flows for Concatenator Manufacturing Division, calculate the PV of near term cash flows, PV (horizon value), and the total value of the firm. r=10% and g= 6%

	Year									
	1	2	3	4	5	6	7	8	9	10
Asset Value	10.00	12.00	14.40	17.28	20.74	23.43	26.47	28.05	29.73	31.51
Earnings	1.20	1.44	1.73	2.07	2.49	2.81	3.18	3.36	3.57	3.78
Investment	2.00	2.40	2.88	3.46	2.69	3.04	1.59	1.68	1.78	1.89
Free Cash Flow	-.80	-.96	-1.15	-1.39	-.20	-.23	1.59	1.68	1.79	1.89
.EPS growth (%)	20	20	20	20	20	13	13	6	6	6

FCF and PV

Example - continued

Given the cash flows for Concatenator Manufacturing Division, calculate the PV of near term cash flows, PV (horizon value), and the total value of the firm. r=10% and g= 6%

$$\text{PV(horizon value)} = \frac{1}{(1.1)^6}\left(\frac{1.59}{.10-.06}\right) = 22.4$$

$$\text{PV(FCF)} = -\frac{.80}{1.1} - \frac{.96}{(1.1)^2} - \frac{1.15}{(1.1)^3} - \frac{1.39}{(1.1)^4} - \frac{.20}{(1.1)^5} - \frac{.23}{(1.1)^6}$$

$$= -3.6$$

FCF and PV

Example - continued

Given the cash flows for Concatenator Manufacturing Division, calculate the PV of near term cash flows, PV (horizon value), and the total value of the firm. r=10% and g= 6%

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$$PV(business) = PV(FCF) + PV(horizon\ value)$$

$$= -3.6 + 22.4$$

$$= \$18.8$$