Dr. Charles W. Evans

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Changes in Price convey information

- Changes in Price convey information
 - Returns

- Changes in Price convey information
 - Returns

$$r = \frac{P_1 - P_0}{P_0}$$

- Changes in Price convey information
 - Returns $r = \frac{P_1 P_0}{P_0} = \frac{P_1}{P_0} \frac{P_0}{P_0}$

- Changes in Price convey information
 - Returns

$$r = \frac{P_1 - P_0}{P_0} = \frac{P_1}{P_0} - 1$$

- Changes in Price convey information
 - Returns



- Changes in Price convey information
 - Returns

$$r = \frac{P_1 - P_0}{P_0} = \frac{P_1}{P_0} - 1$$

- Changes in Price convey information
 - Returns $r = \frac{P_1 P_0}{P_0} = \frac{P_1}{P_0} 1$
- Average Returns

- Changes in Price convey information
 - Returns $r = \frac{P_1 P_0}{P_0} = \frac{P_1}{P_0} 1$
- Average Returns
 - Arithmetic Mean

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 - Returns $r = \frac{P_1 P_0}{P_0} = \frac{P_1}{P_0} 1$
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 - Returns $r = \frac{P_1 P_0}{P_0} = \frac{P_1}{P_0} 1$
- Average Returns
 - Arithmetic Mean
 - Geometric Mean

- Changes in Price convey information
 - Returns $r = \frac{P_1 P_0}{P_0} = \frac{P_1}{P_0} 1$
- Average Returns
 - Arithmetic Mean
 - Geometric Mean

geometric mean = $\sqrt[t]{(1+r_1)*(1+r_2)*(1+r_3)*...*(1+r_t)} - 1$

- Changes in Price convey information
 - Returns $r = \frac{P_1 P_0}{P_0} = \frac{P_1}{P_0} 1$
- Average Returns
 - Arithmetic Mean
 - Geometric Mean

 $geometric mean = \sqrt[t]{(1+r_1)*(1+r_2)*(1+r_3)*...*(1+r_t)} - 1$ $geometric mean = ((1+r_1)*(1+r_2)*(1+r_3)*...*(1+r_t))^{(1/t)} - 1$





P = $\frac{D_0(1+g)}{(r-g)}$

$$(r-g) = \frac{D_0(1+g)}{P}$$

$$r = \frac{D_0(1+g)}{P} + g$$



$$r_e = \frac{D_0(1+g)}{P} + g$$







$$D_0 = 0 \Rightarrow \frac{\text{NI/share}}{P} = \frac{1}{\text{PE ratio}}$$



$$r_e = \frac{D_0(1+g)}{P} + g$$

$$NI_0 = D_0 + Ret. Earnings_0$$

$$D_0 = 0 \Rightarrow \frac{\text{NI/share}}{P} = \frac{1}{\text{PE ratio}}$$

 $r_e = \frac{(1+g)}{PE ratio} + g$

$$r_e = \frac{D_0(1+g)}{P} + g$$

 $NI_0 = D_0 + Ret. Earnings_0$



$$r_e = \frac{(1+g)}{PE ratio} + g$$
 $r_e = \frac{D_0(1+g)}{P} + g$

'Dividend Discounting'

$$r_e = \frac{(1+g)}{PE \ ratio} + g$$
 $r_e = \frac{D_0(1+g)}{P} + g$

• Capital Asset Pricing Model (CAPM)

'Dividend Discounting'

$$r_e = \frac{(1+g)}{PE ratio} + g$$
 $r_e = \frac{D_0(1+g)}{P} + g$

• Capital Asset Pricing Model (CAPM) $r_e = r_f + \beta(r_m - r_f)$

$$r_e = \frac{(1+g)}{PE \ ratio} + g$$
 $r_e = \frac{D_0(1+g)}{P} + g$

- Capital Asset Pricing Model (CAPM) $r_e = r_f + \beta(r_m - r_f)$
 - $r_f \rightarrow$ T-Bill rate / LIBOR

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- Capital Asset Pricing Model (CAPM) $r_e = r_f + \beta(r_m - r_f)$
 - $r_f \rightarrow$ T-Bill rate / LIBOR
 - $r_m \rightarrow S\&P 500 \text{ returns}$

$$r_e = \frac{(1+g)}{PE \ ratio} + g$$
 $r_e = \frac{D_0(1+g)}{P} + g$

- Capital Asset Pricing Model (CAPM) $r_e = r_f + \beta(r_m - r_f)$ $\beta > 1$: more volatile than market
 - $r_f \rightarrow$ T-Bill rate / LIBOR
 - $r_m \rightarrow S\&P 500 \text{ returns}$

$$r_e = \frac{(1+g)}{PE \ ratio} + g$$
 $r_e = \frac{D_0(1+g)}{P} + g$

- Capital Asset Pricing Model (CAPM) $r_e = r_f + \beta (r_m - r_f)$
 - $r_f \rightarrow$ T-Bill rate / LIBOR
- $\beta > 1$: more volatile than market
- β = 1 : as volatile as market
- $r_m \rightarrow S\&P 500 \text{ returns}$

$$r_e = \frac{(1+g)}{PE \ ratio} + g$$
 $r_e = \frac{D_0(1+g)}{P} + g$

- Capital Asset Pricing Model (CAPM) $r_e = r_f + \beta(r_m - r_f)$ $\beta > 1 : more volatile$
 - $r_f \rightarrow$ T-Bill rate / LIBOR
- $\beta > 1$: more volatile than market
- β = 1 : as volatile as market
- $0 < \beta < 1$: less volatile than market
- $r_m \rightarrow S\&P 500 \text{ returns}$
'Dividend Discounting'

$$r_e = \frac{(1+g)}{PE \ ratio} + g$$
 $r_e = \frac{D_0(1+g)}{P} + g$

- Capital Asset Pricing Model (CAPM) $r_e = r_f + \beta (r_m - r_f)$
 - $r_f \rightarrow$ T-Bill rate / LIBOR
 - $r_m \rightarrow S\&P 500 \text{ returns}$

- $\beta > 1$: more volatile than market
- β = 1 : as volatile as market
- $0 < \beta < 1$: less volatile than market
- $\beta = 0$: uncorrelated with market

'Dividend Discounting'

$$r_e = \frac{(1+g)}{PE ratio} + g$$
 $r_e = \frac{D_0(1+g)}{P} + g$

- Capital Asset Pricing Model (CAPM) $r_e = r_f + \beta (r_m - r_f)$
 - $r_f \rightarrow$ T-Bill rate / LIBOR
 - $r_m \rightarrow S\&P 500 \text{ returns}$

- $\beta > 1$: more volatile than market
- β = 1 : as volatile as market
- $0 < \beta < 1$: less volatile than market
- $\beta = 0$: uncorrelated with market
- $\beta < 0$: inversely correlated with market

Cost of Debt

- Cost of Debt
 - Return on Debt to Creditor = Cost of Debt to Firm

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 - Average rate paid on Debt

Cost of Capital

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 - Weighted Average of Cost of Equity and Debt

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 - Weighted Average of Cost of Capital (WACC)

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$$WACC = \frac{D}{A}r_d + \frac{E}{A}r_e$$

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 - Weighted Average of Cost of Equity and Debt
 - Weighted Average of Cost of Capital (WACC)

$$WACC = \frac{D}{A}r_d + \frac{E}{A}r_e$$
$$\frac{D}{A} + \frac{E}{A}$$

- Cost of Capital
 - Weighted Average of Cost of Equity and Debt
 - Weighted Average of Cost of Capital (WACC)

$$WACC = \frac{D}{A}r_d + \frac{E}{A}r_e$$
$$\frac{D}{A} + \frac{E}{A} = \frac{D+E}{A}$$

- Cost of Capital
 - Weighted Average of Cost of Equity and Debt
 - Weighted Average of Cost of Capital (WACC)

$$WACC = \frac{D}{A}r_d + \frac{E}{A}r_e$$
$$\frac{D}{A} + \frac{E}{A} = \frac{D+E}{A} = \frac{A}{A}$$

- Cost of Capital
 - Weighted Average of Cost of Equity and Debt
 - Weighted Average of Cost of Capital (WACC)

$$WACC = \frac{D}{A}r_d + \frac{E}{A}r_e$$
$$\frac{D}{A} + \frac{E}{A} = \frac{D+E}{A} = \frac{A}{A} = 1$$

• Example

$$WACC = \frac{D}{A}r_d + \frac{E}{A}r_e$$

• Example

$$WACC = \frac{D}{A}r_d + \frac{E}{A}r_e$$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example $WACC = \underbrace{D}_{r_{d}+1}$

$$VACC = \frac{D}{A}r_d + \frac{L}{A}r_e$$

 $\boldsymbol{\Gamma}$

T-Bill rate: 0.4%

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Dividend: 0

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T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 0.2821 r_d + 0.7179 r_e$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example $WACC = 0.282 \, \ln_d + 0.7179 \, r_e$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

T-Bill rate: 0.4%

 $WACC = 0.2821 * 13.10\% + 0.7179r_{e}$

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$



T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$



T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

$$r_e = \frac{(1+g)}{PE \ ratio} + g$$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

$$r_e = \frac{(1+g)}{PE \ ratio} + g$$

$$r_e = r_f + \beta (r_m - r_f)$$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_{e}$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

Weighted-Average Interest Paid: 13.10%

 $r_{e} = \frac{(1+g)}{PE \ ratio} + g$ $r_{e} = r_{f} + \beta (r_{m} - r_{f})$

• Example

 $WACC = 3.6955\% + 0.7179r_e$

$$r_e = \frac{1.039}{PE \ ratio} + 0.039$$

$$r_e = r_f + \beta (r_m - r_f)$$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$



T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

$$r_e = \frac{1.039}{5.46} + 0.039$$

$$r_e = r_f + \beta (r_m - r_f)$$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

 $r_e = 0.1903 + 0.039$

$$r_e = r_f + \beta (r_m - r_f)$$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

 $r_e = 22.93\%$

$$r_e = r_f + \beta (r_m - r_f)$$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46



T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

 $r_e = 22.93\%$

$$r_e = 0.4\% + \beta(r_m - 0.4\%)$$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

 $r_e = 22.93\%$ $r_e = 0.4\% + \beta(r_m - 0.4\%)$



Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

 $r_e = 22.93\%$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

Weighted-Average Interest Paid: 13.10%

 $r_e = 0.4\% + \beta(8.4\% - 0.4\%)$

• Example

 $WACC = 3.6955\% + 0.7179r_{e}$

 $r_e = 0.4\% + \beta(8.4\% - 0.4\%)$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

Weighted-Average Interest Paid: 13.10%

 $r_e = 22.93\%$
• Example

 $WACC = 3.6955\% + 0.7179r_e$

 $r_e = 22.93\%$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

Weighted-Average Interest Paid: 13.10%

 $r_e = 0.4\% + 2.3(8.4\% - 0.4\%)$

• Example

 $WACC = 3.6955\% + 0.7179r_e$

 $r_e = 22.93\%$

 $r_e = 0.4\% + 2.3 * 8.0\%$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

 $r_e = 22.93\%$

$$r_e = 0.4\% + 18.4\%$$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

 $r_e = 22.93\%$

$$r_e = 18.80\%$$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179 r_e$ $r_e = 22.93\%$ $WACC = 3.6955\% + 0.7179 r_e$

$$r_e = 18.80\%$$

WACC = 3.6955% + 0.7179 r_e

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example



T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $r_{e} = 22.93\%$

 $WACC = 3.6955\% + 0.7179r_{e}$

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

WACC = 3.6955% + 0.7179 * 22.93% Beta: 2.3

Est. Earnings Growth Rate: 3.9%

 $r_e = 18.80\%$ P/E Ratio: 5.46

WACC = 3.6955% + 0.7179*18.80%

• Example

 $WACC = 3.6955\% + 0.7179r_e$

 $r_e = 22.93\%$ WACC = 3.6955% + 16.4609%

 $r_e = 18.80\%$ WACC = 3.6955% + 13.4965% T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

 $WACC = 3.6955\% + 0.7179r_e$

 $r_e = 22.93\%$ WACC = 20.16%

 $r_e = 18.80\%$ WACC = 17.19% T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

T-Bill rate: 0.4%

Expected market return: 8.4%

Dividend: 0

Total Debt/Asset Ratio: 28.21%

Beta: 2.3

Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

T-Bill rate: 0.4%

Expected market return: 8.4%



Est. Earnings Growth Rate: 3.9%

P/E Ratio: 5.46

• Example

T-Bill rate: 0.4%

assets liabilities		Dividend: 0	
		Debt/Equity Ratio: 0.40	
		Beta: 2.3	
		Est. Earnings Growth Rate: 3.9%	
		P/E Ratio: 5.46	
		Weighted-Average Interest Paid: 13.10%	

• Example

T-Bill rate: 0.4%

assets	liabilities	Dividend: 0
	daht	Debt/Equity Ratio: 0.40
assets	debt	Beta: 2.3
	equity	Est. Earnings Growth Rate: 3.9%
		P/E Ratio: 5.46
		Weighted-Average Interest Paid: 13.10%

• Example

T-Bill rate: 0.4%

assets	liabilities		Dividend: 0
aaaata	dobt	0.40	Debt/Equity Ratio: 0.40
assels	debi	0.40	Beta: 2.3
	equity	1.00	Est. Earnings Growth Rate: 3.9%
			P/E Ratio: 5.46
			Weighted-Average Interest Paid: 13.10%

• Example

L

T-Bill rate: 0.4%

assets	liabilities		Dividend: 0	
	debt	0.40	Debt/Equity Ratio: 0.40	
asseis	debt	0.40	Beta: 2.3	
	equity	1.00	Est. Earnings Growth Rate: 3.9%	
			P/E Ratio: 5.46	
1.40		1.40	Weighted-Average Interest Paid: 13.10%	

• Example

D/A = 0.40/1.40

E/A = 1.00/1/40

assets	liabilities	_
assets	debt	0.40
	equity	1.00
1.40		 1.40

• Example

D/A = 0.40/1.40 = 0.2857

E/A = 1.00/1/40 = 0.7142

assets	liabilities	
assets	debt	0.40
	equity	1.00
1.40		1.40

• Example



assets	liabilities	
assets	debt	0.40
	equity	1.00
1.40		1.40

Capital Markets

- Capital Markets
 - Initial Public Offering

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 - Underpricing

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 - NYSE, NASDAQ, LSE, TSX, Hong Kong

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 - Initial Public Offering
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 - Systemic Risk

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 - Unsystematic aka, Idiosyncratic Risk

- Capital Markets
 - Initial Public Offering
 - Underpricing
 - NYSE, NASDAQ, LSE, TSX, Hong Kong
 - Rising stars: Jo'burg, Moscow, Mumbai, São Paolo
 - Diversification
 - Systemic Risk
 - Unsystematic aka, Idiosyncratic Risk
 - The Future Is Unknowable

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