Business Fundamentals for Analytics

Financial Management

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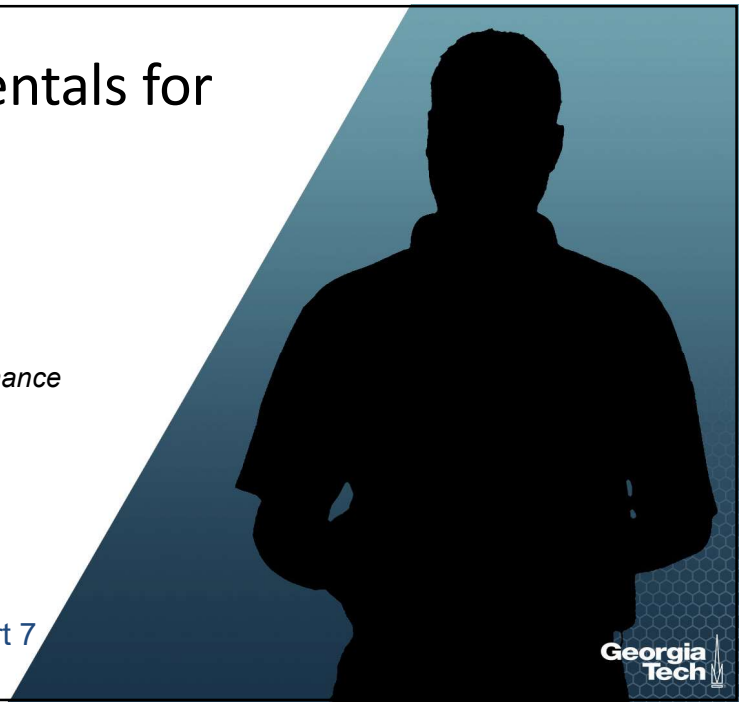
Capital Investments Analysis- Part 7



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Relevant Cash Flows

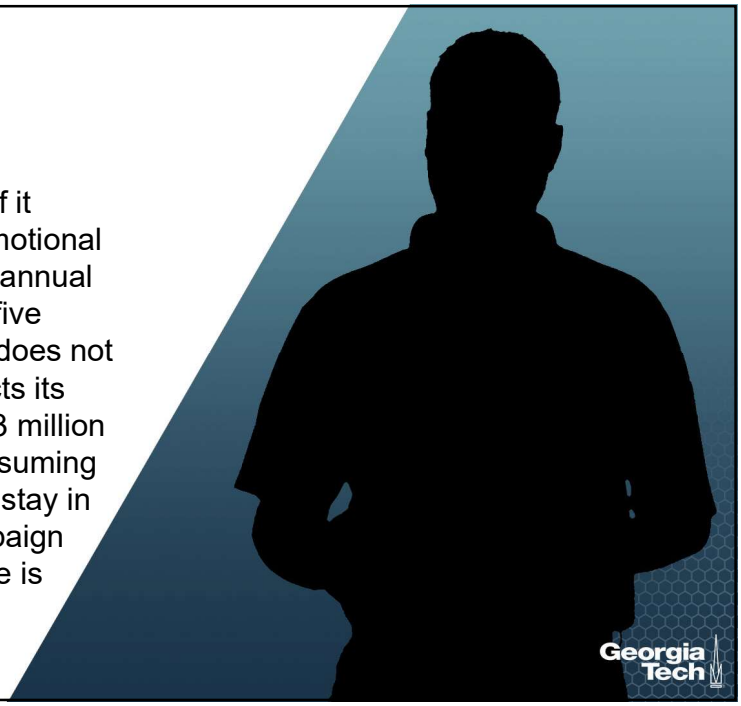
Principle 1:
Record cash flows when the money actually moves, not when the accountant using accrual concepts says they occur

Principle 2:
Imagine two worlds, one in which the investment is made and one in which it is rejected. All cash flows that are different in these two worlds are relevant to the decision, and those that are the same are irrelevant

2

Example: Microdyne

Times are tough for Microdyne. If it engages in a new, year long promotional campaign costing $10 million, its annual after-tax cash flow over the next five years will be only $100,000. If it does not undertake the campaign, it expects its after-tax cash flow to be minus $3 million annually for the same period. Assuming that the company has decided to stay in its chosen business, is this campaign worthwhile when the discount rate is 10%. Why or why not?



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Solution: Microdyne

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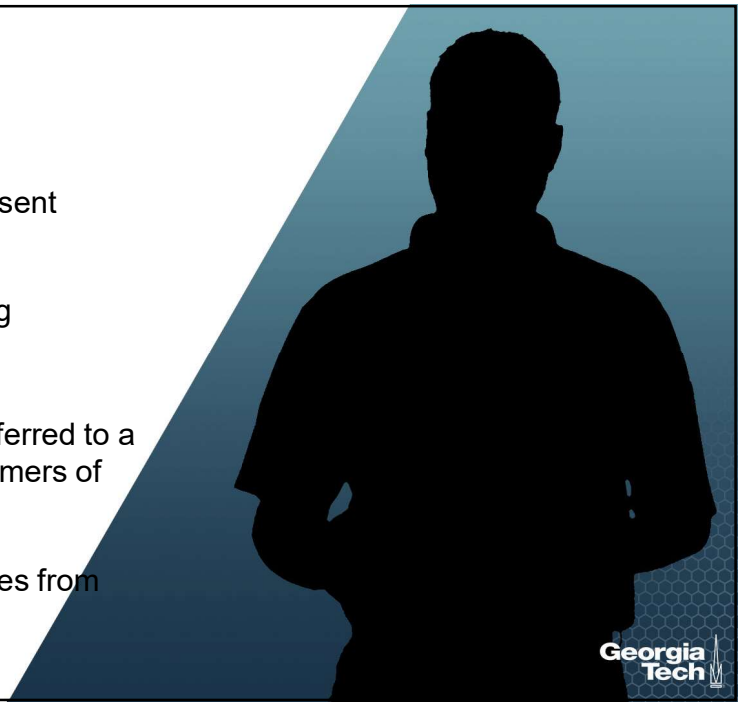
Treatment of Costs



Sunk Costs: Not relevant for present decision

Test Marketing Costs: Marketing research expenses expended.

Erosion Costs: Cash flow transferred to a new project from sales and customers of other products of the firm.

Opportunity Costs: Lost revenues from alternative uses of the asset

5

Cash Flows

Depreciation: It is a non-cash expense. Add depreciation back to income after tax to calculate the investment's after-tax cash flow. (ATCF)

ATCF = (Revenue - Costs - Depreciation) (1-Tax) + Depreciation

= (R - C) (1 - Tax) + D (Tax)

Working Capital: Changes in the that are the result of an investment decision are relevant to the decision. At the beginning of the project life, working capital would be treated as cash outflows. At the end of project life, working capital would be treated as cash inflows.

6

Factors to Consider When Making Cash Flow Estimates

Items	Factors to Consider
Price, Volume	Competition from existing products Competition from technological advances Values to customer
Variable costs	Labor, Material, Energy
Fixed costs	Marketing (sales, advertising) Information Technology Accounting Management
Capital expenditure	Property, Plant & Equipment
Working Capital	Inventory Accounts receivable Accounts payable

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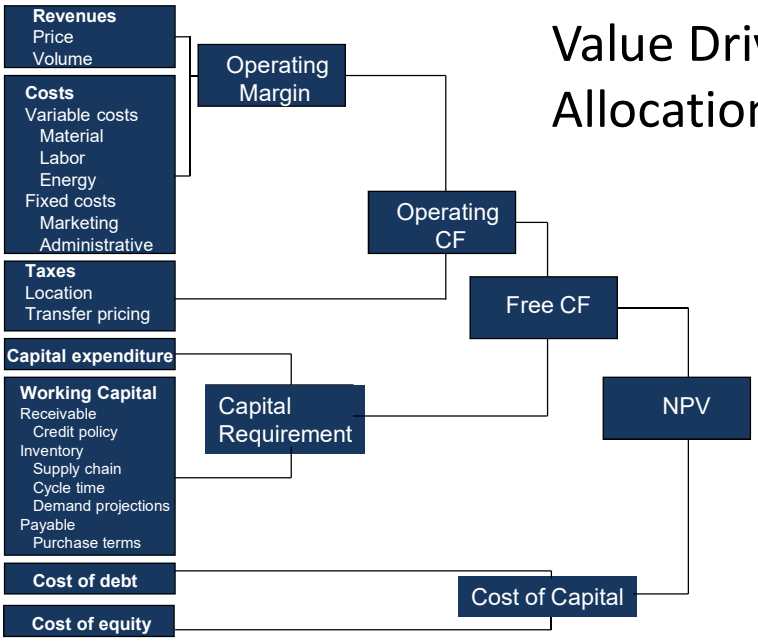
Value Drivers in Resource Allocation Decisions



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8

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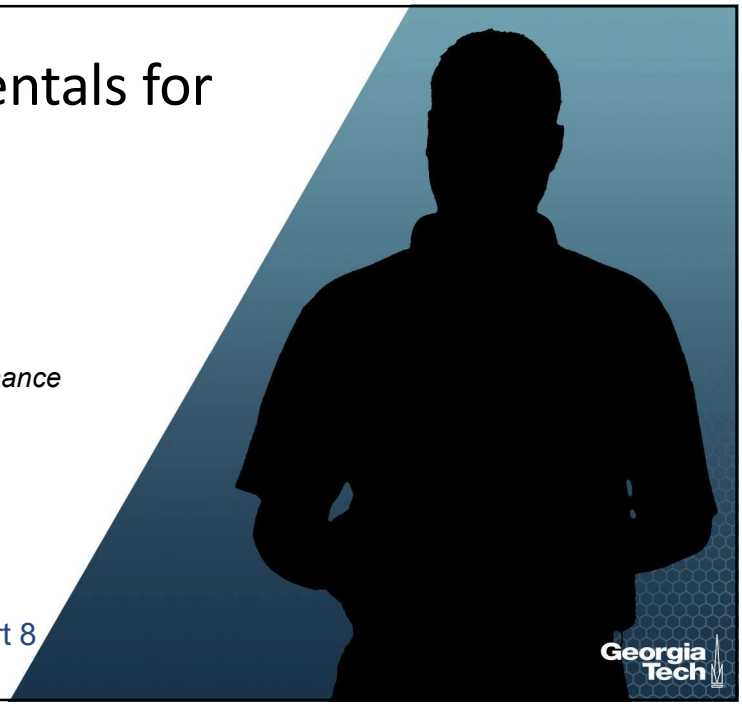

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9

Example: Baffle Bag and Box Company

One year ago, Baffle Bag and Box Company (BB&B) purchased a new folder for $11,000. The company now finds a new box folder is available that may offer significant advantages. The new machine can be purchased for $15,000, has an economic life of 10 years, and has no salvage value. It is expected that the new machine will produce a gross margin of $4,000 per year, so that, using straight-line depreciation, the annual taxable income will be $2,500.

The current machine is expected to produce a gross margin of $2,000 per year, and, assuming a total economic life of 11 years and straight line depreciation, a profit before taxes of $1,000. The current market value of the old machine is $5,000. BB&B's tax rate is 45%, and its cost of capital after tax is 10 percent.

Ignore possible capital gain taxes and assuming zero salvage values at the end of the machines' economic lives, should BB&B replace its year-old box folder?

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10

Solution: Baffle Bag and Box Company

	Old Machine	New Machine
Gross	$2,000	
- Depreciation	1,000	
Profit before tax	1,000	
Tax	450	
Profit after tax	550	
+ Depreciation	1,000	
After-tax cash flow	$1,550	

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11

Solution: Baffle Bag and Box Company (Cont'd)

Using With-Without Principle:

Initial Cash flow = Cost of new machine less
Proceeds from sale of
old machine
=

Operating cash flow =

Terminal cash flow =

NPV = -10,000 + (1,325/1.1) +(1,325/1.1^2)+.....

+(1,325/1.1^{10})

=

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12

Example: Auger Biotech

Times are tough to Auger Biotech. Having raised $85 million in an initial public offering of its stock early in the year, the company is poised to launch its product. If Auger engages in a promotional campaign costing $60 million this year, its annual after-tax cash flow over the next five years will be only $700,000. If it does not undertake the campaign, it expects its after-tax cash flow to be minus $18 million annually for the same period.

Assuming the company has decided to stay in its chosen business, is this campaign worthwhile when the discount rate is 10 percent? Why or why not?

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13

Solution: Auger Biotech

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14

Example: Caffe Vita Coffee Roasting Co.

One year ago, Caffe Vita Coffee Roasting Co. (CVCRC) purchased three small-batch coffee roasters for $3.3 million. The company now finds that new roasters are available that offer significant advantages. The new roasters can be purchased for $4.5 million, have an economic life of 10 years, and have no salvage value. It is expected that the new roasters will produce a gross margin of $1.2 million per year, so that, using straight-line depreciation, the annual taxable income will be $750,000.

The current roasters are expected to produce a gross profit of $600,000 per year and, assuming a total economic life of 11 years and straight-line depreciation, a profit before tax of $300,000. The current market value of the old roasters is $1.5 million. CVCRC's tax rate is 45 percent, and its cost of capital after tax is 10 percent.

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15

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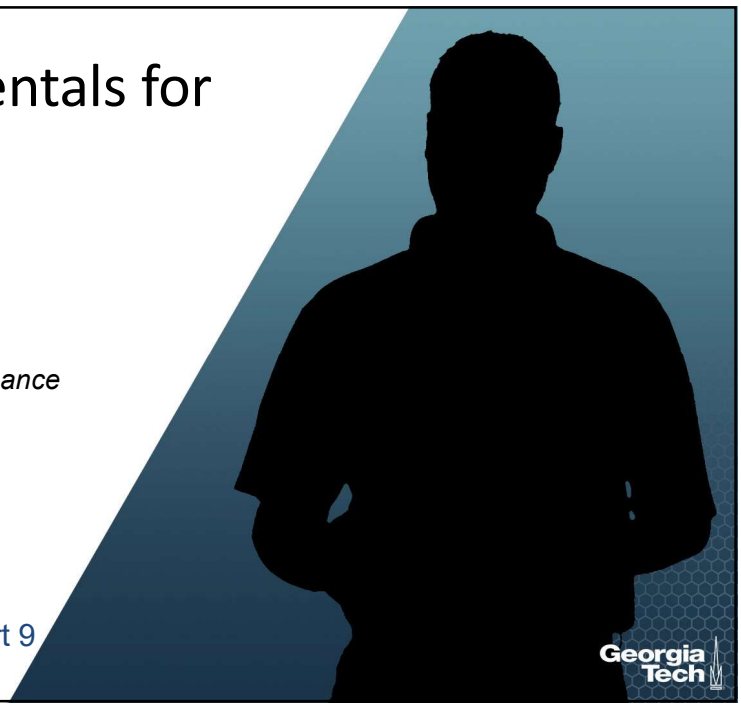

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16

Inflation and Returns: Key Issues

- What is the difference between a real and a nominal return?
- How can we convert from one to the other?

Background:

We have $1000, and Diet Coke cost $2.00/six pack. We can buy 500 six packs. Suppose the rate of inflation is 5%, so that the price rises to $2.10 in one year. We invest the $1000, and it grows to $1100 in one year. What's our return in dollars? In six packs?

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17

Inflation and Returns

A. Dollars. Our return is:

($1100 - $1000)/$1000 = $100/$1000 = 10%

( ) The percentage increase in the amount of green stuff is 10%; our return is 10%.

B. Six packs. We can buy $1100/$2.10 = 523.81 six packs, so our return is:

(523.81 - 500)/500 = 23.81/500 = 4.76%

( ) The percentage increase in the amount of brown stuff is 4.76%; our return is 4.76%.

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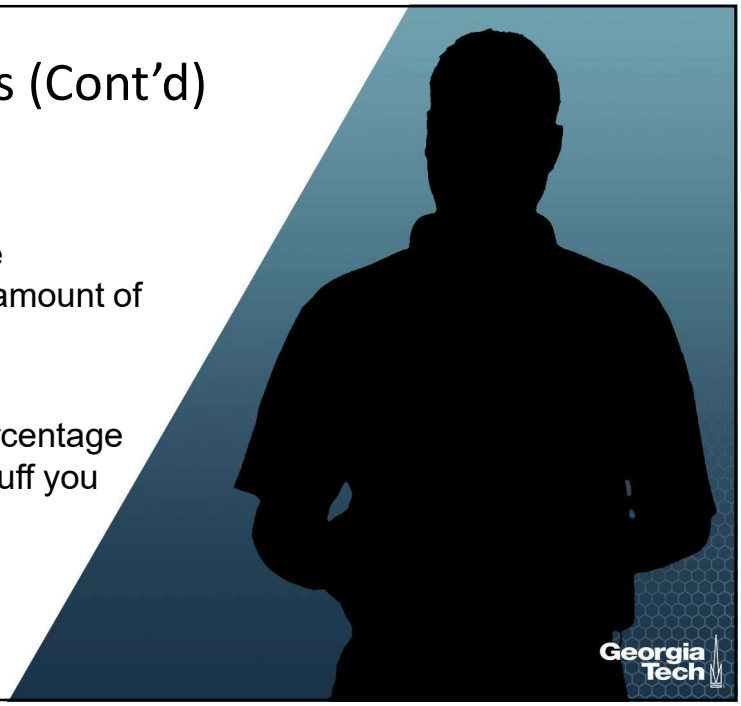
18

Inflation and Returns (Cont'd)

Real versus Nominal Returns

- Your **nominal return** is the percentage change in the amount of money you have.
- Your **real return** is the percentage change in the amount of stuff you can actually buy.



19

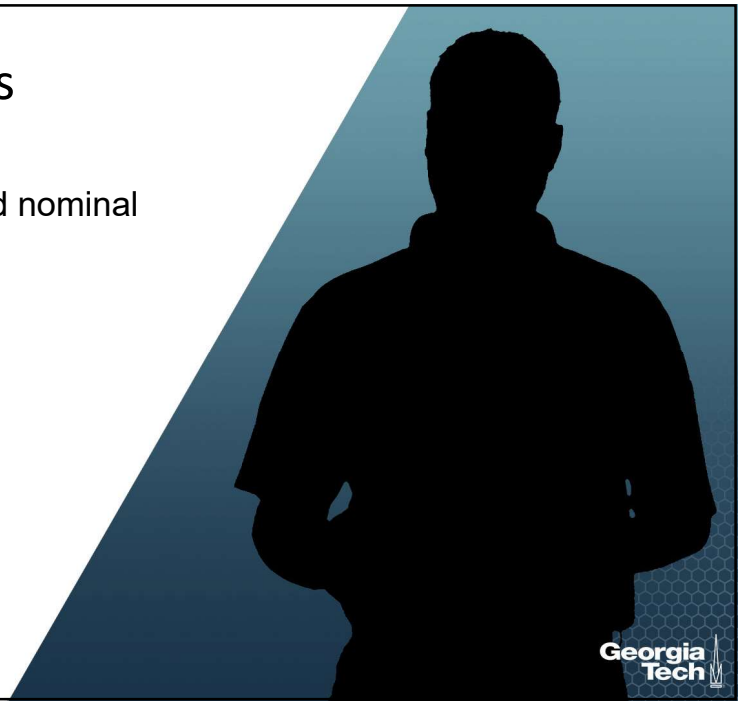
Inflation and Returns

Relationship between real and nominal returns:

R: the nominal return

r: the real return

h: the inflation rate



20

Inflation and Returns: The Fisher Effect

The Fisher Effect:

$$1 + R = (1 + r) \times (1 + h)$$

From above, the real return is 4.76%; the nominal return is 10%, and the inflation rate is 5%:

$$(1 + R) = 1.10$$

$$(1 + r) \times (1 + h) = 1.0476 \times 1.05 = 1.10$$

Approximately $R = r+h$

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21

Capital Budgeting & Inflation

- Express cash flows in real terms and discount them at the real interest **rate or**
- Convert real cash flows to nominal cash flows by allowing them to grow at rate of inflation and discount them at the nominal rate.
- Issue is important when dealing with
    1. Long horizons
    2. High inflationary times
- Depreciation always expressed in nominal terms.

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22

Sensitivity Analysis

- Target Market Share
- Cost Overrun
- Inflation
- Competition
- Discount Rate
- Valuable Options

23

Home Depot Capital Investment

Home Depot is considering a new store with the following characteristics:

- Initial investment of $20 million on 100,000 square feet store.
- The HD plans to borrow $5 million, at an interest rate of 5.8%, using a 10-year term loan.
- The store will have a life span of 10 years.
- Estimated salvage value of $ 7.5 million at the end of 10 years.
- Estimated sales $40 million in the first and expected to grow at 5%.
- The pre-tax operating margin, at the store prior to depreciation, is expected to be 10% for the entire period.
- The after-tax operating income and depreciation is given in the next page.
- The net working capital is expected to be 8% of revenues and is expected to be entirely salvageable at the end of ten years.
- Working capital investments are assumed to be made at the beginning of each year.
- The cost of capital is 9.78%.

24

Net Income at the Home Depot Store

Year	Revenues	Optg Expenses	Depreciation	EBIT	Interest	Taxable Income	NI
1	$40,000,000.00	36000000	1,250,000	$2,750,000	290,000	$2,460,000	$1,599,000.00
2	$42,000,000.00	37800000	1,250,000	$2,950,000	267,791	$2,682,209	$1,743,435.99
3	$44,100,000.00	39690000	1,250,000	$3,160,000	244,293	$2,915,707	$1,895,209.26
4	$46,305,000.00	41674500	1,250,000	$3,380,500	219,433	$3,161,067	$2,054,693.37
5	$48,620,250.00	43758225	1,250,000	$3,612,025	193,131	$3,418,894	$2,222,280.98
6	$51,051,262.50	45946136	1,250,000	$3,855,126	165,304	$3,689,823	$2,398,384.73
7	$53,603,825.63	48243443	1,250,000	$4,110,383	135,862	$3,974,521	$2,583,438.37
8	$56,284,016.91	50655615	1,250,000	$4,378,402	104,713	$4,273,689	$2,777,897.79
9	$59,098,217.75	53188396	1,250,000	$4,659,822	71,757	$4,588,065	$2,982,242.16
10	$62,053,128.64	55847816	1,250,000	$4,955,313	36,890	$4,918,423	$3,196,975.12

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25

Free Cash Flow to Equityholders

Year	NI	Depreciat.	CAPEX	Debt	WC	Salvage	CF to Equity
			-20,000,000	5,000,000	-3,200,000		-18,200,000
1	1,599,000	1,250,000		-382,917	-160,000		2,306,083
2	1,743,436	1,250,000		-405,127	-168,000		2,420,309
3	1,895,209	1,250,000		-428,524	-176,400		2,540,285
4	2,054,693	1,250,000		-453,484	-185,220		2,665,989
5	2,222,281	1,250,000		-479,786	-194,481		2,798,014
6	2,398,385	1,250,000		-507,614	-204,205		2,936,566
7	2,583,438	1,250,000		-537,055	-214,415		3,081,968
8	2,777,898	1,250,000		-568,205	-225,136		3,234,557
9	2,982,242	1,250,000		-601,160	-236,393		3,394,689
10	3,196,975	1,250,000		-636,028	4,964,250	7,500,000	16,275,197

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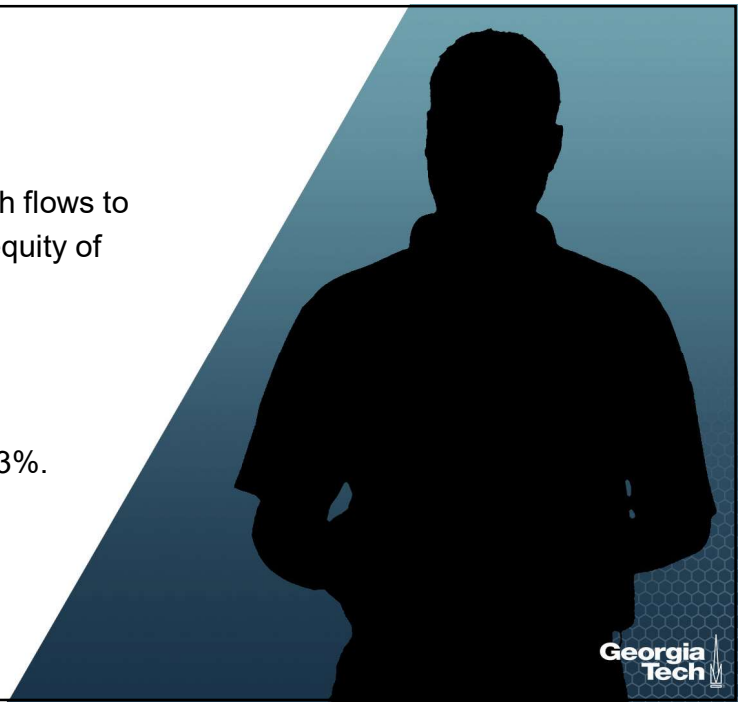
26

Net Present Value

The net present value of free cash flows to Equity discounted at the cost of equity of 9.78% is

$4,101,613

The internal rate of return is 13.53%.



27

Simulation (1 of 5)

Step 1: Identify each key variable and the probability distribution associated with it.

Variable	
Base Case	Revenues $ 30 million or $300 per square foot Growth rate = 5% Operating Margin = 10% WC = 10% of revenues
Revenues	$ 200 per square foot to $400 per square foot
Growth	0 to 12%
Operating Margin	2 % to 20%
Working Capital	0 to 20%

28

Simulation (2 of 5)

Variable	Distribution	Expected Value	Distribution
Revenues	General	$30 million value $20 $25 $30 $35 $40	Probability 0.1250 0.1875 0.3750 0.1875 0.1250
Growth Rate	Normal	5%	Std. Deviation = 2%
Operating Margin	Uniform	10%	Minimum= 0 Maximum= 20%
WC as % of Revenues	Normal	10%	Std. Deviation = 2.5%

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29

Simulation (3 of 5)

Step 2: Draw one outcome for each variable.

Variable	Drawn outcome
Revenues	$25 million
Growth Rate	6.35%
Operating Margin	10.00%
WC as % of Revenues	9.16%

Step 3: Estimate NPV and IRR.

NPV = -13,423

IRR = 12.48%

Step 4: Repeat steps (2) and (3) 5,000 times. Compute the summary statistics.

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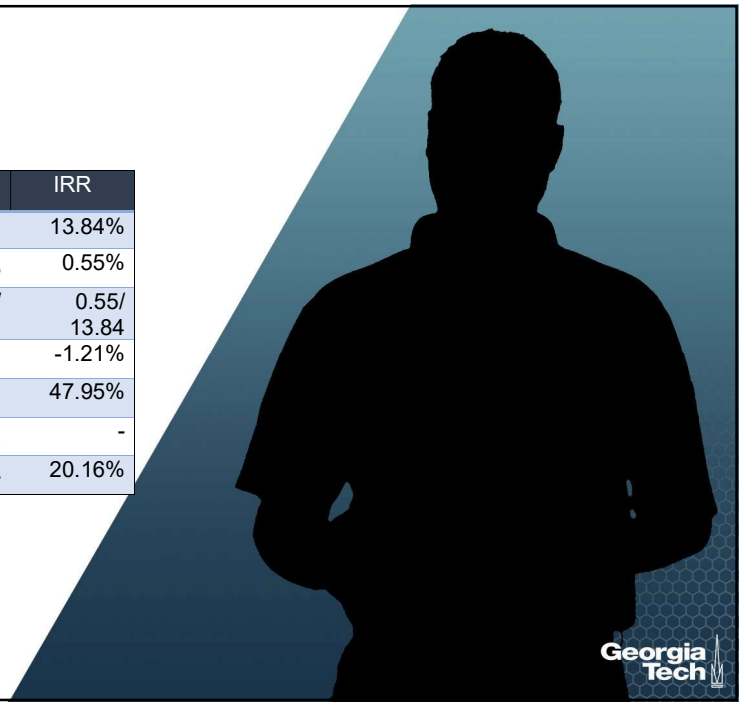
30

Simulation (4 of 5)

Description	NPV	IRR
Expected Value	$1,067,150	13.84%
Standard Deviation	451,335	0.55%
Coefficient of Variation	451,335/ 1,067,150	0.55/ 13.84
Minimum	-9,504,201	-1.21%
Maximum	31,013,450	47.95%
% of time below zero	20.16%	-
% of time below discount rate	-	20.16%



31

Simulation (5 of 5)

Step 5: Use the distribution of NPV to answer the following questions:

- What is the likelihood that this will be a bad project?
- What is the worst case and best-case scenarios?
- Can you try to build linkages in the simulations?

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32

Capital Investment Analysis Summary

1. Net Present Value is the most preferred technique.
2. Capital budgeting must be done on an incremental basis. This means that sunk costs must be ignored, while opportunity costs and side effects must be considered.
3. Inflation must be correctly handled. One approach is to express both cash flows and the discount rate in nominal terms. The other approach is to express both cash flow and discount rate in real terms.
4. Uncertainty in the forecasts can be addressed by conducting sensitivity analysis or simulation.

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33

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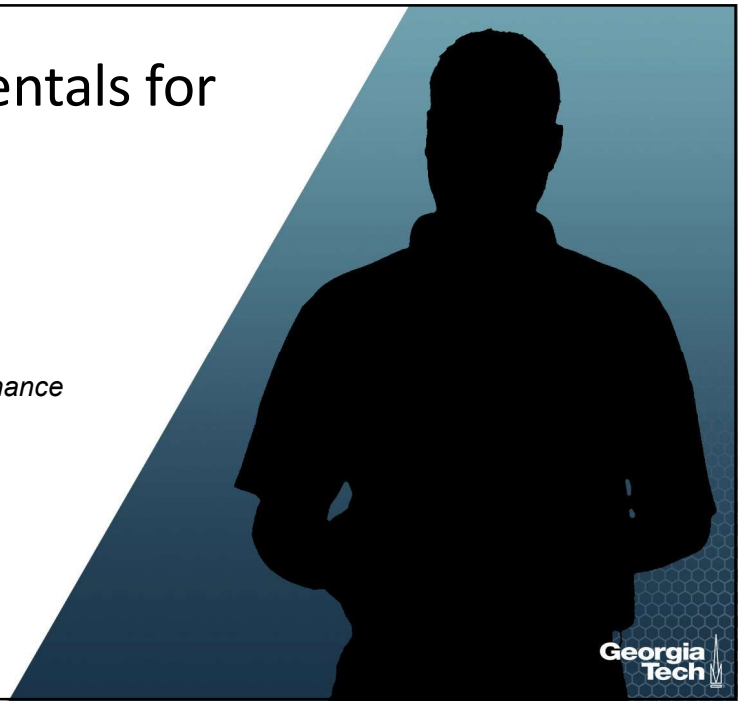

Stock Valuation- Part 1

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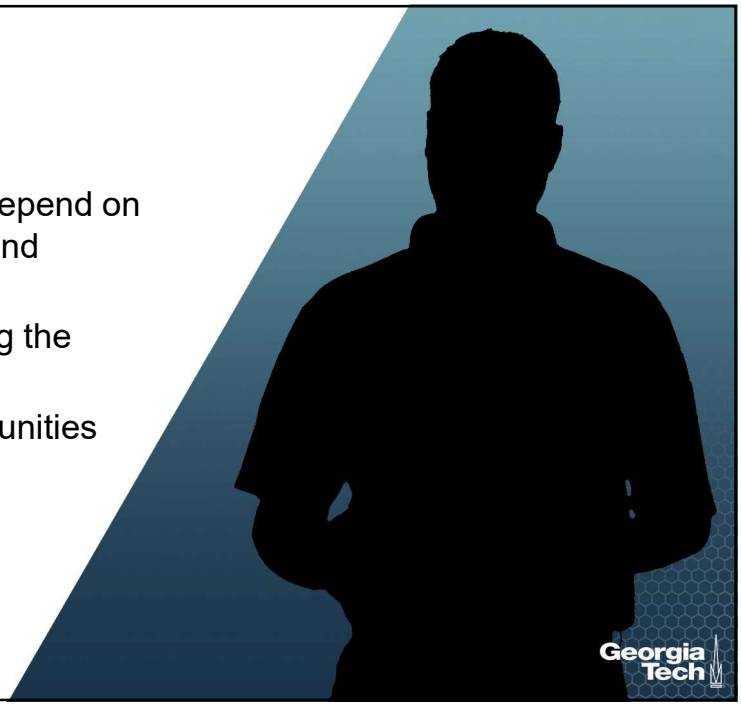
34

Learning Objectives

- Explain how stock prices depend on future dividends and dividend growth
- Compute stock prices using the dividend growth model
- Explain how growth opportunities affect stock values
- Describe the PE ratio



35

The PV of Common Stocks

The value of any asset is the present value of its expected future cash flows.

Stock ownership produces cash flows from:

- Dividends
- Capital Gains

Valuation of Different Types of Stocks

- Zero Growth
- Constant Growth
- Differential Growth

36

Case 1: Zero Growth

Assume that dividends will remain at the same level forever,

$$\text{Div}_1 = \text{Div}_2 = \text{Div}_3 = \cdots$$

Since future cash flows are constant, the value of a zero growth stock is the present value of a perpetuity:

$$P_0 = \frac{\text{Div}_1}{(1+R)^1} + \frac{\text{Div}_2}{(1+R)^2} + \frac{\text{Div}_3}{(1+R)^3} + \cdots$$

$$P_0 = \frac{\text{Div}}{R}$$

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37

Case 2: Constant Growth

Assume that dividends will grow at a constant rate, *g*, forever, *i.e.,*

$$\text{Div}_1 = \text{Div}_0(1+g)$$
$$\text{Div}_2 = \text{Div}_1(1+g) = \text{Div}_0(1+g)^2$$
$$\text{Div}_3 = \text{Div}_2(1+g) = \text{Div}_0(1+g)^3$$

Since future cash flows grow at a constant rate forever, the value of a constant growth stock is the present value of a growing perpetuity:

$$P_0 = \frac{\text{Div}_1}{R-g}$$

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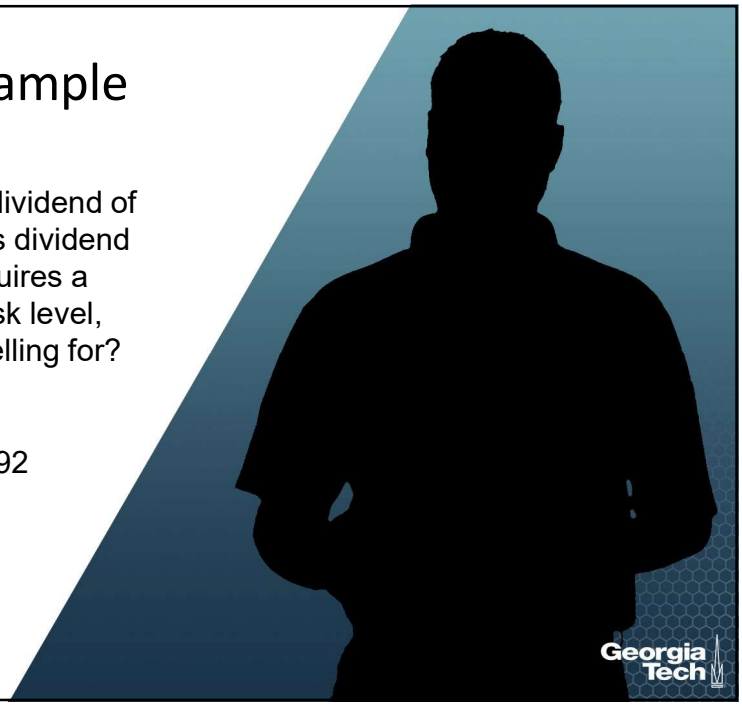
38

Constant Growth Example

Suppose Big D, Inc., just paid a dividend of $.50. It is expected to increase its dividend by 2% per year. If the market requires a return of 15% on assets of this risk level, how much should the stock be selling for?

$P_0 = .50(1+.02) / (.15 - .02) = \$3.92$



39

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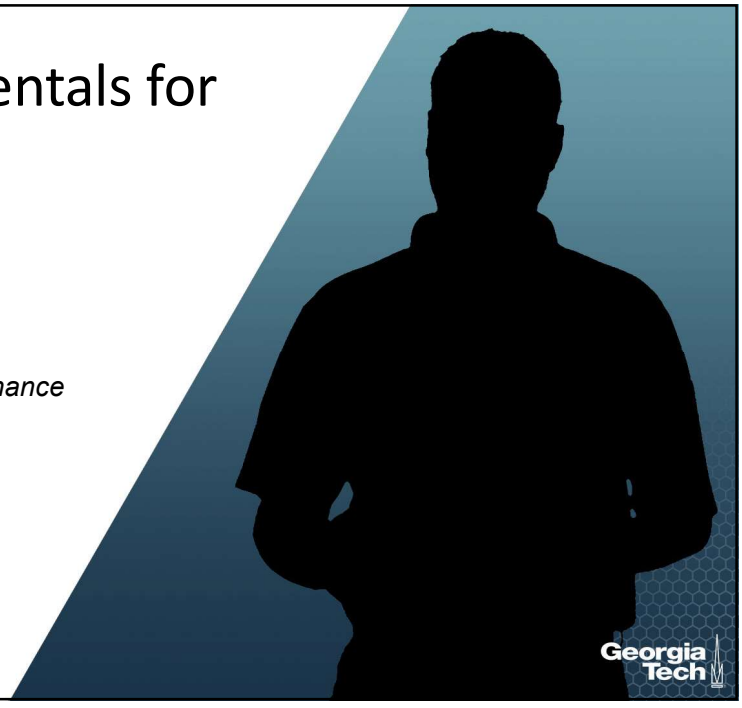
Stock Valuation- Part 2



40

Case 3: Differential Growth

- Assume that dividends will grow at different rates in the foreseeable future and then will grow at a constant rate thereafter.
- To value a Differential Growth Stock, we need to:
  - Estimate future dividends in the foreseeable future.
  - Estimate the future stock price when the stock becomes a Constant Growth Stock (Case 2).
  - Compute the total present value of the estimated future dividends and future stock price at the appropriate discount rate.

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41

Differential Growth Example

A common stock just paid a dividend of $2. The dividend is expected to grow at 8% for 3 years, then it will grow at 4% in perpetuity.

What is the stock worth? The discount rate is 12%.

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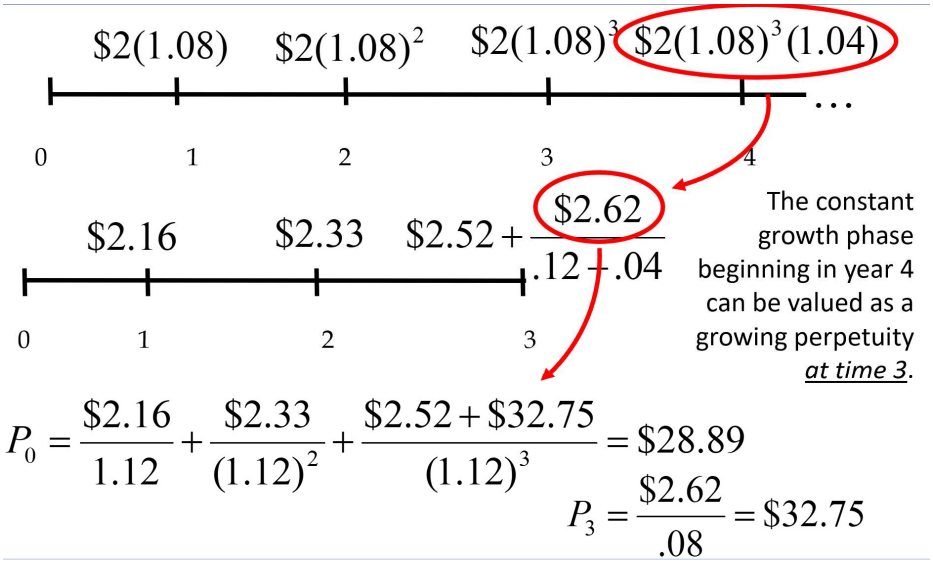
42

With Cash Flows



$$P_0 = \frac{\$2.16}{1.12} + \frac{\$2.33}{(1.12)^2} + \frac{\$2.52 + \$32.75}{(1.12)^3} = \$28.89$$

$$P_3 = \frac{\$2.62}{.08} = \$32.75$$

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43

Estimates of Parameters

- The value of a firm depends upon its growth rate, g, and its discount rate, R.
- Where does g come from?
  - g = Retention ratio × Return on retained earnings
  - Retention Ratio = 1 –(Dividend per share/Earnings per share)

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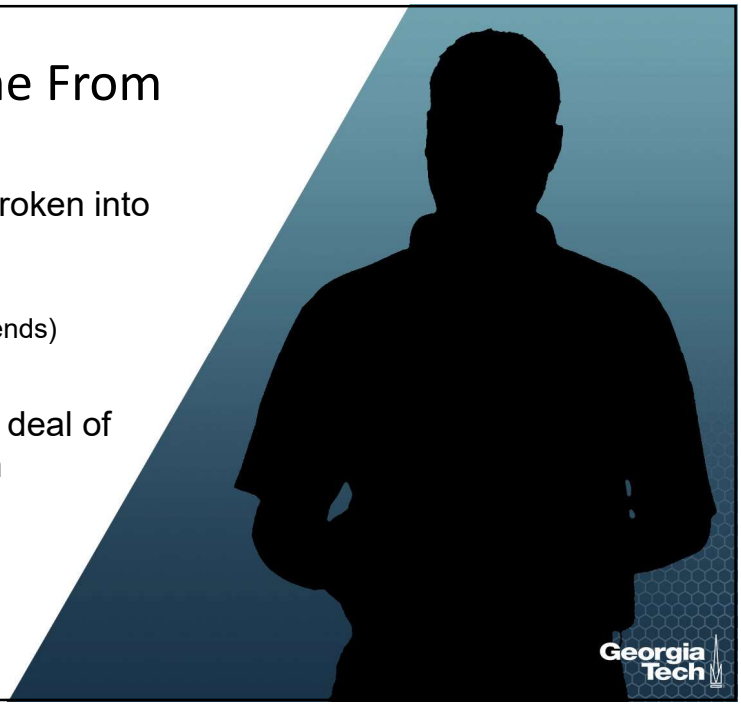
44

Where Does 'R' Come From

- The discount rate can be broken into two parts.
  - The dividend yield
  - The growth rate (in dividends)
- In practice, there is a great deal of estimation error involved in estimating R.



45

Growth Opportunities

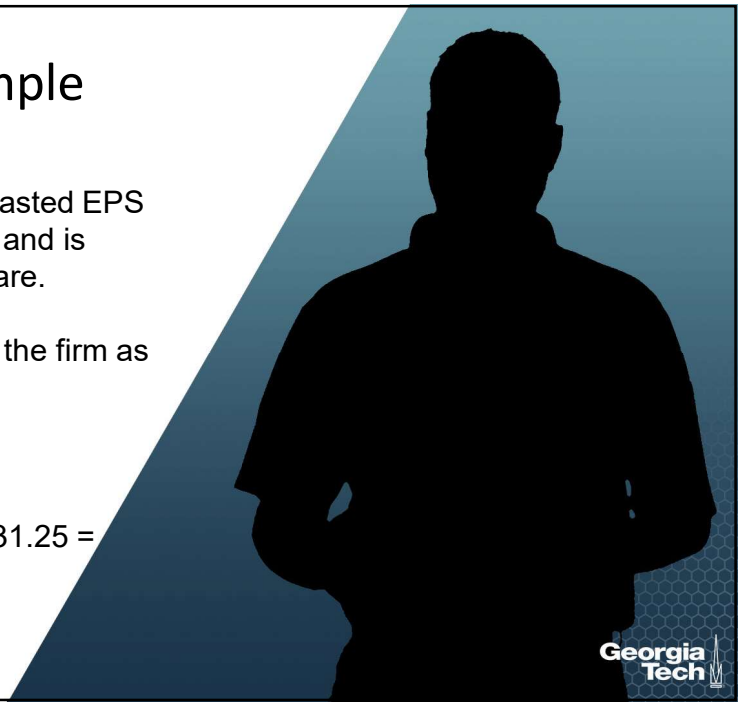
- Growth opportunities are opportunities to invest in positive NPV projects.
- The value of a firm can be conceptualized as the sum of the value of a firm that pays out 100% of its earnings as dividends plus the net present value of the growth opportunities.

$$P = \frac{EPS}{R} + NPVGO$$

46

NPVGO Model: Example

- Consider a firm that has forecasted EPS of $5, a discount rate of 16%, and is currently priced at $75 per share.
- We can calculate the value of the firm as a cash cow.
- EPS/r = 5/16 = $31.25
- So, NPVGO must be: $75 - $31.25 = $43.75



47

Retention Rate and Firm Value

- An increase in the retention rate will:
  - Reduce the dividend paid to shareholders
  - Increase the firm's growth rate
- These have offsetting influences on stock price
- Which one dominates?
  - If Return on equity>R, then increased retention increases firm value since reinvested capital earns more than the cost of capital.

48

Comparables

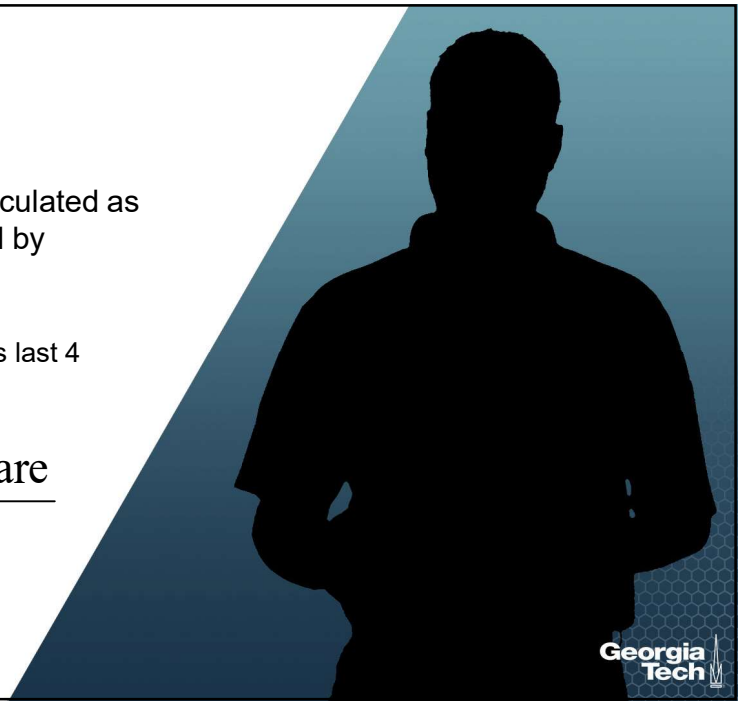
- Comparables are used to value companies based primarily on multiples.
- Common multiples include:
  - Price-to-Earnings
  - Enterprise Value Ratios

49

Price-Earnings Ratio

- The price-earnings ratio is calculated as the current stock price divided by annual EPS.
  - *The Wall Street Journal* uses last 4 quarter's earnings

$$\text{P/E ratio} = \frac{\text{Price per share}}{EPS}$$



50

PE and NPVGO

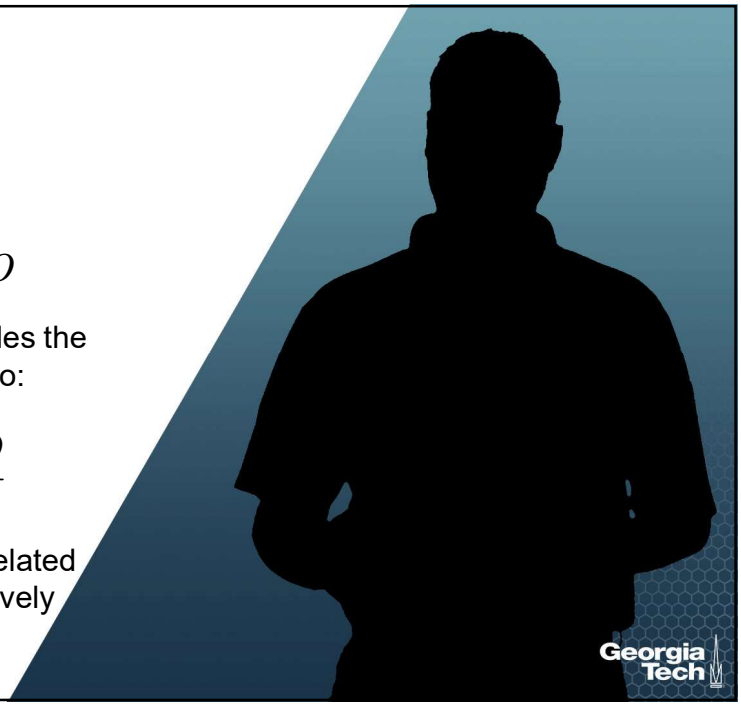
Recall,

$$P = \frac{EPS}{R} + NPVGO$$

Dividing every term by EPS provides the following description of the PE ratio:

$$PE = \frac{1}{R} + \frac{NPVGO}{EPS}$$

So, a firm's PE ratio is positively related to growth opportunities and negatively related to risk (*R*)



51

Enterprise Value Ratios

- The PE ratio focuses on equity, but what if we want the value of the firm?
- Use Enterprise Value (EV):
  - EV = market value of equity + market value of debt – cash
- Like PE, we compare the value to a measure of earnings. From a firm level, this is EBITDA, or earnings before interest, taxes, depreciation, and amortization.
  - EBITDA represents a measure of total firm cash flow
- The Enterprise Value Ratio = EV / EBITDA

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52

Problem 1: FFDP Corp.

Stock Valuation and EV

FFDP Corp. has yearly sales of $48 million and costs of $15 million. The company's balance sheet shows debt of $64 million and cash of $23 million. There are 1.95 million shares outstanding and the industry EV/EBITDA multiple is 6.4.

- What is the company's enterprise value?
- What is the stock price per share?

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53

Problem 1: FFDP Corp. - Solution

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54

Business Fundamentals for Analytics

Financial Management

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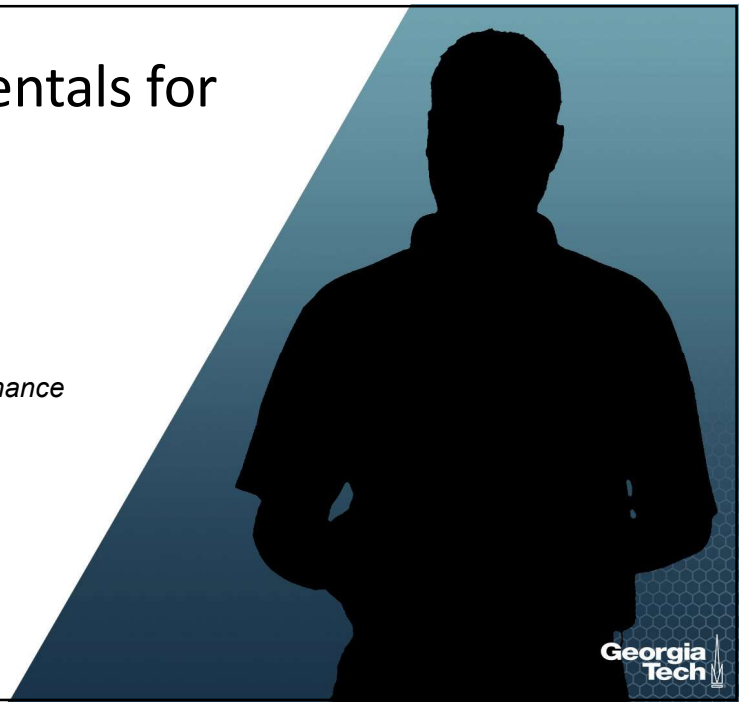

Stock Valuation- Part 3

55

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56

Problem 1: FFDP Corp. - Solution

57

Problem 2: Storico Co.

Nonconstant Growth

Storico Co. just paid a dividend of $3.40 per share. The company will increase its dividend by 20 percent next year and will then reduce its dividend growth rate by 5 percentage points per year until it reaches the industry average of 5 percent dividend growth, after which the company will keep a constant growth rate forever.

- If the required return on Storico stock is 13 percent, what will a share of stock sell for today?

58

Problem 2: Storico - Solution

59

Stock Valuation Summary

A stock can be valued by discounting its dividends. There are three cases:

- Zero growth in dividends:

$$P_0 = \frac{\text{Div}}{r}$$

- Constant growth in dividends:

$$P_0 = \frac{\text{Div}_1}{r - g}$$

- Differential growth in dividends:

$$P = \frac{C}{r - g_1}\left[1 - \frac{(1+g_1)^T}{(1+r)^T}\right] + \frac{\left(\frac{\text{Div}_{N+1}}{r - g_2}\right)}{(1+r)^N}$$

60

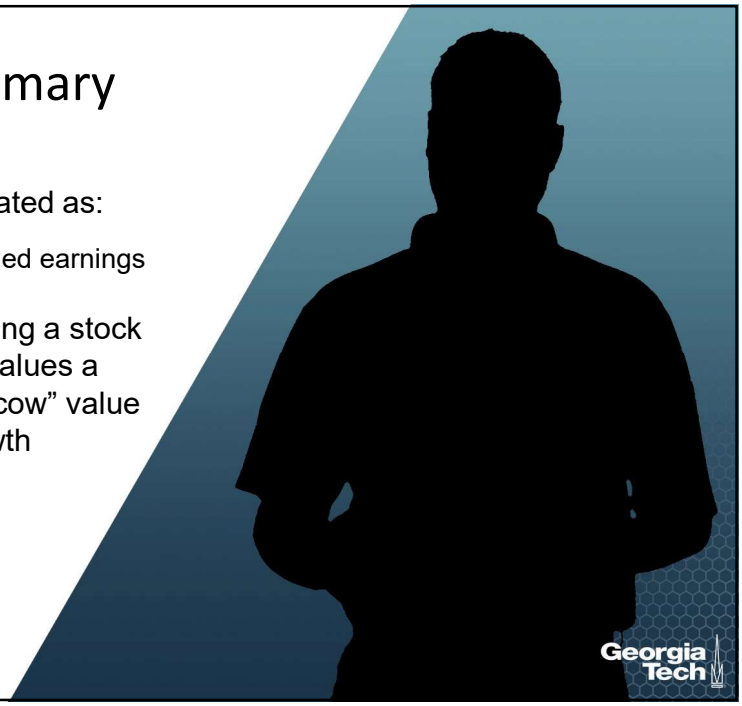
Stock Valuation Summary

- The growth rate can be estimated as:

g = Retention ratio × Return on retained earnings

- An alternative method of valuing a stock was presented, the NPVGO values a stock as the sum of its "cash cow" value plus the present value of growth opportunities.

$$P = \frac{EPS}{r} + NPVGO$$



61