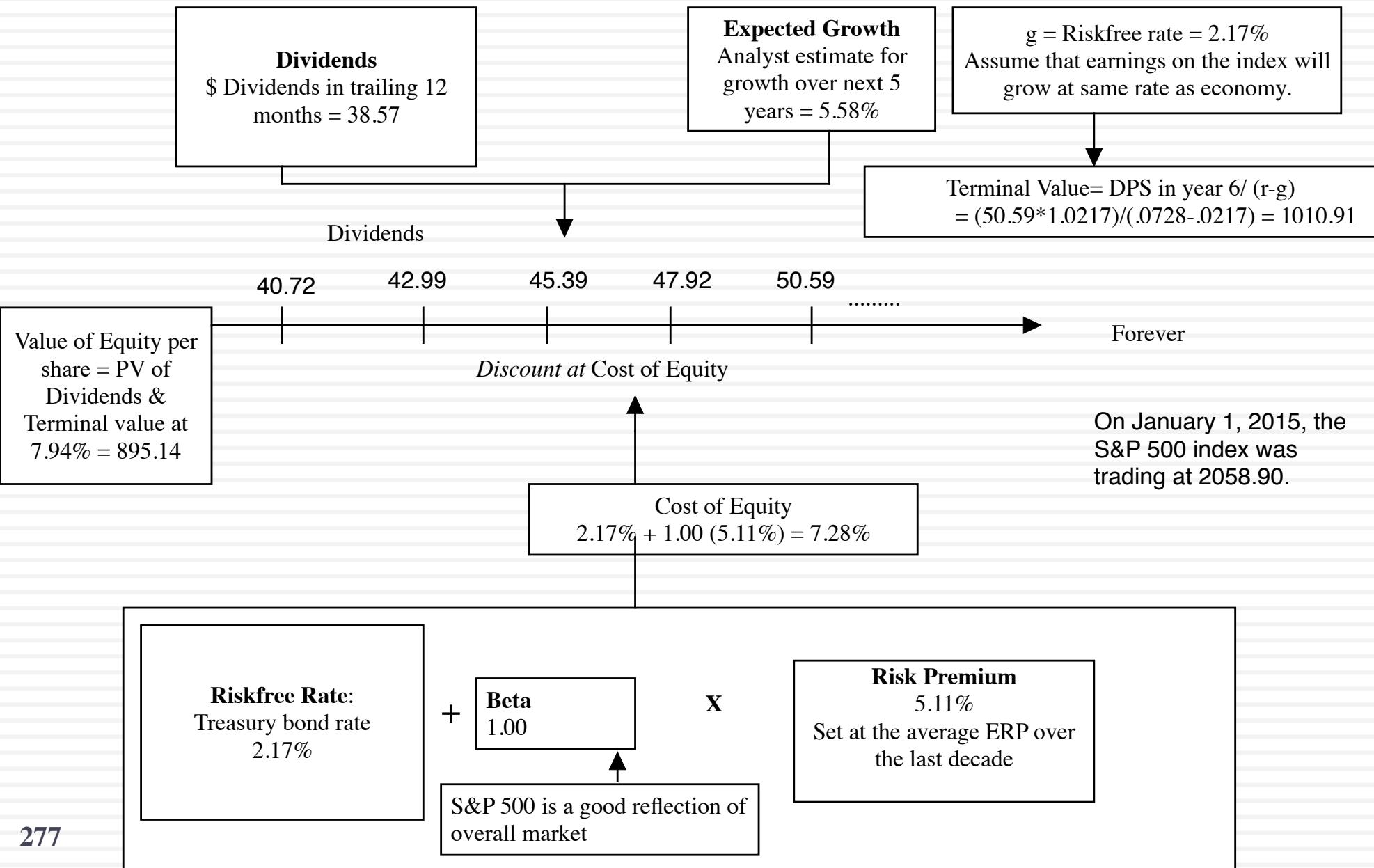


From a Company to the Market: Valuing the S&P 500: Dividend Discount Model in January 2015

Rationale for model

Why dividends? Because it is the only tangible cash flow, right?

Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.

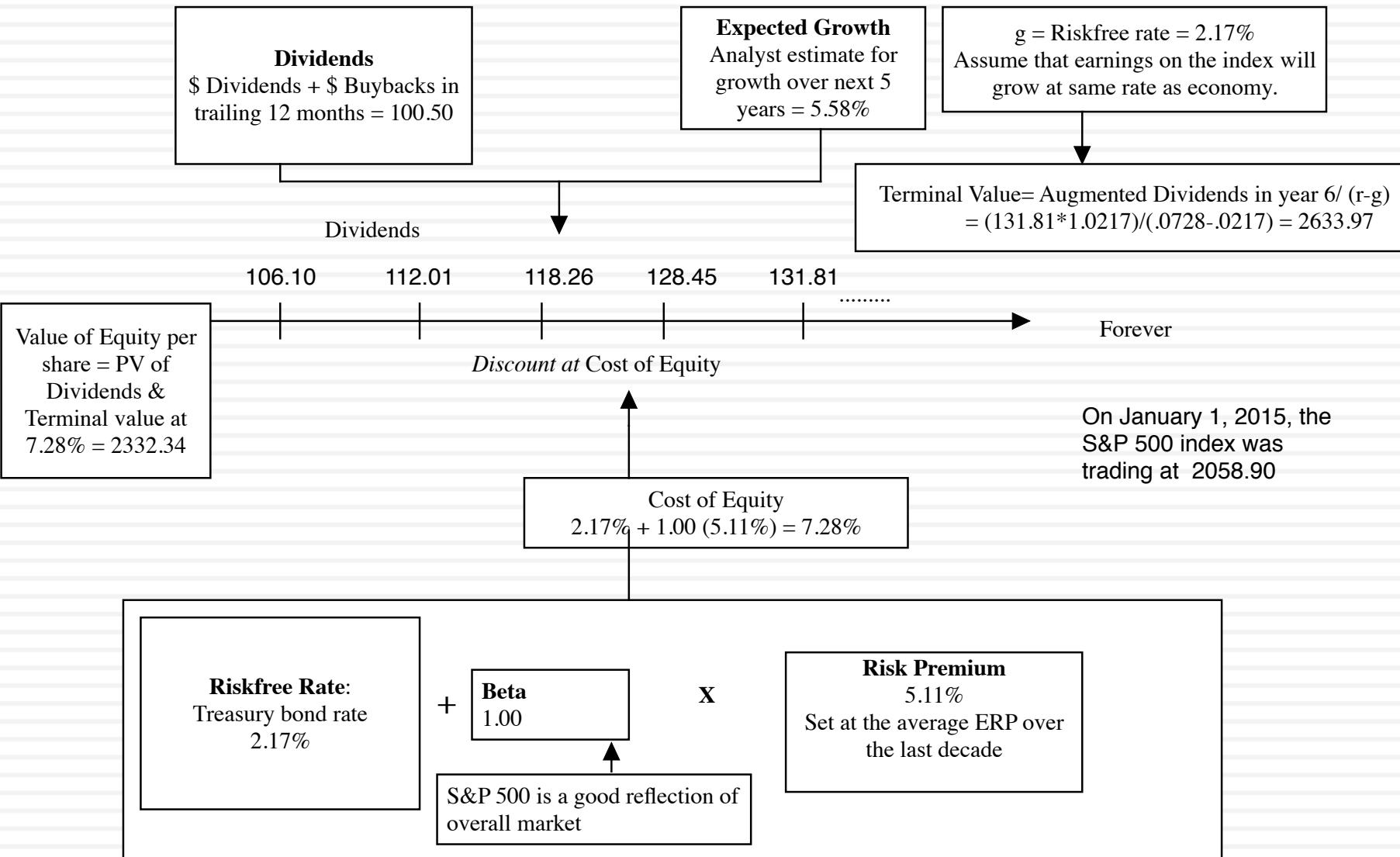


From a Company to the Market: Valuing the S&P 500: Augmented Dividend Discount Model in January 2015

Rationale for model

Why augmented dividends? Because companies are increasing returning cash in the form of stock buybacks

Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.

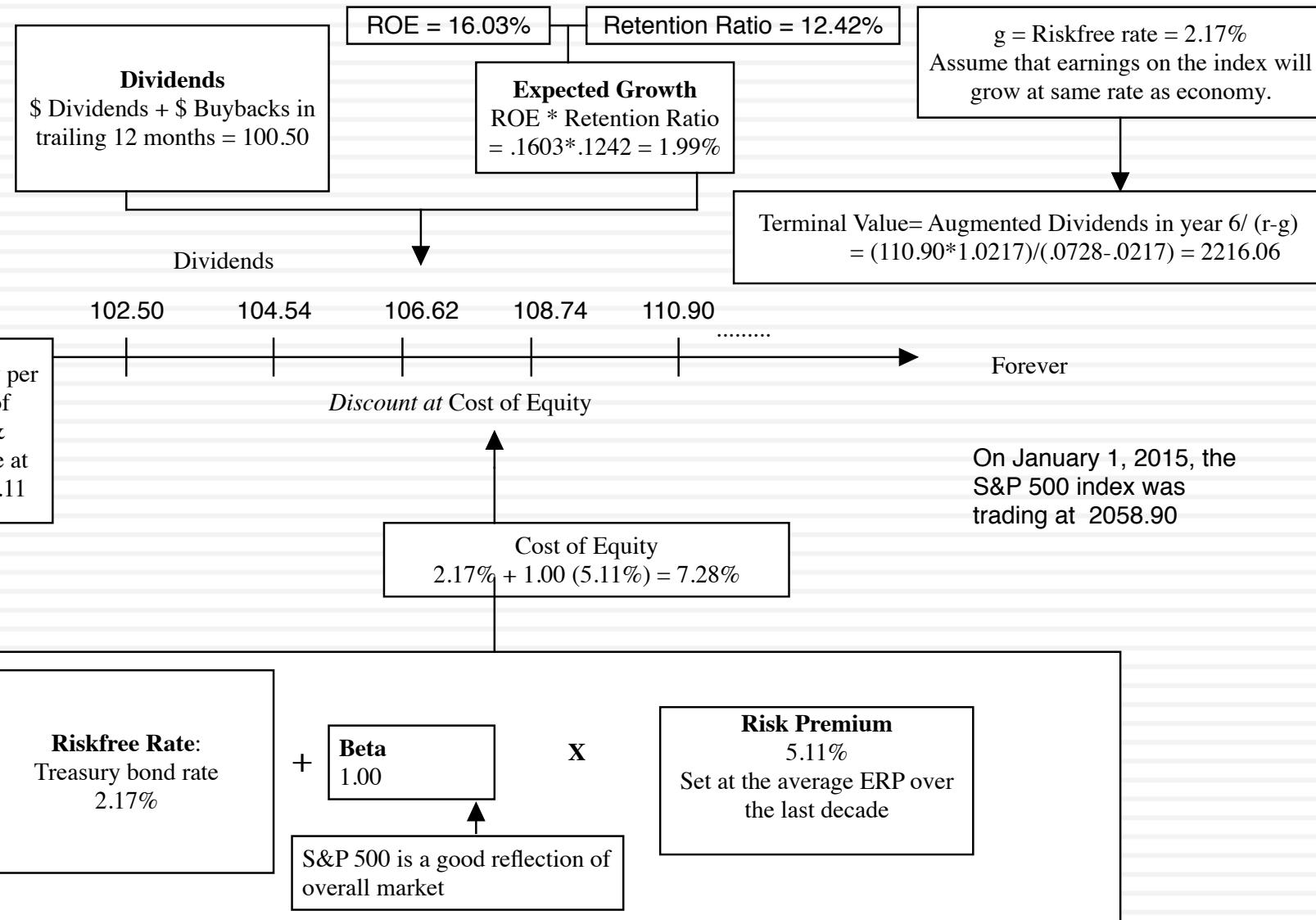


Valuing the S&P 500: Augmented Dividends and Fundamental Growth January 2015

Rationale for model

Why augmented dividends? Because companies are increasing returning cash in the form of stock buybacks

Why 2-stage? Why not?



Evaluating the Effect of Tax Reform on January 1, 2018

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Macro Inputs		
US T.Bond rate (1/1/18) = 2.41%		
ERP = 5.08%		
	Pre-tax reform	Post-tax reform
Beta	1.07	1.07
Pre-tax cost of debt	3.91%	3.91%
Marginal Tax Rate	38.00%	24.00%
Debt to Capital Ratio	23.51%	23.51%
Revenues	\$12,254.10	\$12,254.10
Operating Income (EBIT)	\$1,438.22	\$1,438.22
Effective tax rate	25.19%	20.00%
After-tax return on capital	12.76%	13.65%
Reinvestment Rate =	59.27%	65.00%
Length of growth period =	5	5
Computed Values		
Cost of Equity =	7.85%	7.85%
After-tax cost of debt =	2.42%	2.97%
Cost of capital =	6.57%	6.70%
After-tax return on capital =	12.76%	13.65%
Reinvestment Rate =	59.27%	65.00%
Expected growth rate=	7.56%	8.87%
Value of firm		
PV of FCFF in high growth =	\$2,253.08	\$2,139.72
Terminal value =	\$30,926.29	\$34,590.66
Value of firm today =	\$24,750.46	\$27,151.37
Value with old tax code inputs = \$24,751 billion Value with new tax code inputs = \$27,151 billion Change in value = \$2,400 billion Percentage Change in value = $2400/24,751 = 9.70\%$		
Marginal Tax Rate The drop in the federal corporate tax rate from 35% to 21% lowers overall marginal tax rate (with state & local taxes) from 38% to 24%		
Effective tax rate Change in corporate tax rate on US income & shift to regional tax model for global taxes will lower effective tax rate from 25.19% to 20%		
Tax effect on debt Lower marginal tax rate increases after-tax cost of debt and capital (holding debt ratio fixed).		
Higher ROIC/Reinvestment ROIC rises proportionately with drop in effective tax rate. Capital expensing rules lead to marginally more reinvestment. Expected Growth = ROIC * Reinvestment Rate		

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The Dark Side of Valuation

Anyone can value a company that is stable,
makes money and has an established
business model!

The fundamental determinants of value...

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What are the
**cashflows from
existing assets?**
- Equity: Cashflows
after debt payments
- Firm: Cashflows
before debt payments

What is the **value added** by growth assets?
Equity: Growth in equity earnings/ cashflows
Firm: Growth in operating earnings/
cashflows

How **risky** are the **cash flows** from both
existing assets and growth assets?
Equity: Risk in equity in the company
Firm: Risk in the firm's operations

When will the firm
become a **mature
firm**, and what are
the potential
roadblocks?

The Dark Side of Valuation...

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- Valuing stable, money making companies with consistent and clear accounting statements, a long and stable history and lots of comparable firms is easy to do.
- The true test of your valuation skills is when you have to value “difficult” companies. In particular, the challenges are greatest when valuing:
 - ▣ Young companies, early in the life cycle, in young businesses
 - ▣ Companies that don’t fit the accounting mold
 - ▣ Companies that face substantial truncation risk (default or nationalization risk)

Difficult to value companies...

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- Across the life cycle:
 - ▣ Young, growth firms: Limited history, small revenues in conjunction with big operating losses and a propensity for failure make these companies tough to value.
 - ▣ Mature companies in transition: When mature companies change or are forced to change, history may have to be abandoned and parameters have to be reestimated.
 - ▣ Declining and Distressed firms: A long but irrelevant history, declining markets, high debt loads and the likelihood of distress make them troublesome.
- Across markets
 - ▣ Emerging market companies are often difficult to value because of the way they are structured, their exposure to country risk and poor corporate governance.
- Across sectors
 - ▣ Financial service firms: Opacity of financial statements and difficulties in estimating basic inputs leave us trusting managers to tell us what's going on.
 - ▣ Commodity and cyclical firms: Dependence of the underlying commodity prices or overall economic growth make these valuations susceptible to macro factors.
 - ▣ Firms with intangible assets: Accounting principles are left to the wayside on these firms.

I. The challenge with young companies...

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Making judgments on revenues/ profits difficult because you cannot draw on history. If you have no product/ service, it is difficult to gauge market potential or profitability. The company's entire value lies in future growth but you have little to base your estimate on.

Cash flows from existing assets non-existent or negative.

What is the value added by growth assets?

What are the cashflows from existing assets?

Different claims on cash flows can affect value of equity at each stage.

What is the value of equity in the firm?

How risky are the cash flows from both existing assets and growth assets?

Limited historical data on earnings, and no market prices for securities makes it difficult to assess risk.

When will the firm become a mature firm, and what are the potential roadblocks?

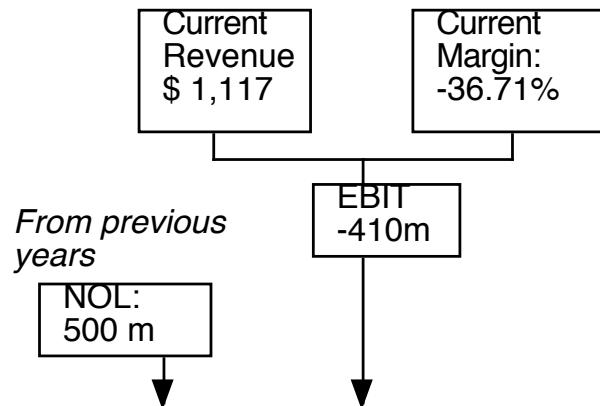
Will the firm make it through the gauntlet of market demand and competition. Even if it does, assessing when it will become mature is difficult because there is so little to go on.

Upping the ante.. Young companies in young businesses...

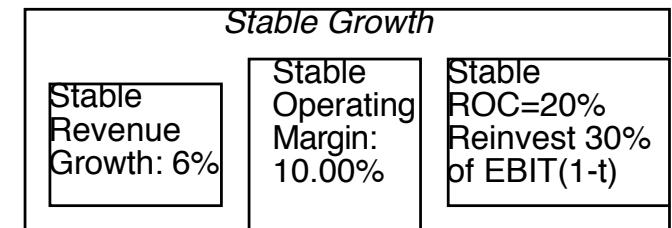
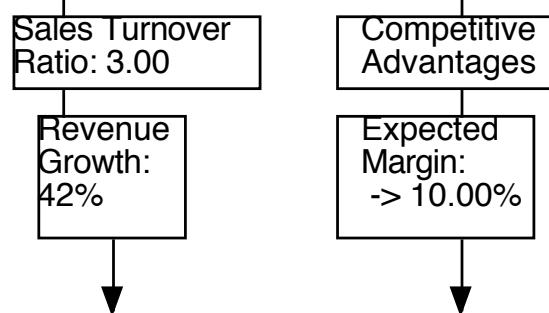
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- When valuing a business, we generally draw on three sources of information
 - ▣ The firm's current financial statement
 - How much did the firm sell?
 - How much did it earn?
 - ▣ The firm's financial history, usually summarized in its financial statements.
 - How fast have the firm's revenues and earnings grown over time?
 - What can we learn about cost structure and profitability from these trends?
 - Susceptibility to macro-economic factors (recessions and cyclical firms)
 - ▣ The industry and comparable firm data
 - What happens to firms as they mature? (Margins.. Revenue growth... Reinvestment needs... Risk)
- It is when valuing these companies that you find yourself tempted by the dark side, where
 - ▣ "Paradigm shifts" happen...
 - ▣ New metrics are invented ...
 - ▣ The story dominates and the numbers lag...

9a. Amazon in January 2000



Sales to capital ratio and expected margin are retail industry average numbers



$$\text{Terminal Value} = \frac{1881}{(.0961 - .06)} = 52,148$$

Term. Year	\$41,346
	10.00%
	35.00%
	\$2,688
	\$ 807
	\$1,881

Forever

Value of Op Assets	\$ 14,910
+ Cash	\$ 26
= Value of Firm	\$14,936
- Value of Debt	\$ 349
= Value of Equity	\$14,587
- Equity Options	\$ 2,892
Value per share	\$ 34.32

All existing options valued as options, using current stock price of \$84.

Revenues	\$2,793	5,585	9,774	14,661	19,059	23,862	28,729	33,211	36,798	39,006
EBIT	-\$373	-\$94	\$407	\$1,038	\$1,628	\$2,212	\$2,768	\$3,261	\$3,646	\$3,883
EBIT (1-t)	-\$373	-\$94	\$407	\$871	\$1,058	\$1,438	\$1,799	\$2,119	\$2,370	\$2,524
- Reinvestment	\$559	\$931	\$1,396	\$1,629	\$1,466	\$1,601	\$1,623	\$1,494	\$1,196	\$736
FCFF	-\$931	-\$1,024	-\$989	-\$758	-\$408	-\$163	\$177	\$625	\$1,174	\$1,788
	1	2	3	4	5	6	7	8	9	10
Cost of Equity	12.90%	12.90%	12.90%	12.90%	12.90%	12.42%	12.30%	12.10%	11.70%	10.50%
Cost of Debt	8.00%	8.00%	8.00%	8.00%	8.00%	7.80%	7.75%	7.67%	7.50%	7.00%
AT cost of debt	8.00%	8.00%	8.00%	6.71%	5.20%	5.07%	5.04%	4.98%	4.88%	4.55%
Cost of Capital	12.84%	12.84%	12.84%	12.83%	12.81%	12.13%	11.96%	11.69%	11.15%	9.61%

Used average interest coverage ratio over next 5 years to get BBB rating.

Cost of Debt
6.5%+1.5% = 8.0%
Tax rate = 0% -> 35%

Weights
Debt = 1.2% -> 15%

Amazon was trading at \$84 in January 2000.

Dot.com retailers for first 5 years
Conventional retailers after year 5

Riskfree Rate:
T. Bond rate = 6.5%

+ Beta
1.60 -> 1.00

X Risk Premium
4%

Internet/
Retail

Operating
Leverage

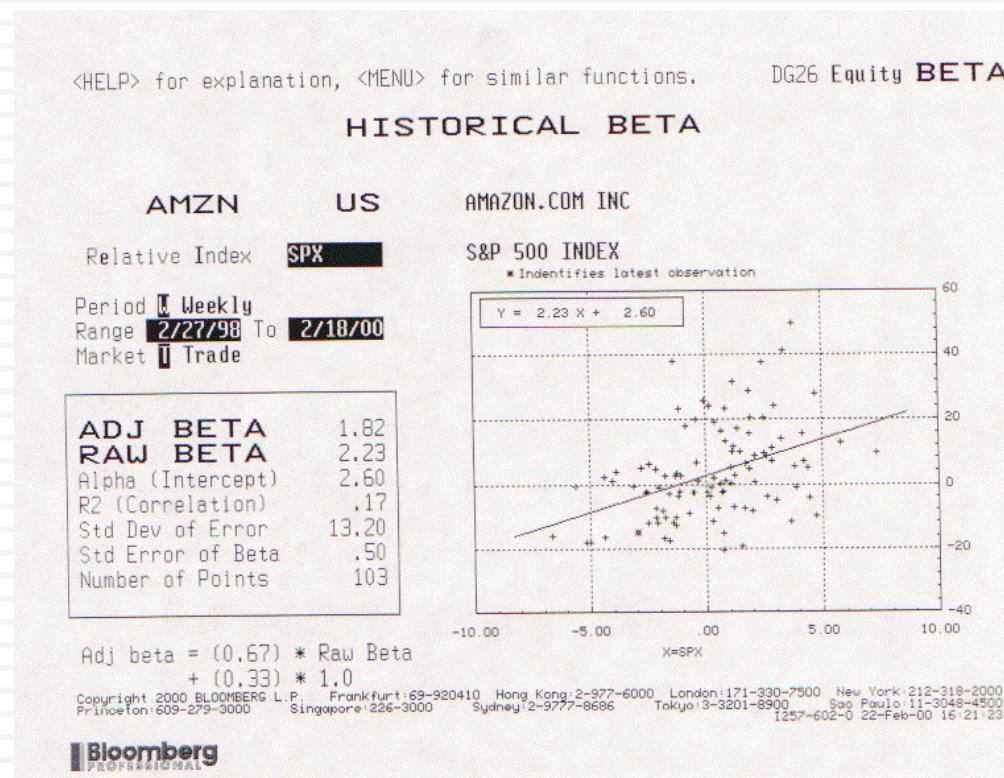
Current
D/E: 1.21%

Base Equity
Premium

Country Risk
Premium

Pushed debt ratio to retail industry average of 15%.

Lesson 1: Don't sweat the small stuff



- Spotlight the business the company is in & use the beta of that business.
- Don't try to incorporate failure risk into the discount rate.
- Let the cost of capital change over time, as the company changes.
- If you are desperate, use the cross section of costs of capital to get your estimation going (use the 90th or 95th percentile across all companies).

Lesson 2: Work backwards and keep it simple...

Year	Revenue Growth	Sales	Operating Margin	EBIT	EBIT (1-t)
Tr 12 mths		\$1,117	-36.71%	-\$410	-\$410
1	150.00%	\$2,793	-13.35%	-\$373	-\$373
2	100.00%	\$5,585	-1.68%	-\$94	-\$94
3	75.00%	\$9,774	4.16%	\$407	\$407
4	50.00%	\$14,661	7.08%	\$1,038	\$871
5	30.00%	\$19,059	8.54%	\$1,628	\$1,058
6	25.20%	\$23,862	9.27%	\$2,212	\$1,438
7	20.40%	\$28,729	9.64%	\$2,768	\$1,799
8	15.60%	\$33,211	9.82%	\$3,261	\$2,119
9	10.80%	\$36,798	9.91%	\$3,646	\$2,370
10	6.00%	\$39,006	9.95%	\$3,883	\$2,524
TY	6.00%	\$41,346	10.00%	\$4,135	\$2,688

Lesson 3: Scaling up is hard to do & failure is common



- Lower revenue growth rates, as revenues scale up.
- Keep track of dollar revenues, as you go through time, measuring against market size.

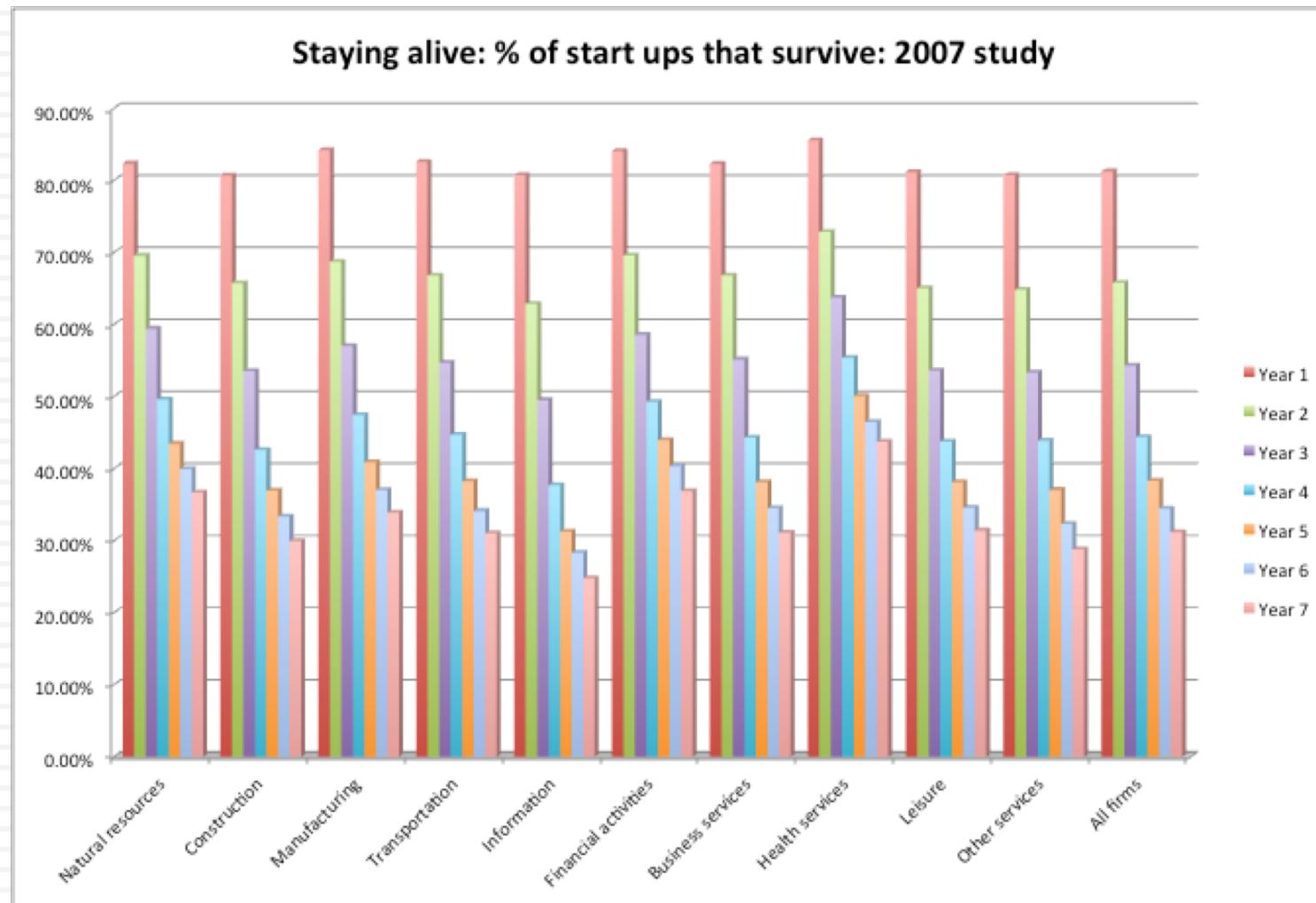
Lesson 4: Don't forget to pay for growth...

Year	Revenues	Δ Revenue	Sales/Cap	Δ Investment	Invested Capital	EBIT (1-t)	Imputed ROC
Tr 12 mths	\$1,117				\$ 487	-\$410	
1	\$2,793	\$1,676	3.00	\$559	\$ 1,045	-\$373	-76.62%
2	\$5,585	\$2,793	3.00	\$931	\$ 1,976	-\$94	-8.96%
3	\$9,774	\$4,189	3.00	\$1,396	\$ 3,372	\$407	20.59%
4	\$14,661	\$4,887	3.00	\$1,629	\$ 5,001	\$871	25.82%
5	\$19,059	\$4,398	3.00	\$1,466	\$ 6,467	\$1,058	21.16%
6	\$23,862	\$4,803	3.00	\$1,601	\$ 8,068	\$1,438	22.23%
7	\$28,729	\$4,868	3.00	\$1,623	\$ 9,691	\$1,799	22.30%
8	\$33,211	\$4,482	3.00	\$1,494	\$ 11,185	\$2,119	21.87%
9	\$36,798	\$3,587	3.00	\$1,196	\$ 12,380	\$2,370	21.19%
10	\$39,006	\$2,208	3.00	\$736	\$ 13,116	\$2,524	20.39%
TY	\$41,346	\$2,340	NA		Assumed to be =		20.00%

Lesson 5: The dilution is taken care off..

- With young growth companies, it is almost a given that the number of shares outstanding will increase over time for two reasons:
 - ▣ To grow, the company will have to issue new shares either to raise cash to take projects or to offer to target company stockholders in acquisitions
 - ▣ Many young, growth companies also offer options to managers as compensation and these options will get exercised, if the company is successful.
- In DCF valuation, both effects are already incorporated into the value per share, even though we use the current number of shares in estimating value per share
 - ▣ The need for new equity issues is captured in negative cash flows in the earlier years. The present value of these negative cash flows will drag down the current value of equity and this is the effect of future dilution.
 - ▣ The options are valued and netted out against the current value. Using an option pricing model allows you to incorporate the expected likelihood that they will be exercised and the price at which they will be exercised.

Lesson 6: If you are worried about failure, incorporate into value



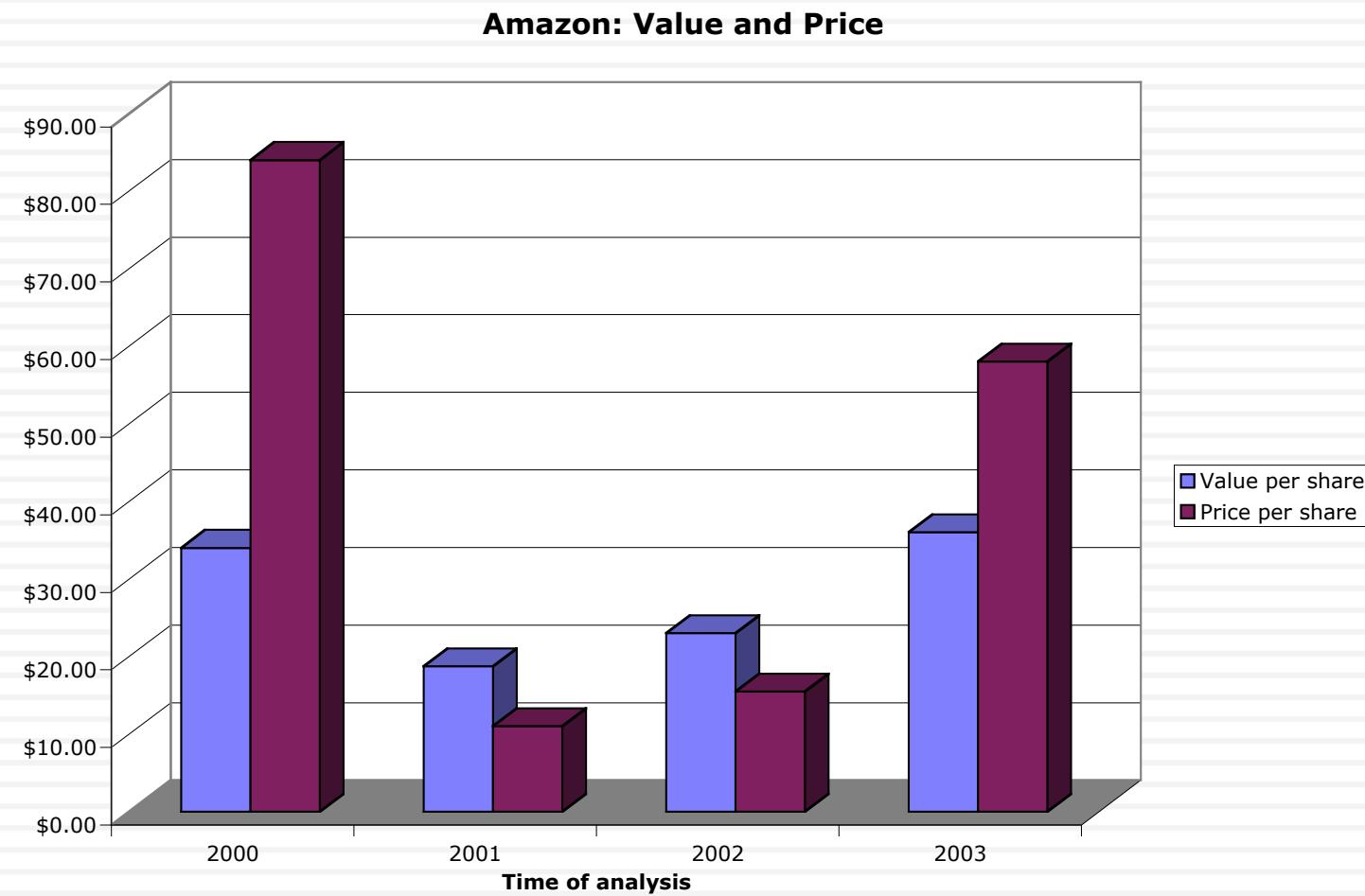
Lesson 7: There are always scenarios where the market price can be justified...

	6%	8%	10%	12%	14%
30%	\$ (1.94)	\$ 2.95	\$ 7.84	\$ 12.71	\$ 17.57
35%	\$ 1.41	\$ 8.37	\$ 15.33	\$ 22.27	\$ 29.21
40%	\$ 6.10	\$ 15.93	\$ 25.74	\$ 35.54	\$ 45.34
45%	\$ 12.59	\$ 26.34	\$ 40.05	\$ 53.77	\$ 67.48
50%	\$ 21.47	\$ 40.50	\$ 59.52	\$ 78.53	\$ 97.54
55%	\$ 33.47	\$ 59.60	\$ 85.72	\$ 111.84	\$ 137.95
60%	\$ 49.53	\$ 85.10	\$ 120.66	\$ 156.22	\$ 191.77

Lesson 8: You will be wrong 100% of the time and it really is not your fault...

- No matter how careful you are in getting your inputs and how well structured your model is, your estimate of value will change both as new information comes out about the company, the business and the economy.
- As information comes out, you will have to adjust and adapt your model to reflect the information. Rather than be defensive about the resulting changes in value, recognize that this is the essence of risk.
- A test: If your valuations are unbiased, you should find yourself increasing estimated values as often as you are decreasing values. In other words, there should be equal doses of good and bad news affecting valuations (at least over time).

And the market is often “more wrong”....

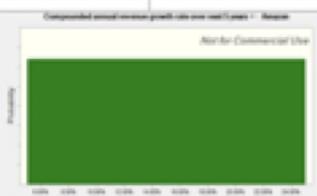
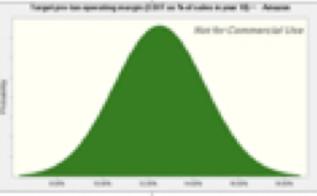
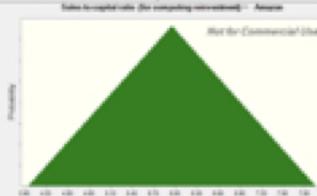
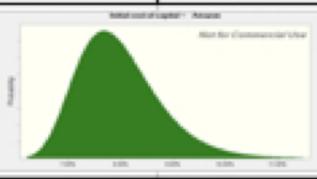


Assessing my 2000 forecasts, in 2014

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	Revenues		Operating Income		Operating Margin	
Year	<i>My forecast (2000)</i>	<i>Actual</i>	<i>My forecast (2000)</i>	<i>Actual</i>	<i>My forecast (2000)</i>	<i>Actual</i>
2000	\$2,793	\$2,762	-\$373	-\$664.00	-13.35%	-24.04%
2001	\$5,585	\$3,122	-\$94	-\$231.00	-1.68%	-7.40%
2002	\$9,774	\$3,932	\$407	\$106.00	4.16%	2.70%
2003	\$14,661	\$5,264	\$1,038	\$271.00	7.08%	5.15%
2004	\$19,059	\$6,921	\$1,628	\$440.00	8.54%	6.36%
2005	\$23,862	\$8,490	\$2,212	\$432.00	9.27%	5.09%
2006	\$28,729	\$10,711	\$2,768	\$389.00	9.63%	3.63%
2007	\$33,211	\$14,835	\$3,261	\$655.00	9.82%	4.42%
2008	\$36,798	\$19,166	\$3,646	\$842.00	9.91%	4.39%
2009	\$39,006	\$24,509	\$3,883	\$1,129.00	9.95%	4.61%
2010	\$41,346	\$34,204	\$4,135	\$1,406.00	10.00%	4.11%
2011	\$43,827	\$48,077	\$4,383	\$862.00	10.00%	1.79%
2012	\$46,457	\$61,093	\$4,646	\$676.00	10.00%	1.11%
2013	\$49,244	\$74,452	\$4,925	\$745.00	10.00%	1.00%
2014 (LTM)	\$51,460	\$85,247	\$5,146.35	\$97.00	10.00%	0.11%

Amazon						
<i>The Greatest (and most Feared) Disruptive Platform in History</i>						
Amazon will complete its metamorphosis from being a retail company to one that can take its competitive advantages - access to capital & willingness to lose money for long periods, while disrupting and changing the status quo - to any business that it targets, giving it the potential for high revenue growth on top of already-large revenues. It will be able to use the pricing power it accumulates in each business it is in, to increase profit margins, partly through economies of scale and partly through higher prices. Its low debt ratio and divergent business mix give it a low cost of capital.						
<i>The Assumptions</i>						
	Base year	Years 1-5	Years 6-10		After year 10	Link to story
Revenues (a)	\$ 208,125	15.00%	3.00%		3.00%	Expanding into new businesses
Operating margin (b)	7.71%	7.71%	12.50%		12.50%	Economies of scale and pricing power increase margins
Tax rate	20.20%	20.20%	24.00%		24.00%	Converging on a global tax rate of 25%
Reinvestment (c)		Sales to capital ratio 5.95		RIR =	30.00%	Big payoffs from investing in technology and content
Return on capital	15.24%	Marginal ROIC =	89.16%		10.00%	The last man standing...
Cost of capital (d)		7.97%	7.50%		7.50%	Low debt & diverse business mix
<i>The Cash Flows</i>						
	Revenues	Operating Margin	EBIT	EBIT(1-t)	Reinvestment	FCFF
1	\$ 239,344	8.67%	\$ 20,753	\$ 16,560	\$ 5,249	\$ 11,311
2	\$ 275,245	9.63%	\$ 26,501	\$ 21,147	\$ 6,037	\$ 15,110
3	\$ 316,532	10.59%	\$ 33,506	\$ 26,736	\$ 6,942	\$ 19,794
4	\$ 364,012	11.54%	\$ 42,017	\$ 33,527	\$ 7,983	\$ 25,544
5	\$ 418,614	12.50%	\$ 52,327	\$ 41,754	\$ 9,181	\$ 32,573
6	\$ 471,359	12.50%	\$ 58,920	\$ 46,568	\$ 8,869	\$ 37,699
7	\$ 519,438	12.50%	\$ 64,930	\$ 50,825	\$ 8,084	\$ 42,741
8	\$ 559,954	12.50%	\$ 69,994	\$ 54,258	\$ 6,813	\$ 47,446
9	\$ 590,191	12.50%	\$ 73,774	\$ 56,628	\$ 5,084	\$ 51,544
10	\$ 607,897	12.50%	\$ 75,987	\$ 57,750	\$ 2,977	\$ 54,773
Terminal year	\$ 626,134	12.50%	\$ 78,267	\$ 59,483	\$ 17,845	\$ 41,638
<i>The Value</i>						
Terminal value		\$ 925,287				
PV(Terminal value)		\$ 435,438				
PV (CF over next 10 years)		\$ 206,707				
Value of operating assets =		\$ 642,144				
Adjustment for distress		\$ -		Probability of failure =	0.00%	
- Debt & Minority interests		\$ 45,435				
+ Cash & Other Non-operating assets		\$ 27,050				
Value of equity		\$ 623,759				
- Value of equity options		\$ -				
Number of shares		497.00				
Value per share		\$ 1,255.05		Stock was trading at =	\$ 1,970.19	

Revenue Growth Rate	
Minimum	5.00%
Maximum	25.00%
	
Operating Margin	
Mean	12.50%
Std Dev	2.00%
	
Sales/Invested Capital	
Minimum	3.95
Likeliest	5.95
Maximum	7.95
	
Cost of Capital	
Location	5.00%
Mean	7.97%
Std. Dev.	0.80%
	

Correlation = 0.40

Base Case	\$1,255.09
Mean	\$1,343.67
Median	\$1,241.98

Amazon: Simulated Values in September 2018

Percentiles	Value/Share
0%	\$234.29
10%	\$705.19
20%	\$832.65
30%	\$957.69
40%	\$1,092.41
50%	\$1,241.97
60%	\$1,411.82
70%	\$1,605.37
80%	\$1,837.98
90%	\$2,152.15
100%	\$3,887.62

