

# The Dark Side of Valuation

Valuing young, high growth companies

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## Risk Adjusted Value: Three Basic Propositions

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The value of an asset is the present value of the expected cash flows on that asset, over its expected life:

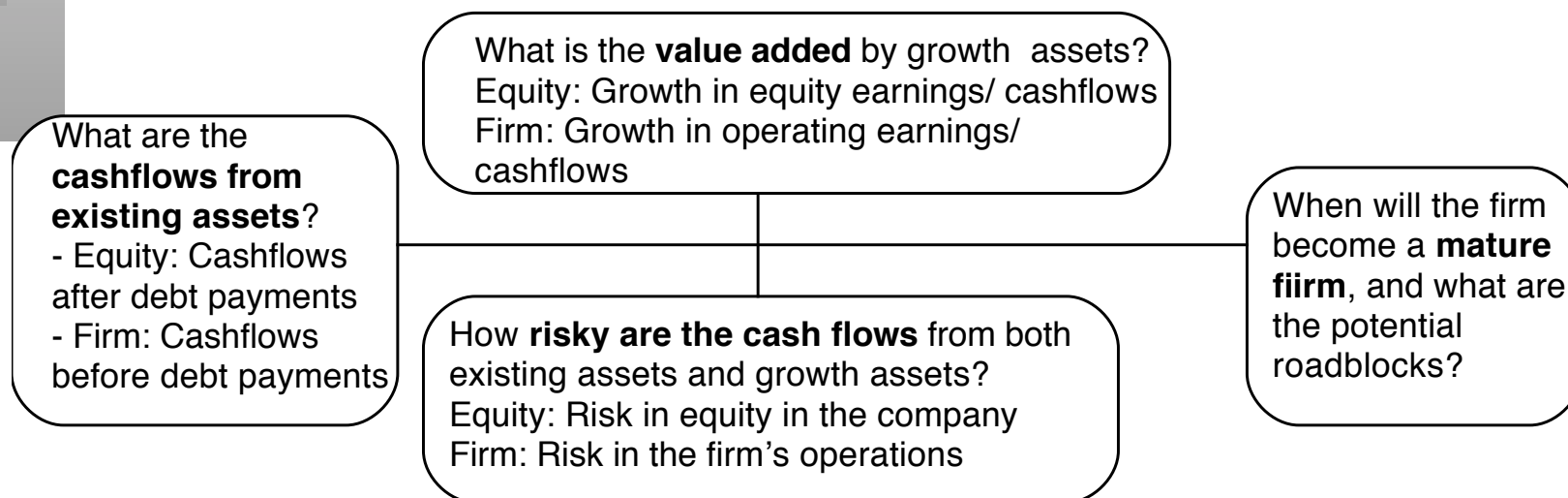
$$\text{Value of asset} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \dots + \frac{E(CF_n)}{(1+r)^n}$$

**Proposition 1: If “it” does not affect the cash flows or alter risk (thus changing discount rates), “it” cannot affect value.**

**Proposition 2: For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.**

**Proposition 3: Assets that generate cash flows early in their life will be worth more than assets that generate cash flows later; the latter may however have greater growth and higher cash flows to compensate.**

## The fundamental determinants of value...



## The Dark Side of Valuation...

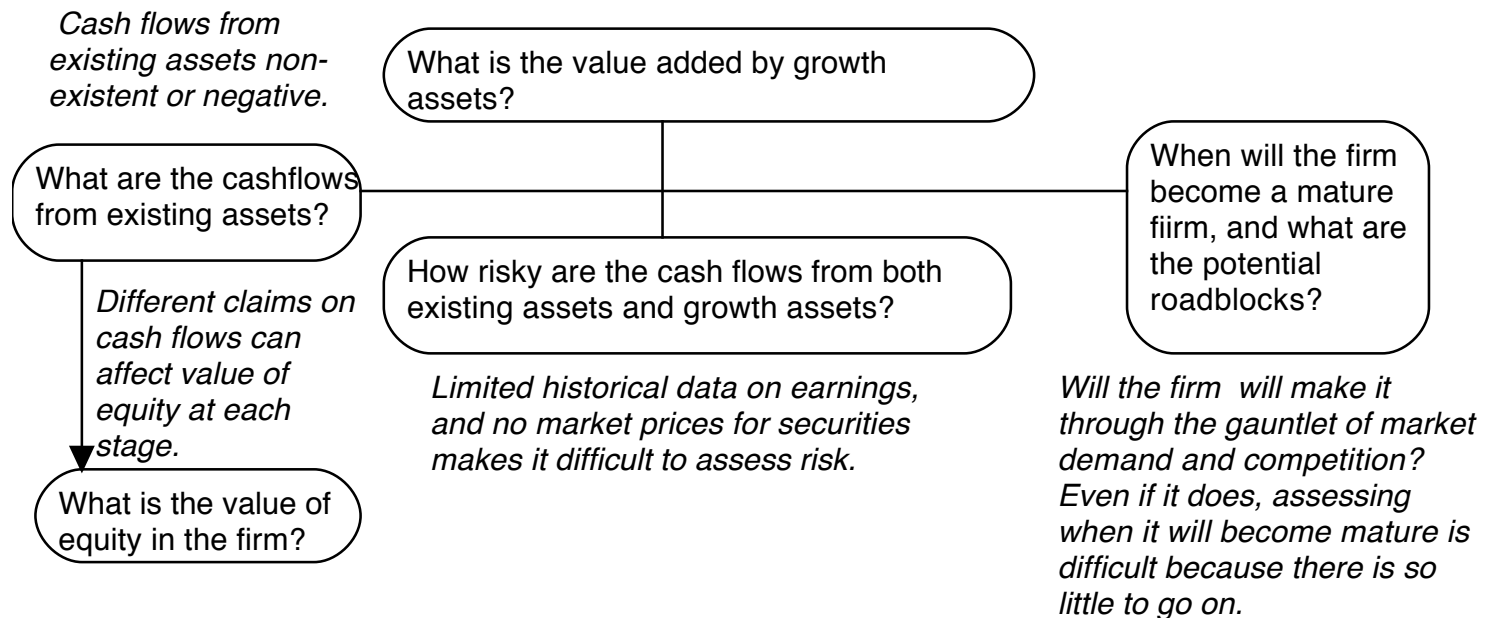
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- Valuing stable, money making companies with consistent and clear accounting statements, a long and stable history and lots of comparable firms is easy to do.
- The true test of your valuation skills is when you have to value “difficult” companies. 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)

# The challenge with young companies...

## Young and Start-up Companies

*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.*



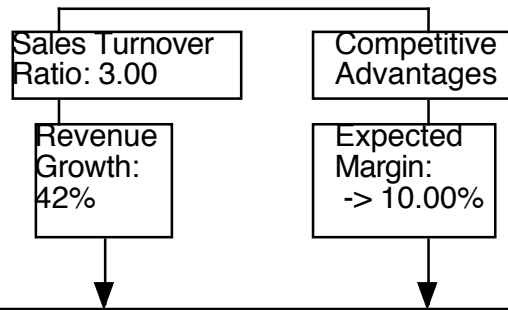
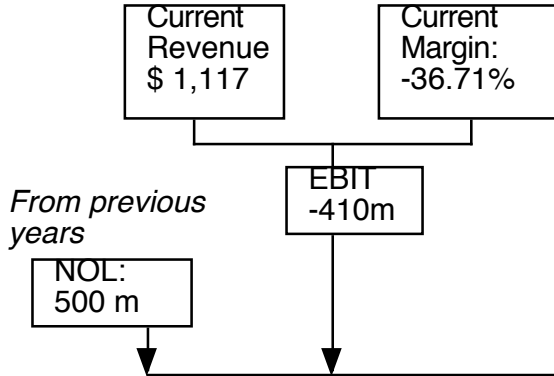
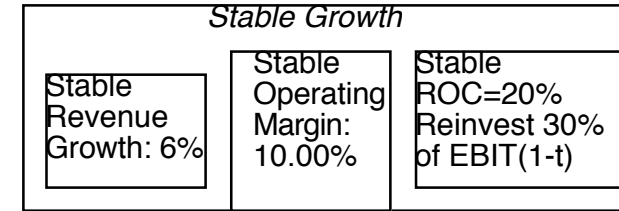
## Upping the ante.. Young companies in young businesses...

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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)
- When valuing these companies, the 'dark side' beckons:
  - "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*



Terminal Value =  $1881 / (.0961 - .06) = 52,148$

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

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

Term. Year

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

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

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%

**Cost of Equity 12.90%**

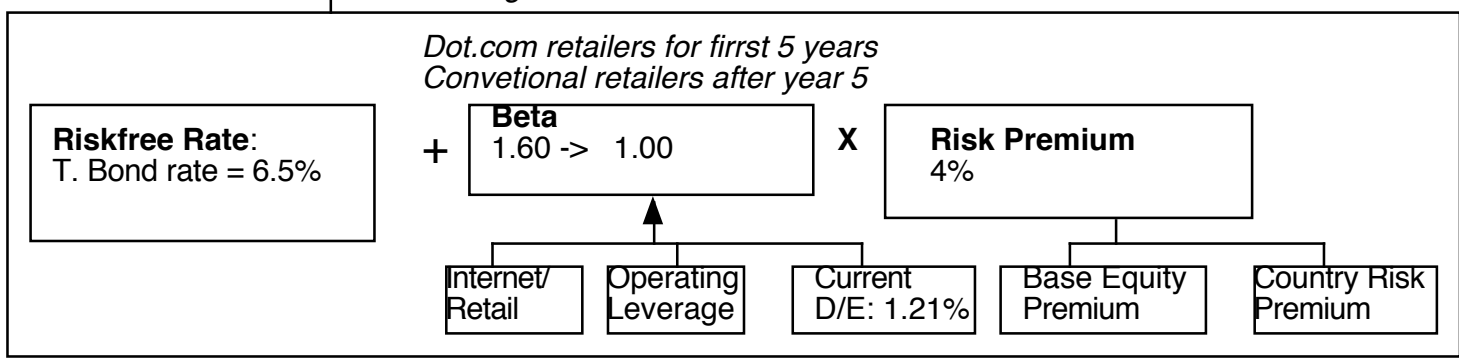
*Used average interest coverage ratio over next 5 years to get BBB rating.*

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

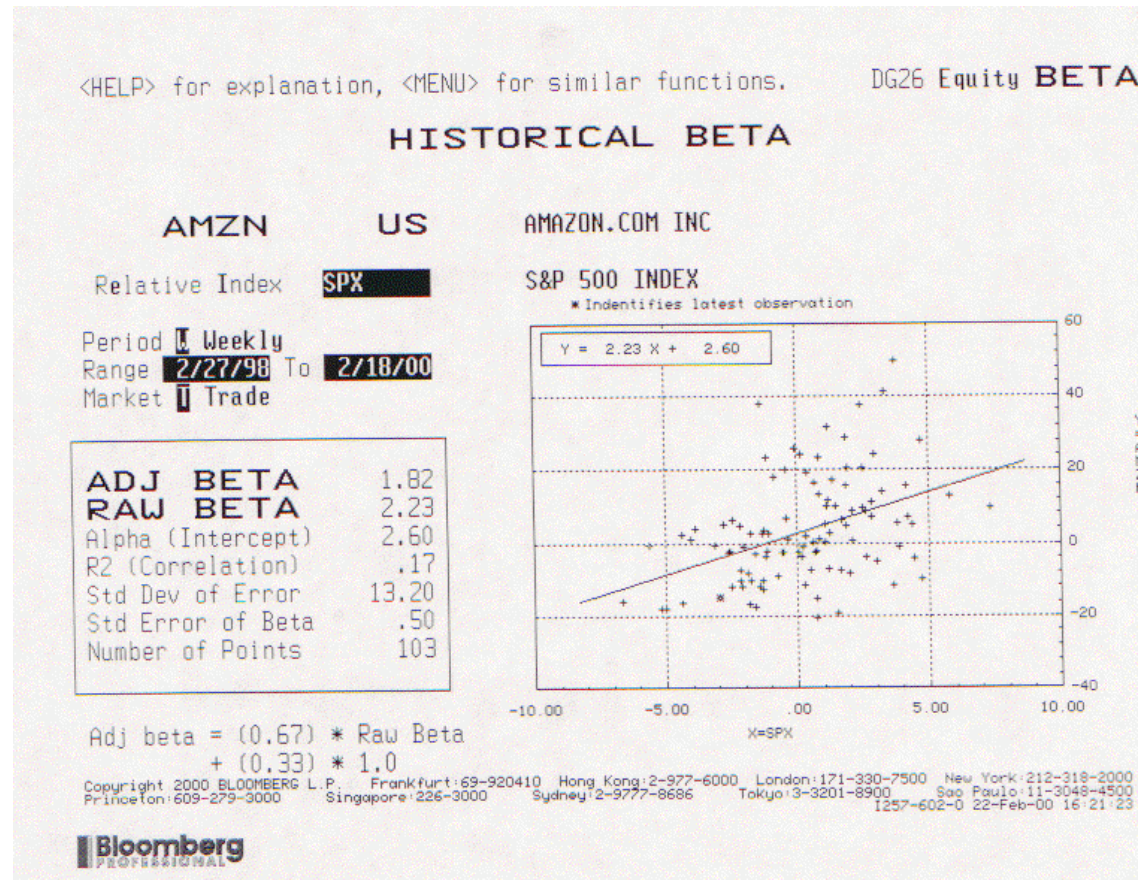
**Weights Debt= 1.2% -> 15%**

Amazon was trading at \$84 in January 2000.

*Pushed debt ratio to retail industry average of 15%.*



# Lesson 1: Don't trust regression betas....





## Lesson 2: The cost of capital will change over time...

Year	1	2	3	4	5
EBIT	-\$373	-\$94	\$407	\$1,038	\$1,628
Taxes	\$0	\$0	\$0	\$167	\$570
EBIT(1-t)	-\$373	-\$94	\$407	\$871	\$1,058
Tax rate	0%	0%	0%	16.13%	35%
NOL	\$500	\$873	\$967	\$560	\$0

	Yrs 1-3	4	5	6	7	8	9	10	Terminal year
Tax Rate	0.00%	16.13%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%
Debt Ratio	1.20%	1.20%	1.20%	3.96%	4.65%	5.80%	8.10%	15.00%	15.00%
Beta	1.60	1.60	1.60	1.48	1.36	1.24	1.12	1.00	1.00
Cost of Equity	12.90%	12.90%	12.90%	12.42%	11.94%	11.46%	10.98%	10.50%	10.50%
Cost of Debt	8.00%	8.00%	8.00%	7.80%	7.75%	7.67%	7.50%	7.00%	7.00%
After-tax cost of debt	8.00%	6.71%	5.20%	5.07%	5.04%	4.98%	4.88%	4.55%	4.55%
Cost of Capital	12.84%	12.83%	12.81%	12.13%	11.62%	11.08%	10.49%	9.61%	9.61%

## Lesson 3: Use updated numbers and the free cash flows will often be negative (even if the company is making money)

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- When valuing Amazon in early 2000, the last annual report that was available was the 1998 annual report. For a young company, that is ancient data, since so much can change over the course of a short time period. To value Amazon the trailing 12-month numbers were used.

- Trailing 12-month inputs

- Amazon's EBIT (Trailing 1999) = -\$ 410 million
- Tax rate used = 0%
- Capital spending (Trailing 1999) = \$ 243 million (includes acquisitions)
- Depreciation (Trailing 1999) = \$ 31 million
- Non-cash Working capital Change (1999) = - 80 million

- Estimating FCFF (1999)

Current EBIT * (1 - tax rate)	= - 410 (1-0)	= - \$410 million
- (Capital Spending - Depreciation)	= \$212 million	
- Change in Working Capital		= - \$ 80 million
Current FCFF		= - \$542 million

## Lesson 4: Many of the operating expenses may be capital expenses....

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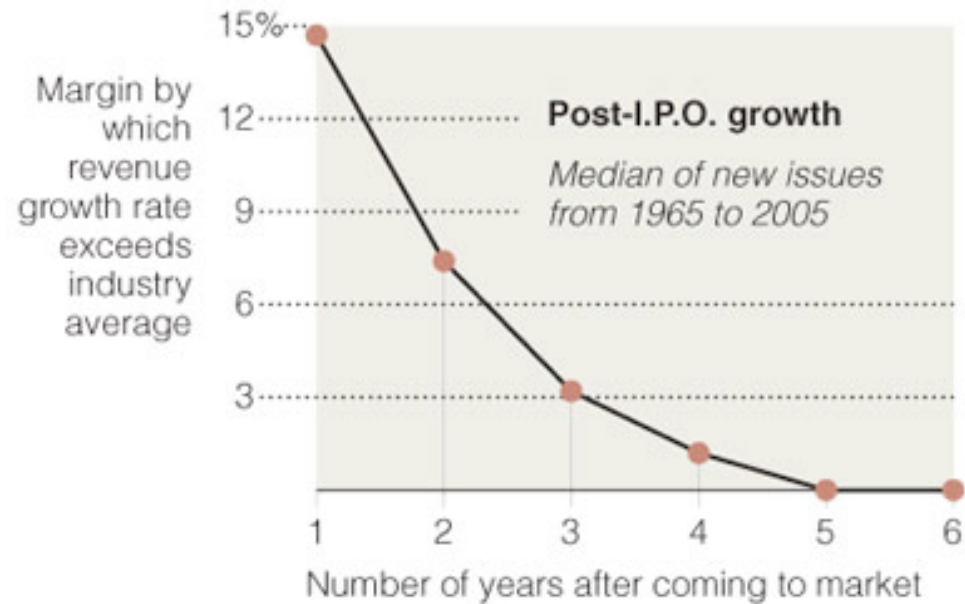
- Since young companies are focused on generating future growth, it is possible that some or a significant portion of what accountants categorize as operating expenses represent expenditures designed to generate future growth (and thus are capital expenditures).
- In the late 1990s, many dot-com companies argued that SG&A expenses were really focused on getting new customers and should be treated as capital expenditures. Amazon, for instance, would have reported a profit if the SG&A expenses from 1999 were treated as capital expenditures, rather than operating expenses.
- If we adopt this rationale, it will also mean that they are reinvesting far more than we think they are. It will, however, make not their cash flows less negative.
- Should Amazon.com's selling expenses be treated as cap ex?

## Lesson 5: Work backwards

Year	Revenues	Operating Margin	EBIT
Tr12m	\$1,117	-36.71%	-\$410
1	\$2,793	-13.35%	-\$373
2	\$5,585	-1.68%	-\$94
3	\$9,774	4.16%	\$407
4	\$14,661	7.08%	\$1,038
5	\$19,059	8.54%	\$1,628
6	\$23,862	9.27%	\$2,212
7	\$28,729	9.64%	\$2,768
8	\$33,211	9.82%	\$3,261
9	\$36,798	9.91%	\$3,646
10	\$39,006	9.95%	\$3,883
<b>TY(11)</b>	<b>\$41,346</b>	<b>10.00%</b>	<b>\$4,135</b> Ind. Average

## Lesson 6: Scaling up is hard to do...

Typically, the revenue growth rate of a newly public company outpaces its industry average for only about five years.



Source: Andrew Metrick

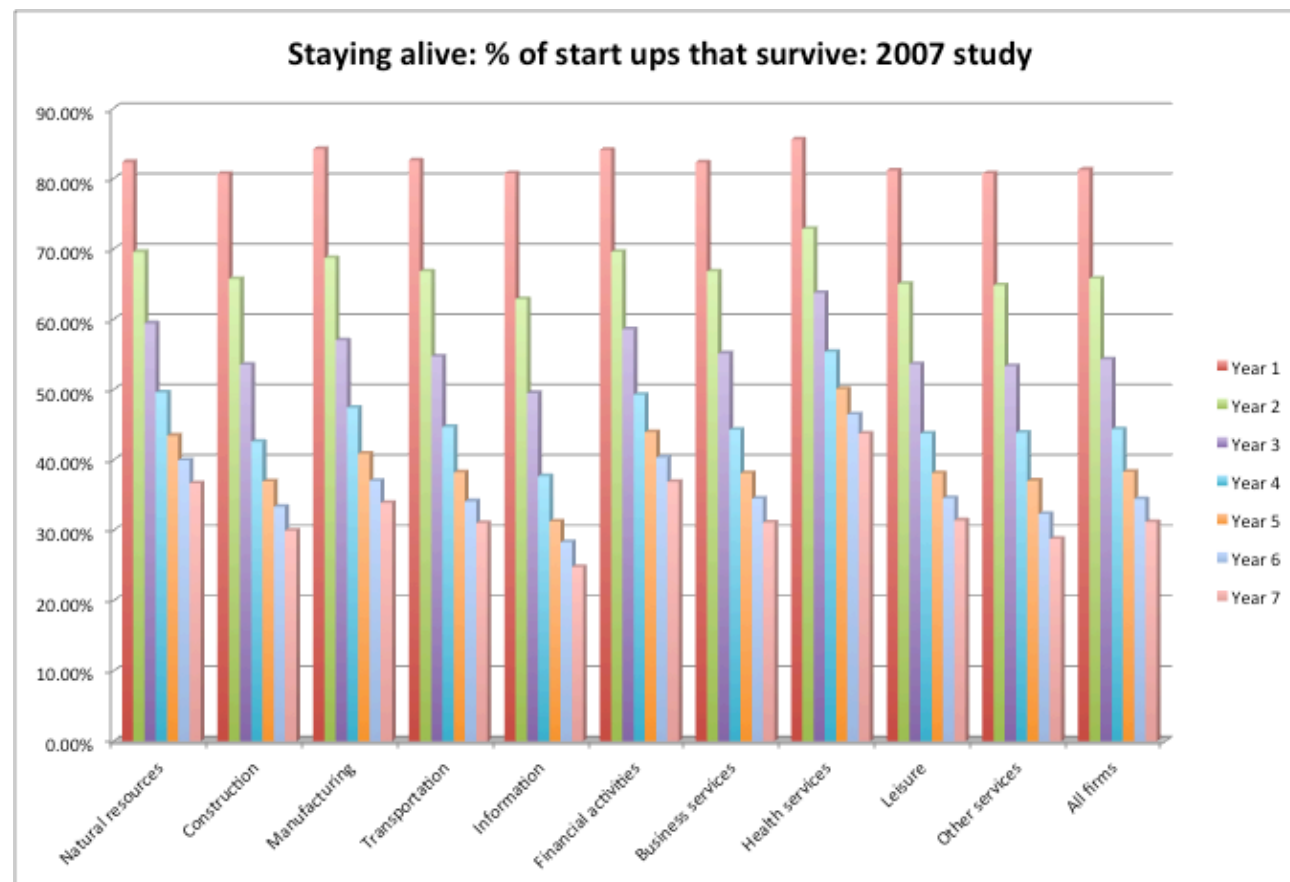
The New York Times

## Lesson 7: Don't forget to pay for growth...

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Yr	Rev Grwth	Rev	Reinv	Sales/Capital	ROC
1	150.00%	\$1,676	\$559	3.00	-76.62%
2	100.00%	\$2,793	\$931	3.00	-8.96%
3	75.00%	\$4,189	\$1,396	3.00	20.59%
4	50.00%	\$4,887	\$1,629	3.00	25.82%
5	30.00%	\$4,398	\$1,466	3.00	21.16%
6	25.20%	\$4,803	\$1,601	3.00	22.23%
7	20.40%	\$4,868	\$1,623	3.00	22.30%
8	15.60%	\$4,482	\$1,494	3.00	21.87%
9	10.80%	\$3,587	\$1,196	3.00	21.19%
10	6.00%	\$2,208	\$736	3.00	20.39%

## Lesson 8: Survival and success are not guaranteed...



## Lesson 9: There are always scenarios where the market price can be justified...

		Target Operating Margin				
		6%	8%	10%	12%	14%
Compounded Revenue Growth rate	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



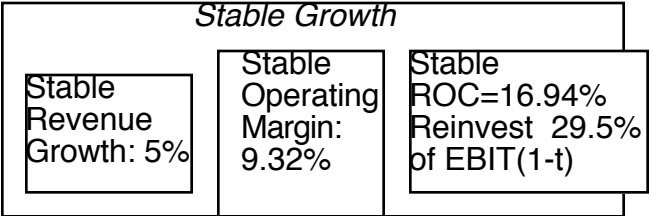
## Lesson 10: You will be wrong 100% of the time... and it really is not (always) your fault...

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- 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).*

### 9b. Amazon in January 2001

**Reinvestment:**  
Cap ex includes acquisitions  
Working capital is 3% of revenues



NOL: 1,289 m

Current Revenue \$ 2,465

Current Margin: -34.60%

EBIT -853m

Sales Turnover Ratio: 3.02

Competitive

Revenue Growth: 25.41%

Expected Margin: -> 9.32%

Terminal Value =  $1064 / (.0876 - .05)$   
= \$ 28,310

Term. Year  
\$24,912  
\$2,302  
\$1,509  
\$ 445  
\$1,064

	1	2	3	4	5	6	7	8	9	10
Revenues	\$4,314	\$6,471	\$9,059	\$11,777	\$14,132	\$16,534	\$18,849	\$20,922	\$22,596	\$23,726
EBIT	-\$545	-\$107	\$347	\$774	\$1,123	\$1,428	\$1,692	\$1,914	\$2,087	\$2,201
EBIT(1-t)	-\$545	-\$107	\$347	\$774	\$1,017	\$928	\$1,100	\$1,244	\$1,356	\$1,431
- Reinvestment	\$612	\$714	\$857	\$900	\$780	\$796	\$766	\$687	\$554	\$374
FCFF	-\$1,157	-\$822	-\$510	-\$126	\$237	\$132	\$333	\$558	\$802	\$1,057

Value of Op Assets \$ 8,789  
+ Cash & Non-op \$ 1,263  
= Value of Firm \$10,052  
· Value of Debt \$ 1,879  
= Value of Equity \$ 8,173  
· Equity Options \$ 845  
Value per share \$ 20.83

	1	2	3	4	5	6	7	8	9	10
Debt Ratio	27.27%	27.27%	27.27%	27.27%	27.27%	24.81%	24.20%	23.18%	21.13%	15.00%
Beta	2.18	2.18	2.18	2.18	2.18	1.96	1.75	1.53	1.32	1.10
Cost of Equity	13.81%	13.81%	13.81%	13.81%	13.81%	12.95%	12.09%	11.22%	10.36%	9.50%
AT cost of debt	10.00%	10.00%	10.00%	10.00%	9.06%	6.11%	6.01%	5.85%	5.53%	4.55%
Cost of Capital	12.77%	12.77%	12.77%	12.77%	12.52%	11.25%	10.62%	9.98%	9.34%	8.76%

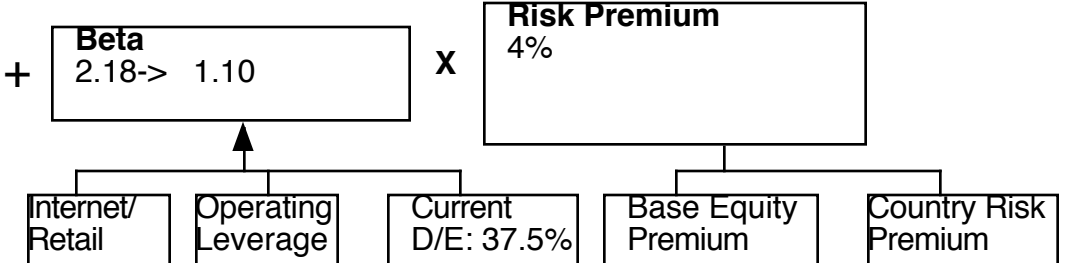
Forever

**Cost of Equity 13.81%**

**Cost of Debt 6.5%+3.5%=10.0%**  
Tax rate = 0% -> 35%

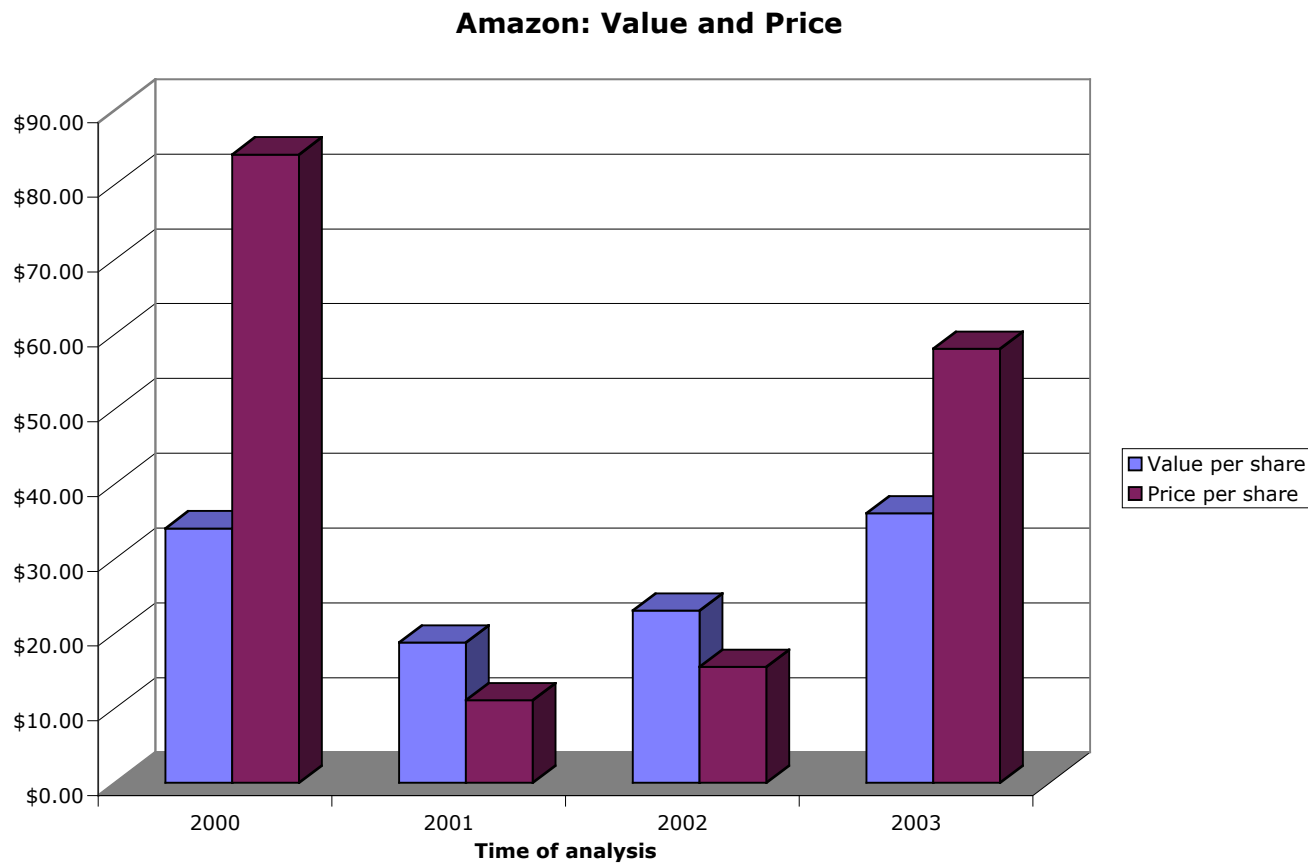
**Weights Debt= 27.3% -> 15%**

**Riskfree Rate:**  
T. Bond rate = 5.1%



**Amazon.com**  
**January 2001**  
**Stock price = \$14**

Here is your consolation prize... the market makes even bigger mistakes...



## Lesson 11: Pricing $\neq$ Valuation

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- Faced with uncertainty, most investors price young, growth companies, rather than value them. You price an asset by looking at what others will pay rather than what an asset is worth.
- Pricing usually manifests itself in the form of multiples (sometimes creative) and comparisons across firms and transactions.
- Those who price assets argue that they are doing so, because they do not want to make the assumptions that underlie full-fledged valuation but those assumptions are made implicitly rather than explicitly.

Starting numbers

Valuing Facebook Pre-IPO: May 17, 2012

	This year	Last year
Revenues	\$3,711.00	\$ 1,974.00
Operating income or EBIT	\$1,695.00	\$ 1,032.00
Invested Capital	\$4,216.11	\$ 694.00
Tax rate	40.00%	
Operating margin	45.68%	
Return on capital	146.54%	
Sales/Capital	0.88	
Revenue growth rate	87.99%	

Revenue growth of 40% a year for 5 years, tapering down to 2% in year 10

Pre-tax operating margin declines to 35% in year 10

Sales to capital ratio of 1.50 for incremental sales

**Stable Growth**  
 g = 2%; Beta = 1.00;  
 Cost of capital = 8%  
 ROC = 20%;  
 Reinvestment Rate = 2%/20% = 10%

Terminal Value<sub>10</sub> = 8,330 / (.08 - .02) = 138,830

Operating assets	65,967
+ Cash	1,512
- Debt	1,219
Value of equity	66,264
- Options	3,088
Value in stock	63,175
Value/share	\$27.07

Year	1	2	3	4	5	6	7	8	9	10
Revenues	\$5,195	\$7,274	\$10,183	\$14,256	\$19,959	\$26,425	\$32,979	\$38,651	\$42,362	\$43,209
Operating margin	44.61%	43.54%	42.47%	41.41%	40.34%	39.27%	38.20%	37.14%	36.07%	35.00%
EBIT	\$2,318	\$3,167	\$4,325	\$5,903	\$8,051	\$10,377	\$12,599	\$14,353	\$15,279	\$15,123
EBIT (1-t)	\$1,391	\$1,900	\$2,595	\$3,542	\$4,830	\$6,226	\$7,559	\$8,612	\$9,167	\$9,074
- Reinvestment	\$ 990	\$1,385	\$1,940	\$2,715	\$3,802	\$4,311	\$4,369	\$3,782	\$2,474	\$ 565
FCFF	\$ 401	\$ 515	\$ 655	\$ 826	\$ 1,029	\$ 1,915	\$ 3,190	\$ 4,830	\$ 6,694	\$ 8,509

Term yr	
EBIT (1-t)	9255
- Reinv	926
FCFF	8330

Cost of capital = 11.19% (.988) + 1.59% (.012) = 11.07%

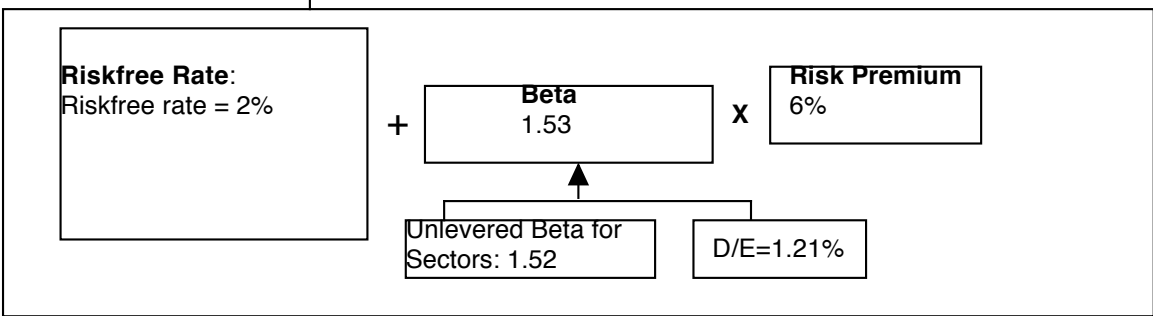
Cost of capital decreases to 8% from years 6-10

**Cost of Equity**  
11.19%

**Cost of Debt**  
(2% + 0.65%)(1 - .40) = 1.59%

**Weights**  
E = 98.8% D = 1.2%

At 4.00 pm, May 17, the offering was priced at \$38/share



# Lesson 12: Uncertainty is not a bug, but a feature with young companies

