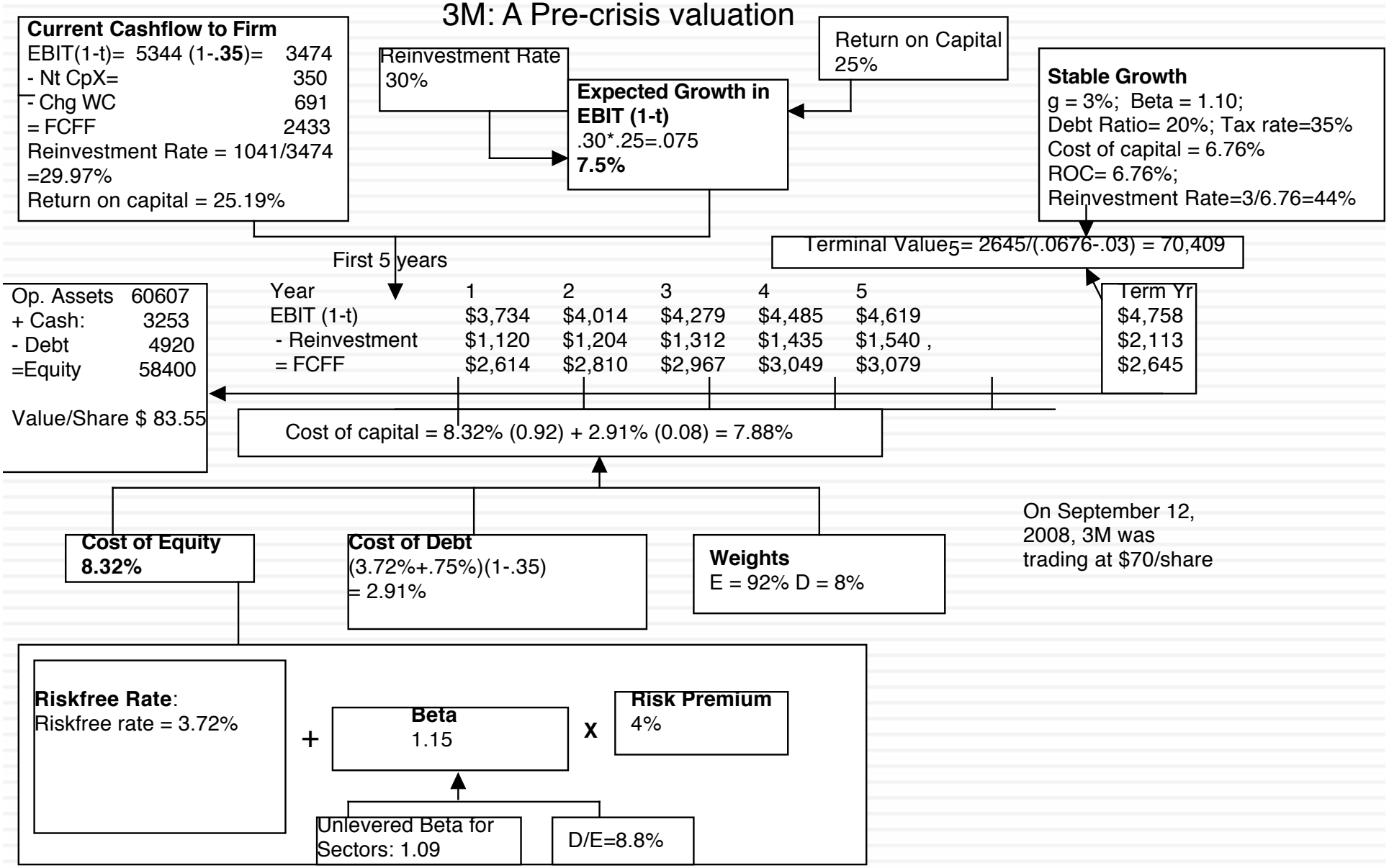
3M: A Pre-crisis valuation



3M: Post-crisis valuation

Lowered base operating income by 10%

Current Cashflow to Firm
EBIT(1-t)= 4810 (1-**.35**)= 3,180
— Nt CpX= 350
- Chg WC 691
= FCFF 2139
Reinvestment Rate = 1041/3180 =33%
Return on capital = 23.06%

Reinvestment Rate 25%

Reduced growth rate to 5%

Expected Growth in EBIT (1-t)
.25*.20=.05
5%

Return on Capital 20%

Did not increase debt ratio in stable growth to 20%

Stable Growth
g = 3%; Beta = 1.00;; ERP =4%
Debt Ratio= 8%; Tax rate=35%
Cost of capital = 7.55%
ROC= 7.55%;
Reinvestment Rate=3/7.55=40%

Terminal Value$_5$= 2434/(.0755-.03) = 53,481

First 5 years

Year	1	2	3	4	5	Term Yr
EBIT (1-t)	$3,339	$3,506	$3,667	$3,807	$3,921	$4,038
- Reinvestment	$835	$877	$1,025	$1,288	$1,558	$1,604
= FCFF	$2,504	$2,630	$2,642	$2,519	$2,363	$2,434

Op. Assets 43,975
+ Cash: 3253
- Debt 4920
=Equity 42308

Value/Share $ 60.53

Cost of capital = 10.86% (0.92) + 3.55% (0.08) = 10.27%

Higher default spread for next 5 years

Cost of Equity 10.86%

Cost of Debt
(3.96%+.1.5%)(1-.35)
= 3.55%

Weights
E = 92% D = 8%

On October 16, 2008, MMM was trading at $57/share.

Riskfree Rate:
Riskfree rate = 3.96%

Increased risk premium to 6% for next 5 years

+ **Beta** 1.15 x **Risk Premium** 6%

Unlevered Beta for Sectors: 1.09

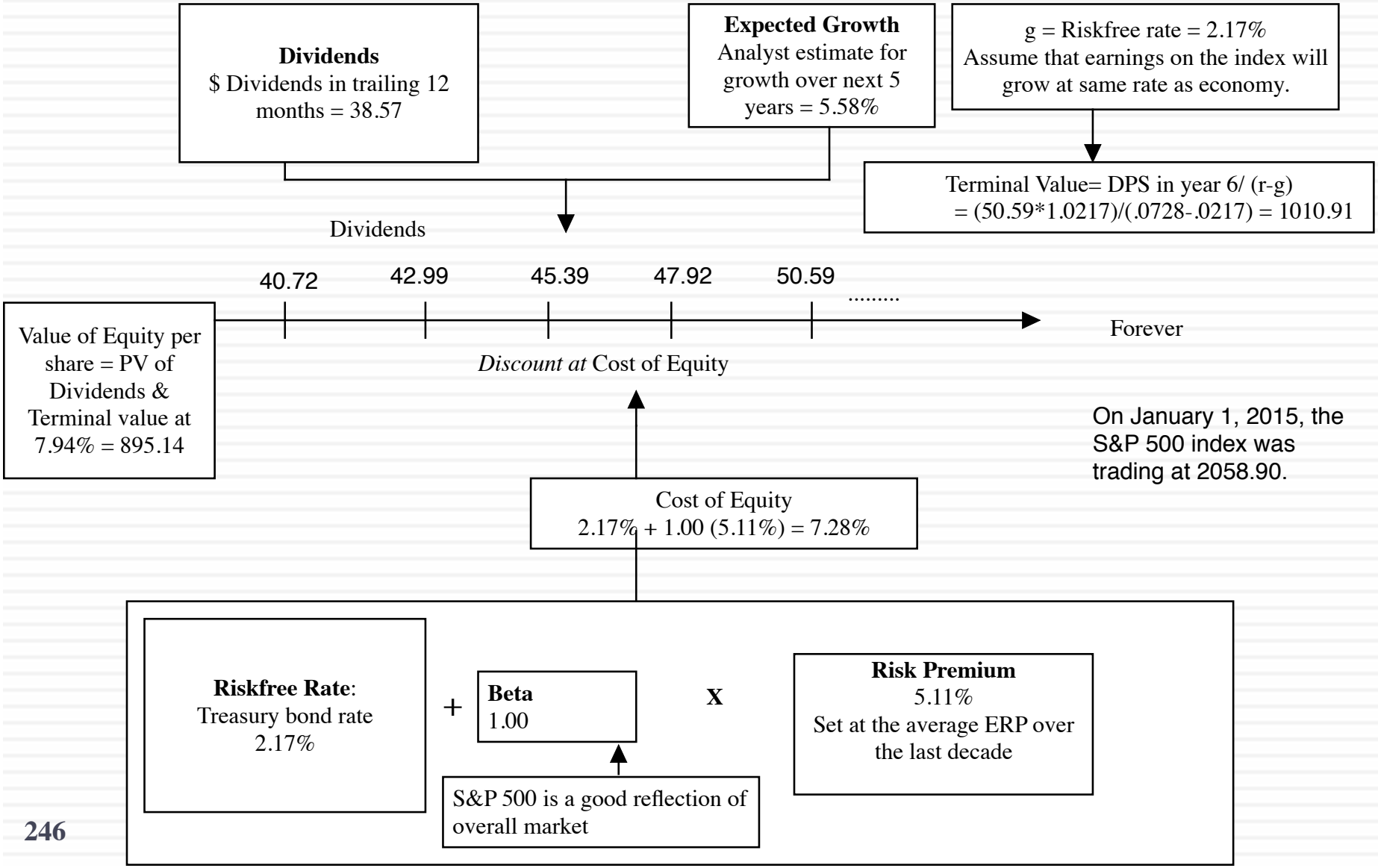
D/E=8.8%

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.

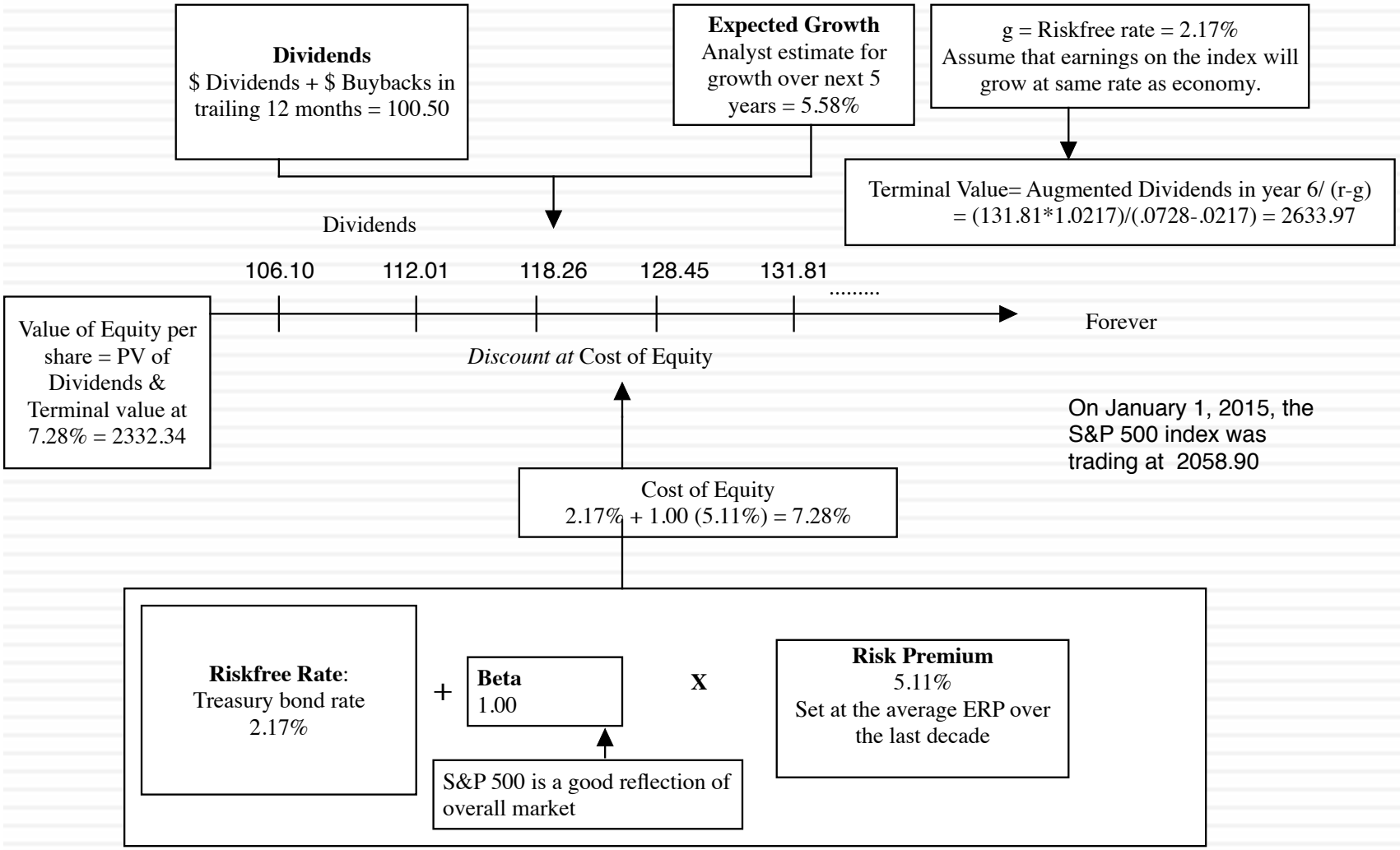


From a Company to the Market: Valuing the S&P 500: Augmented Dividend Discount Model in January 2015

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.

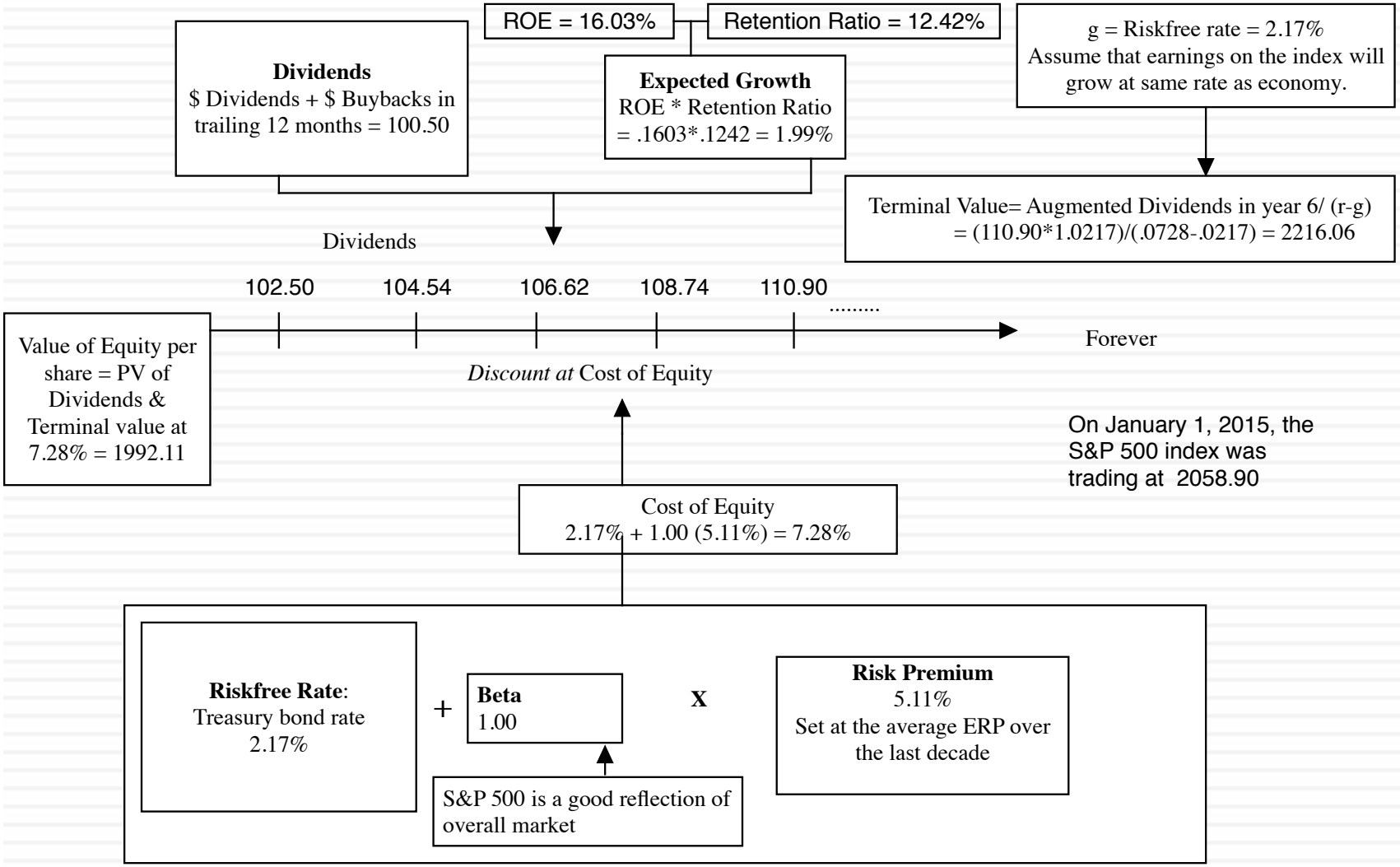


Valuing the S&P 500: Augmented Dividends and Fundamental Growth January 2015

Rationale for model

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

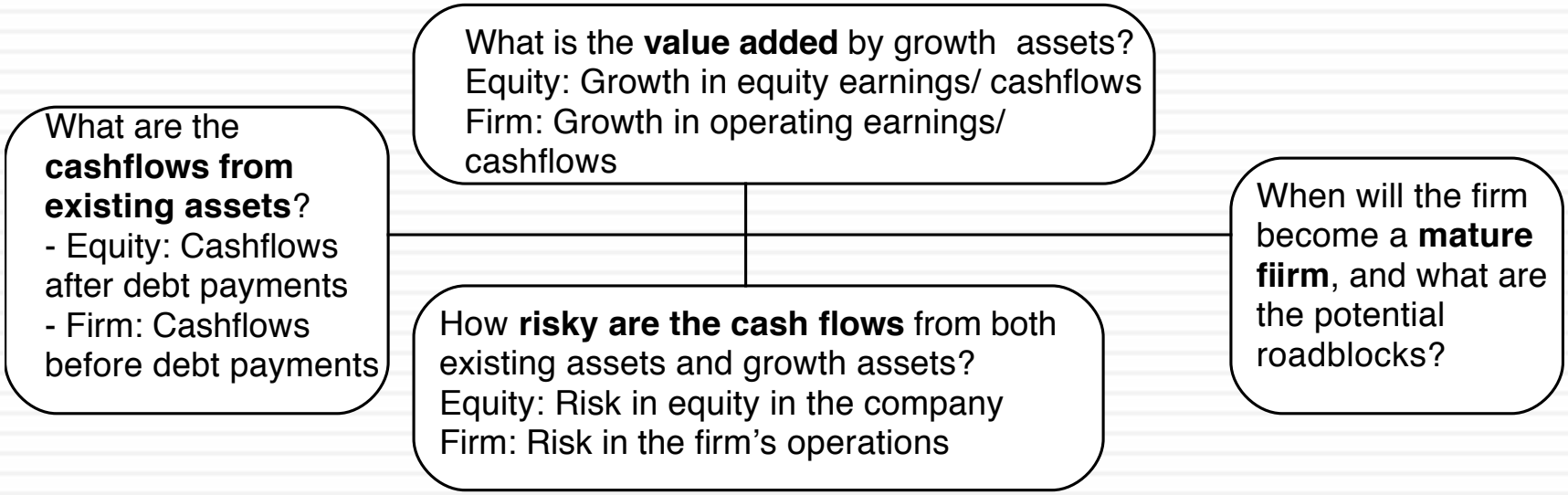
Why 2-stage? Why not?



THE DARK SIDE OF VALUATION: VALUING DIFFICULT-TO-VALUE COMPANIES

Anyone can value a money-making stable company..

The fundamental determinants of value…



The Dark Side of Valuation…

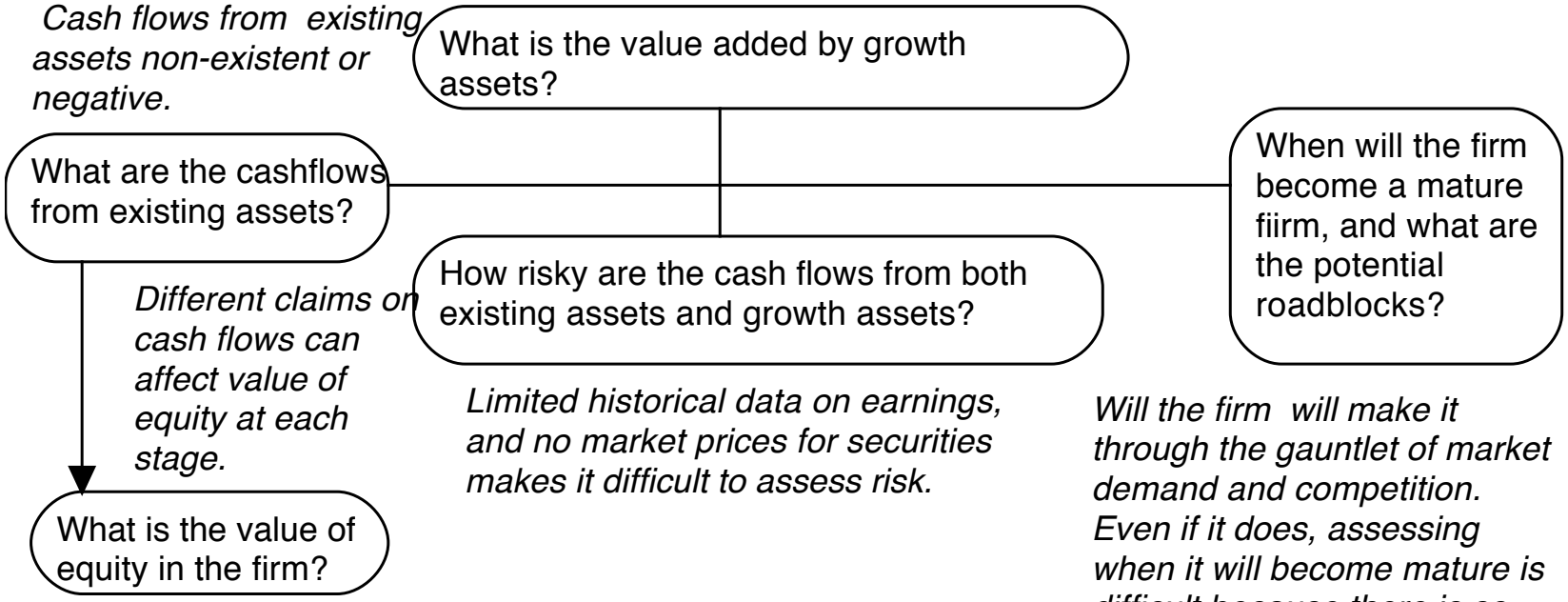
- Valuing stable, money making companies with consistent and clear accounting statements, a long and stable history and lots of comparable firms is easy to do.
- The true test of your valuation skills is when you have to value "difficult" companies. In particular, the challenges are greatest when valuing:
  - 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…

- 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…

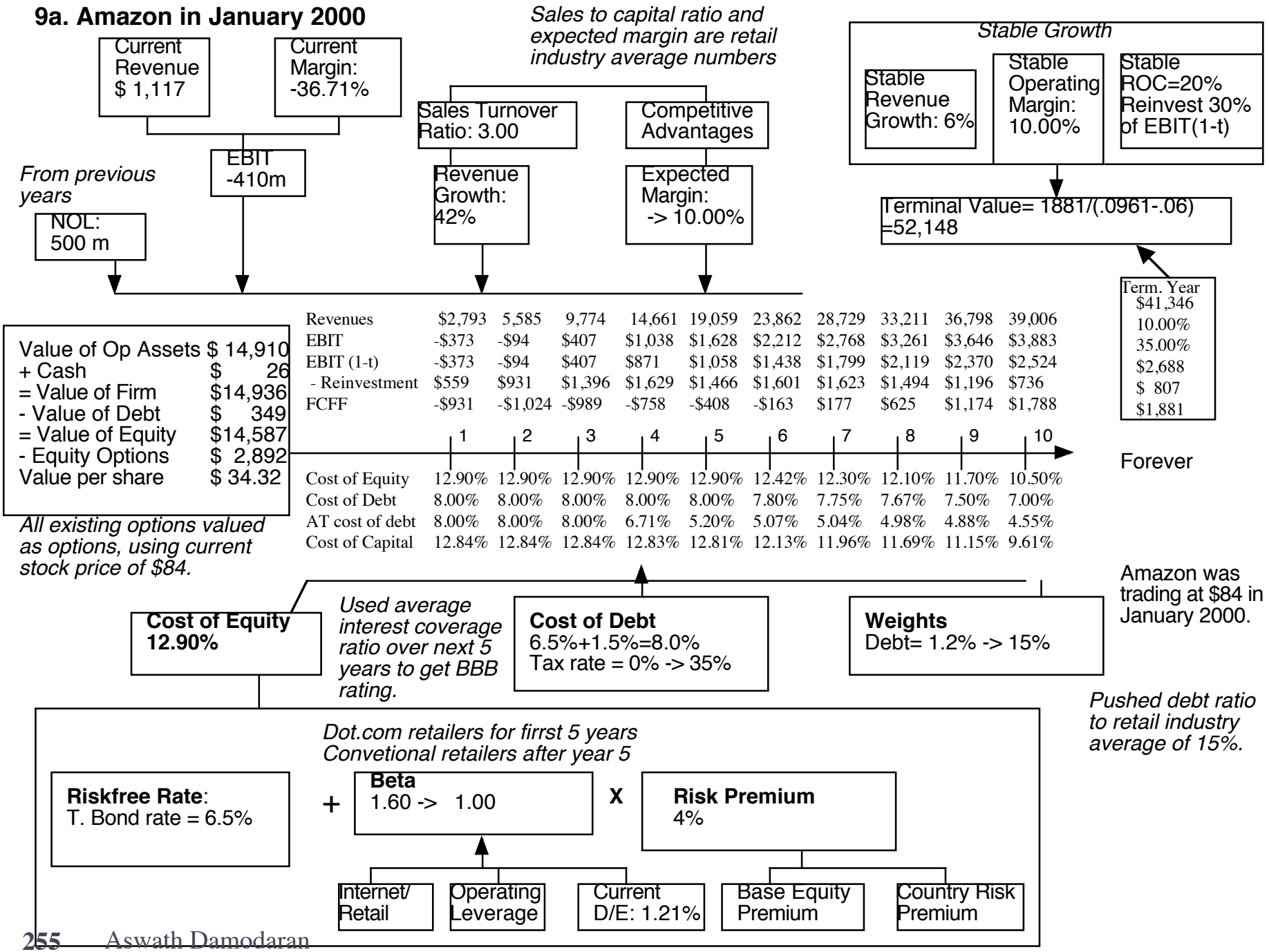
Making judgments on revenues/ profits difficult becaue you cannot draw on history. If you have no product/ service, it is difficult to gauge market potential or profitability. The company;s entire value lies in future growth but you have little to base your estimate on.



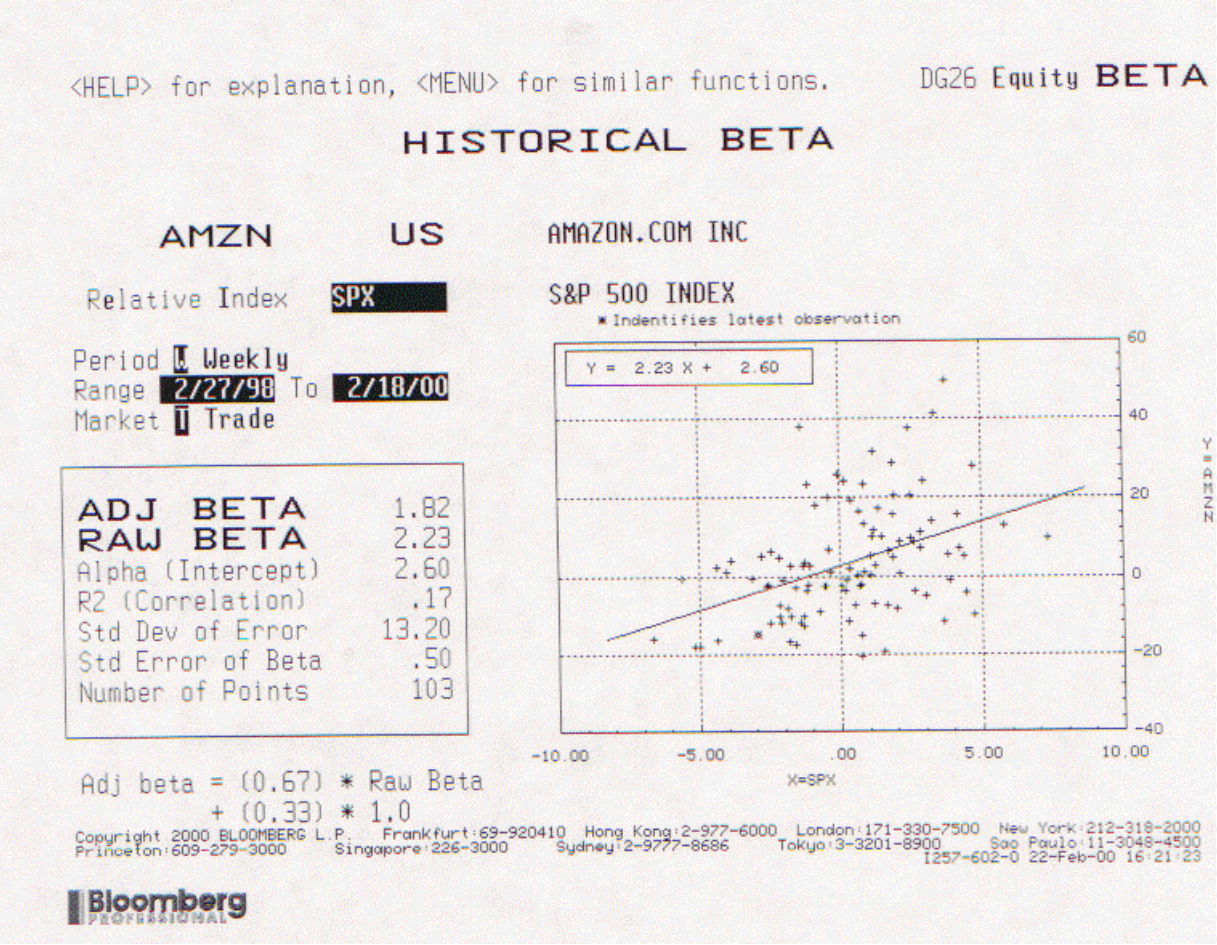
Upping the ante.. Young companies in young businesses…

- 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



Lesson 1: Don't trust regression betas….

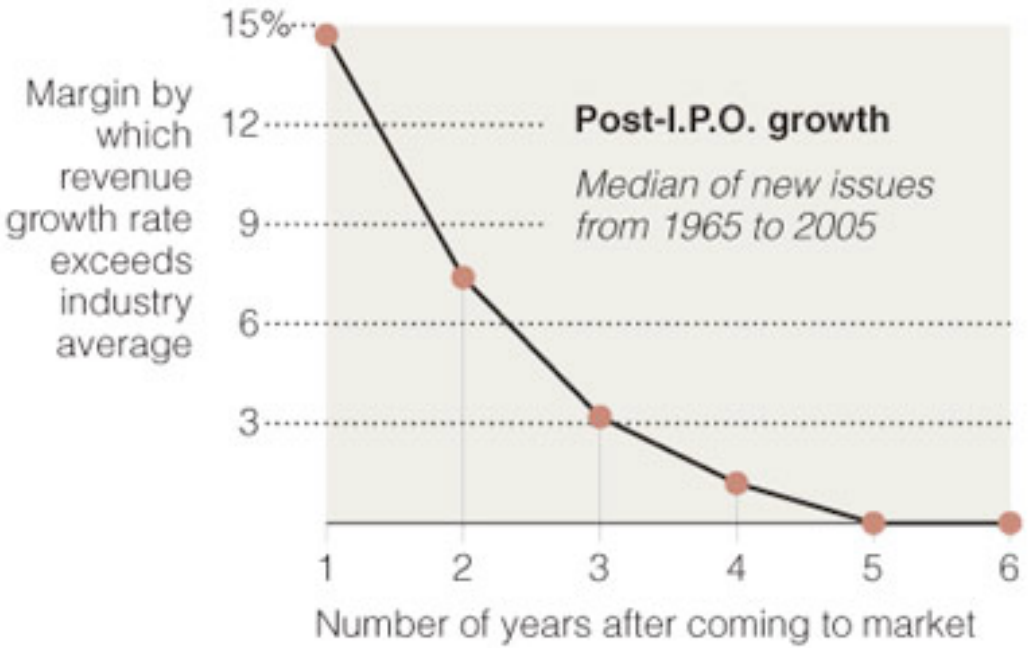


Lesson 2: Work backwards and keep it simple…

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
TY(11)	$41,346	10.00%	$4,135

Lesson 3: 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 4: Don't forget to pay for growth… and check your reinvestment…

Year	Rev growth	Chg in Rev	Reinv	S/Cap	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 5: And don't worry about dilution… It is already factored in

- 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.

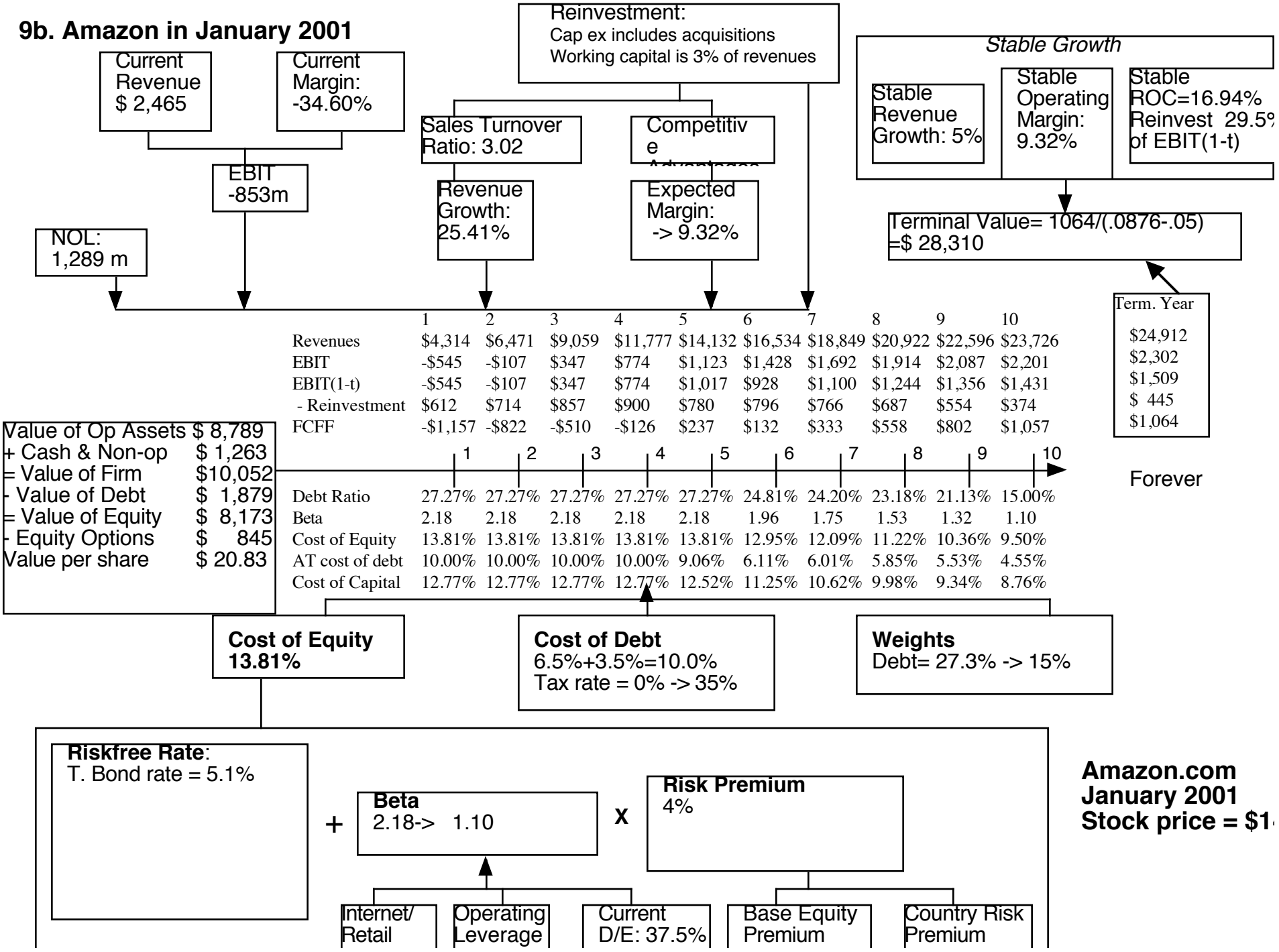
Lesson 6: There are always scenarios where the market price can be justified…

	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

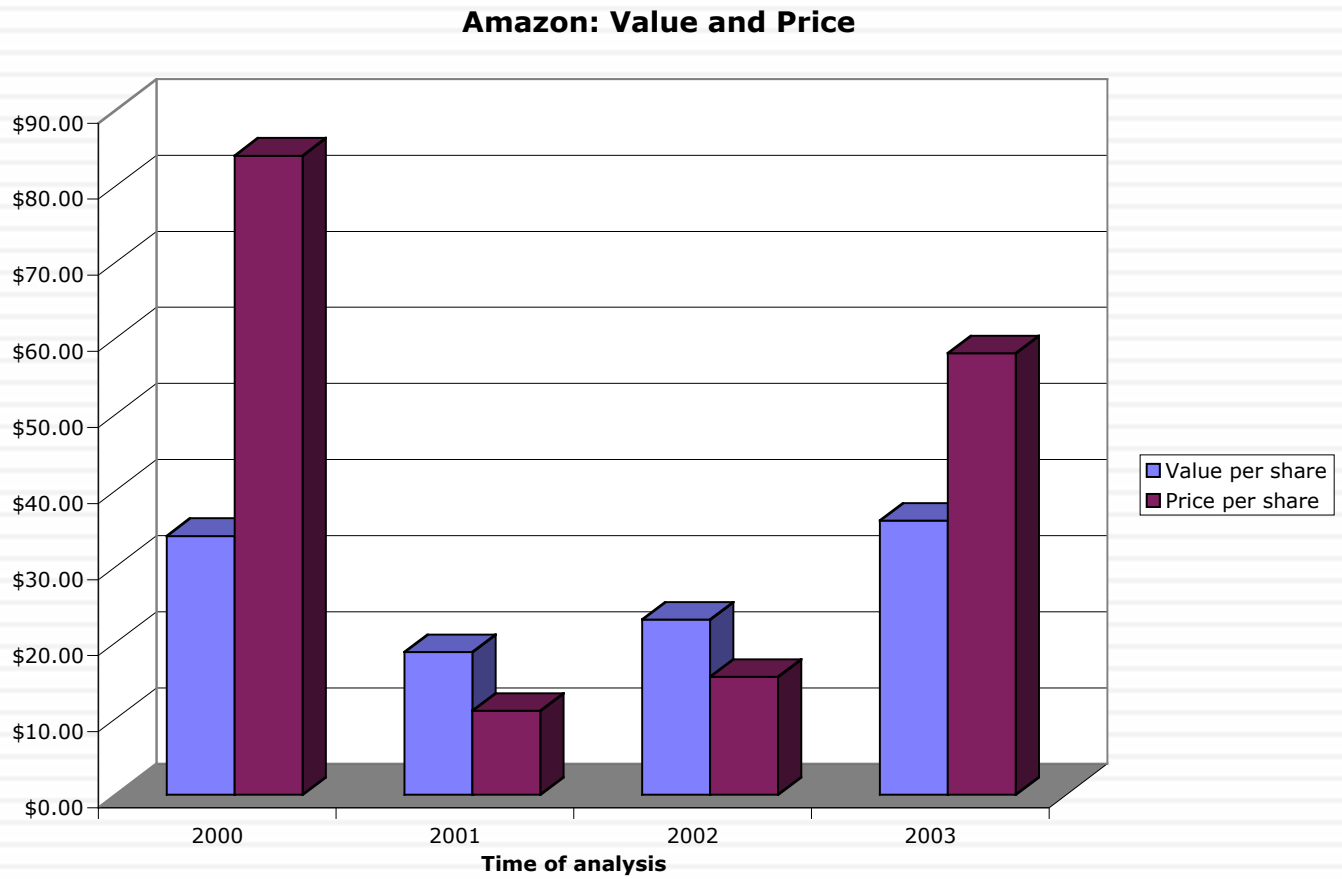
Lesson 7: You will be wrong 100% of the time… and it really is not (always) your fault…

- 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).

9b. Amazon in January 2001



And the market is often "more wrong"….



II. Mature Companies in transition..

- Mature companies are generally the easiest group to value. They have long, established histories that can be mined for inputs. They have investment policies that are set and capital structures that are stable, thus making valuation more grounded in past data.
- However, this stability in the numbers can mask real problems at the company. The company may be set in a process, where it invests more or less than it should and does not have the right financing mix. In effect, the policies are consistent, stable and bad.
- If you expect these companies to change or as is more often the case to have change thrust upon them,