Valuing Companies

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Valuing companies

- Familiar valuation methods
  - Discounted Cash Flow Analysis
  - Comparables
  - Real Options

- Some new issues
  - Do we value assets or equity?
  - Terminal values (liquidation, going concern)
  - Minority interests, controlling interests

DCF Analysis

- WACC method:
  - Forecast expected FCF
  - Estimate WACC
  - Compute PV

- APV method:
  - Forecast expected FCF
  - Estimate k_A
  - Compute PV
  - Add PV(Tax Shield)

Value Assets or Equity?

- DCF methods give you the value of the whole firm (D + E) or ***Enterprise Value***.
  - E.g., you are founding a new firm: you will receive D from creditors and E from shareholders.

- Often, you need to value the ***Equity Value*** in an existing firm
  - E.g., M&A, IPOs
  - You need to subtract the value of its existing debt D

- Also, need to add the value of control when valuing a controlling equity position (more on this later).

Terminal Values

- In valuing long-lived projects or ongoing businesses, we don't typically forecast every year of cash flow forever.
- Forecast FCF until it is reasonable (or best guess) to think that the project or company is in "steady state."
- Typically, assume:
  - either the company is liquidated;
  - or FCF is a growing, flat, or declining, perpetuity;
- Note: The forecast horizon will depend on firm and industry.

Terminal Value in Liquidation

1) Salvage value (SV):

- CF that the firm receives from liquidating its assets

SV = Liquidation price - Liquidation costs

- The firm is taxed on (SV – PPE) so that overall it gets

SV*(1- t) + t*PPE

2) Net Working Capital

- Recouped NWC at project end (i.e., **last ΔNWC = last WC**)

Remarks

- In principle, you would like NWC's actual value, not book value.

- These might differ for instance:
  - cannot recoup full A/R,
  - Inventory sells over or below book value
  - etc.

- Liquidation value tends to underestimate TV unless liquidation is likely. Useful as a lower bound.

Terminal Value as Perpetuity

- No-growth perpetuity

  $TV = FCF_{T+1} / k$

- For a no-growth firm, we can assume (for simplicity)

  FCF = EBIT(1-t) + Depreciation – CAPX – ΔNWC

  0 0

  $TV = EBIT(1-t)_{T+1} / k$

Terminal Value as Growing Perpetuity

- PV in year t of a perpetuity growing at a rate g

$$TV = FCF_{T+1} / (k - g)$$

- For a growing perpetuity, we can assume (for simplicity)

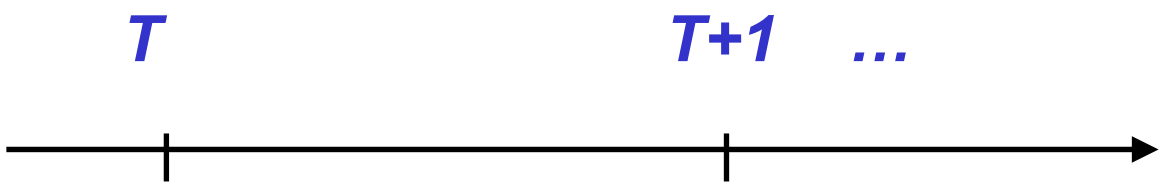
$$\textbf{FCF = EBIT(1-t)} + \underbrace{\text{Depreciation} - \text{CAPX} - \Delta\text{NWC}}$$

$$-\Delta NA = -g*NA_{\text{prior year}}$$

$$TV = [EBIT(1- t)_{T+1} - g*NA_T] / (k - g)$$

$$(1+g)EBIT(1-t)_T$$

Terminal Value as Perpetuity (Summary)



TV

FCF

FCF_{T+1} / k

FCF_{T+1} / (k – g)

EBIT(t-1)

EBIT(t-1) - ΔNA

$g*NA_T$

No growth

Growth @ g

Remarks

- Growing perpetuity - assumptions
  - Net assets grow at the same rate as profits
  - ΔNA is a good measure of replacement costs
- Don’t forget to discount TV further to get PVTV
- In WACC method, k=WACC
- IN APV method, $k=k_A$ for FCF and appropriate rate for TS

Example

- You are considering the acquisition of XYZ Enterprises. XYZ's balance sheet looks like this as of today (year 0).

Assets		Liabilities	
Current assets	50	Current liabilities	20
Plant	50	Debt	30
		Net worth	50
Total	**100**	**Total**	**100**

- Projections:

	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	200	217	239	270	293
EBIT	20	22	25	26	30
NWC	33	37	41	44	48
Depreciation	5	5	6	7	8
CAPX	10	10	15	6	20

Example (cont.)

What is the value of XYZ's stock under the following assumptions:

1) XYZ is liquidated after year 5 (assuming zero salvage value).

2) Sales growth and EBIT/Sales ratios are (past year 5):

Sales growth	EBIT/Sales
5%	10%
0%	10%
5%	5%
0%	5%

Tax rate = 34%, and WACC = 13%.

Example (cont.)

Start by estimating FCF over 5 years:

- NWC(year 0) = Current assets - current liabs = 50-20=30

$$FCF = EBIT(1 - t) + Dep - CAPX - \Delta NWC$$

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
EBIT		20	22	25	26	30
EBIT(1-t)		13.2	14.52	16.5	17.16	19.8
NWC	30	33	37	41	44	48
ΔNWC		3	4	4	3	4
Depreciation		5	5	6	7	8
CAPX		10	10	15	6	20
FCF		5.2	5.52	3.5	15.16	3.8
PV @ 13%	**22.7**					

Example – Liquidation Value (LV)

1) Liquidation value (LV)

t*PPE(year 5) + NWC(year 5)

PPE(year 5) = PPE(year 0) + all CAPX - all Dep from year 0 to 5

PPE = 80

PPE * t = 80 * 34% = 27.2

LV = 27.2 + 48 = 75.2 ==> PVLV = $75.2/(1.13)^5 = 40.8$

Firm value = 22.7 + 40.8 = **63.5**

Equity value = Firm value - MV of Debt = 63.5 - 30 = **33.5**

Example (cont.)

For 2) to 5), we need EBIT (year 6) and NA (year 5) to apply

$$\mathbf{TV = [EBIT(year\ 6)(1 - t) - g*NA(year\ 5)]/[k - g]}$$

EBIT(year 6) = fraction α of Sales(year 6)

= α*(1 + g)*Sales(year 5)= α*(1 + g) *293

NA(year 5) = NA(year 0) +all CAPX -all Dep +all ΔNWC from 0 to 5

= 128

PVTV = TV/$(1.13)^5$

Example (cont.)

	α	g	TV	PVTV	Firm	Equity
2)	10%	5%	173.8	94.3	117.0	87.0
3)	10%	0%	148.8	80.7	103.4	73.4
4)	5%	5%	46.9	25.5	48.2	18.2
5)	5%	0%	74.4	40.4	63.1	33.1

When is Growth Valuable?

TV (with growth) > TV (w/o growth)

$$\frac{(1+g)\cdot EBIT(1-t)-g\cdot NA}{k-g} > \frac{EBIT(1-t)}{k}$$

$$\frac{(1+g)\cdot EBIT(1-t)-g\cdot NA}{k-g} > \frac{EBIT(1-t)}{k}$$

$$[(1+g)\cdot EBIT(1-t)-g\cdot NA]\times k > EBIT(1-t)\times(k-g)$$

$$\frac{EBIT(1-t)}{NA} > \frac{k}{1+k} \approx k$$

EBIT*(1 - t) - k*NA > 0

Economic Value Added (EVA)

$$EVA = EBIT^*(1 - t) - k^*NA$$

Intuition: Growth is good when the cost of increasing NA is more than compensated by the capitalized increase in EBIT*(1 - t).

Remarks

- EVA is a particular incarnation of NPV (+ some assumptions)
- Appeal of EVA coherent measure for Capital budgeting, Performance evaluation and Managerial compensation.
- Assumes linear relationship between NA and EBIT*(1 - t)
- **EVA has nothing to do with sustainable growth:**
  - Sustainable growth rate answers “How fast can I grow without increasing my leverage ratio or issuing equity?”
  - It has nothing to say about whether growing is good or not.

EVA: Bottom Line

Use EVA as...

- a simple measure to determine whether the business is generating value and whether growth is enhancing value
- as a way of setting goals to enhance value

Beware of EVA for...

- young companies
- companies in rapidly changing business environments
- companies where book values are not accurate measures of replacement costs

DCF Analysis: Pros and Cons

Strengths

- CF comes from specific forecasts and assumptions
- Can see impact of changes in strategies
- Valuation tied to underlying fundamentals

Weaknesses

- CF only as good as your forecasts/assumptions
- Might “forget something”
- Need to forecast managerial behavior (unless you’re in control)
- Need to estimate the discount rate using a theory (e.g., CAPM) that may be incorrect or imprecise in this particular case

Multiples

- Assess the firm's value based on that of publicly traded comps.

- **Cash-flow-based Value multiples:**
  - MV of firm/Earnings, MV of firm /EBITDA, MV of firm /FCF

- **Cash-flow-based Price multiples:**
  - Price/Earnings (P/E), Price/EBITDA, Price/FCF

- **Asset-based multiples:**
  - MV of firm/BV of assets, MV of equity/BV of equity

Procedure

- **Hope:** Firms in the same business should have similar multiples (e.g., P/E).
- **STEP 1:** Identify firms in same business as the firm you want to value.
- **STEP 2:** Calculate P/E ratio for comps and come up with an estimate of P/E for the firm you want to value (e.g. take the average of comps' P/E).
- **STEP 3:** Multiply the estimated P/E by the actual Net Income of the firm you want to value.

Motivation for Multiples?

- **Assumption 1**: Comps' actual FCF are a perpetuity

$$MV = \frac{FCF}{WACC - g} \quad \Rightarrow \quad \boxed{\frac{MV}{FCF} = \frac{1}{WACC - g}}$$

- **Assumption 2**:
  - Comps have the same WACC (requires similar D/(D+E))
  - Comps are growing at a similar rate g

Motivation for Multiples?

- **Assumption 1:**
  - E = CF to shareholders
  - E is a perpetuity

$$P = \frac{E}{k_E - g} \quad \Rightarrow \quad \boxed{\frac{P}{E} = \frac{1}{k_E - g}}$$

- **Assumption 2**:
  - Comps have the same k_E => ***This requires similar leverage!***
  - Comps are growing at a similar rate g

Remarks

- For firms with no earnings or limited asset base (e.g. hi-tech),
  - price-to-patents multiples,
  - price-to-subscribers multiples,
  - or even price-to-Ph.D. multiples!

- Since these are rough approximations (at best)
  - One may want to check different multiples
  - See if some multiples are quite constant across firms

Example: Valuing ADI

	EBIT	tax rate	Net income	BV equity	BV liabs	# shares
ADI (Dec. 1995)	163.6	25%	119.3	656.0	345.7	114.5

	ADI	**Burr-Brown**	**Linear Techno.**	**Maxim Integrated Products**	**Siliconix**	**Motorola**	**Mean w/o ADI**
ROE	18.2%	16.3%	25.5%	23.4%	26.8%	16.1%	**21.6%**
Liabs/Assets	34.5%	29.0%	16.9%	22.1%	56.6%	51.5%	**35.2%**
5-year growth in sales	14.3%	9.9%	32.2%	43.1%	14.0%	20.3%	**23.9%**
P/E		14.2	25.8	30.3	15.2	18.9	**20.9**
(D+E)/EBIT(1-t)		16.3	26.6	30.3	18.3	24.2	**23.1**
Market-to-Book equity		2.3	6.6	7.1	4.1	3.0	**4.6**
Market-to-Book firm		1.9	5.6	5.7	2.3	2.0	**3.5**

Example (cont.)

- There is no exact science to come up with appropriate multiples. The following is only an example. Need experience and guts.

- ADI's 5-year sales growth is less than average
  - Shade down estimate of P/E and (D+E)/EBIT*(1 - t) w.r.t. mean
    - P/E = 20.9*(1 - 15%) = 17.8
    - (D+E)/EBIT*(1 - t) = 23.1*(1 - 15%) = 19.6

- ADI's ROE is less than average
  - Shade down estimate of M/B equity and M/B firm w.r.t. mean
    - M/B equity = 4.6*(1 - 15%) = 3.9
    - M/B firm = 3.5*(1 - 15%) = 3.0

Example (cont.)

		P/E	(D+E) / EBIT(1-t)	M/B Equity	M/B Firm
1)	Comps ratio (X / Y)	17.8	19.6	3.9	3.0
		NI	EBIT(1-t)	BV Equity	BV Firm
2)	Actual (Y)	119.3	122.7	656	1001.7
3)	MV Firm (Ratio * Y)		2409.2		2980.1
4)	MV Equity (Ratio * Y	2119.4	2063.5	2565.0	2634.4
	or MV Firm - Debt)				
5)	**Price** (MV Equity / #shares)	**18.5**	**18.0**	**22.4**	**23.0**

Comparables: Pros and Cons

Pros:

- Simple + lots of information
- Market consensus about discount rate and growth rate.
- Free-ride on market's information.

Cons:

- Assumes that companies are alike in growth, costs of capital, business composition, leverage
- Hard to find true comps
- Hard to incorporate firm specific information
- Accounting differences
- If everyone uses comps, who actually does fundamental analysis?

Comps & the Conglomerate Discount

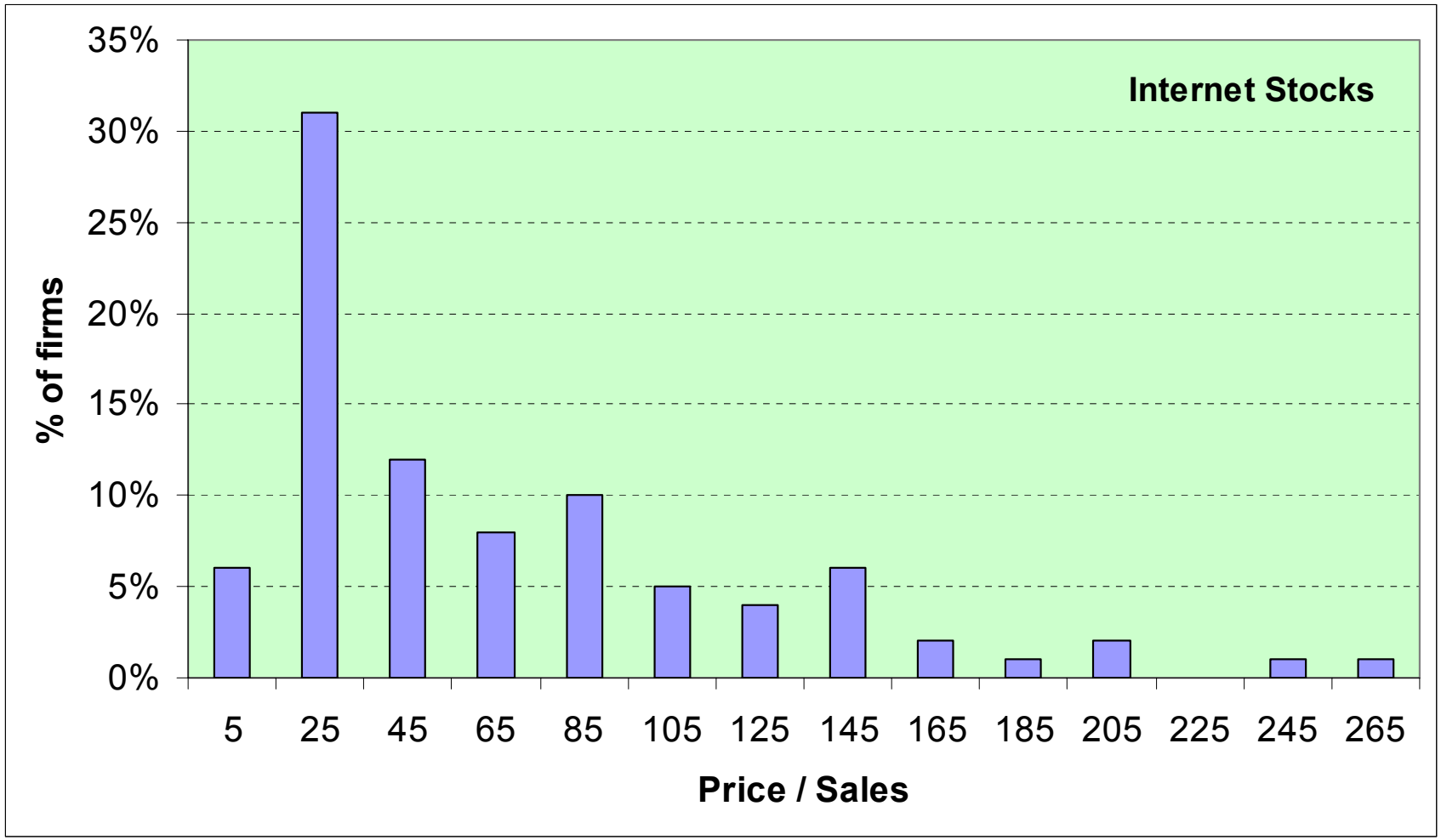
- Is the value of a conglomerate equal to the sum of its parts?
  - Calculate Firm Value / Assets for the conglomerate
  - For each of its business segments (in annual report), calculate median Firm Value / Assets for single segment firms in that industry
  - Add up these comps, weighting by the share of the conglomerate's assets in that industry

- Result: On average, conglomerates are worth 12% less than the sum of their parts.

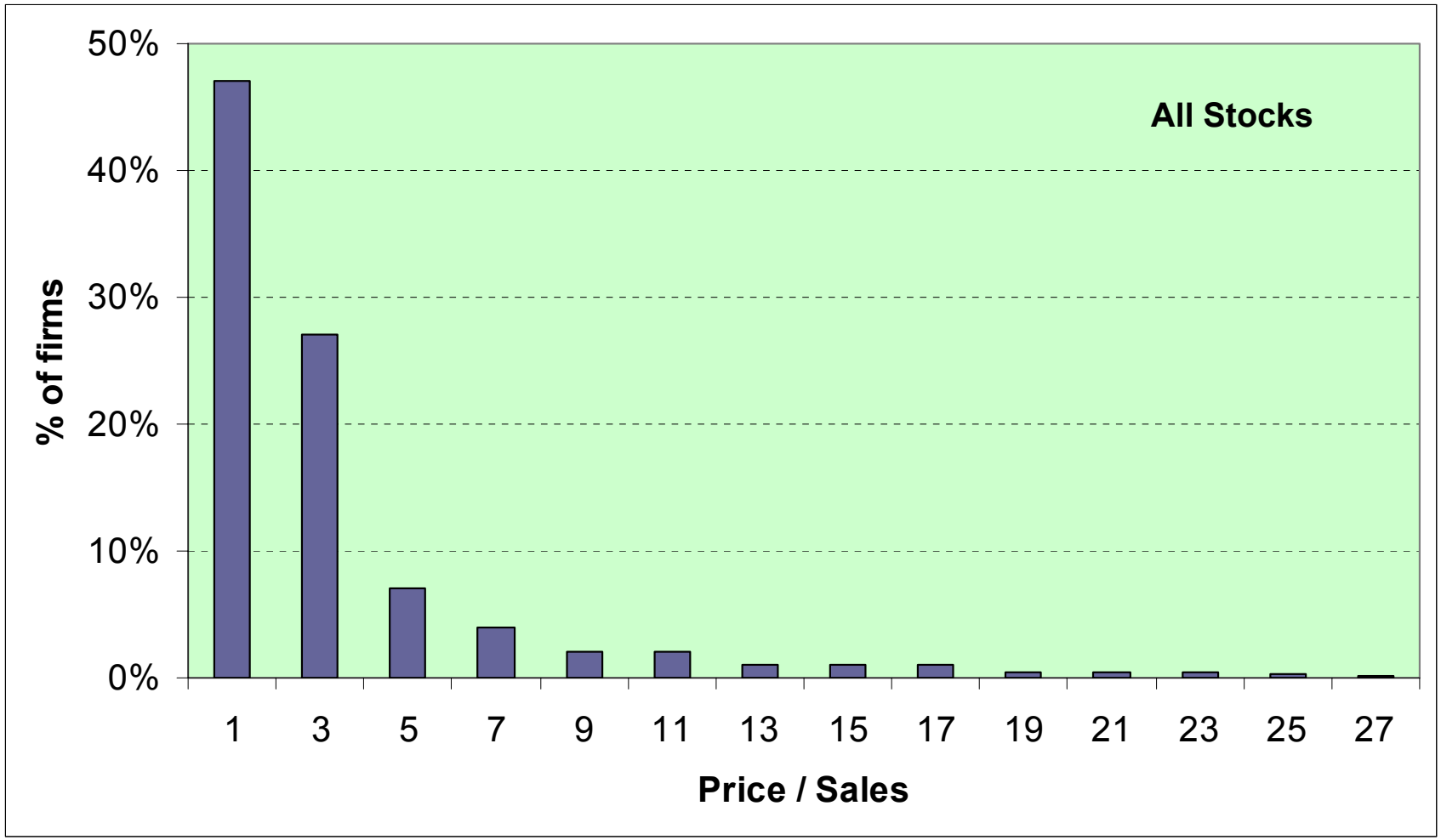
Possible Interpretations

- Conglomerates are an inefficient form of organization
- The stock market doesn't get it
- The comparables method doesn't work

Distribution of Price / Sales ratios for Internet stocks
(March 2000)



Distribution of Price / Sales ratios for all stocks
(March 2000)



Internet stocks and selected high-tech stocks
(March 2000, in $billions)

	Internet	Cisco	Intel	IBM	Microsoft
Equity MV	651.6	445.5	408	194.1	505.7
Equity BV	34.7	11.7	35.8	21.6	27.5
Sales	12.1	12.2	29.4	87.5	19.7
Gross Profits	4.8	8.4	20.3	38.1	17.4
NI	-7.2	2.1	7.3	7.7	7.8
M/B Equity	18.8	38.1	11.4	9.0	18.4
MV Equity / Sales	53.9	36.5	13.9	2.2	25.7
MV Equity / Profits	135.8	53.0	20.1	5.1	29.1

What growth and margin assumptions would have justified Internet valuation in March 2000?

Short-run growth rate	Years of high growth	Value ($billions)
Panel A: Profit margin = 5%		
20%	10	7.7
	20	30.4
	30	58.6
30%	10	50.0
	20	150.2
	30	368.0
Panel B: Profit margin = 10%		
20%	10	37.4
	20	74.6
	30	125.7
30%	10	122.0
	20	314.1
	30	**744.5**

Assumptions: Discount rate = 10%, long-term growth = 6%