13. Valuing Stocks

- Estimating Value
  - Intrinsic Value – based on Discounting Cash Flows (DCF)
  - Relative Value – based on accounting ratios of comparable firms (multiplier)
  - Asset / liquidation value – assumes no synergies and liquid markets.

- Intrinsic Value – Summary of steps to discounting models
  - Determine cash flow to be discounted (Div, FCFF, FCFE).
  - Estimate growth rate (zero, constant, differential).
  - Estimate cost of capital (either cost of equity or WACC).
  - Calculate PV!

- What happened during the "tech bubble"?

- Key relationships
  - DDM constant growth: PV = $D_1/(k–g)$ = $D_0(1+g)$ / $(k–g)$
  - Sustainable growth: g= ROE*b where b=plowback ratio
  - Two Stage Growth

$$PV_0 = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \cdots + \frac{D_T + P_T}{(1+k)^T} \quad \text{where } P_T = \frac{D_{T+1}}{k-g}$$

Intrinsic Value: Div Discount Model

- Stock represents ownership of a corporation. Value is discounted PV of associated cash flows, which are dividends and capital appreciation

$$PV_0 = \frac{D_1 + P_1}{1+k}$$

$$PV_0 = \frac{D_1}{(1+k)} + \frac{D_2 + P_2}{(1+k)^2} = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \ldots$$

- If dividends are constant, then this is PV of perpetuity:

$$PV_0 = \frac{D_1}{k}$$

- Suppose $D_1 = \$1$; $k = 10\%$
  $PV_0 =$
  If market value

- What if the discount rate declines?
  - "required rate of return" vs "market capitalization rate"

-

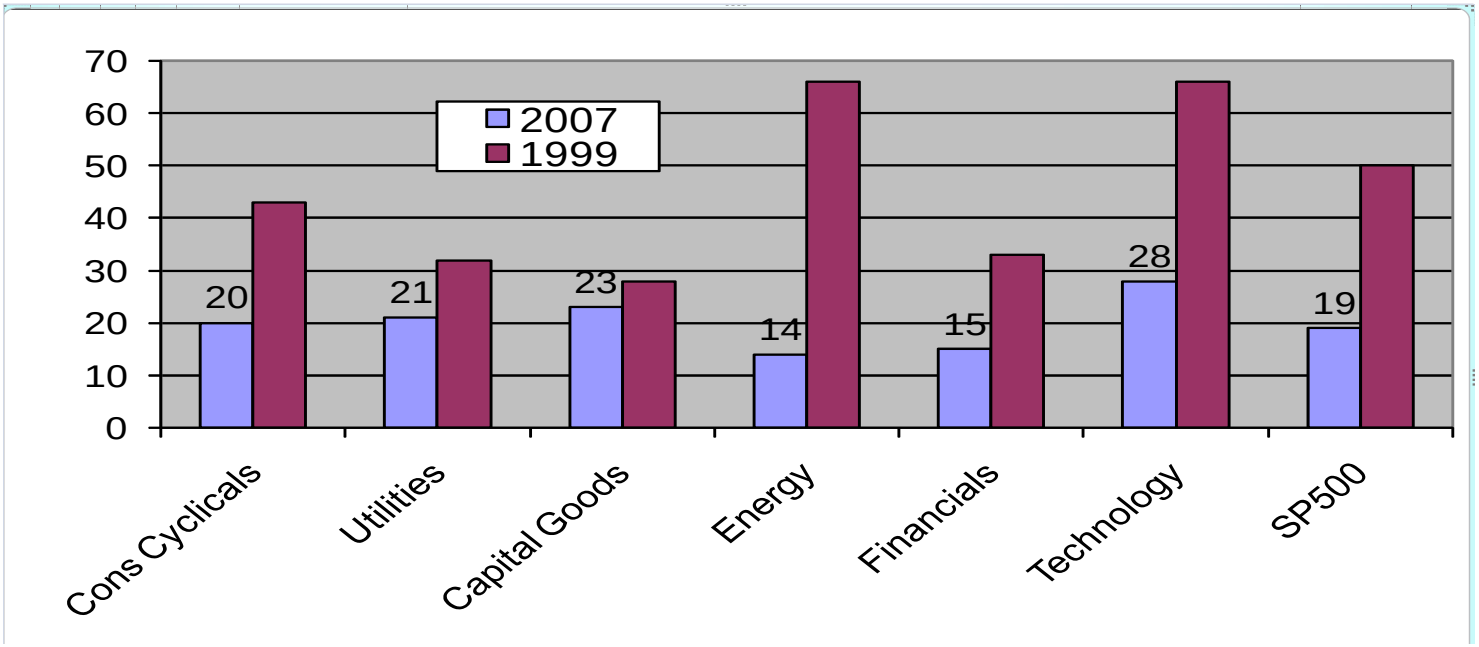
Intrinsic Value and P/E Ratios

- DDM gives us insight into P/E ratios.
- Suppose $D_1 = EPS_1$. Then

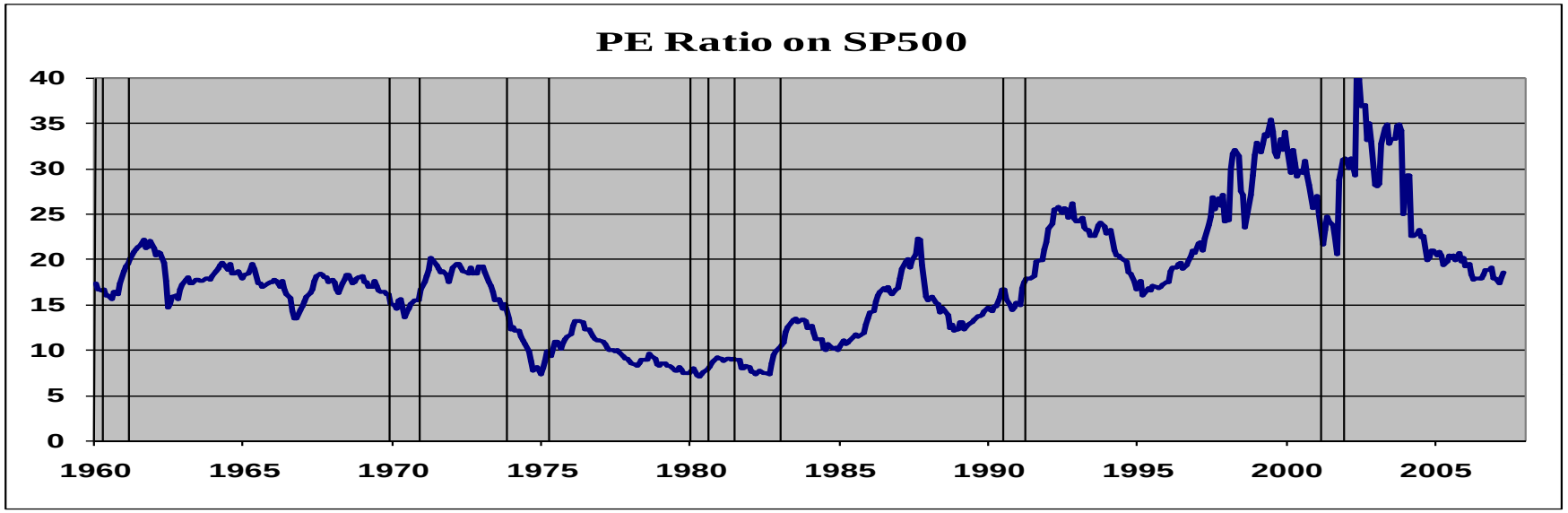
$$PV_0 = \frac{EPS_1}{k}$$

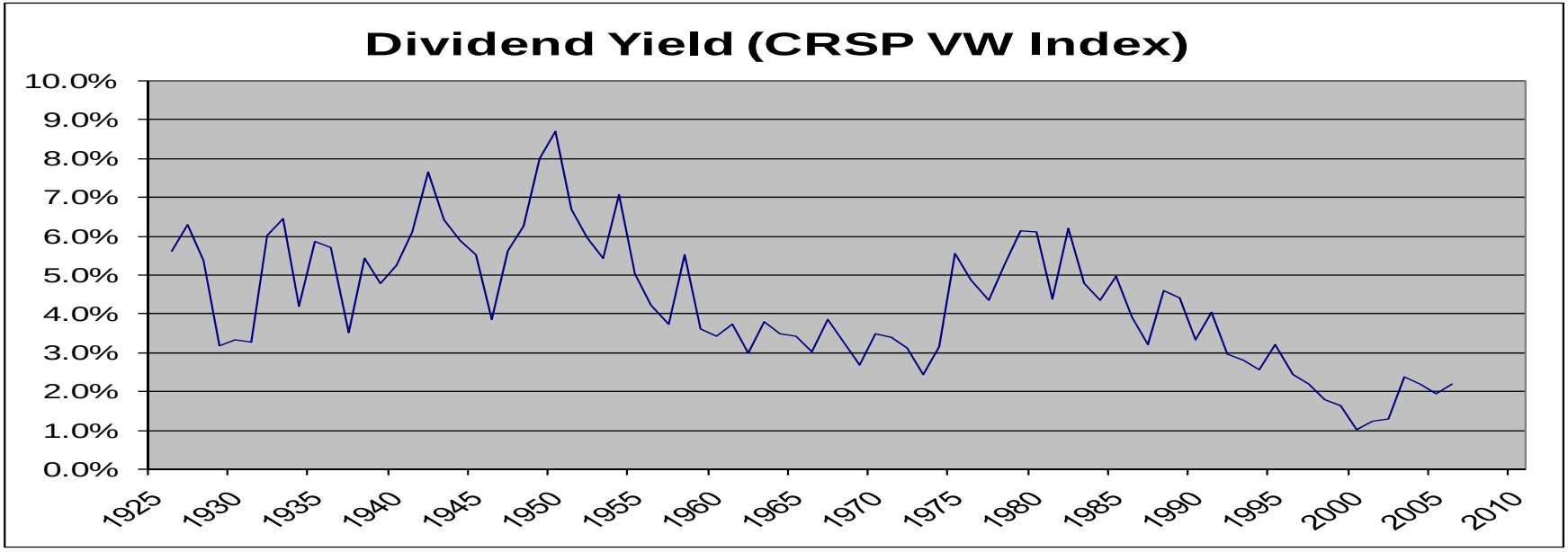
or

$$\frac{PV_0}{EPS_1} = \frac{1}{k}$$



Intrinsic Value and Data





Intrinsic Value and Growth

- Dividends expected to grow at constant rate (subject to $k<g$):

$$PV_0 = \frac{D_1}{k-g} = \frac{D_0(1+g)}{k-g}$$

- DDM with Growth
  - Suppose D_1=\$1/share; g=0; k=10% then PV_0 = \$1/.1 = \$10
  - Suppose now g = 7.5, then PV_0

- P/E ratios with growth – note that (div payout) + (plowback rate) = 1
  - Let $b = (1 - D_0/EPS_0)$.

  - Historical market data b=.3; k=.10; g= .05. (note: recent b=.73)

$$PV_0 = \frac{D_0(1+g)}{k-g}$$

$$PV_0 = \frac{(1-b)*EPS_0(1+g)}{k-g}$$

$$\frac{PV_0}{EPS_0} = \frac{(1-b)(1+g)}{k-g}$$

Intrinsic Value and 2-Stage Growth

Analysts expect Apple's (AAPL) earnings (and cash flow) to grow at about 20% over the next five years, as continues to benefit from extending its popular IPOD technology. After 5 years growth will slow to 6% (less than 10-yr industry avg). The required rate of return (by CAPM) is about 12% (based on 4% risk prem over long-bond with beta~1.5). Apple just earned levered free cash flow of $3.63 per share.

$$PV_0 = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \frac{D_4}{(1+k)^4} + \frac{D_5 + P_5}{(1+k)^5} \quad \text{where } P_5 = \frac{D_6}{k-g}$$

D_0=	**3.63**		**g_1=**	**20%**					
k =	**12%**	`	**g_2=**	**6%**	based on 3.5% real growth and 2.5% infl				
T =	**5**						**Terminal**		
T	**0**	**1**	**2**	**3**	**4**	**5**	***5***		
CF	0	D_1	D_2	D_3	D_4	D_5	P_5		
$CF	0	4.36	5.23	6.27	7.53	9.03	***159.58***		
PV(CF)		3.89	4.17	4.46	4.78	5.13	***90.55***		
Sum(PV)	112.98								

Frequently, the terminal price is assumed to fixed by a ratio, such as P_5/E_5 =25.

Which Growth Rates Should We Use?

- Historical growth – based on historical (5-yr) growth in div, sales, EPS, etc.
  - Some industries may reflect possibility of above avg or below avg growth.

- Mature growth – assume fixed real growth (2.5%?) plus inflation.
  -

- Sustainable growth – g = ROE*b, where b is plowback ratio.
  - For mature firms with stable accounting data.
  - Will greater plowback cause stock price to increase?

- Forecasted growth – forecast some rate of initial growth for some fixed period. How fast can a firm grow?
  - MSFT (1985-04)
    - 48% for rev and NI
  - AMZN (1997-04)
    -
  - Dell (1996-05)
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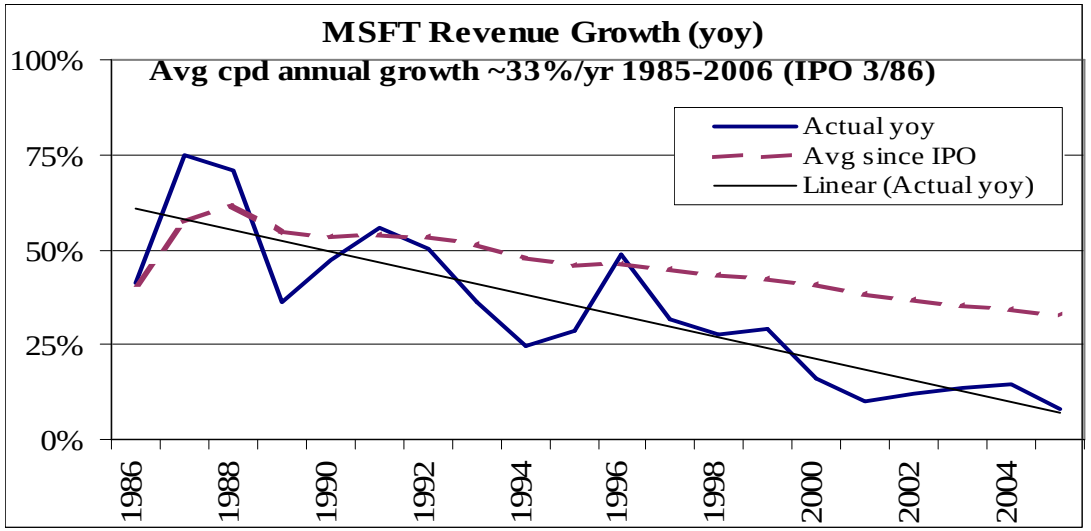


Which Cash Flow Should We Discount?

- Dividends – for companies with history of stable dividends, or mature firms with zero or steady growth. Discount by cost of equity.
  - Commonly applied to regulated utilities, financial services firms, REITs.
  -

- FCF to Equity (FCFE) – measures cash available for distribution to shareholders.
  - FCFE = FCFF – Int(1–t) + Increase Net Debt.
  - Also known as Levered Free Cash Flow.
  - Use for firms without predictable dividends but with stable leverage.
  - Intrinsic Value/share = PV/share;
  - Discount by cost of equity.

- FCF to Firm (FCFF) – measures cash available for distribution to shareholders and bondholders.
  - FCFF = OCF – Net Capital Spend – ΔNWC; where OCF=EBIT(1–t) + Dep.
  - Use if leverage variable; if investor will have "control"; or if FCFE<0.
  - Intrinsic Value/share = PV/share – LTD/share.
  - Discount by Weighted Average Cost of Capital.

Which Discount Rate Should We Use?

- Cost of equity (r_E) – discount cash flows to stockholders by cost of equity.
  - Could make educated guess, with higher rates for riskier firms.
    -
  - Estimate by bond yield plus risk premium: YTM on bonds + 3.5%
    -
  - Estimate by CAPM: $E(r_E) = r_f + \beta [E(r_m) - r_f)]$
    - where r_f is YTM on 10-yr T-bond; and $[E(r_m) - r_f)] = 5\%\text{-}7\%$.

- Weighted Average Cost of Capital – discount cash flows to stockholders and bondholders by WACC.
  - WACC = $[E/V]\ r_E + (1-t)\ [D/V]\ r_D$

    E and D are mkt values of debt and equity;

    V is total market value of firm ($E+D$)

    r_D is required return (YTM) on debt.

- Internet – Intrinsic value at dividenddiscountmodel.com and Moneychimp

Other Valuation Methods

- Intrinsic Value – Summary
  - Determine cash flow to be discounted (Div, FCFF, FCFE).
  - Estimate growth rate (zero, constant, differential).
  - Estimate cost of capital (either cost of equity or WACC).
  - Calculate PV!

- Relative value – based on accounting ratios of comparable firms. Ratios may be adjusted for extraordinary/cyclical items.
  - Ex: AAPL's EPS is P/E for computer hardware industry is .
  - Relative Intrinsic Value = (EPS)*(Industry P/E) =

  - P / EBITDA – excludes accounting measures of depreciation and amort.
  - P / Sales – useful if no earnings; requires no manipulation.
  - P / Free Cash Flow –
  - P / Book –

- Asset / liquidation value –
  - No value for people/expertise; brand/franchise; customer base. Min value.

- Build vs. buy –

Relative and Intrinsic Value: Example

SO - Actual Price (8/07) **P =**	**$36.70**			
Relative Value:	**(1) SO Ratio**	**(2) Industry Ratio**	**(3) = P/(1) $/share**	**(4)=(2)*(3) Intrinsic Value**
Earnings (ttm)	16.01	17.36	$ 2.29	$ 39.79
Sales (ttm)	1.81	1.84	$ 20.28	$ 37.31
CF (ttm)	9.30	9.46	$ 3.95	$ 37.33
Average Relative Value				**$ 38.14**
Intrinsic Value (DDM with constant growth):				
g **= growth** (g=ROE*b)		**4.5%**		
ROE (5-yr avg)	15.30%			
D_0	1.63		Notes	
EPS_0	2.30		Div growth 5-yr: 3.3%%	
Plowback (b=1-D_0/EPS_0)	29.1%		Sales growth 5-yr: 7.8%	
k **= mkt cap rate** (guess or CAPM)		**9.00%**		
DDM: $D_1/(k-g) = D_0(1+g)/(k-g)$				**$ 37.48**

- Sources: http://finance.google.com (gives link to Reuters.com for more ratios);
  - http://finance.yahoo.com; Morningstar has ratios, but not $$ for DIV and EPS

Bubble: Intrinsic Values??

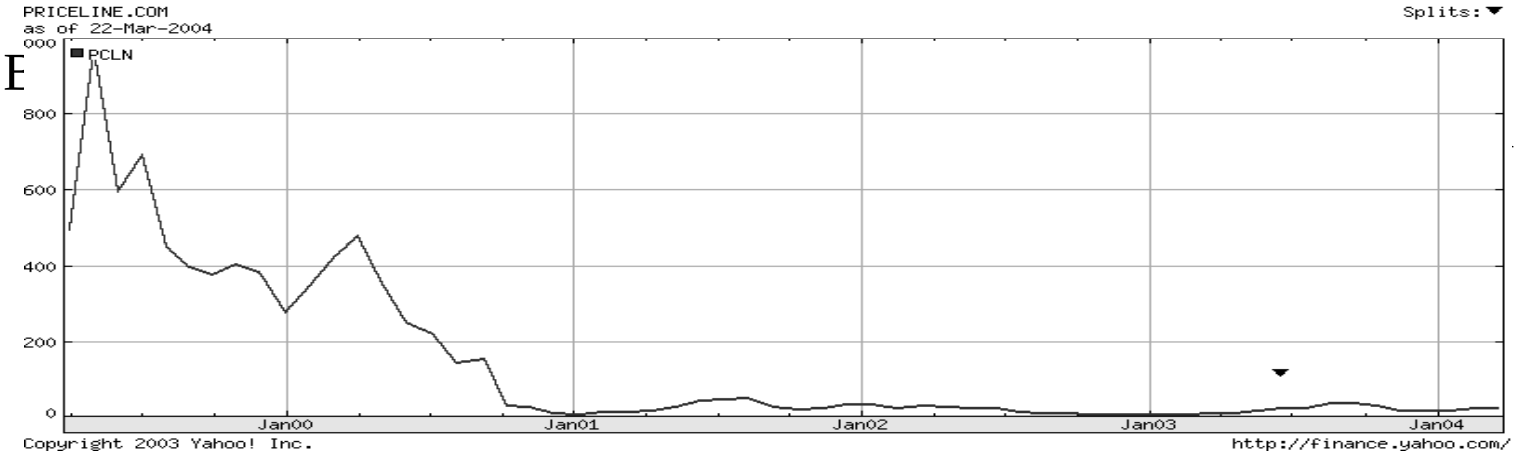
- On-line trading
  - Democratization of stock trading
  - Many traders, little experience and no advice
  - Massively Confused Investors Making Conspicuously Ignorant Choices (JF)

- IPO Mania
  - Historical data suggests IPO "bounce"…

- Wall Street versus Investors
  - Limit versus market orders (Knight-Trimark)
  - Analyst hype; IPO allocations (Spinning and laddering)

- Main Street vs Investors
  - Accounting Gimmicks (and Corporate Governance)

- E



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Bubble: IPO Mania 1

IPO	Issuer	Offer	Close	% Change	12/00
12/09/99	VA Linux	$30	$239	697%	$4
11/5/99	webMethods	35	212	508	$32
12/10/99	Free Markets	48	280	480	18
1980s				7%	
1990-98				15%	$27B left on table
1999-00				65%	$65B left on table

- 3COM spins-off Palm in March 2000
  - Palm priced at $14-$16; revised to $38; trades $165.
  - Palm valuation $32B. 3COM valuation $19B.

- Does this make sense??
  -

Bubble: IPO Mania 2

- Massively Confused Investors Making Conspicuously Ignorant Choices (JF)

- MCI-MCIC
  - Massmutual Corporate Investors (MCI) – closed end mutual fund ~$200M.
  - MCI Comm (MCIC) – eventually acquired by WCOM for $20B
  - WCOM negotiated with MCIC from 11/96-11/97
  - Similar co-movements on days with significant MCIC news.

- CVF
  - 4/15/97: Castle Convertible (closed-end) Fund (CVF) drops 32%
    Financial Times story about Czech Value Fund investing in fraudulent firms.

- TCOMA
  - 6/24/98: REIT Transcontinental Realty Investors (TCI) jumps 4% .
    ATT agrees to buy Tele-communications Inc (TCOMA).
  - 10/13/93: TCI's highest volume. Bell Atlantic announces purchase TCOMA

Bubble: Wall St vs Investors

- Analysts

  Henry Blodget (Merrill Lynch-retired) - I-B client Infospac $122 to $3; Target $150.
  - E-mail describes firm as

  Mary Meeker (MS) - valuation by clicks/cust; mind share; engaged web shoppers.
  - 1999: MS earns $476M IPO fees; Mary $15M;

  Jack Grubman (Citigroup- resigned, $15M fine) - WCOM and Windstar I-Bank clients.
  -

- Other problems - 1,000 lawsuits on behalf of shareholders in 263 companies.
  - IPO Allocations - Laddering; Spinnng ($11M to WCOM Ebbers from Citi).
  - CSFB's Quattrone ($100M/yr) controlled tech research division.
  - Jon Lebed fined $300k??

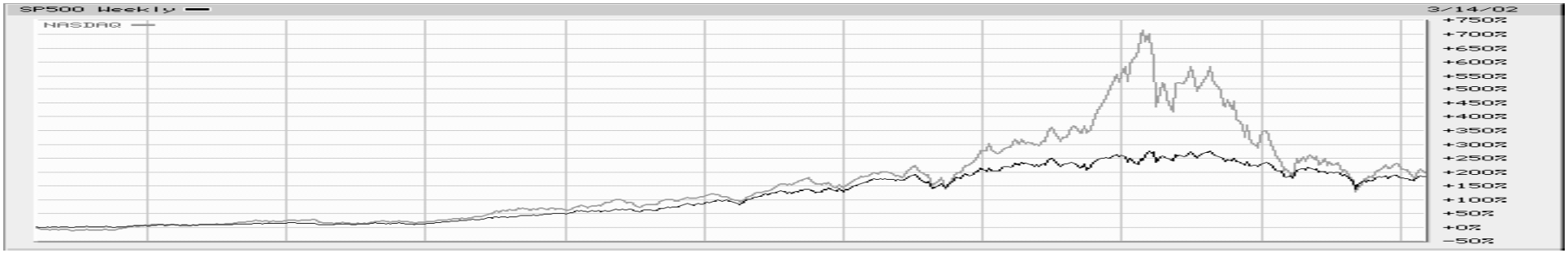
- Analyst settlement (with NYAG and SEC) – total fines $1.4B.
  - Citigroup $400M; CSFB $200M; ML 200M; MS 125M; Goldman 110M…
  - Changes in handling research, brokers must provide some indep research.

Bubble: Main St vs Investors

- Accounting Scandals
  - Worldcom (capitalize costs $11B); Enron (anything goes?)
  - Tyco – acquisitions and merger accounting to pump-up earnings
  - Telecoms, Energy traders (WCOM, Global X, Qwest) – swaps

- Solutions: Sarbanes-Oxley Act
  - Executive Officer/Director Conduct; Public Company Disclosures
  - Audit Committees; Auditor Independence (limit consulting; rotate partner).
  - SEC appoints Public Corp Oversight Board to enforce standards and rules.

- How the Bubble Burst
  - 381 internet IPOs in 1999-00. 7 in 2001. 1/3 down 90%+.
  - IPO Lock-ups Expire: Huge insider sell pressure by early 2000.
  - Fool or Genius? - Warren Buffet?? Stanley Druckenmiller?
  - Down >40% (3/00-12/01): Comm; software; semi-conductors; computers.

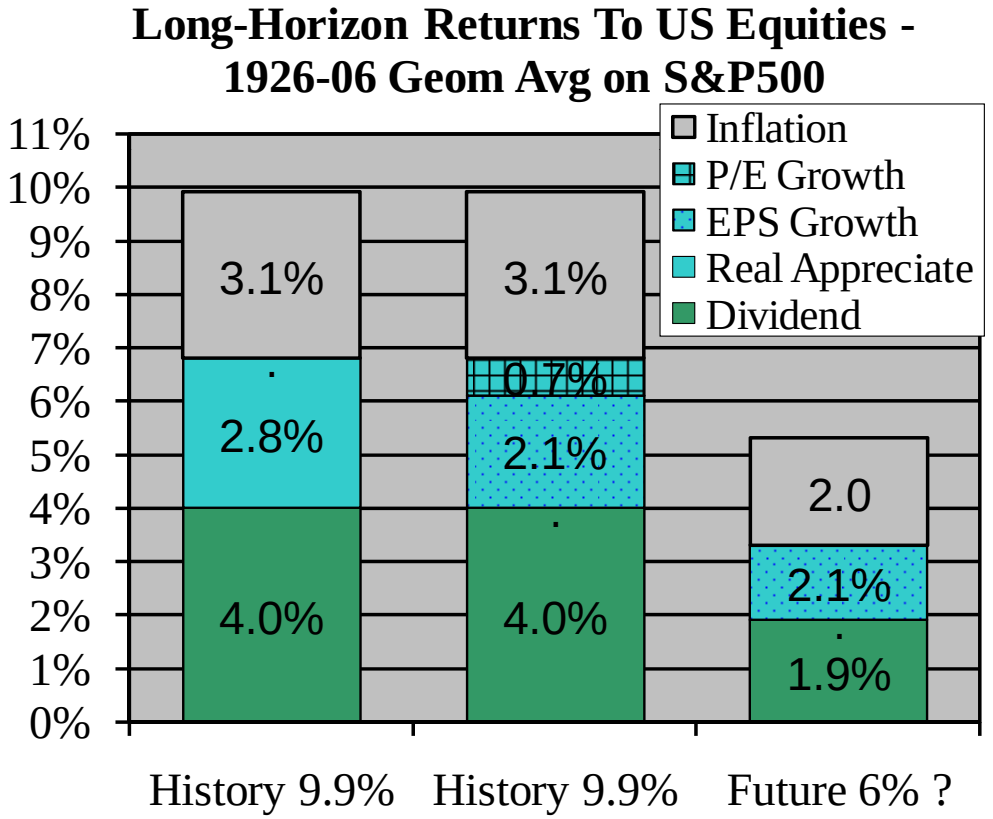


Intrinsic Value: Historical Returns

- How have stocks generated returns historically (geom avg 1926-06)?
  - Rearrange DDM, where D_1/P is div yld and g is price appreciation
  - $k = D_1/P + g$
  - $k \approx D_1/P + g_{real} + g_{infl}$
  - $k \approx 4.0\% + 2.8\% + 3.1\% \approx 9.9\%$

- Decomposing real growth g_{real}
  - $g_{\text{real}} \approx g_{real\ EPS} + g_{P/E}$
  - $\approx 2.1\% + 0.7\% \approx 2.8\%$

- Future Returns
  - $k \approx D_1/P + g_{real\ EPS} + g_{P/E} + g_{infl}$
  - $k \approx 1.9\% + 2.1\% + 0 + 2\% \approx 6\%$



Valuation Tips for Savvy Investors

- DDM - useful benchmark for establishing value.
  - Use when CF are positive and predictable; often overvalues versus mkt.
  - Reliability of discount rate / terminal growth rate / projections?
  - Variations: see slides on FCFF, FCFE, estimating growth and discount rate.

- Relative Valuation – Commonly used and accepted; Uses realized values.
  - Market inefficiencies? Availability of comps?

- Asset / Liquidation Value - Requires liquid mkts (commodities, fin assets, equip)
  - No value for people/expertise; brand/franchise; customer base.
  - Useful if not viable as going concern; Worst case scenario

- Don't forget portfolios!

- Key relationships
  - DDM constant growth: PV = $D_1/(k–g)$ where $D_1=(1–b)*EPS_1$; b=plowback.
  - Sustainable growth: g= ROE*b
  - Differential Growth

$$PV_0 = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \cdots + \frac{D_T + P_T}{(1+k)^T} \quad \text{where } P_T = \frac{D_{T+1}}{k-g}$$