

Columbia Business School

**Security Analysis
Student Lecture Notes**

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Class I

Coin Tossing Contest

Student Guesses

Round

1	2	3	4	5	6	7
_____	_____	_____	_____	_____	_____	_____

Bonus Round

1	2	3
_____	_____	_____
\$10	\$20	\$30

Actual Results

1	2	3	4	5	6	7
_____	_____	_____	_____	_____	_____	_____

Bonus Round

1	2	3
_____	_____	_____
\$10	\$20	\$30

Round 1

High _____

Estimate _____

Low _____

Round 2

Estimate _____

Round 3

Estimate _____

Round 1

High _____

Estimate _____

Low _____

Round 2

Estimate _____

Round 3

Estimate _____

Listed below are ten requests for information that you are unlikely to know. For each write down your best estimate of the answer. Then put a lower and upper bound around your estimate such that you are 90% confident that the correct answer falls within the “confidence range”.

1. Number of General Motors automobiles produced in 1990 _____

2. IBM’s assets in 1989 _____

3. Total number of \$5 bills in circulation on March 31, 1990 _____

4. Total area in square miles of Lake Michigan _____

5. Total population of Barcelona, Spain, in 1990 _____

6. The amount of taxes collected by the IRS in 1970 _____

7. The average annual snowfall in Anchorage, Alaska _____

8. The number of bound volumes in all 26 branches of the
San Francisco Public Library _____

9. The dollar value of outstanding consumer credit at the end of 1988 _____

10. The median price of existing single family homes in Honolulu,
Hawaii, in 1990 _____

VII. Groundwork

A. Two broad schools of thought regarding setting of stock prices

“Firm foundation”

— intrinsic value

Ben Graham
John Burr Williams
Warren Buffett

— value based on future earnings/dividend stream

“Castle-in-the-air”

— psychology

John Maynard Keynes
William O’Neill
George Soros

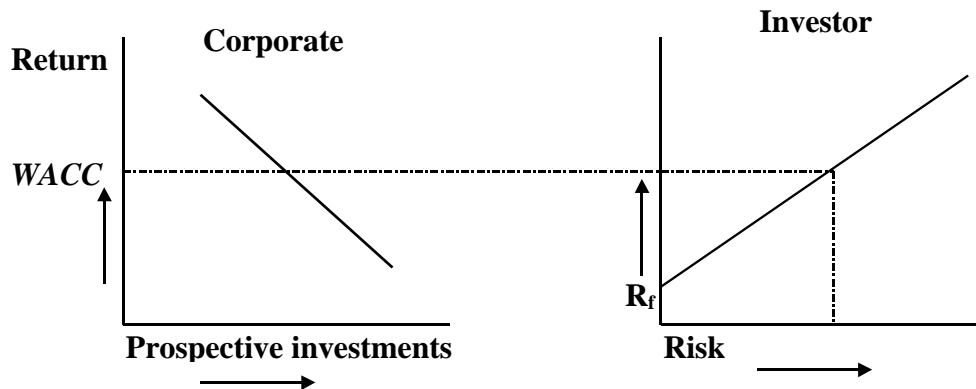
— value based on “greater fool theory”

— perception is reality



Need a model or thought process that can capture both

B. Risk/Reward Tradeoff



Risk and Return 1926 - 1988

	<u>% return</u> <u>geometric</u>	<u>standard</u> <u>deviation</u>
CPI	3.1	4.8
T-bills	3.5	3.3
LT corporate stocks	5.0	8.4
small cap	10.0	20.9
	12.3	35.6

3 types of business projects

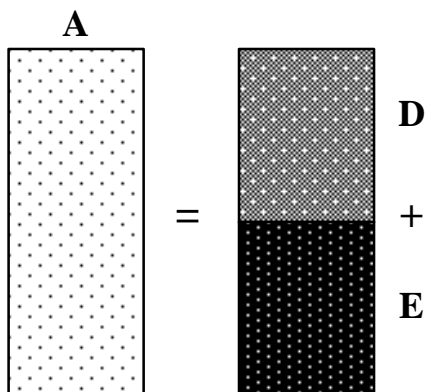
- first question to ask when looking at a business

Stern Stewart Performance 1000

- | | | |
|--------------------|----|-------------------|
| 1) earn above WACC | y | $r > \text{WACC}$ |
| 2) earn WACC | x | $r = \text{WACC}$ |
| 3) earn below WACC | x- | $r < \text{WACC}$ |

C. Valuing a business

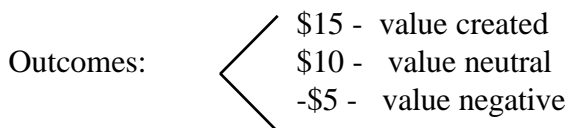
— course will focus on equities — but the explicit process we will use is relevant for all securities



- value of assets = cash generated
balance sheet \neq value
- value - liabilities = equity
concept of residual claim for equities
- value independent of capital structure (M + M)
- how does one measure returns?

D. Lemonade stand

- \$100 needed to start
- bank loan - 10% - WACC



- cash-in versus cash-out
- no question of short-term versus long-term
- understand how value is created

E. Equities as a “derivative” market

Business

Key elements

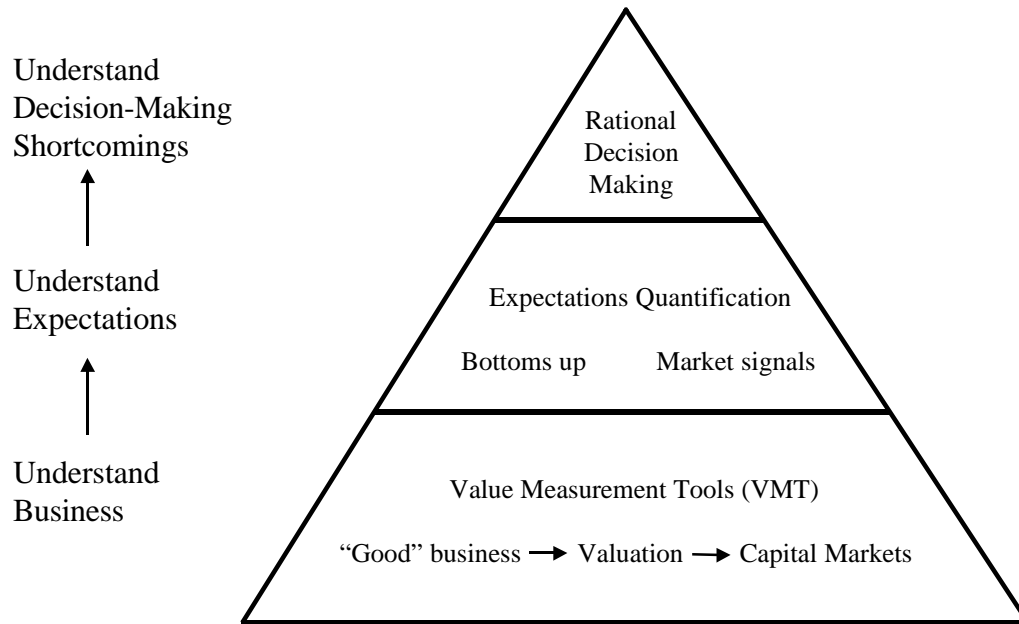
- Competitive advantage
- Limited information
- Competitive dynamics
- Strategy
- Financial performance
- Incentives

Capital Markets

Key elements

- Expectations (good business isn't always a good stock)
- Vast information
- Macro drivers (interest rates, currencies)
- Financials and psychological factors

F. Mauboussin's "Pyramid of Investing"



Class II

I. Introduction

II. Subject: What makes stocks go up and down?

III. Open question: What factors affect stock prices? (draw up list)

IV. Market Myths - Market Realities

1. EPS drives value or $\text{EPS} \times \text{P/E} = \text{value}$

A. When there is a deviation between earnings and cash flow, which does the market follow?

- Credit Suisse First Boston survey 4.1/3.5/3.4
- Empire State Building

	<u>Earnings</u>	<u>CF</u>	<u>Stock Price</u>
1. FIFO → LIFO	↓	↑	↑
2. FASB 106	↓	–	–

Market follows cash flow!

B. Why $\text{EPS} \times \text{P/E} = \text{value}$ is banker's dream

$\text{EPS} \times \text{P/E} = \text{value}$	1. increase EPS
	2. increase P/E

Hi-Lo Fallacy

	<u>Hi</u>	<u>Lo</u>	A. Get EPS ↑ (Hi buys Lo)	B. Get P/E ↑ (Lo buys Hi)
# shares	1,000	1,000	1,500	3,000
Earnings	1,000	1,000	2,000	2,000
Total value	20,000	10,000	30,000	30,000
Share price	\$20	\$10	\$20	\$10
EPS	\$1.00	\$1.00	\$1.33	\$0.66
P/E	20X	10X	15X	15X

- Value is determined by risk-adjusted cash flows: unless cash flows, risk change → there is no change in value
- Buffett — Scott Fetzer example
after acquisition — Earnings 30% lower
identical economics
talk more about P/E's/valuation next week

2. The stock market is short-term oriented

- A. Simple test → examine how much of a company's current share price can be accounted for by expected dividends over next 5 years

e.g.

	Price <u>12/31/91</u>	Cum PV <u>5 yr. dividend</u>	% share price <u>beyond 5 years</u>
AXP	20.50	3.80	81.5%
DIS	114.50	3.18	97.2
MO	80.25	10.05	87.5

B. M + M Formula

$$\text{Value} = \frac{\text{NOPAT}}{\text{WACC}} + \frac{I(r - \text{WACC})\text{CAP}}{\text{WACC}(1 + \text{WACC})}$$

<u>Base</u>		<u>year 1</u>			
NOPAT	=	1,000	1,100	19,800 =	$\frac{1,100}{10\%} + \frac{880(15.0\% - 10.0\%)CAP}{10\%(1 + 10\%)}$
I	=	800	880		
g	=	10%		19,800 =	$11,000 + \frac{44 CAP}{.11}$
WACC=	10%	10%			
r	=	15.0%		8,800 =	$\frac{44 CAP}{.11}$
P/E	=	18X		968 =	44 CAP
CAP	=	?		CAP =	22 years

C. KO out 2 years — someone will pay more

D. Why quarterly earnings matter

3. Investment R & D and accelerated capital spending is not rewarded

A. higher R & D spending as a % of sales leads to higher P/E

B. projects announced with long-term payoffs

C. Internet stocks

4. Dividends matter

— accept classic finance theory that companies that earn high rates of return and grow rapidly should not pay dividends

— employee stock options

— but dividends are a valuable signaling mechanism

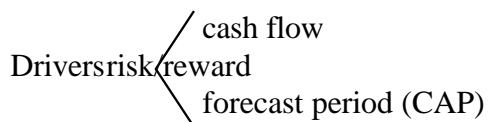
III. Summary of market mechanics

1. Given: (a) cash flow is more important than earnings

(b) there is a long-term relationship between risk/reward

(c) market is not short-term oriented

(d) being forward looking, market by definition based on expectations



2. What do top investors care about?

- in order to determine the direction of the herd, you need not interview each cow, just the lead steer
- lead steer = an influential investor that sets price on the margin
- generally, a lead steer is a buy side analyst, but it can include sell side
- lead steer roundtable

- Best example = Warren Buffett

3. Least Common Denominator Theory

- helps bridge gap between “reality” and rhetoric
 - * DCF
 - * Cash Flow (Cash Flow Multiple)
 - * Earnings (P/E)
 - * best model, leading investors
 - * better, same flaws as EPS
 - * theoretically weak, easy to articulate

4. What about booms/busts?

- fear and greed play a role — when are they being evoked?
- inherently difficult to gain from “psychological inefficiencies”

IV. Market Efficiency

How believe the market is inefficient?/efficient? why/why not?

1. Test of market efficiency

- (1) uniform and costless information dissemination
- (2) prices always fully reflect available information
- (3) liquidity
- (4) low/non-existent transaction costs

2. Three Forms of Efficiency

<u>Weak - technical</u>	<u>Semi-strong - fundamental</u>	<u>Strong - insider</u>
- <ul style="list-style-type: none">• seasonality• poor performers do better	- low "P/E" - some money managers consistently outperform	- share repurchase, dividends - options pricing
<hr/>		
+ <ul style="list-style-type: none">• Louis Bachelier 1900 French capital markets• Maurice Kendall 1953 British stocks	+ <ul style="list-style-type: none">• performance of fund managers roughly 70% "outperformed" by market• Jensen 1955-64 78% "outperformed" by market• Fortune (10/94) 2,700 equity managers 74% "outperformed" by market	

Two Areas of Potential Exploitation:

- Information
- Analysis

3. Capital markets as a complex adaptive system

B. Tension exists between academics and practitioners

academics: rational agents, random walk, efficient markets

practitioners: outperformance of some, irrational investors, inefficiency

one model reconciles both: complex adaptive system

B. Paradigm shifts — Thomas Kuhn

- 1) Theory laid out
- 2) Scientists test the theory and facts counter it
- 3) Original theory stretched
- 4) New theory supercedes the old

Example:

- 1) Aristotle proposes geocentric universe with orbits as circles
- 2) Astronomers observe that orbits are elliptical, not circular
- 3) Ptolemy introduces circles-upon-circles
- 4) Copernicus, Kepler, Galileo introduce helocentric universe, elliptical orbits and celestial imperfection

Correspondence — Jeremy Bernstein (*Cranks, Quarks and the Cosmos*)

Two tests:

- 1) new idea must explain why the old theory worked
- 2) add some predictive value

C. Classical Capital Market Theory

Economics still largely based on equilibrium systems: supply and demand, risk and reward, price and quantity.

This stems from the view that economics is a science akin to Newtonian physics — cause and effect and implied predictability.

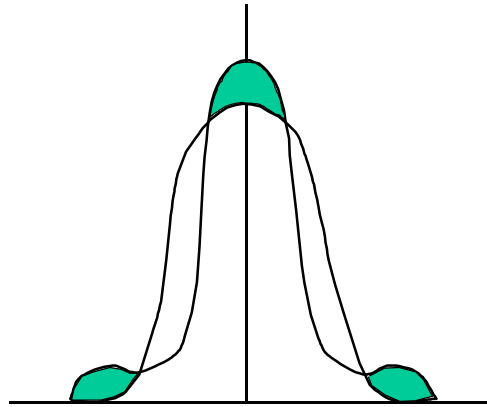
Many statistical tools only can be applied if equilibrium theory holds (Fama 1963)

Classical theory

- 1) Stock market efficiency — prices reflect all relevant information when that information is cheap and widely disseminated
 - purchasing stocks is an NPV zero proposition
 - prices not always “correct”, but not systematically wrong
 - doesn't require random walk, but often does
- 2) Random walk — security price changes are independent of one another
 - lots of agents — current prices reflect info that is collectively known
 - implies that probability distribution is normal
- 3) Rational agents — investors can assess and optimize risk/reward opportunities
 - Markowitz — mean/variance efficiency
 - Sharpe, Linter — CAPM
- 4) Assumptions/prediction
 - stock returns treated as independent, identically distributed random variables
 - rational agents
 - modest trading activity, limited price fluctuations

D) Classical Theory Tested

- 1) Stock market turns are not normal
 - high kurtosis — tails are fatter and mean higher than what is predicted
 - punctuated equilibrium



- 2) Random walk not supported by data
 - Campbell, Lo, Mackinley — show prices are predictable
 - elements of persistence
- 3) Volume higher and changes greater than predicted
 - volume is active
 - large changes (crash '87)
- 4) Risk and reward not linked via variance
 - Fama
 - firm size and price/book — maintained “rational” framework
- 5) Investors are not rational
 - systematic judgment errors have been identified
 - humans operate inductively, not deductively

E. Theory Stretch

- 1) Non-normal distributions
 - fat tails observed — often explained away or data culled
 - sticking with traditional probability calculus
- 2) Noise traders (Black 1986)
 - “noise” fills the theory/practice gap
 - should not trade
 - “noise theories were all derived originally as part of a broad effort to apply the logic behind the capital asset pricing model to...behavior that does not fit conventional notions of optimization.”
- 3) Crashes
 - Fama — “I think the crash in '87 was a mistake”
 - Miller — recommends reading Mandelbrot

- 4) Behavioral finance
 - “as if” argument
 - dilutes theory

F. Complex Adaptive Systems

Complex adaptive systems can be described in three parts. First, there are lots of agents, each operating with their own decision rules. Next, the interactions between the agents become the basis of “emergence” – the aggregate becomes more complicated than the sum of the parts. Finally, a “meta-system” is created that has distinct characteristics. Each part is described briefly:

- *Decision Rules.* Agents within a complex adaptive system take information from the environment, combine it with their own interaction with the environment, and derive decision rules. Various decision rules compete with one another based on their utility, with the most effective rules surviving. This process allows for adaptation, which explains the “adaptive” in “complex adaptive system.” Individual trading rules and investment rules of thumb are decision rules in the capital markets.
- *Emergence.* Emergence is the complex, large-scale behaviors that result from the aggregate interactions of many less complex agents. An ant colony is a good example of this phenomenon. If you were to interview any single ant about what it does, you would hear a narrowly defined task or set of tasks. However, because of the interaction of all ants, a functional and adaptive colony emerges. In capital markets language, the behavior of the market “emerges” from the interaction of investors. This is Adam Smith’s invisible hand.”
- *Market as a “Meta-System”.* We use the term meta-system to convey clearly the notion that the market has properties and characteristics distinct from the agents that comprise it. Two key characteristics of CAS include nonlinearity and critical points. Nonlinearity is the idea that the output of the system will not necessarily be proportionate with the input of the system. The familiar multiplier effect in economics is a good example. Critical points describe the fact the periodically, small-scale stimuli lead to large-scale effects – the proverbial straw that broke the camel’s back. In the realm of markets, this means booms and crashes.

G. Does the New Theory Conform to Reality?

- 1) Non-normal distribution’s explains high kurtosis
- 2) Random walk — although persistence exists — hard to detect
- 3) Homogeneous versus heterogeneous expectations
 - deductive vs. inductive
 - “El Farol” problem: errors independent OK; non-independent can lead to self-reinforcing trends
- 4) Portfolio manager performance

- not much predictability with complex adaptive system
 - some investors “hard wired”
- 5) Artificial stock market
- Santa Fe Institute
 - replicate market activity

H. What do we do?

- 1) Careful about risk and reward
 - CAPM good first approximation
 - more to come
- 2) Avoid cause and effect thinking
 - human nature
 - crash of '87
- 3) DCF is valuable
 - first principles
 - sort out key issues
 - crystallize expectations
- 4) Strategy/micro-economics
 - Capital-based to information-based society
 - increasing returns

4. Why does EMH still win out?

⇒ Thesis: still no way to game the system
efficiency is effectively accurate

5. My opinion

6. An Interesting Analogy

	“Beat the Dealer”	Stock market
Focus	1 game <i>not</i> multiple games	define expertise
Lots of “plays”	100 hands/hour head on w/dealer	examine lots of situations get information
Limited opportunities	10% favorable 90% unfavorable	small % favorable even when you know what you’re doing
Betting	small when odds low large when odds high	none when odds low huge when odds high

Thorp, *Beat The Dealer*, pp. 55-56.

⇒ reassuring to read Buffett

III. Valuation Techniques

A. P/E, P/E Multiple

<u>Description</u>	<u>Plus</u>	<u>Minus</u>	<u>How used in “real world”</u>
price of stock/ earnings per share	<ul style="list-style-type: none"> • simple • proxy for cash flow • widely accepted • broadly articulated 	<ul style="list-style-type: none"> • excludes risk • excludes capital needs • time value of \$ • EPS can be manipulated 	<ul style="list-style-type: none"> • relative P/E • EPS momentum • absolute P/E • P/E vs. growth rate

- P/E versus growth rate — “buy at less than 1X growth rate”
- the EPS growth to P/E multiple link is fallacious – it should be EPS growth to ROIC to P/E multiple

	Return on Invested Capital			
	8%	10%	15%	20%
5%	8.5x	10.0x	12.0x	12.9x
10%	5.7	10.0	15.8	18.6
15%	0.1	10.0	23.4	29.9
20%	NM	10.0	38.2	52.2

Assume all equity financed; 10% WACC; 20-year forecast period

C. Price/Sales

<u>Description</u>	<u>Plus</u>	<u>Minus</u>	<u>How used in “real world”</u>
Equity market capitalization/ sales	<ul style="list-style-type: none"> • simple • earnings power when combined with business model • especially prominent with nascent technology 	<ul style="list-style-type: none"> • capital intensity • growth rate • risk 	<ul style="list-style-type: none"> • comparable analysis within industry • below 1x sales (software)

C. Book Value, Price/Book

<u>Description</u>	<u>Plus</u>	<u>Minus</u>	<u>How used in “real world”</u>
stock price/ shareholders’ equity	<ul style="list-style-type: none"> • simple • margin of safety • indicator of value creation 	<ul style="list-style-type: none"> • can be manipulated • subject to accounting vagaries • does not capture key issues of value 	<ul style="list-style-type: none"> • low price/book (preferably at or below 1.0)

D. Enterprise Value/Operating Cash Flow

<u>Description</u>	<u>Plus</u>	<u>Minus</u>	<u>How used in “real world”</u>
enterprise value/ EBITDA	<ul style="list-style-type: none"> • more reflective of economics of business • simple • good for M & A • relates <u>enterprise</u> to cash flow • industries that don’t money 	<ul style="list-style-type: none"> • excludes risk • excludes capital needs • time value of \$ 	<ul style="list-style-type: none"> • low price/EBITDA • PMV investors • EBITDA growth versus multiple
— P/E versus enterprise/EBITDA (Kellogg versus Nabisco)			

	<u>12/31/97</u>	<u>P/E</u>	<u>Enterprise/ EBITDA</u>
Kellogg	\$50	26.5X	13.4X
Nabisco	\$48	26.3X	9.8X

E. Dividend Discount Model

John Burr Williams
Theory of Investment Value (1938)

<u>Description</u>	<u>Plus</u>	<u>Minus</u>	<u>How used in “real world”</u>
discount future dividends to PV	<ul style="list-style-type: none"> • incorporates time value of money • implicitly incorporates capital needs • mimics life cycle 	<ul style="list-style-type: none"> • discount rate “not correct” • biased toward high yield stocks and against growth stocks • cumbersome to calculate 	<ul style="list-style-type: none"> • calculate NPV • calculate IRR • “black box”

→ typically 3 stages

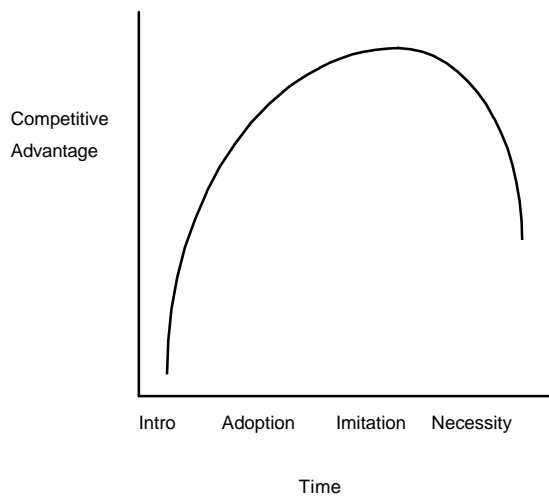
(1) growth — high EPS growth, low payout

(2) transition — payout up, EPS growth stabilizes

$$g = \text{ROE} \times (1 - \text{payout})$$

(3) mature — terminal value

$$\frac{D_t}{R_f - \text{ERP}}$$



F. Discounted Cash Flow

<u>Description</u>	<u>Plus</u>	<u>Minus</u>	<u>How used in "real world"</u>
discounts FCF	<ul style="list-style-type: none"> • reflects economics of market • incorporates risk • incorporates capital intensity • incorporates time value of \$ 	<ul style="list-style-type: none"> • not widely articulated • more cumbersome to calculate 	<ul style="list-style-type: none"> • few market participants • strategic planning, M & A

IV. Full Development of DCF

- to value any business, security, you need to answer 3 questions

(1) What will cash flows be? (cash-in versus cash-out)

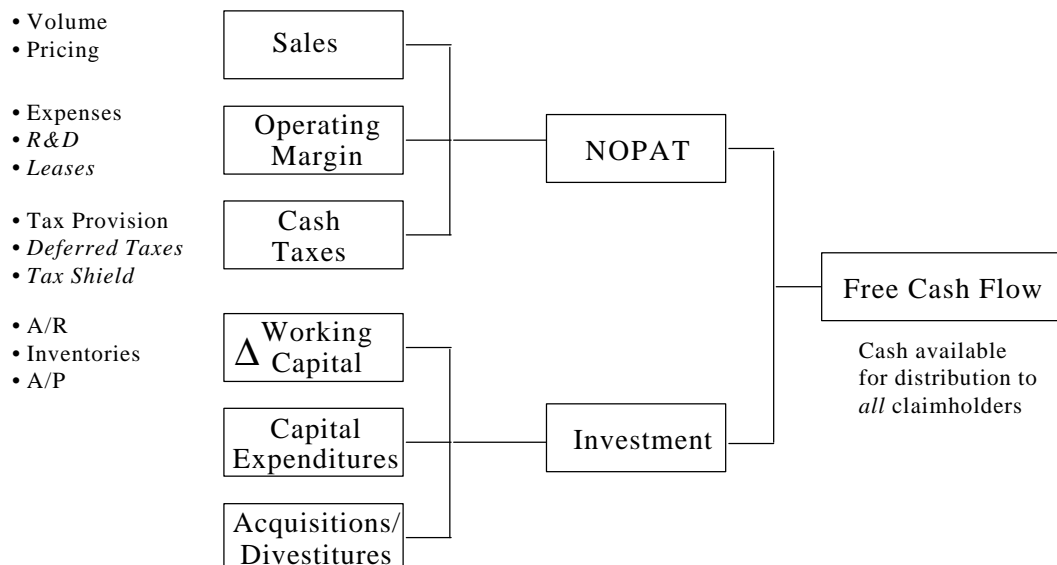
(2) When will they be received?

(3) How certain are they?

A. What is appropriate cash flow to project and discount?

- cash distributable to all claimholders
 - earnings after-tax
 - after investment
 - before financing costs

Free Cash Flow = Net operating profit after tax (NOPAT) – Investment in future growth (I)



- NOPAT = net operating profit after taxes

= operating income

- cash taxes attributable to operating income

(1) income tax provision

(2) less: deferred taxes

(3) plus: tax savings from interest expense
(tax rate * interest expense)

(4) less: taxes paid on interest income

+ amortization of goodwill

- I = Investment in future growth

(1) change in working capital (operating: receivables and inventories less payables)

(2) capital expenditures (net of depreciation)

(3) acquisitions (net of divestitures)

- Buffett's "owner earnings" = levered FCF

- Recommend think about FCF/DCF in terms of Al Rappaport's "value drivers"

⇒ translates everyday items/ratios into Free Cash Flow

1. sales (growth)

2. operating margin (includes goodwill amortization)

3. incremental fixed capital $\left(\frac{\text{capital expenditures} - \text{depreciation}}{\text{change in sales}} \right)$

4. incremental working capital $\frac{\text{change in working capital}}{\text{change in sales}}$

5. cash tax rate

6. cost of capital

7. competitive advantage period

- Financial Companies
 - ⇒ debt is a “raw material” so interest expense is really “cost of goods sold”
 - ⇒ rather than free cash flow, financials use modified earnings, cash flow available for equity investors and the cost of equity
 - ⇒ model is slightly different but the concepts are the same

B. Appropriate Discount Rate

⇒ Weighted Average Cost of Capital (WACC)

4 steps:

1. Estimate cost of equity (K_e)
2. Estimate cost of debt (K_d)
3. Estimate weighted average based on target, market value debt/total capital ratio
4. Estimate WACC
 - Arbitrage Pricing Theory = multifactor analog to CAPM
 - Great book on risk: Against the Gods: The Remarkable Story of Risk by Peter Bernstein

D. Terminal Value — 3 Approaches

D. Growth in perpetuity

$$\text{Value} = \frac{\text{FCF}_{\text{CAP}+1}}{\text{WACC} - g}$$

$\text{FCF}_{\text{CAP}+1}$ = normalized FCF one year after CAP

WACC = weighted average cost of capital

g = growth in FCF in perpetuity

2. Value driver formula — mathematically equivalent to growth in perpetuity

$$\text{Value} = \frac{\text{NOPAT}_{\text{CAP}+1} (1 - g/r)}{\text{WACC} - g}$$

NOPAT = normalized NOPAT after CAP

g = growth in NOPAT

r = rate of return on new investment

- assumes I in FCF formula and I in value driver formula have same returns

3. Perpetuity assumption

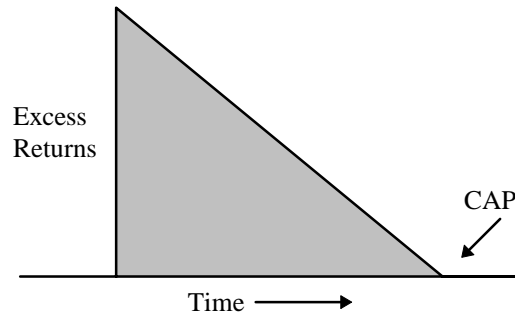
$$\text{Value} = \frac{\text{NOPAT}_{\text{CAP}+1}}{\text{WACC}}$$

- equal to value driver when $r = \text{WACC}$

$$\begin{aligned} & \frac{\text{NOPAT} (1 - g/r)}{\text{WACC} - g} \\ = & \frac{\text{NOPAT} (1 - g/\text{WACC})}{\text{WACC} - g} \\ = & \frac{\text{NOPAT} [\text{WACC} - g/\text{WACC}]}{\text{WACC} - g} \\ = & \frac{\text{NOPAT}}{\text{WACC}} \end{aligned}$$

E. Competitive Advantage Period

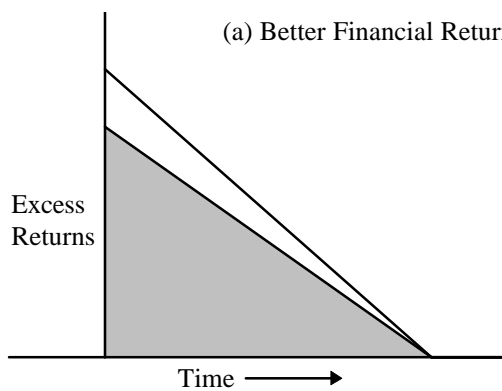
1. economic theory suggests that returns are driven down to the cost of capital
 - CAP equals the period of time a company can generate excess returns on new investments



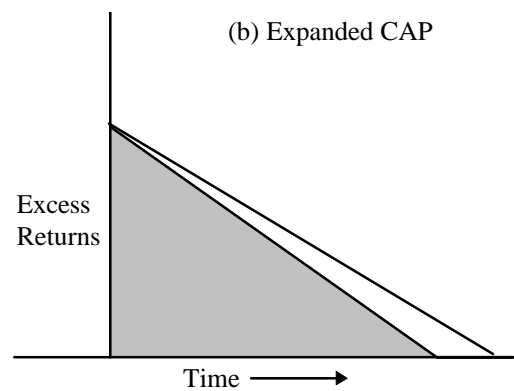
- shaded area = aggregate value creation
 - = P/E above “commodity” multiple
 - = enterprise value/EBITDA above “commodity” multiple
- management should maximize shaded area — 2 dimensions height and width
- no one knows “real” number; helps quantify expectations

- CAP is defined by 3 factors
 - ⇒ current ROIC
 - ⇒ rate of industry change
 - ⇒ barriers to entry

2. sources of value creation — change in expectations



- earnings surprise
- balance sheet surprise

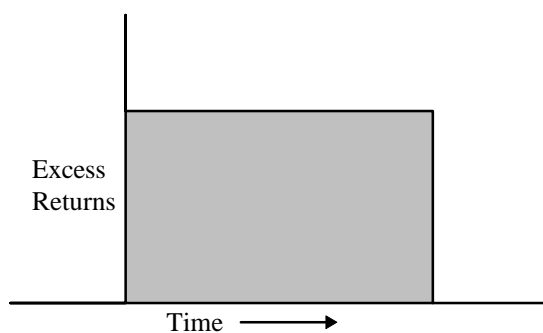


- change in industry structure
- change in management

3. Goldman Sachs Study

4. How I think it looks

- threshold of pain
- concept of “Bid-a-Note” from “Name That Tune”



V. Debate about “growth” versus value

1. Buffett says debunking difference is considered intellectual cross dressing

- buy/sell securities that are under/overvalued to outperform
- in fact, most growth and value funds own the same stocks

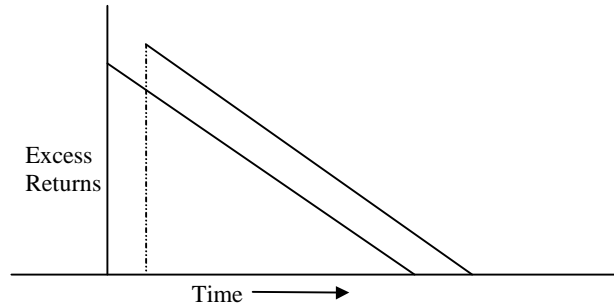
	<i>Growth funds</i>	<i>Value funds</i>
Philip Morris	1	1
FNMA	2	5
Merck	3	4
PepsiCo	8	16
Pfizer	11	19
American International Group	13	13
Royal Dutch	16	6
General Electric	18	2
Bristol-Myers Squibb	20	12
IBM	21	7

Source: Bogel on Mutual Funds

2. EPS rising \neq value creation

3. Growth defined

- buy value creating companies
 - \Rightarrow hope that returns $>$ expectation
 - \Rightarrow hope that CAP remains static; expands



Alan Shapiro USC:

Excess returns	KO	73-83	2.9%
		84-94	28.6%

4. "Value" defined ^{*1974-183 ROE > 20%} ^{*13.6% S&P 500}
^{*13.4% "super"}

- buy value creator with transitory dip in returns or CAP
- buy value neutral/value destroyer with a catalyst

VI. Market Signals

- Essence of investing
- Recognize that stock prices convey very important information
- Stocks say something about businesses/business prospects

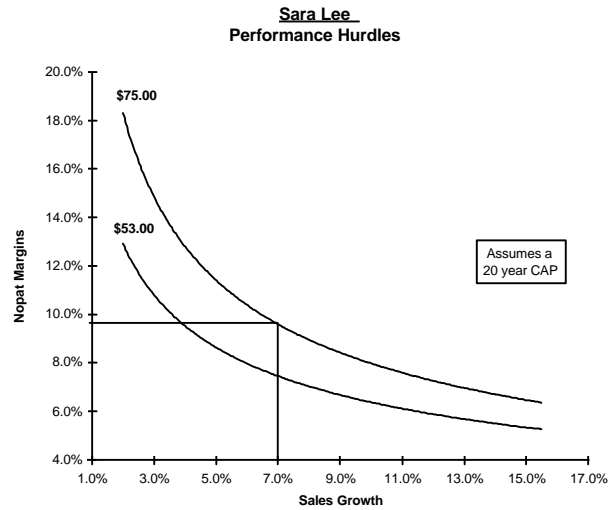
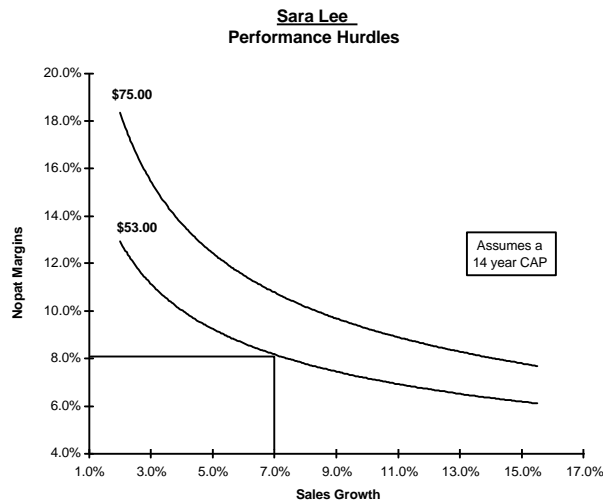
1. Bottoms up valuation

- take assumptions about business compare with current market value
- higher jumper, where the bar is set

2. Take stock price — reflect on implied corporate performance

(a) Hold constant value drivers most easily estimated

- capital intensity
- tax rate
- WACC
- Calculate IRR from stock price



VII. Understand Expectations

Class IV

I. Introduction

II. Rates of Return

- keep saying returns > WACC but have not clearly defined returns
- much easier said than done
- very important from corporate standpoint – you need to understand expectations

A. Return on Equity

<u>Definition</u>	<u>±</u>	<u>=</u>	<u>“how used”</u>
Earnings/ (avg) equity	— simple — all things equal, indicative — good proxy, young companies — widely used	— accrual acct’g based — <i>flawed numerator</i> — <i>flawed denominator</i> — not an economic measure — mix operating performance with financing decisions returns > Kd ↑ ROE	— return standard — ROE/Ke spread
		<u>Earnings</u>	<u>Equity</u>
		— manipulated — time value \$ — risk	— manipulated — accounting convention — buybacks — FASB 106

B. Return on Assets

<u>Definition</u>	<u>±</u>	<u>=</u>	<u>“how used”</u>
Earnings/ (avg) assets	—simple to calculate, articulate —all things equal, indicative	—flawed numerator —flawed denominator —understates/overstates DCF returns —operating performance/ financing	—return standard —compared to WACC

- project that is NPV zero

C. Return on Invested Capital

<u>Definition</u>	<u>±</u>	<u>=</u>	<u>“how used”</u>
NOPAT/ (avg) invested capital	— best of acct’g measures — spread versus WACC useful over time	— accounting denominator — more difficult to calculate than ROE, ROA	— spread

Operating Approach

Current assets
- NIBCLs
Net Working Capital

Net P, P&E
Goodwill
Other
Invested Capital

Financing Approach

Short-term debt
Long-term debt
Total Debt

Deferred taxes
Other liabilities
Preferred stock
Common equity
Invested Capital

Further modified:
* Capitalized R&D
* LIFO reserve
* Non-capitalized leases
* Accumulated goodwill
 amortization
* Restructuring charges
* Phantom goodwill

D. Threshold/ Incremental Threshold Margin “economic break-even”

Incremental threshold margin = margin required on now investments to earn WACC

$$= \frac{(\text{fixed capital} + \text{working capital rate}) * \text{WACC}}{(1 + \text{WACC}) (1 - \text{cash tax rate})}$$

Threshold margin = margin required to earn WACC

$$\frac{\text{Year0 EBIT} + (\text{Incremental threshold margin} * \text{incremental sales})}{\text{Year 0 sales} + \text{incremental sales}}$$

E. Economic Value Added

<u>Definition</u>	\pm	=	<u>“how used”</u>
NOPAT-(invested capital * WACC)	— partially economic — capital charge — effective for compensation	— mixes accounting — w/economic — allocates value incorrectly	— strategic planning — performance monitoring — compensation

EVA versus FCF

- mathematical equivalents
- allocation of value, value creation different

value = “steady state” + “PVGO”

	EVA	FCF
“Beg value”	\$3,900	\$3,900
PVGO	279	978
after PVGO	<u>699</u>	<u>0</u>
	\$4,878	\$4,878

F. Rate of Return on Incremental Invested Capital

= return generated on capital added at the margin

Simple version

- has simplifying assumption that rate on “base” invested capital is stable

$$= \frac{\text{NOPAT}_2}{\text{Invested capital}_1} - \frac{\text{NOPAT}_1}{\text{Invested capital}_0}$$

Complex version

The Market-Demanded Return on New Investment (MDROI)

- A. Stock Price = expectations
- B. Expectations = “steady-state” value + PVGO
- C. PVGO = Investment, how long (MICAP), and return on investment
- D. You know:
 - stock price
 - PVGO
 - I
 - WACC
 - MICAP

Hence, you can solve the MDROI

1. First, take the current stock price as well as your forecast of future NOPATs and Investments and use them to calculate the Market-Implied Competitive Advantage Period (MI-CAP). For example, in Rappaport’s analysis on Chapter 6 of the revised *Creating Shareholder Value*, the share price is \$130, and the MI-CAP is 5 years.

Years	0	1	2	3	4	5
Sales	\$ 100.00	\$ 112.00	\$ 125.44	\$ 140.49	\$ 157.35	\$ 176.23
Δ Sales		12.00	13.44	15.05	16.86	18.88
Operating Profit	15.00	16.80	18.82	21.07	23.60	26.44
NOPAT	9.75	10.92	12.23	13.70	15.34	17.18
Incremental capex		2.40	2.69	3.01	3.37	3.78
Incremental WC Inv.		1.20	1.34	1.51	1.69	1.89
Total Inc. Investment		3.60	4.03	4.52	5.06	5.66
FCF		7.32	8.20	9.18	10.28	11.52
Discount Factor @ 10%	1.00	0.91	0.83	0.75	0.68	0.62
PV of FCF (t)		6.65	6.78	6.90	7.02	7.15
Σ PV of FCF (0 ... t)		6.65	13.43	20.33	27.35	34.50
Residual Value	97.50	109.20	122.30	136.98	153.42	171.83
PV of Res. Val.	97.50	99.27	101.08	102.92	104.79	106.69
Core Enterprise Value	97.50	105.93	114.51	123.24	132.14	141.20
Corporate Value	106.30	114.73	123.31	132.04	140.94	150.00
Shareholder Value	86.30	94.73	103.31	112.04	120.94	130.00
SVA		8.43	8.58	8.74	8.90	9.06
Σ SVA						43.70

MI-CAP → 5

Share Price → 130.00

2. Next, look at your forecast of future Investments (the annual change in your company's Invested Capital base). Calculate the present value of those investments using the weighted average cost of capital (WACC). Then calculate the sum of the PV's of those Investments from Year 1 to the MI-CAP year (in this case, 5 years).

Years	0	1	2	3	4	5
Total Inc. Investment		3.60	4.03	4.52	5.06	5.66
PV of Inv. (t)		3.27	3.33	3.39	3.45	3.52
Σ PV of Inv. (0 ... MI-CAP)						16.97

This gives you the present value of all the cash that the market expects managers to invest at a return different than the cost of capital.

3. Next, we want to calculate the Return on New Investments that shareholders demand the company must earn so that shareholders will at least earn their return on equity. How do we do this?

- Standard corporate finance tells us that $\Sigma PV(FCF) = \Sigma PV(NOPAT) - \Sigma PV(\text{Investment})$.
- In an efficient market, a shareholder does not earn excess returns on his investment, i.e. buying the stock is an NPV-neutral proposition. Thus, the stock price – $\Sigma PV(FCF)$ will equal 0.
- We've already calculated the $\Sigma PV(\text{Investment})$ in Step 2.
- So if we set the $\Sigma PV(FCF)$ equal to 0, then we see that $\Sigma PV(NOPAT) = \Sigma PV(\text{Investment})$.
- We assume that the company will generate increased NOPATs due to its increased investment. Furthermore, we assume that investors will capitalize NOPAT improvements using the standard perpetuity formula of $(\text{Cash Flow})/(\text{discount rate})$. Investors are assumed to capitalize the improvement in NOPAT using the minimum return on capital (R) that they expect the company to earn on these investments.
- The market will then calculate the present value of these perpetuities using this discount rate (R). (Remember that the perpetuity formula values a cash flow that starts NEXT year. Thus, since these perpetuities start THIS year, we use the previous year (t-1) to calculate the discount factor.)
- We then sum the present value of these NOPAT improvements (capitalized at this minimum return on capital (R)).

	0	1	2	3	4	5
Δ NOPAT		1.17	1.31	1.47	1.64	1.84
Δ NOPAT/R		4.31	4.82	5.40	6.05	6.78
Discount Factor @ R		1.00	0.79	0.62	0.49	0.38
PV of Δ NOPAT/R (t)		4.31	3.79	3.34	2.94	2.59
Σ PV of Δ NOPAT/R (0 ... CAP)						16.97

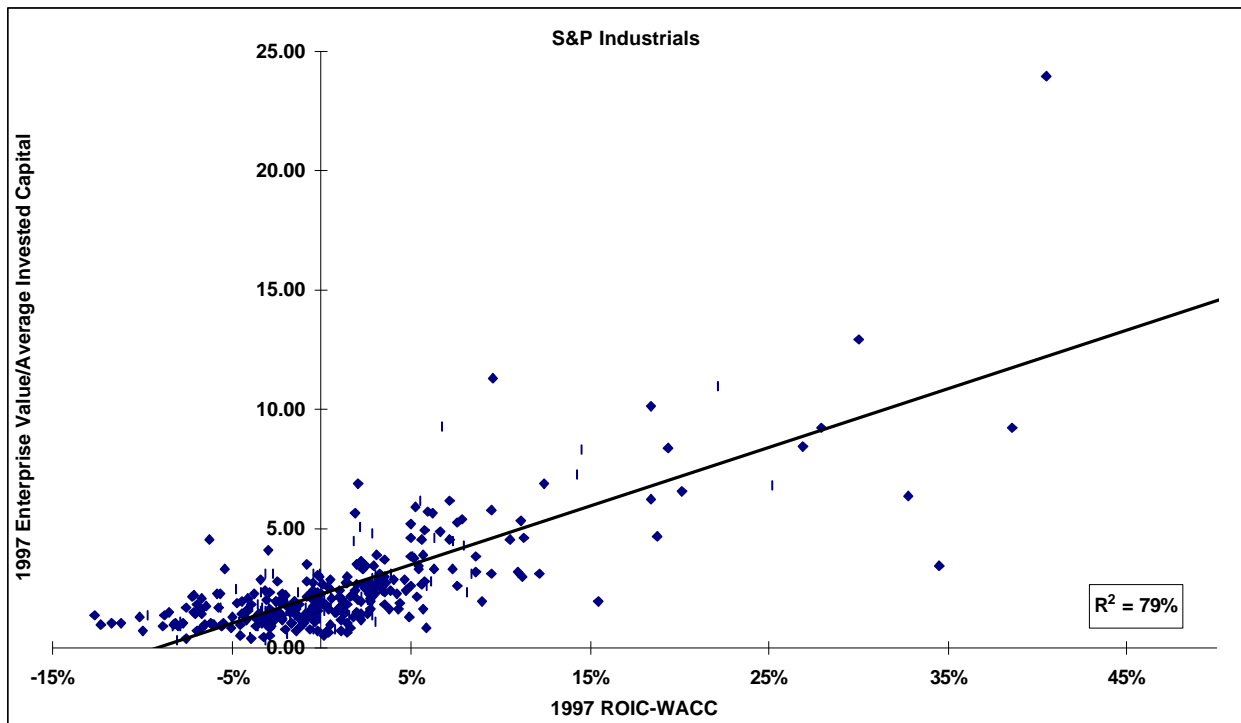
- Now all we need to do is to try different Market-Demanded Returns on New Investments (R) until the $\Sigma PV(NOPAT)$ equals the $\Sigma PV(\text{Investment})$ that we calculated in Step 2. In this example, $R = 27.17\%$.

Conclusion

- It highlights the fact that CAP, by itself, is incomplete. MI-CAP only tells you *how long* the market gives a company credit for investing above the cost of capital. This Return on New Investment number tells you *what return* the company will earn on its new investments, given that it can sustain the NOPAT from its old business.
- It's forward looking.
- You can compare the R to several benchmarks. For example, you can compare R to historical returns, returns typical of the industry in which the company is investing, or annual Incremental Returns on Capital (IRC).
- It's expressed as a percent. Most analysts and managers prefer percents (e.g. IRR, ROIC) over numbers (e.g. NPV dollar amounts, EVA dollars).
- You can use this tool to help pick a target price. You would repeat the 3 steps:
 - 1) Calculate the CAP is implied by your target price.
 - 2) Use your Investment forecast along with this CAP to calculate $\Sigma PV(\text{Investment})$
 - 3) Calculate the R needed to equate $\Sigma PV(\text{NOPAT})$ with $\Sigma PV(\text{Investment})$

Then, assess the reasonableness of the new R.

G. ROIC spread and Enterprise Value to Invested Capital



- ROIC - WACC spread better explains EV/IC than EPS or cash flow growth
- consistently true across industries and across time
- watch the y - intercepts and slope

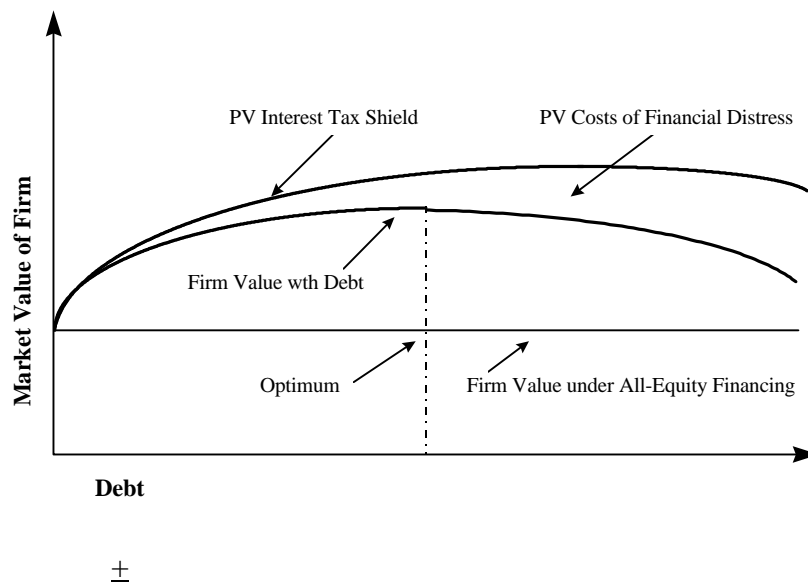
III. Capital Structure Considerations

- market adjusted equity versus book equity
- maximize debt levels while maintaining financial flexibility

- analyze debt levels versus peer group

Theories of Capital Structure

A. Static Model



- common sense—tax shield increases value
- correctly predicts that asset rich companies borrow more than “growth” and asset poor companies
- debt \uparrow good, debt \downarrow bad
- so many companies don’t have optimal capital structures
- within industry, most profitable companies borrow less, least profitable borrow most

E.G. Packaged Food

	<u>ROIC</u>		<u>ROIC</u>
GEB	23.4%	CAG	13.2%
K	21.8%	BN	11.0%
CPB	18.9%	MSTR	6.0%

B. Pecking Order Theory

Assumptions: 1. dividend policy is sticky

2. firms prefer internal to external financing; they seek external if necessary for NPV positive projects.
3. if they need external capital; they issue safest security first
4. as firm seeks more external financing; works down pecking order

- | | |
|---|--|
| \pm | $=$ |
| <ul style="list-style-type: none"> • intra-industry debt levels explained • debt increases, equity increase explained | <ul style="list-style-type: none"> • why issue equity if could issue debt |

C. Organizational Theory

PV Asset, Pretax	PVA	Existing Debt	D
PV Growth, Pretax	PVGO	Employee's surplus	S
<u>PT Taxes</u>	<u>PVTAX</u>	<u>Existing equity</u> E	
After-tax value	V	After-tax value	V

$$W = S + E$$

Corporate Wealth = Employee's surplus + Equity

S = PV perks, overstaffing, above market wages

= "junior financial claim"

- managers with limited share holdings maximize W, not E

if you add debt, or repurchase shares
as "junior claim" S ↓

IV. Mergers and Acquisitions

1. Empirical facts/thoughts

- roughly 2/3 of all deals are value destroying for acquiring company
- main driver of “wealth transfer” is the premium paid
- value created = PV synergies — premium paid
- pooling versus purchase

2. Wall Street

- tends to focus on EPS accretion/dilution
- focus on strategic fit
- incorrect association between the project and funding source
- strategic fit at what cost?
- the market generally gets it

3. Proper Analysis of M&A

A. value acquiring company

- overvalued/undervalued/fair value
- could affect funding options

B. value target company without synergies

- understand expectations already embedded in the share price
- overvalued/undervalued/fair value

C. identify synergies

- operating: sales, margins, capital needs
- financial: taxes, cost of capital
- human: management

D. value synergies

- embed synergies into model from section B
- understand necessary performance to create value

E. shareholder value at risk (SVAR)

- degree to which company is “betting the firm”
- very different for stock-for-stock versus cash deals
- cash = premium paid (\$) / equity value of acquirer
- stock = premium paid (\$) / combined equity value of acquirer and target

F. the quick analysis

- calculate SVAR
- identify synergy (management credibility)
- value synergy (capitalize at WACC)
- estimate value changes

G. pitfalls

- linking financing source with deal
- overvaluing synergies
- the “winner’s curse”
- management incentives

V. Employee Stock Options

1. Why they are relevant

- Agency costs
- Recruiting/retaining employees
- Liquidity
- New economy

2. Accounting versus Economics

- Diluted shares only count “in-the-money”
- No reckoning for “out-of-the-money” or time value

3. Valuation

- Already granted options as an economic liability
 - Black Scholes adjusted for
 - Churn
 - Taxes
 - ESO’s are warrants
- Future grants as an “expense”
 - Arbitrage between grant value and cash value
 - FASB 123 offers guidelines on grant values
 - Imbed in DCF

4. Signals

- Managers price ahead of good news
- Managers reprice at the bottom
- Disclosure prohibits exploitation

5. Indexed ESO

- Variable, not fixed
- 2x options can be granted
- accounting versus equity compensation

VI. Real options

1. Defined

- Application of financial options theory for real world investments
- Black-Scholes
- Drivers of the model are analogous

2. Advantages versus NPV

- Flexibility
- Contingency

- Volatility
3. When is options thinking applicable?
 - Smart managers
 - Market-leading businesses
 - Uncertain markets
 4. Valuation with real options
 - Add base business and real options
 - Impute real option value

Class V

I. Introduction

II. Summary of First 4 Sessions and Today

1. Markets are sophisticated and relatively well functioning

2. Develop a model that translated performance of business into an economically correct set of expectations

3. Today most important facet of security analysis — strategy assessment
 - This analysis will allow us to develop forecasts, or expectations, or value drivers

III. Two Additional Points on DCF

1. Applications under varied circumstances
 - A. straight forward (e.g., food, beverage, household) — no problem
 - B. cyclical
 - measure ROIC vs. WACC over cycle — watch swings
 - consider returns on capital investment on margin
 - still stock price versus expectations
 - market compensates
 - 1) higher discount rate
 - 2) shorter CAP
 - C. startup/emerging
 - still valid
 - options pricing more reflective

2. Sensitivity Analysis
 - run alternative scenarios
 - probability weight

IV. Strategy Assessment (The Mental Models)

- Porter framework
- New Economy
- Game Theory

Competitive Advantage Competitive advantage exists when a company's sales are greater than costs, including the opportunity cost of capital. One measure of such returns is a positive ROIC-WACC spread. It should be stressed that competitive advantage is not qualitative judgement but rather a quantitative issue. By definition, a business with a competitive advantage either earns, or promises to earn, returns on capital in excess of the cost of capital.

Furthermore, competitive advantage must be viewed in absolute, not relative terms. A business that earns higher returns than its peers do, but does not earn its cost of capital, can be said to have a comparative advantage, not a competitive advantage.

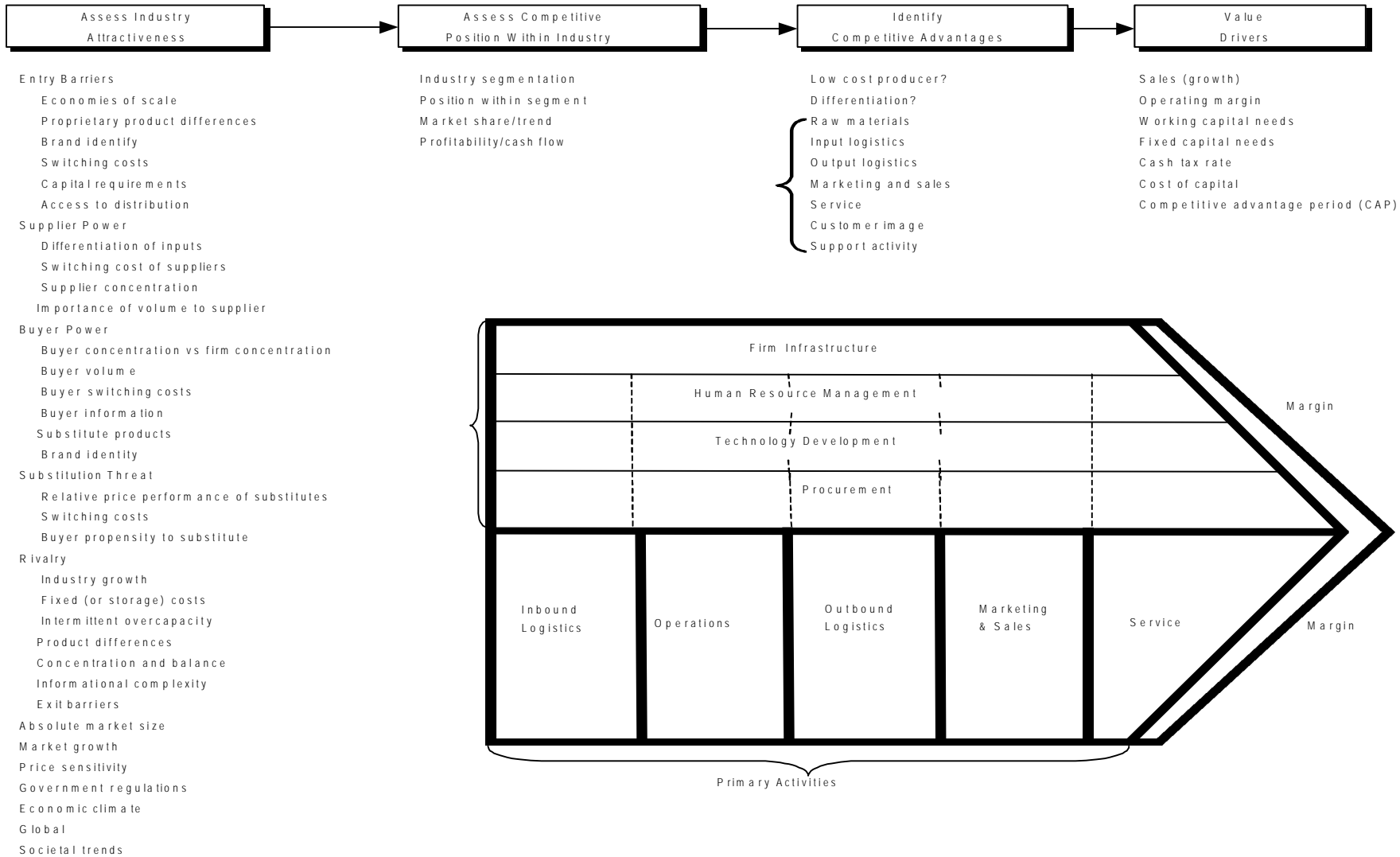
Strategy A successful strategy is one that allows a company to capture a competitive advantage. Porter defines strategy as "the creation of a unique and valuable position, involving a different set of activities." He stresses that operational effectiveness represents excellence in individual activities while strategy is the appropriate combination of activities.

Strategic positions come in a number of forms. A variety-based position is when a company produces a subset of industry's products or services. When a company serves the needs of a particular group of customers, it is pursuing a needs-based position. Finally, an access-based position relies on segmentation of customers by access channel.

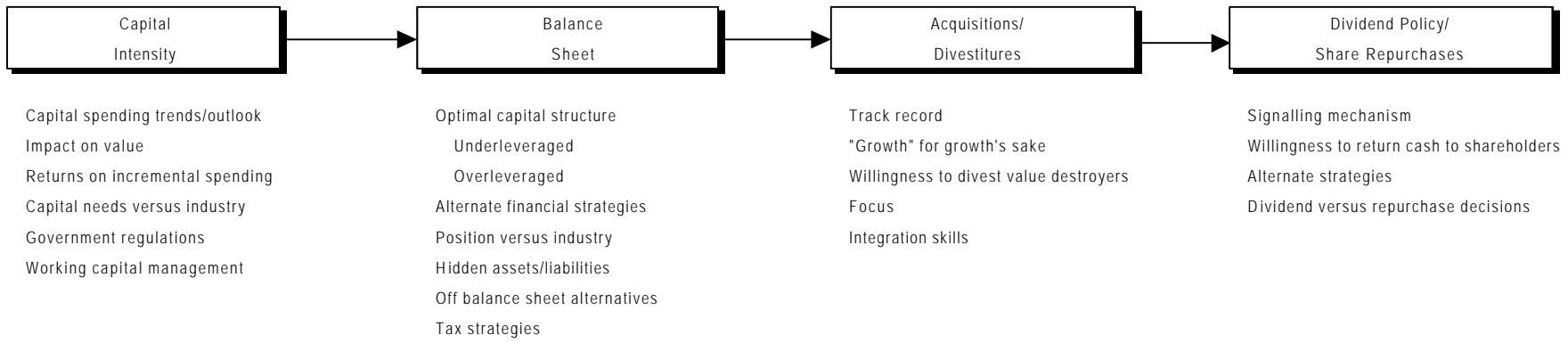
Porter argues that strategic positions are not sustainable unless clear trade-offs are made with other positions. Trade-offs are necessary because of potential inconsistencies in image, the difficulty of executing within multiple positions, and limits on management resources.

V. Assessment Pages

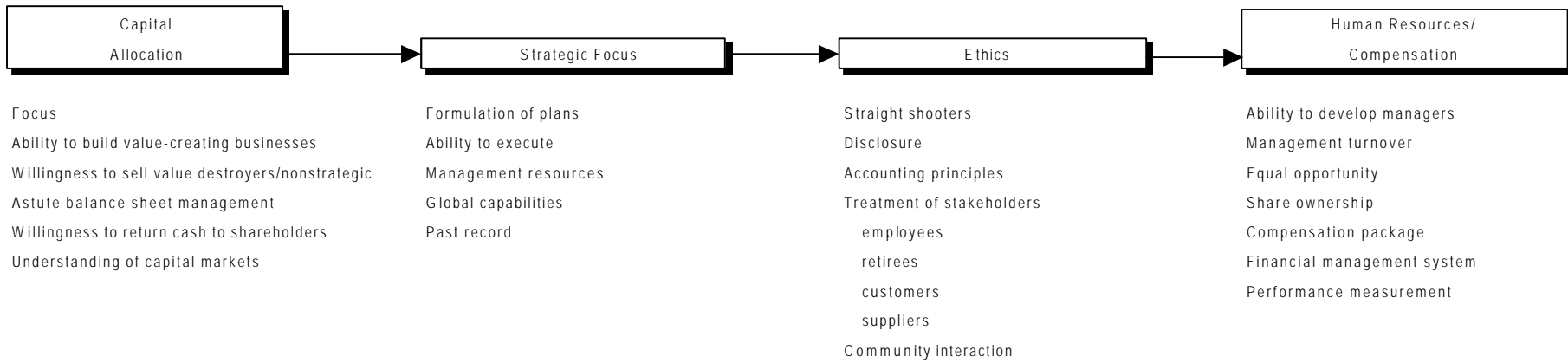
Operating Assessment



Financial Assessment



Management Assessment



Time Allocation

Slow-cycle

Characteristics

Relative stable value chains
Competitive advantage not directly related to economies of scale

Examples

Telephone
Utilities

Value driver characteristics

Long competitive advantage periods
Predictable cash flows
Valuation key

Medium-cycle

Characteristics

Evolving value chains
Productivity key to competitive advantage

Examples

Food
Beverage
Chemicals
Cosmetics/Household products
Autos
Packaging

Value driver characteristics

Varied and dynamic CAPs
Varied and dynamic cash flows
Valuation important

Fast-cycle

Characteristics

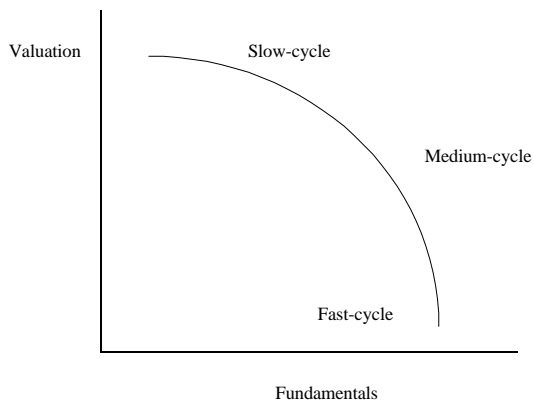
High value chain instability

Examples

Biotechnology
Computers
Entertainment
Semiconductors
Airlines
Entertainment

Value driver characteristics

Short competitive advantage periods
Fundamentals critical
Valuation not important



V. New Economy Strategy

1. What's "New" about the New Economy?

- Networks more prominent
- Trumping tradeoffs
- Economics of physical capital versus intellectual capital

2. Network economics

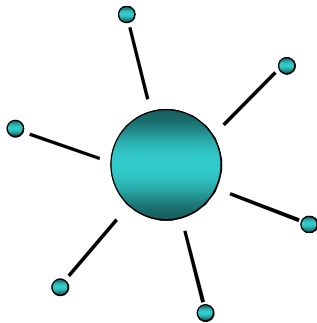
Old Economy

- Old economy has economics of scale
- Supply-side driven
- Positive feedback dissipates as dominance is approached

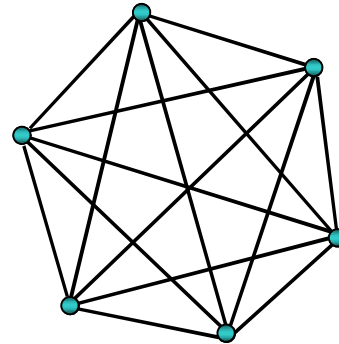
New Economy

- Network effects
- Demand-side driven
- Positive feedback strengthen with dominance

Radial

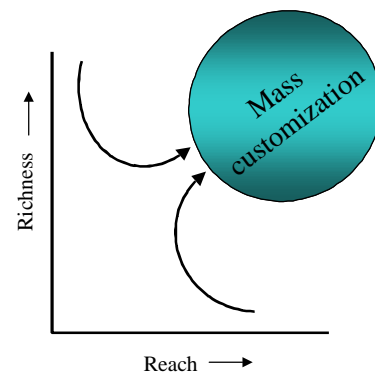
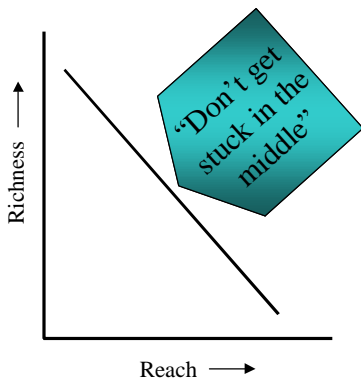


Interactive



"Of networks there shall be few." — Arthur's Law

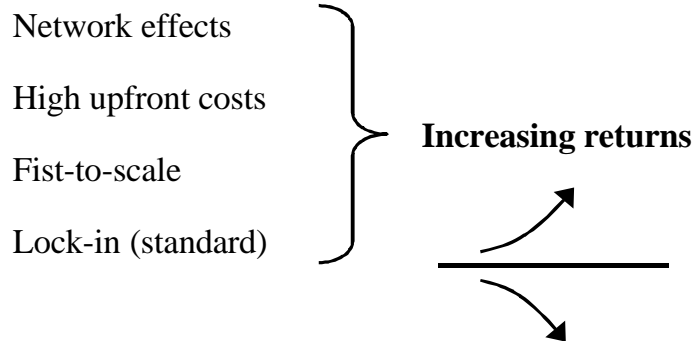
3. Trumping trade-offs



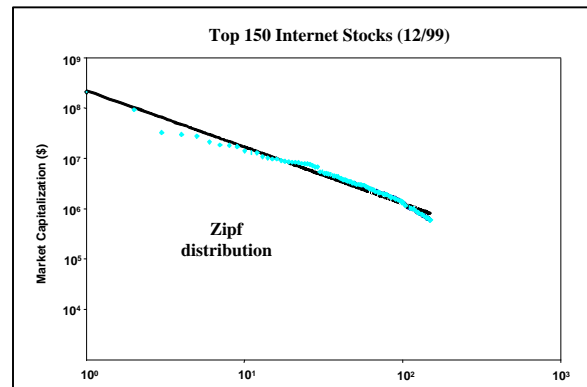
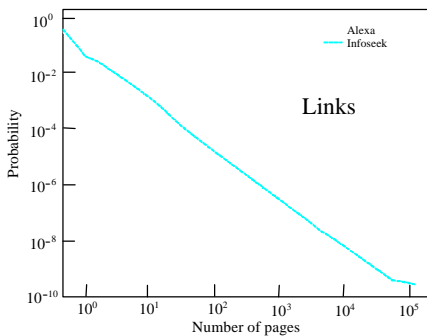
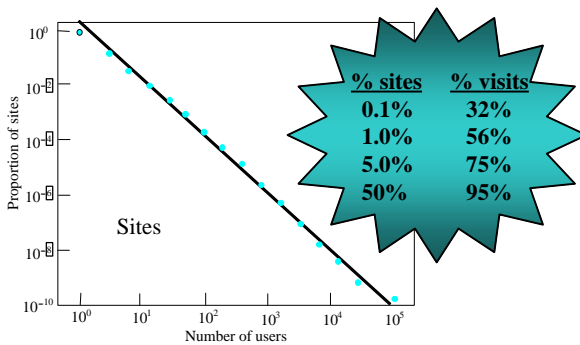
4. Economics: atoms versus bits

Atoms	Bits
◆ Rival good	◆ Non-rival good
◆ Easy to protect	◆ Hard to protect
◆ Spread costs	◆ Upfront costs
◆ Limited scalability	◆ High scalability

5. Increasing returns



6. Topology of the internet



7. What to look for

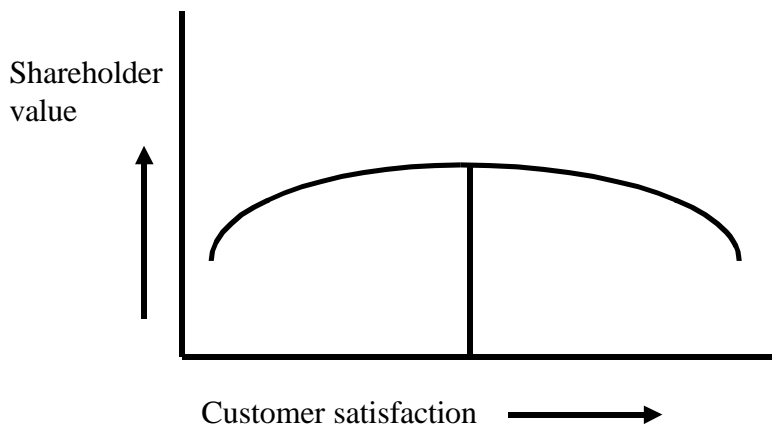
- Heavily discount – or give away – new products
- Link and leverage
- Understand the power of the web
- Think adaptation, not optimization

VII. Game theory

- A. can't make decisions in a void
 - always weigh competitive response
- B. aim for "cooperation"
 - tit-for-tat wins an iterated prisoner's dilemma
 - be aware of the risk of sparking defection
- C. competitors are sometimes hard to define
 - a challenger may reinforce your business
 - "co-opetition"

VIII. Strategic issues

Distinguish between delivering value to consumer/customer and delivering value to shareholders

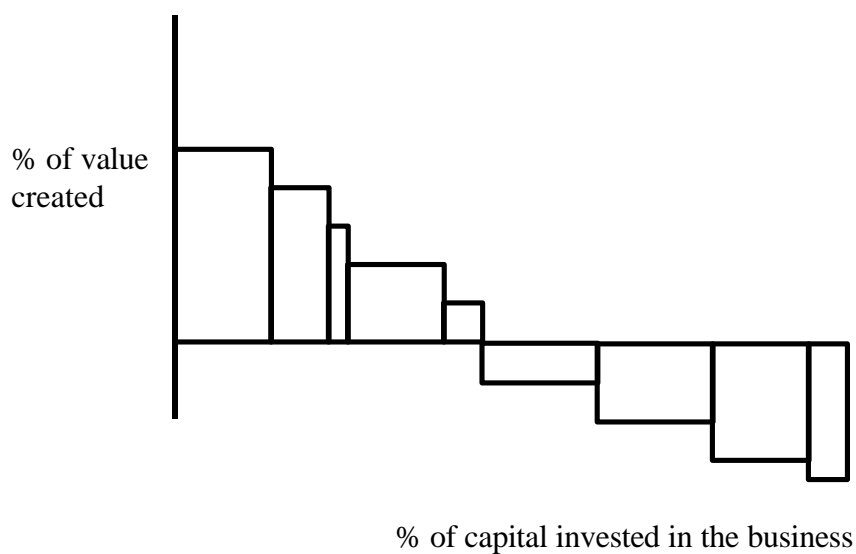


IX. Resource Allocation

If you do not understand where capital has gone and at what return it has been greeted, you do not understand the company.

Four key ideas:

1. Zero-based resource allocation



2. Fund strategies, not projects

3. Capital rationing

4. Zero tolerance for bad growth

XI. Buffett Tenets

A. Business Tenets

- consistent operating history
- favorable long-term prospects
- rationality in industry
- candor in management
- avoidance of the “institutional imperative”

B. Financial Tenets

- high return on equity that is sustainable (with low debt, ROE nearly equals ROIC)
- owner earnings (with low debt nearly equals free cash flow)
- attractive margins (learned from Phil Fisher)
- one dollar premise (basically market value added)

C. Market Tenets

- determine value (John Burr Williams)
- buy only with a margin of safety

XII. Due Diligence

Very important to securities analysis, but value varies significantly among industries

Due diligence is more intensive with:

- Businesses that have changing models
- Smaller companies
- Less visible companies
- One product companies

What do you do?

- Act as a detective
- Who uses the product or service?
- Who supplies raw materials?
- Who distributes the product/service?
- Verify claims — the vast majority of what you hear is true; what’s not true is what’s important

Class VI

I. Introduction

- questions from class 5
- current events
- review presentation skills

II. Role of decision making theory/psychology in investing

Course Pillars

1. capital markets — independence/non-independence of errors
 2. valuation — optimism/pessimism
 3. strategy — company decisions/capital allocation
 4. decision making theory permeates all areas
- not a “soft” issue — as important to understand as finance and strategy

A. Group level

- non-independence of errors

- cumulative impact of information

B. Individual level

1. Humans are not “hard wired” to invest

- “In terms of biological design for the basic neural circuitry of emotion, what we are born with is what worked best for the last 50,000 human generations, not the last 500 generations — and certainly not the last five. The slow, deliberate forces of evolution that have shaped our emotions have done their work over the course of a million years; the last 10,000 years — despite having witnessed the rapid rise of human civilization and the explosion of the human population from five million to five billion — have left little imprint on our biological templates for emotional life.”

Daniel Goleman, *Emotional Intelligence*

2. Time Line of *Homo Sapiens*

EVENT	WHEN	TIME OF DAY
Homo Sapien appears	2,000,000 years ago	12:00 am
Mother of all humans “Mitochondrial Eve”	180,000 years ago	9:50 pm
Domesticated homo sapien	20,000 years ago	11:46 pm
Arabic number system allows math to be done	800 years ago	11:59:25 pm
Modern Finance Theory	40 years ago	11:59:58 pm

3. There are 4 types of “intuitive knowledge”

- Language
- Psychology
 - Understanding other people’s mental state
- Biology
 - Living versus inanimate objects
 - Horse in striped pajamas \neq zebra
- Physics
 - Physical objects have different set of rules than mental concepts
 - Solidity, gravity, inertia are hard wired

4. Emotional baggage/foibles

- humans love to be part of the group — its comforting, safe and offers confirmation
- we love a story — the brain will actually make up causes for a given affect (LeDoux)
- escalation of commitment — “once committed to a course of action, executives often allocate resources in ways that justify their previous choice, whether or not they now appear valid.”
- humans are influenced by how information is presented

- Robert Cialdini — Influence: The Power of Persuasion
 - ⇒ commitment and consistency
 - ⇒ social proof
 - ⇒ scarcity
 - ⇒ reciprocity
 - ⇒ authority
 - ⇒ liking

5. Heuristics and associated biases

- humans operate inductively, not deductively
- it's a complicated world — we need short-hands, rules of thumb, to determine behavior
- these rules of thumb, formally called heuristics, lead to biases that can undermine the quality of decisions

Three general heuristics:

1. **Availability** Individuals assess the frequency, probability or likely causes of an event by the degree to which its instances or occurrences are readily available in memory.
2. **Representativeness** Individuals assess the likelihood of an event's occurrence by the similarity of the occurrence to their stereotypes of similar occurrences.
3. **Anchoring and Adjustment** Individuals make assessments by starting from an initial value and adjusting it to yield a final decision.

Biases from Heuristics

1. Availability

ease of recall — individuals judge events that are more easily recalled from memory, based on vividness or recency, to be more numerous than events of equal frequency whose instances are less easily recalled.

retrievability — individuals are biased in their assessments of the frequency of events based on how their memory structures affect the search process

2. Representativeness

regression to the mean — individuals tend to ignore the fact that extreme events tend to regress to the mean in subsequent trials

insensitivity to sample size — individuals frequently fail to appreciate the role of the sample size in assessing the reliability of sample information

3. Anchoring and Adjustment

insufficient anchor adjustment — individuals make estimates for values based upon the initial value and typically make insufficient adjustments from this “anchor” when establishing a final value

overconfidence — individuals tend to be over confident of the infallibility of their judgments when answering moderately to extremely difficult questions

“need based illusions”

- superiority
- optimism — underestimate probability of a bad outcome
- control — believe they control outcomes

Other Biases

the confirmation trap — individuals tend to seek confirming information for what they think is true and neglect the search for disconfirmatory evidence

hindsight and the curse of knowledge — after finding out whether or not an event occurred, individuals tend to overestimate the degree to which they would have predicted the correct outcome

endowment effect — people value what they possess higher than an object of equal value that they don't possess

winner's curse — demonstration

- anchor/consistency
- winner “wins” prize, gets a bad deal
- plot distribution

Class VII

I. Introduction

II. Final Thoughts/Course Wrap-up (What I hope you gained from the course)

A. Readings and lecture notes with an extended shelf life

- review the reading and notes periodically, they will make more sense each time

B. Course Framework

1. Capital Markets

- acknowledge the role of luck in the money management/stock picking process
- understand the role of independent errors (jelly bean, academy awards)
- understand the established record of money managers
 - ⇒ 75% underperform after costs and fees
- focus on the right drivers, emphasizing clarity of thought
 - ⇒ *don't* get fooled by the business press and faulty causality
- understand that the final chapter has *not* been written in finance theory
 - ⇒ what you have learned at CBS regarding efficiency, risk may be superseded by complex adaptive system
 - ⇒ complex adaptive system framework is already a better *descriptive* model
 - ⇒ complex adaptive system change has not been led by economists

2. Valuation

- valuation in and of itself *cannot* be a competitive advantage
 - ⇒ you can't "out value" the world
 - ⇒ valuation is a key part of the process, but the journey is more important than the destination
 - ⇒ its important to get valuation right, but its not as important as developing a "variant perception"
- we reviewed different valuation techniques and found that the DCF best sorted out the sources of value creation
 - ⇒ P/E's and cash flow multiples are *not* valuation methods, they are shorthands for valuation
 - ⇒ investors that use P/E's aren't dummies, investors that use DCF aren't geniuses; recognize that people use P/E as a heuristic, based on (useful or arbitrary) accumulated experience

- valuation is a great tool for understanding expectations
 - ⇒ understand the consensus view
 - ⇒ understand your view
 - ⇒ determine, with independent thinking, whether or not these views differ
- “margin of safety” means you have a different view and that the probability of you being right is high
 - ⇒ there is always the risk you are wrong
 - ⇒ you want the odds in your favor (think of a gambling analogy)

3. Strategy Assessment

- the most critical element of security analysis, period
- understand the business proposition (what does this one company *do*?)
 - ⇒ understand ROIC of operations
 - ⇒ understand opportunities to grow
- industry structure/competitive position/competitive advantage
 - ⇒ flesh out each element of the process
- critically evaluate management
 - ⇒ do they have a strategy?
 - ⇒ can they execute the strategy?
 - ⇒ how are their capital allocation skills?

4. Decision making theory/psychology

- our cognitive makeup is not geared toward investing - this is a truism
- understand the shortcomings *we all share* to some degree
 - ⇒ irrationally escalating commitments
 - ⇒ consistency versus correctness
 - ⇒ overconfidence in attaining outcomes
 - ⇒ relying too much on readily available information
 - ⇒ anchoring your judgments
- focus on minimizing your errors

C. Professionals

D. Presentations

E. Thank you!

Jar Auction

1. Guess how much money is contained in the jar.

2. Make a bid for the amount in the jar.
