Danger and Opportunity:
Risk: What is it, how do we measure it and what do we do about it?

Aswath Damodaran

Risk is ubiquitous… and has always been around

- Risk has always been part of human existence. In our earliest days, the primary risks were physical and were correlated with material reward.
- With the advent of shipping and trade, we began to see a separation between physical risk and economic rewards. While seamen still saw their rewards linked to exposure to physical risk – scurvy, pirates and storms – wealthy merchants bet their money on ships returning home with bounty.
- With the advent of financial markets and the growth of the leisure business, we have seen an even bigger separation between physical and economic risks.

Agenda

- What is risk?
- Why do we care about risk?
- How do we measure risk?
- How do we deal with risk in analysis?
- How should we manage risk?

I. What is risk?

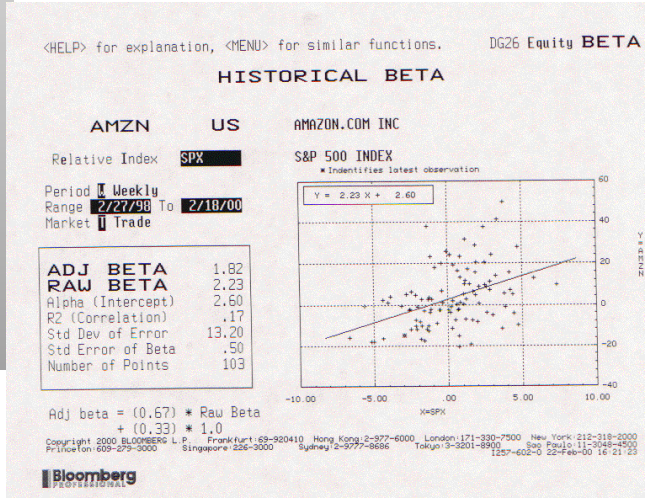
The slippery response… play with words..

- In 1921, Frank Knight distinguished between risk and uncertainty by arguing if uncertainty could be quantified, it should be treated as risk. If not, it should be considered uncertainty.
- As an illustration, he contrasted two individuals drawing from an urn of red and black balls; the first individual is ignorant of the numbers of each color whereas the second individual is aware that there are three red balls for each black ball. The first one, he argued, is faced with uncertainty, whereas the second one is faced with risk.
- The emphasis on whether uncertainty is subjective or objective seems to us misplaced. It is true that risk that is measurable is easier to insure but we do care about all uncertainty, whether measurable or not.

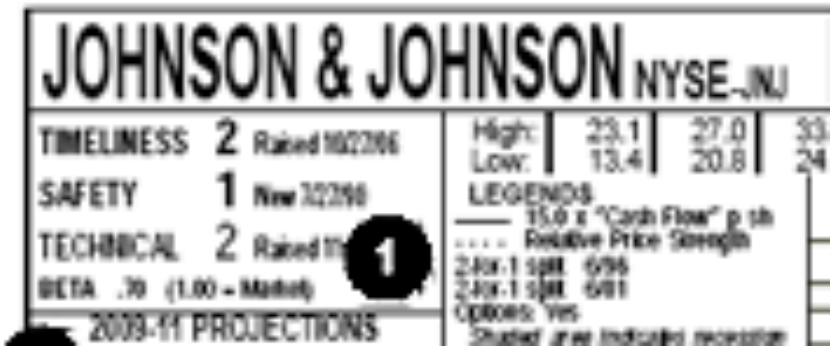
More risk semantics…

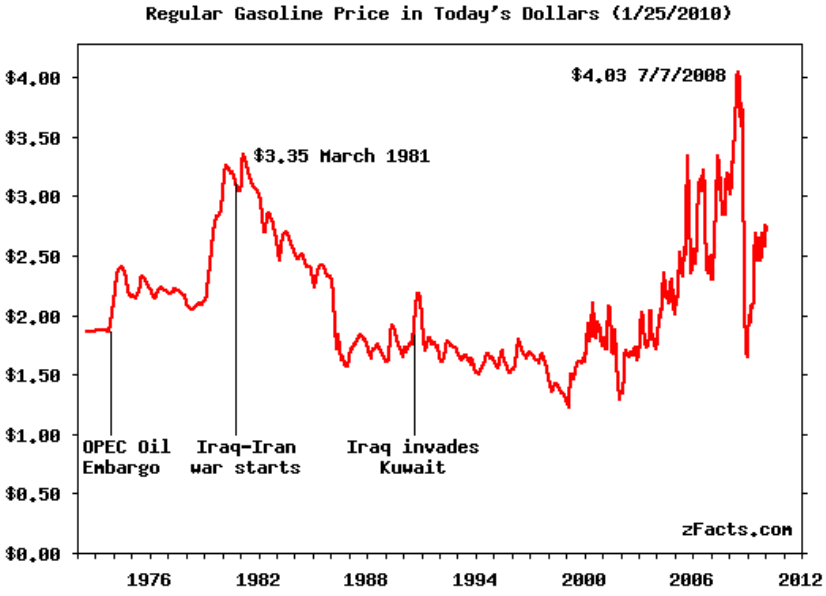
- Risk versus Probability: While some definitions of risk focus only on the probability of an event occurring, more comprehensive definitions incorporate both the probability of the event occurring and the consequences of the event.
- Risk versus Threat: A threat is a low probability event with very large negative consequences, where analysts may be unable to assess the probability. A risk, on the other hand, is defined to be a higher probability event, where there is enough information to make assessments of both the probability and the consequences.
- All outcomes versus Negative outcomes: Some definitions of risk tend to focus only on the downside scenarios, whereas others are more expansive and consider all variability as risk.

Or hiding behind numbers…



Call Detail				Put Detail		
Symbol	Price	Implied Volatility	Strike	Implied Volatility	Price	Symbol
.NQBQ	4.00	64%	**16**	45%	$0.02	.NQNQ
.NQBS	2.94	43%	**17**	38%	$0.04	.NQNS
.NQBR	1.95	31%	**18**	33%	$0.09	.NQNR
.NQBT	1.05	25%	**19**	30%	$0.25	.NQNT
.NQBD	0.44	25%	**20**	29%	$0.65	.NQND
.NQBU	0.15	26%	**21**	32%	$1.36	.NQNU
.NQBB	0.05	28%	**22**	38%	$2.27	.NQNB
.NQBE	0.02	31%	**23**	47%	$3.25	.NQNE
.NQBF	0.00	31%	**24**	54%	$4.22	.NQNF



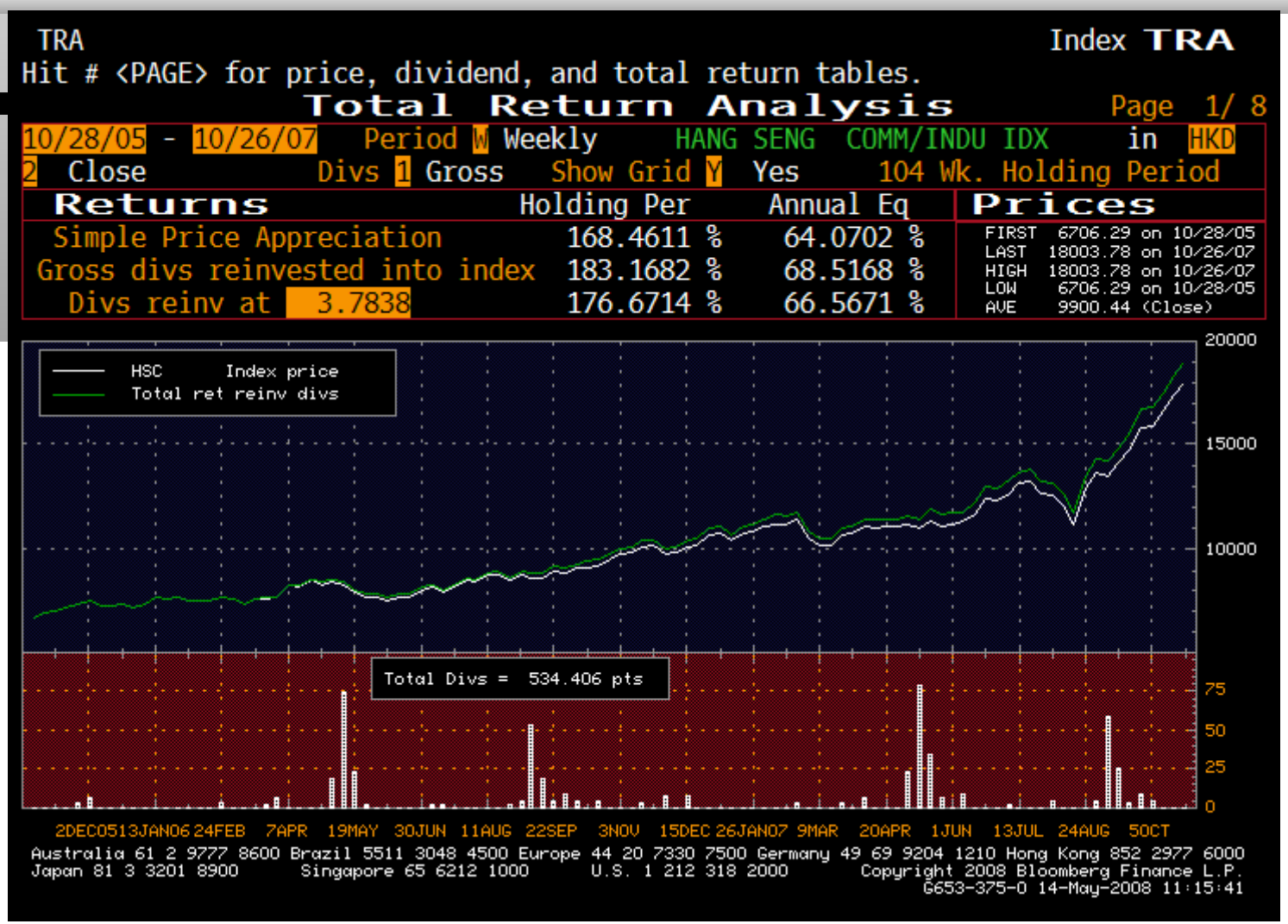


Here is a good definition of risk…

- Risk, in traditional terms, is viewed as a 'negative'. Webster's dictionary, for instance, defines risk as "exposing to danger or hazard". The Chinese symbols for risk, reproduced below, give a much better description of risk

- The first symbol is the symbol for "danger", while the second is the symbol for "opportunity", making risk a mix of danger and opportunity.

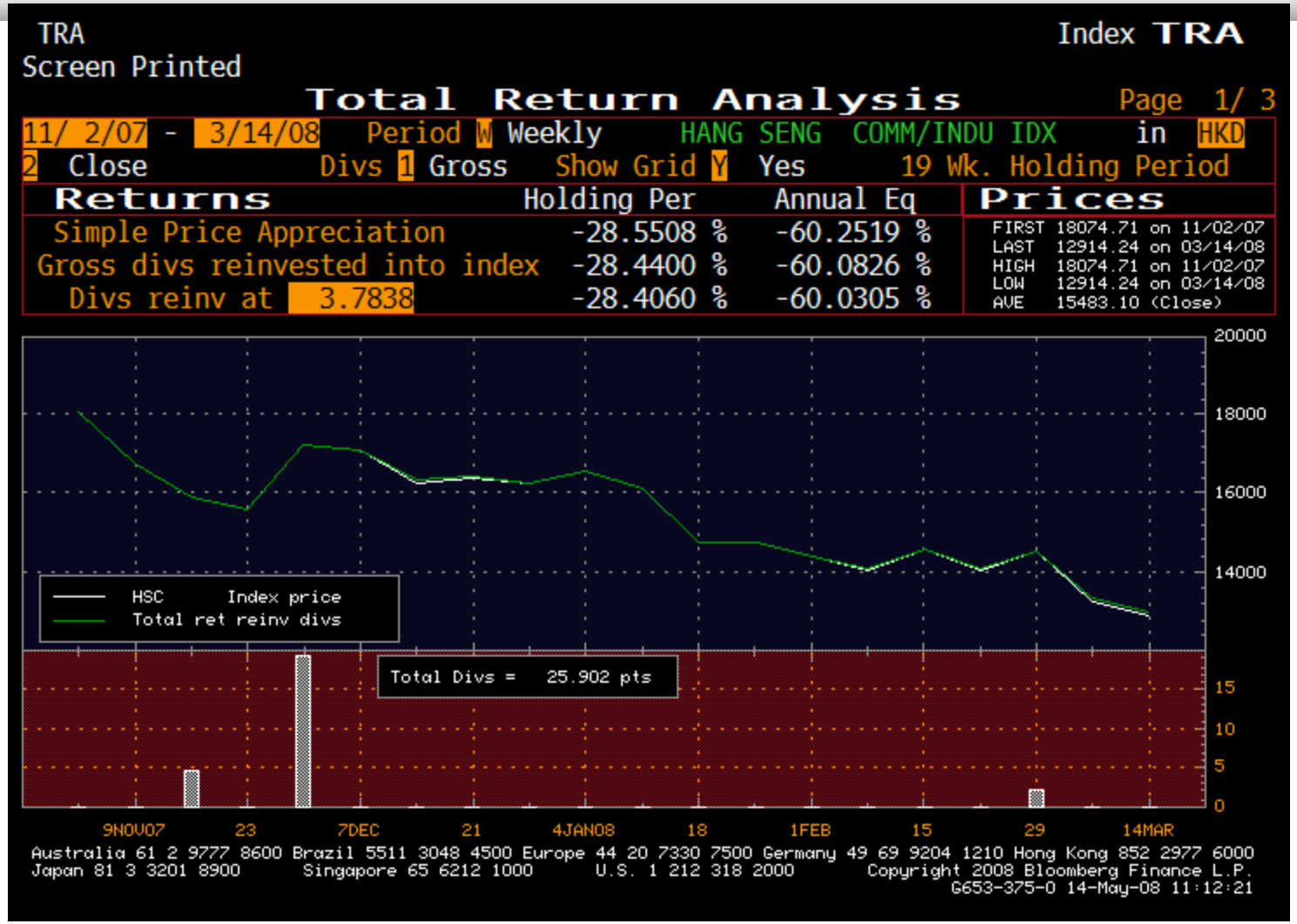
Lesson 1: Where there is upside..



Stories abound about why the party will not end…

- When a market is booming, there are beneficiaries from the boom whose best interest require that the boom continue.
- When the price rise becomes unsustainable or unexplainable using current metrics, there will be many who try to explain it away using one of three tactics:
  - Distraction: Telling a big story that may be true at its essence but that cannot be connected to prices.
  - "The paradigm shift": Arguing that the rules have changed and don't apply any more.

But there is always a downside…



Followed by ex-post rationalization…

- The same analysts who talked about paradigm shifts and used the big story now are perfectly sanguine about explaining why the correction had to happen.
- The defenses/ rationalizations vary but can be categorized into the following:
  1. Don't blame me. Everyone else messed up too.
  2. This is what I thought would happen all along. I just never got around to saying it.
  3. Distraction: Spin another big story to counter the previous one.

Lesson 2: Risk management ≠ Risk hedging..

- For too long, we have ceded the definition and terms of risk management to risk hedgers, who see the purpose of risk management as removing or reducing risk exposures. This has happened because
  - the bulk of risk management product, which are revenue generators, are risk hedging products, be they insurance, derivatives or swaps.
  - it is human nature to remember losses (the downside of risk) more than profits (the upside of risk); we are easy prey, especially after disasters, calamities and market meltdowns for purveyors of risk hedging products.
  - the separation of management from ownership in most publicly traded firms creates a potential conflict of interest between what is good for the business (and its stockholders) and for the managers. Managers may want to protect their jobs by insuring against risks, even though stockholders may gain little from the hedging.
- Risk management, defined correctly, has to look at both the downside of risk and the upside. It cannot just be about hedging risk.

Why do we care about risk and how does it affect us?

Let's start with a simple experiment

- I will flip a coin once and will pay you a dollar if the coin came up tails on the first flip; the experiment will stop if it came up heads.
- If you win the dollar on the first flip, though, you will be offered a second flip where you could double your winnings if the coin came up tails again.
- The game will thus continue, with the prize doubling at each stage, until you come up heads.

How much would you be willing to pay to partake in this gamble?

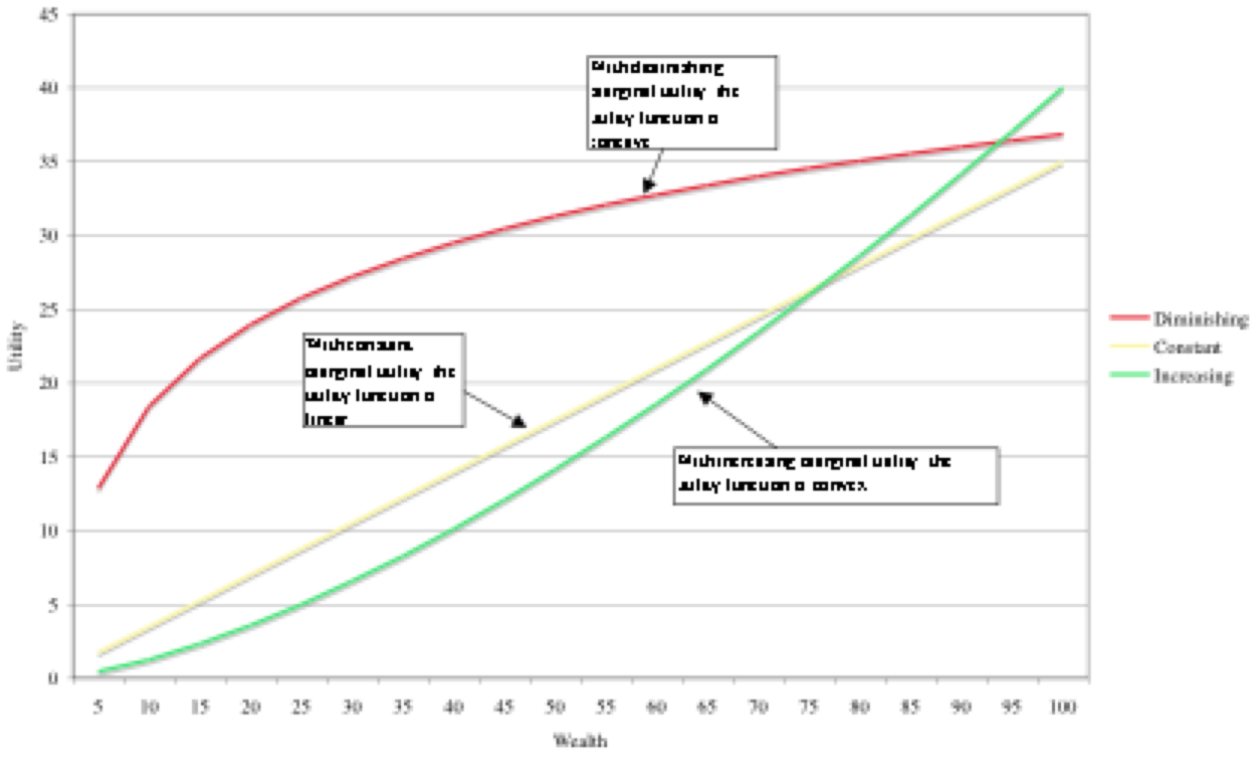
a) Nothing
b) <$2
c) $2-$4
d) $4-$6
e) >$6

The Bernoulli Experiment and the St. Petersburg Paradox

- This was the experiment run by Nicholas Bernoulli in the 1700s. While the expected value of this series of outcomes is infinite, he found that individuals paid, on average, about $2 to play the game.
- He also noticed two other phenomena:
  - First, he noted that the value attached to this gamble would vary across individuals, with some individuals willing to pay more than others, with the difference a function of their risk aversion.
  - His second was that the utility from gaining an additional dollar would decrease with wealth; he argued that "one thousand ducats is more significant to a pauper than to a rich man though both gain the same amount".

The Marginal Utility of Wealth and Risk Aversion

Figure 2.1: Utility and Wealth



The Von-Neumann Morgenstern Construct..

- Rather than think in terms of what it would make an individual to take a specific gamble, they presented the individual with multiple gambles or lotteries with the intention of making him choose between them.
- They based their arguments on five axioms
  1. Comparability or completeness, Alternative gambles be comparable and that individuals be able to specify their preferences for each one
  2. Transitivity: If you prefer A to B and B to C, you prefer A to C.
  3. Independence: Outcomes in each lottery or gamble are independent of each other.
  4. Measurability: The probability of different outcomes within each gamble be measurable with a number.
  5. Ranking axiom, If an individual ranks outcomes B and C between A and D, the probabilities that would yield gambles on which he would indifferent have to be consistent with the rankings.

And the consequences..

- What these axioms allowed Von Neumann and Morgenstern to do was to derive expected utility functions for gambles that were linear functions of the probabilities of the expected utility of the individual outcomes. In short, the expected utility of a gamble with outcomes of $ 10 and $ 100 with equal probabilities can be written as follows:

  $$E(U) = 0.5\ U(10) + 0.5\ U(100)$$

- Extending this approach, we can estimate the expected utility of any gamble, as long as we can specify the potential outcomes and the probabilities of each one.
- Everything we do in conventional economics/finance follows the Von Neumann-Morgenstern construct.

Measuring Risk Aversion

a. Certainty Equivalents: In technical terms, the price that an individual is willing to pay for a bet where there is uncertainty and an expected value is called the certainty equivalent value. The difference between the expected value and your certainty equivalent is a measure of risk aversion.

b. Risk Aversion coefficients: If we can specify the relationship between utility and wealth in a function, the risk aversion coefficient measures how much utility we gain (or lose) as we add (or subtract) from our wealth.

Evidence on risk aversion

I. Experimental studies: We can run controlled experiments, offering subjects choices between gambles and see how they choose.

II. Surveys: In contrast to experiments, where relatively few subjects are observed in a controlled environment, survey approaches look at actual behavior – portfolio choices and insurance decisions, for instance- across large samples.

III. Pricing of risky assets: The financial markets represent experiments in progress, with millions of subjects expressing their risk preferences by how they price risky assets.

IV. Game shows, Race tracks and Gambling: Over the last few decades, the data from gambling events has been examined closely by economists, trying to understand how individuals behave when confronted with risky choices.

a. Experimental Studies: We are risk averse, but there are differences across people

- Male versus Female: Women, in general, are more risk averse than men. However, while men may be less risk averse than women with small bets, they are as risk averse, if not more, for larger, more consequential bets.
- Naïve versus Experienced: A study compared bids from naïve students and construction industry experts for an asset and found that while the winner's curse was prevalent with both, students were more risk averse than the experts.
- Young versus Old: Risk aversion increases as we age. In experiments, older people tend to be more risk averse than younger subjects, though the increase in risk aversion is greater among women than men. In a related finding, single individuals were less risk averse than married individuals, though having more children did not seem to increase risk aversion.
- Racial and Cultural Differences: The experiments that we have reported on have spanned the globe from rural farmers in India to college students in the United States. The conclusion, though, is that human beings have a lot more in common when it comes to risk aversion than they have as differences

With some strange quirks…

I. Framing: Would you rather save 200 out of 600 people or accept a one-third probability that everyone will be saved? While the two statements may be mathematically equivalent, most people choose the first.

II. Loss Aversion: Would you rather take $ 750 or a 75% chance of winning $1000? Would you rather lose $750 guaranteed or a 75% chance of losing $ 1000?

III. Myopic loss aversion: Getting more frequent feedback on where they stand makes individuals more risk averse.

IV. House Money Effect: Individuals are more willing to takes risk with found money (i.e. money obtained easily) than with earned money.

V. The Breakeven Effect: Subjects in experiments who have lost money seem willing to gamble on lotteries (that standing alone would be viewed as unattractive) that offer them a chance to break even.

b. Surveys: The tools…

- Investment Choices: By looking at the proportion of wealth invested in risky assets and relating this to other observable characteristics including level of wealth, researchers have attempted to back out the risk aversion of individuals. Studies using this approach find evidence that wealthier people invest smaller proportions of their wealth in risky assets (declining relative risk aversion) than poorer people.
- Questionnaires: In this approach, participants in the survey are asked to answer a series of questions about the willingness to take risk. The answers are used to assess risk attitudes and measure risk aversion..
- Insurance Decisions: Individuals buy insurance coverage because they are risk averse. A few studies have focused on insurance premia and coverage purchased by individuals to get a sense of how risk averse they are.

And the findings..

- Individuals are risk averse, though the studies differ on what they find about relative risk aversion as wealth increases.
- Surveys find that women are more risk averse than men, even after controlling for differences in age, income and education.
- The lifecycle risk aversion hypothesis posits that risk aversion should increase with age, but surveys cannot directly test this proposition, since it would require testing the same person at different ages. In weak support of this hypothesis, surveys find that older people are, in fact, more risk averse than younger people because they tend to invest less of their wealth in riskier assets.

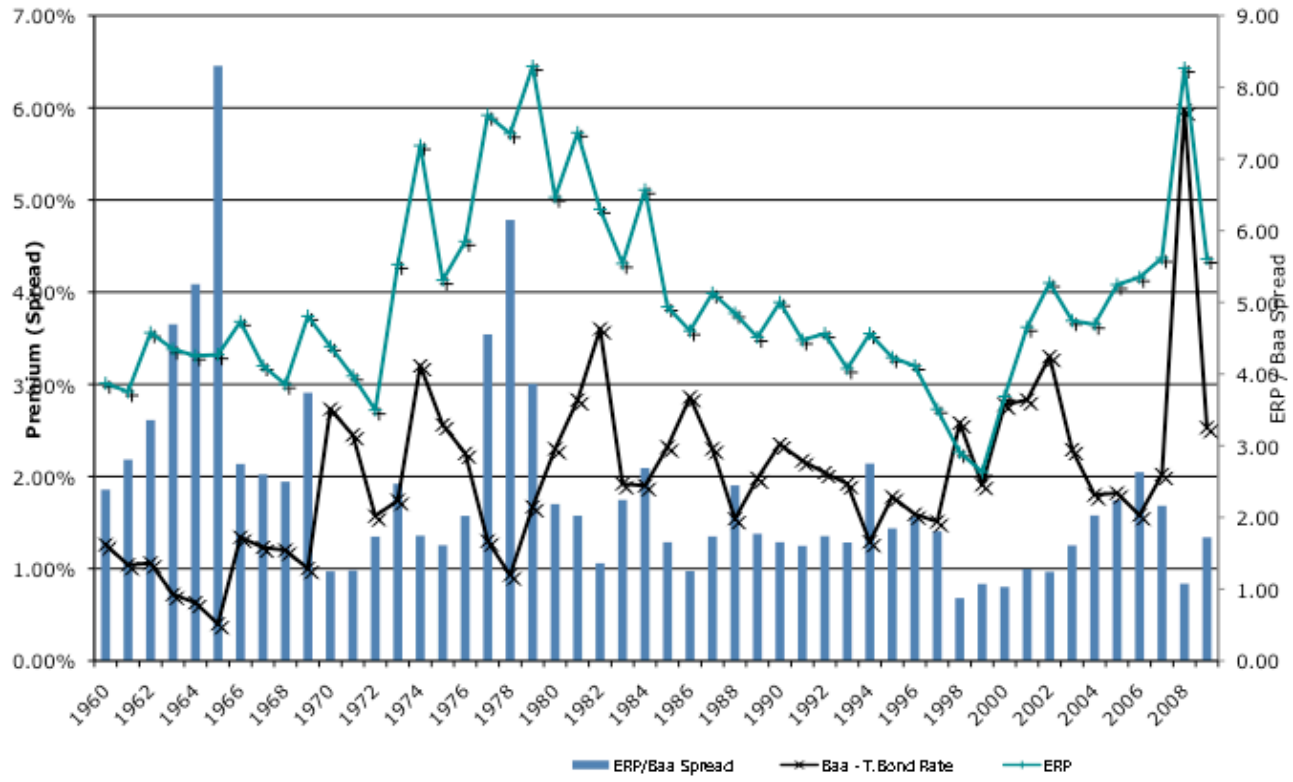
c. Pricing of Risky Assets

- Rather than ask people how risk averse they are or running experiments with small sums of money, we can turn to an ongoing, real time experiment called financial markets, where real money is being bet on real assets.
- Consider a simple proposition. Assume that an asset can be expected to generate $ 10 a year every year in perpetuity. How much would you pay for this asset, if the cash flow is guaranteed?

- Now assume that the expected cash flow is uncertain and that the degree of uncertainty is about the same as the uncertainty you feel about the average stock in the market. How much would you pay for this asset?

Equity Risk Premiums… and Bond Default Spreads..over time

Figure 9: Equity Risk Premiums and Bond Default Spreads



d. Game Shows/Gambling Arenas:

- The very act of gambling seems inconsistent with risk aversion but it can be justified by arguing that either individuals enjoy gambling or that the potential for a large payoff outweighs the negative odds.
- The key finding is what is termed as the long shot bias, which refers to the fact that people pay too much for long shots and too little for favorites.
- This long shot bias has been explained by arguing that
  - Individuals underestimate large probabilities and overestimate small probabilities.
  - Betting on long shots is more exciting and that excitement itself generates utility for individuals.
  - There is a preference for very large positive payoffs, i.e. individuals attach additional utility to very large payoffs, even when the probabilities of receiving them are very small.

In summary

- Individuals are generally risk averse, and are more so when the stakes are large than when they are small. There are big differences in risk aversion across the population and significant differences across sub-groups.
- There are quirks in risk taking behavior
  - Individuals are far more affected by losses than equivalent gains (loss aversion), and this behavior is made worse by frequent monitoring.
  - The choices that people when presented with risky choices or gambles can depend upon how the choice is presented (framing).
  - Individuals tend to be much more willing to take risks with what they consider "found money" than with earned money (house money effect).
  - There are two scenarios where risk aversion seems to be replaced by risk seeking. One is when you have the chance of making an large sum with a very small probability of success (long shot bias). The other is when you have lost money are presented with choices that allow them to make their money back (break even effect).

An alternative to traditional risk theory: Kahneman and Tversky to the rescue

a. Framing: Decisions are affected by how choices are framed, rather than the choices themselves. Thus, if we buy more of a product when it is sold at 20% off a list price of $2.50 than when it sold for a list price of $2.00, we are susceptible to framing.

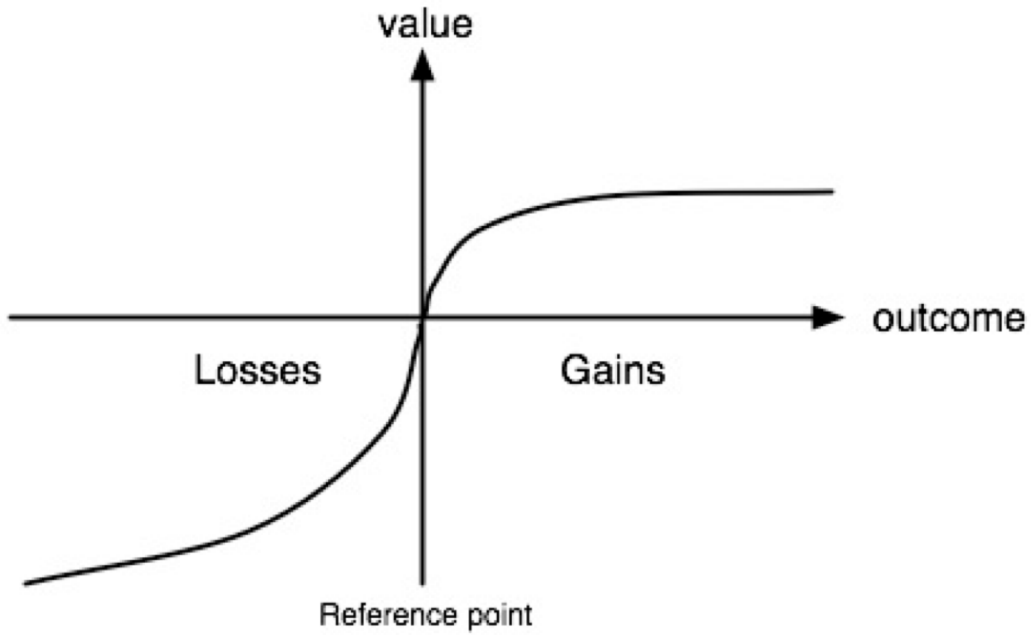
b. Nonlinear preferences: If an individual prefers A to B, B to C, and then C to A, he or she is violating a key axiom of standard preference theory (transitivity). In the real world, there is evidence that this type of behavior is not uncommon.

c. Risk aversion and risk seeking: Individuals often simultaneously exhibit risk aversion in some actions while seeking out risk in others.

d. Source: The mechanism through which information is delivered may matter, even if the product or service is identical. For instance, people will pay more for a good, based upon how it is packaged, than for an identical good, even though they plan to discard the packaging instantly after the purchase.

e. Loss Aversion: Individuals seem to fell more pain from losses than from equivalent gains. Individuals will often be willing to accept a gamble with uncertainty and an expected loss than a guaranteed loss of the same amount.

The Value Function



- The implication is that how individuals behave will depend upon how a problem is framed, with the decision being different if the outcome is framed relative to a reference point to make it look like a gain as opposed to a different reference point to convert it into a loss.

Task 1: How risk averse are you?

- How risk averse are you?

a) More risk averse than my colleagues

b) About as risk averse as my colleagues

c) Less risk averse than my colleagues

If you are more or less risk averse than your colleagues, how does this difference affect your decisions and discussions?

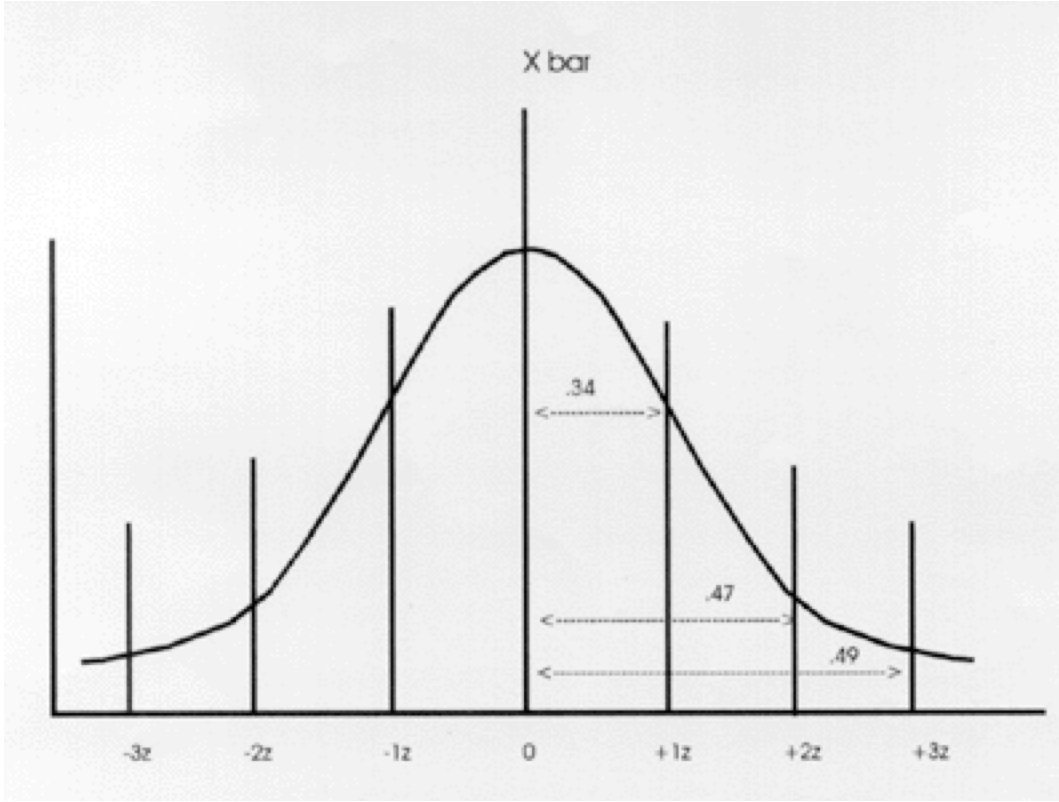
How do we measure risk?

I. Probabilities…

- The Pacioli Puzzle: In 1394, Luca Pacioli, a Franciscan monk, posed this question: Assume that two gamblers are playing an even odds, best of five dice game and are interrupted after three games, with one gambler leading two to one. What is the fairest way to split the pot between the two gamblers, assuming that the game cannot be resumed but taking into account the state of the game when it was interrupted?
- It was not until 1654 that the Pacioli puzzle was fully solved when Blaise Pascal and Pierre de Fermat exchanged a series of five letters on the puzzle. In these letters, Pascal and Fermat considered all the possible outcomes to the Pacioli puzzle and noted that with a fair dice, the gambler who was ahead two games to one in a best-of-five dice game would prevail three times out of four, if the game were completed, and was thus entitled to three quarters of the pot. In the process, they established the foundations of probabilities.

II. To Statistical Distributions..

- Abraham de Moivre, an English mathematician of French extraction, introduced the normal distribution as an approximation as sample sizes became large.



III. To Actuarial Tables and the Birth of Insurance..

- In 1662, John Graunt created one of the first mortality tables by counting for every one hundred children born in London, each year from 1603 to 1661, how many were still living. He estimated that while 64 out of every 100 made it age 6 alive, only 1 in 100 survived to be 76.
- The advances in assessing probabilities and the subsequent development of statistical measures of risk laid the basis for the modern insurance business.
- In the aftermath of the great fire of London in 1666, Nicholas Barbon opened "The Fire Office", the first fire insurance company to insure brick homes. Lloyd's of London became the first the first large company to offer insurance to ship owners.

IV. Financial Assets and Statistical Risk Measures..

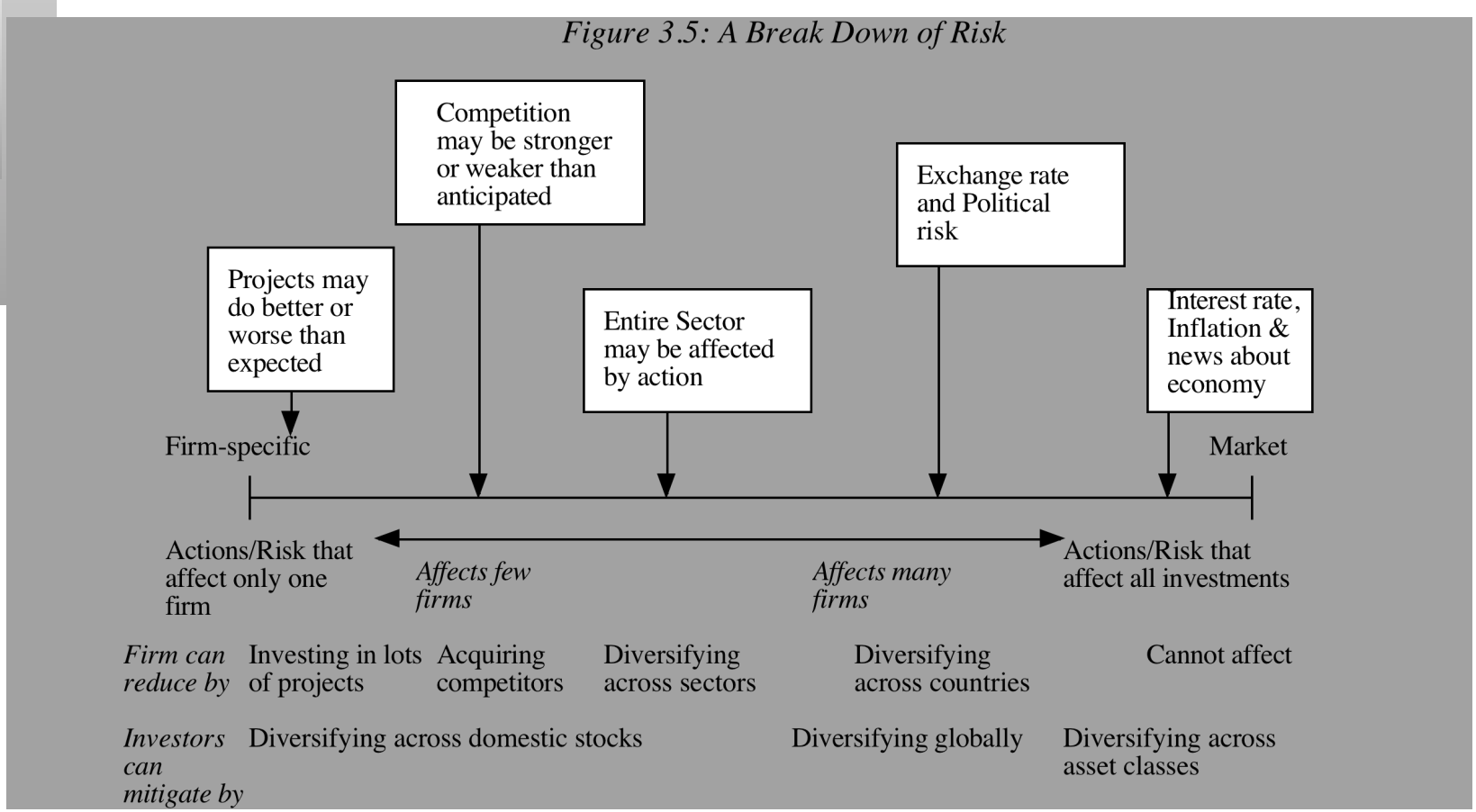
- When stocks were first traded in the 18th and 19th century, there was little access to information and few ways of processing even that limited information in the eighteenth and nineteenth centuries.
- By the early part of the twentieth century, services were already starting to collect return and price data on individual securities and computing basic statistics such as the expected return and standard deviation in returns.
- By 1915, services including the Standard Statistics Bureau (the precursor to Standard and Poor's), Fitch and Moody's were processing accounting information to provide bond ratings as measures of credit risk in companies.

V. The Markowitz Revolution

- Markowitz noted that if the value of a stock is the present value of its expected dividends and an investor were intent on only maximizing returns, he or she would invest in the one stock that had the highest expected dividends, a practice that was clearly at odds with both practice and theory at that time, which recommended investing in diversified portfolios.
- Investors, he reasoned, must diversify because they care about risk, and the risk of a diversified portfolio must therefore be lower than the risk of the individual securities that went into it. His key insight was that the variance of a portfolio could be written as a function not only of how much was invested in each security and the variances of the individual securities but also of the correlation between the securities.

The Importance of Diversification: Risk Types

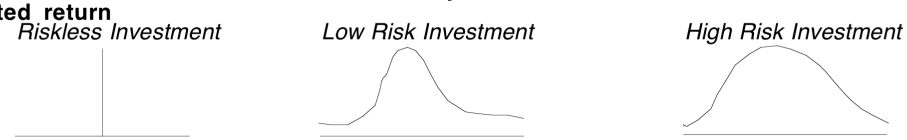
Figure 3.5: A Break Down of Risk



VI. Risk and Return Models in Finance

Step 1: Defining Risk

The risk in an investment can be measured by the variance in actual returns around an expected return



Step 2: Differentiating between Rewarded and Unrewarded Risk

Risk that is specific to investment (Firm Specific)
Can be diversified away in a diversified portfolio
1. each investment is a small proportion of portfolio
2. risk averages out across investments in portfolio

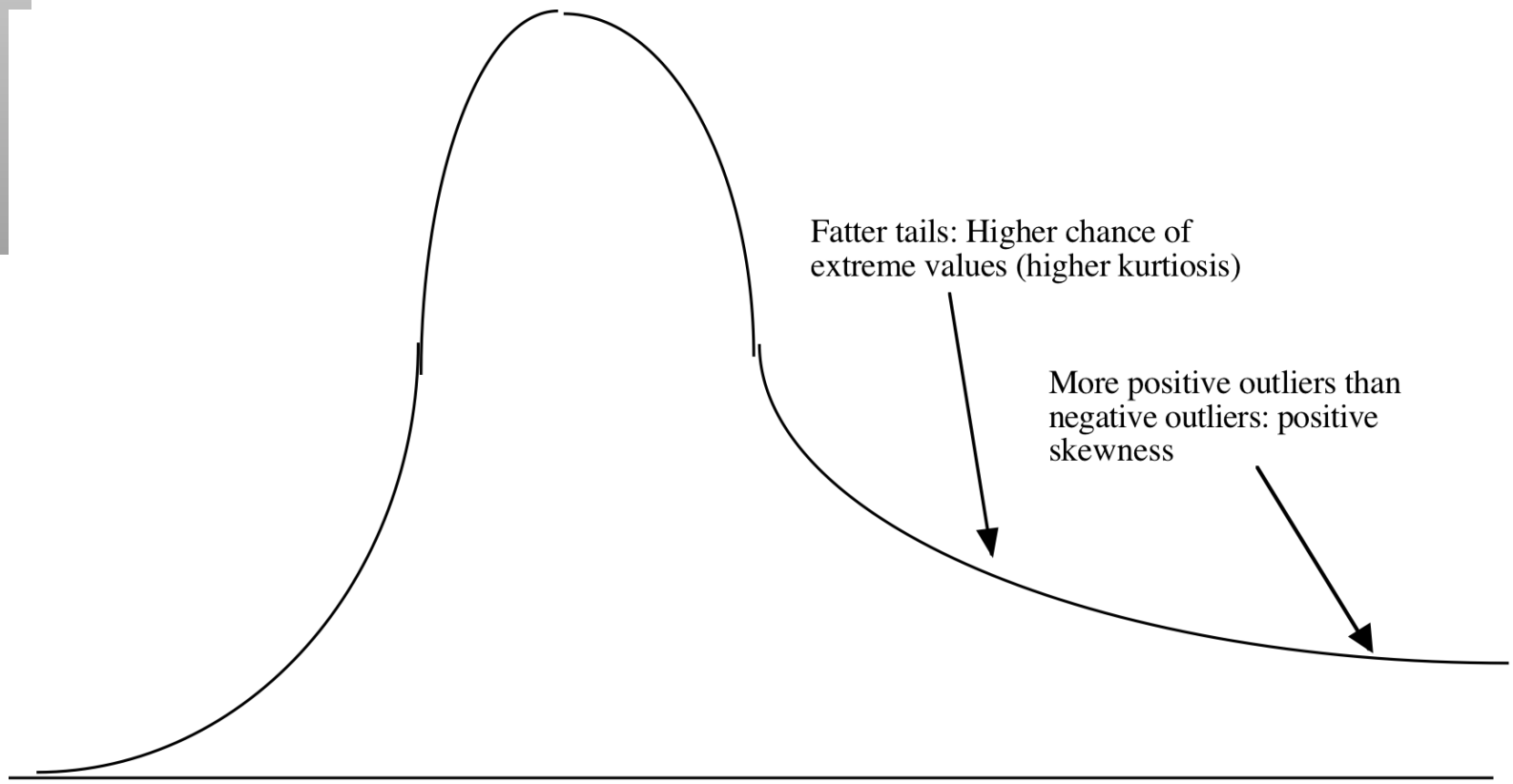
Risk that affects all investments (Market Risk)
Cannot be diversified away since most assets are affected by it.

The marginal investor is assumed to hold a "diversified" portfolio. Thus, only market risk will be rewarded and priced.

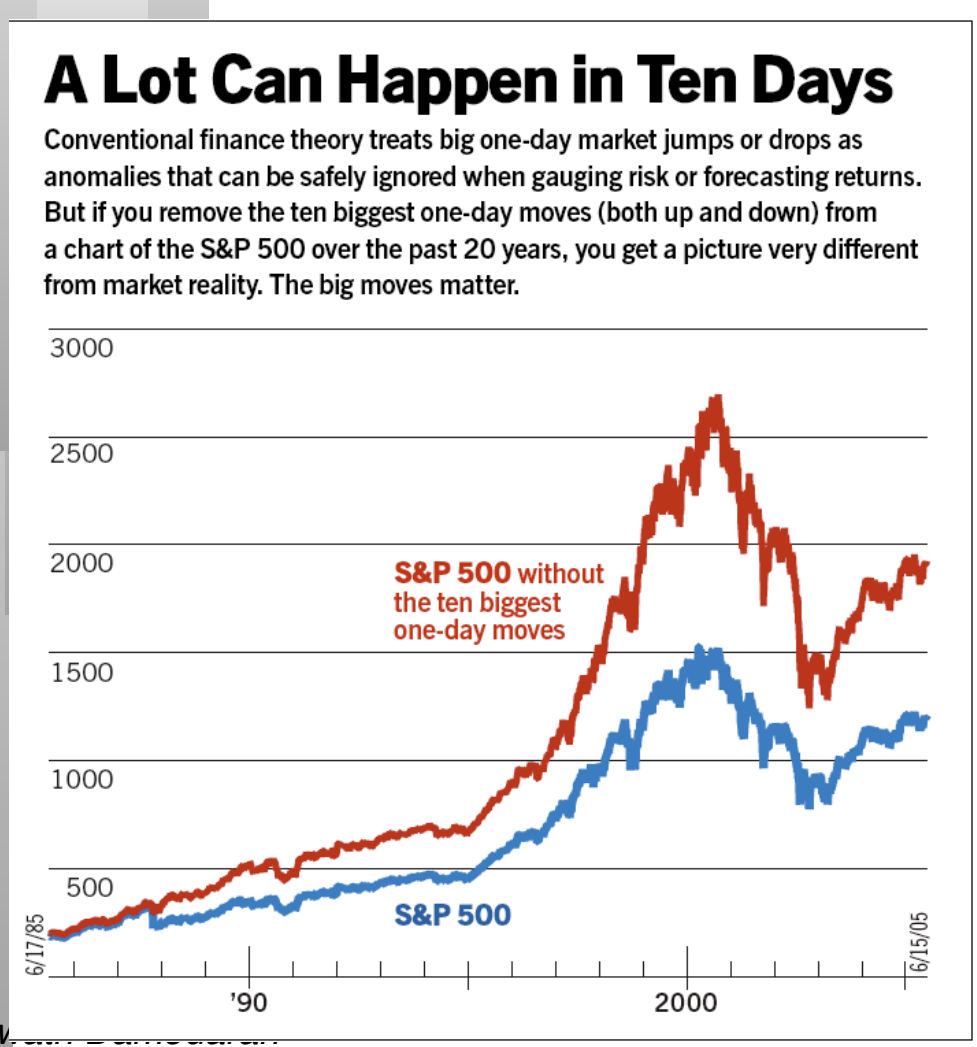
Step 3: Measuring Market Risk

The CAPM	**The APM**	**Multi-Factor Models**	**Proxy Models**
If there is 1. no private information 2. no transactions cost the optimal diversified portfolio includes every traded asset. Everyone will hold this market portfolio **Market Risk = Risk added by any investment to the market portfolio:**	If there are no arbitrage opportunities then the market risk of any asset must be captured by betas relative to factors that affect all investments. **Market Risk = Risk exposures of any asset to market factors**	Since market risk affects most or all investments, it must come from macro economic factors. **Market Risk = Risk exposures of any asset to macro economic factors.**	In an efficient market, differences in returns across long periods must be due to market risk differences. Looking for variables correlated with returns should then give us proxies for this risk. **Market Risk = Captured by the Proxy Variable(s)**
Beta of asset relative to Market portfolio (from a regression)	Betas of asset relative to unspecified market factors (from a factor analysis)	Betas of assets relative to specified macro economic factors (from a regression)	Equation relating returns to proxy variables (from a regression)

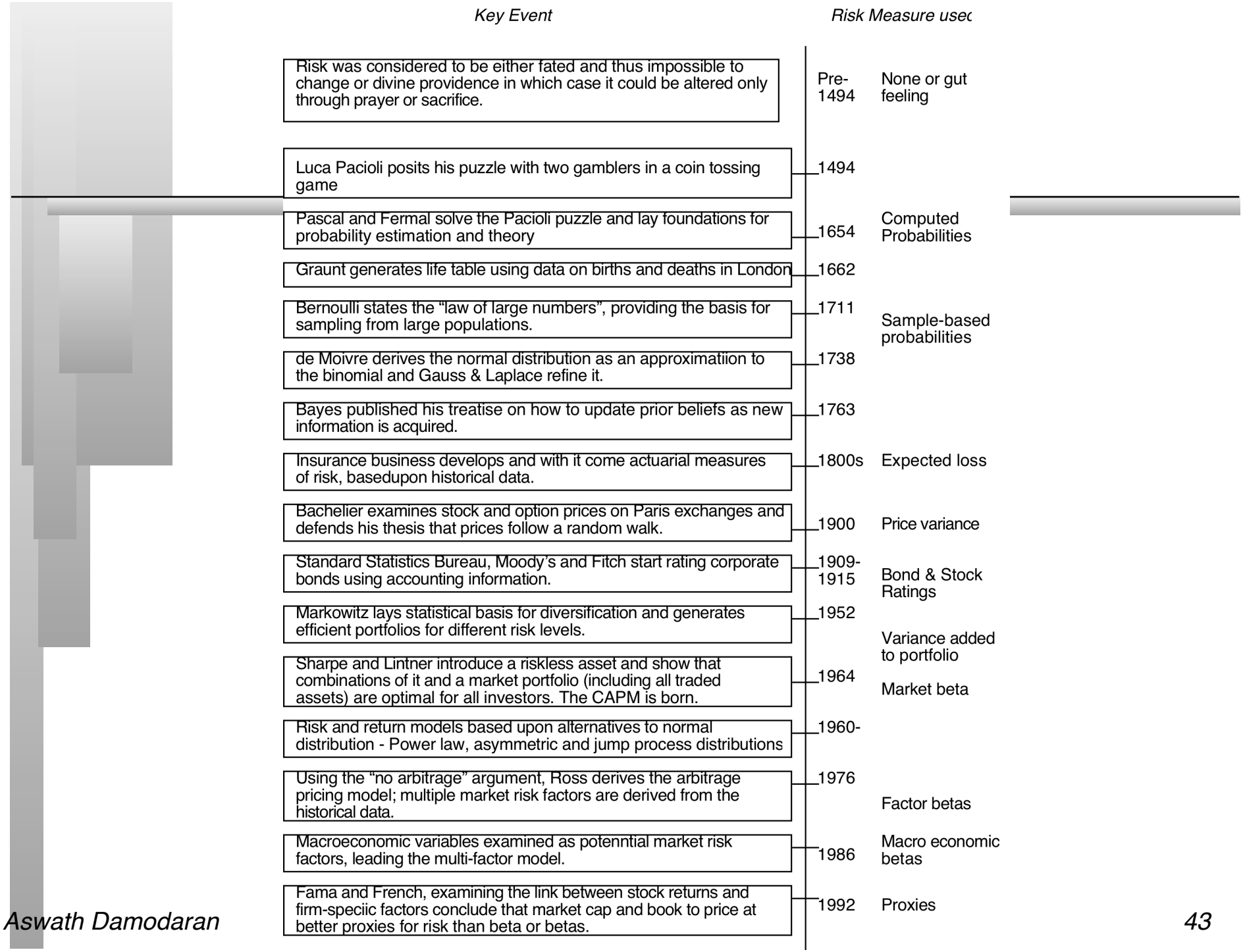
VII. The Challenges to Risk and Return Models: The real world is not normally distributed…



And the consequences…



	Normal Distribution
0 Sigmas	1 in 2 times
1 Sigma	1 in 6.3 times
2 Sigmas	1 in 44 times
3 Sigma	1 in 740 times
4 Sigma	1 in 32,000 times
5 Sigma	1 in 3.5 million times
6 Sigma	1 in billion times


Key Event
Risk Measure used
Risk was considered to be either fated and thus impossible to change or divine providence in which case it could be altered only through prayer or sacrifice.
Pre-1494
None or gut feeling
Luca Pacioli posits his puzzle with two gamblers in a coin tossing game
1494
Pascal and Fermal solve the Pacioli puzzle and lay foundations for probability estimation and theory
1654
Computed Probabilities
Graunt generates life table using data on births and deaths in London
1662
Bernoulli states the "law of large numbers", providing the basis for sampling from large populations.
1711
Sample-based probabilities
de Moivre derives the normal distribution as an approximatiion to the binomial and Gauss & Laplace refine it.
1738
Bayes published his treatise on how to update prior beliefs as new information is acquired.
1763
Insurance business develops and with it come actuarial measures of risk, basedupon historical data.
1800s
Expected loss
Bachelier examines stock and option prices on Paris exchanges and defends his thesis that prices follow a random walk.
1900
Price variance
Standard Statistics Bureau, Moody's and Fitch start rating corporate bonds using accounting information.
1909-1915
Bond & Stock Ratings
Markowitz lays statistical basis for diversification and generates efficient portfolios for different risk levels.
1952
Variance added to portfolio
Sharpe and Lintner introduce a riskless asset and show that combinations of it and a market portfolio (including all traded assets) are optimal for all investors. The CAPM is born.
1964
Market beta
Risk and return models based upon alternatives to normal distribution - Power law, asymmetric and jump process distributions
1960-
Using the "no arbitrage" argument, Ross derives the arbitrage pricing model; multiple market risk factors are derived from the historical data.
1976
Factor betas
Macroeconomic variables examined as potenntial market risk factors, leading the multi-factor model.
1986
Macro economic betas
Fama and French, examining the link between stock returns and firm-speciic factors conclude that market cap and book to price at better proxies for risk than beta or betas.
1992
Proxies

How do we deal with risk in decision making?

Tools and Techniques for risk assessment

Ways of dealing with risk in analysis

- Risk Adjusted Value
  - Estimate expected cash flows and adjust the discount rate for risk
  - Use certainty equivalent cash flows and use the riskfree rate as the discount rate
  - Hybrid approaches
- Probabilistic Approaches
  - Sensitivity Analysis
  - Decision Trees
  - Simulations
- Value at Risk (VAR) and variants

I. Risk Adjusted Value

- The value of a risky asset can be estimated by discounting the expected cash flows on the asset over its life at a risk-adjusted discount rate:

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

where the asset has a n-year life, $E(CF_t)$ is the expected cash flow in period t and r is a discount rate that reflects the risk of the cash flows.

- Alternatively, we can replace the expected cash flows with the guaranteed cash flows we would have accepted as an alternative (certainty equivalents) and discount these at the riskfree rate:

$$\text{Value of asset} = \frac{CE(CF_1)}{(1+r_f)} + \frac{CE(CF_2)}{(1+r_f)^2} + \frac{CE(CF_3)}{(1+r_f)^3} \ldots\ldots + \frac{CE(CF_n)}{(1+r_f)^n}$$

where $CE(CF_t)$ is the certainty equivalent of $E(CF_t)$ and r_f is the riskfree rate.

a. Risk Adjusted Discount Rates

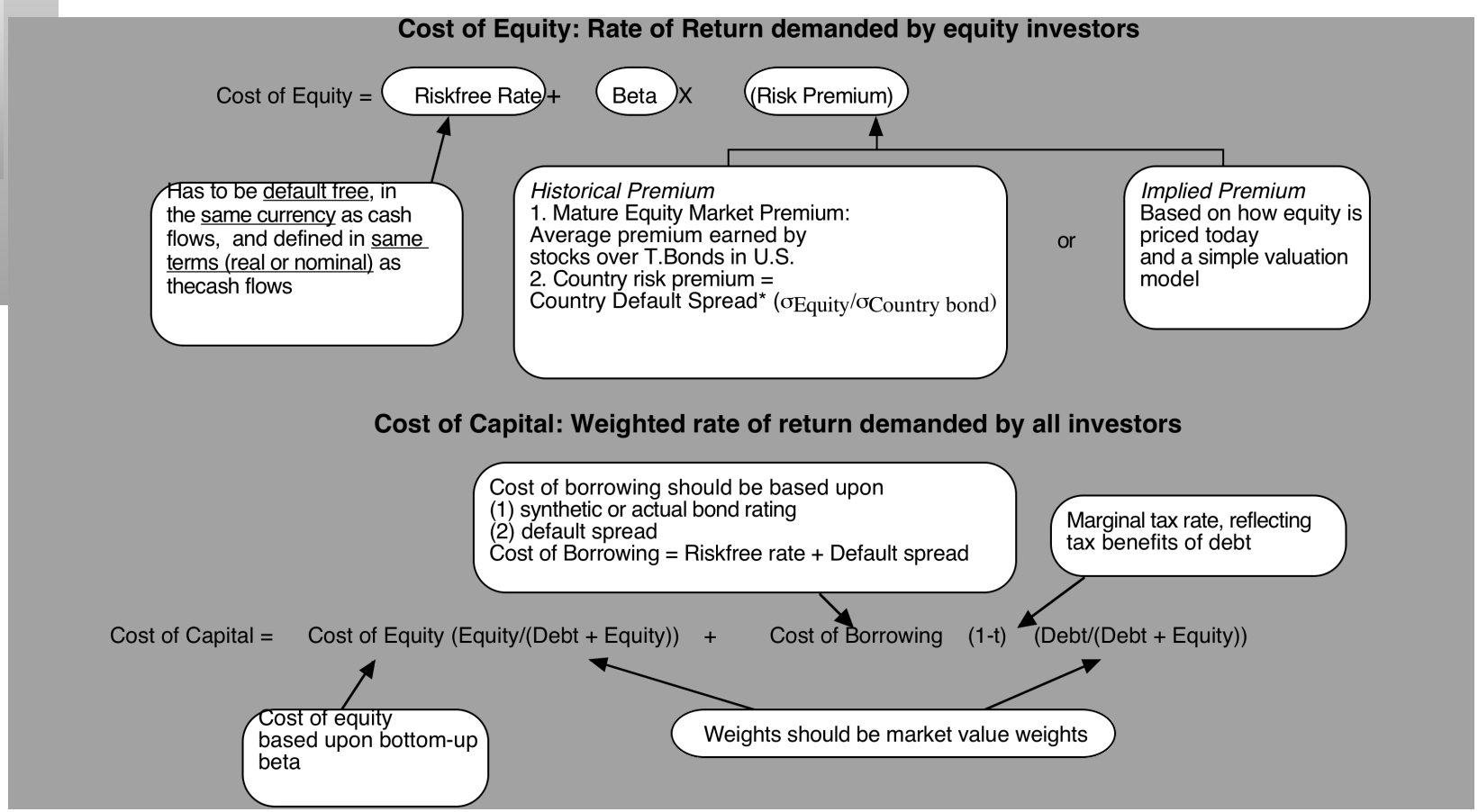
Step 1: Estimate the expected cash flows from a project/asset/business. If there is risk in the asset, this will require use to consider/estimate cash flows under different scenarios, attach probabilities to these scenarios and estimate an expected value across scenarios. In most cases, though, it takes the form of a base case set of estimates that capture the range of possible outcomes.

Step 2: Estimate a risk-adjusted discount rate. While there are a number of details that go into this estimate, you can think of a risk-adjusted discount rate as composed of two components

Risk adjusted rate = Riskfree Rate + Risk Premium

Step 3: Take the present value of the cash flows at the risk adjusted discount rate.

A primer on risk adjusted discount rates

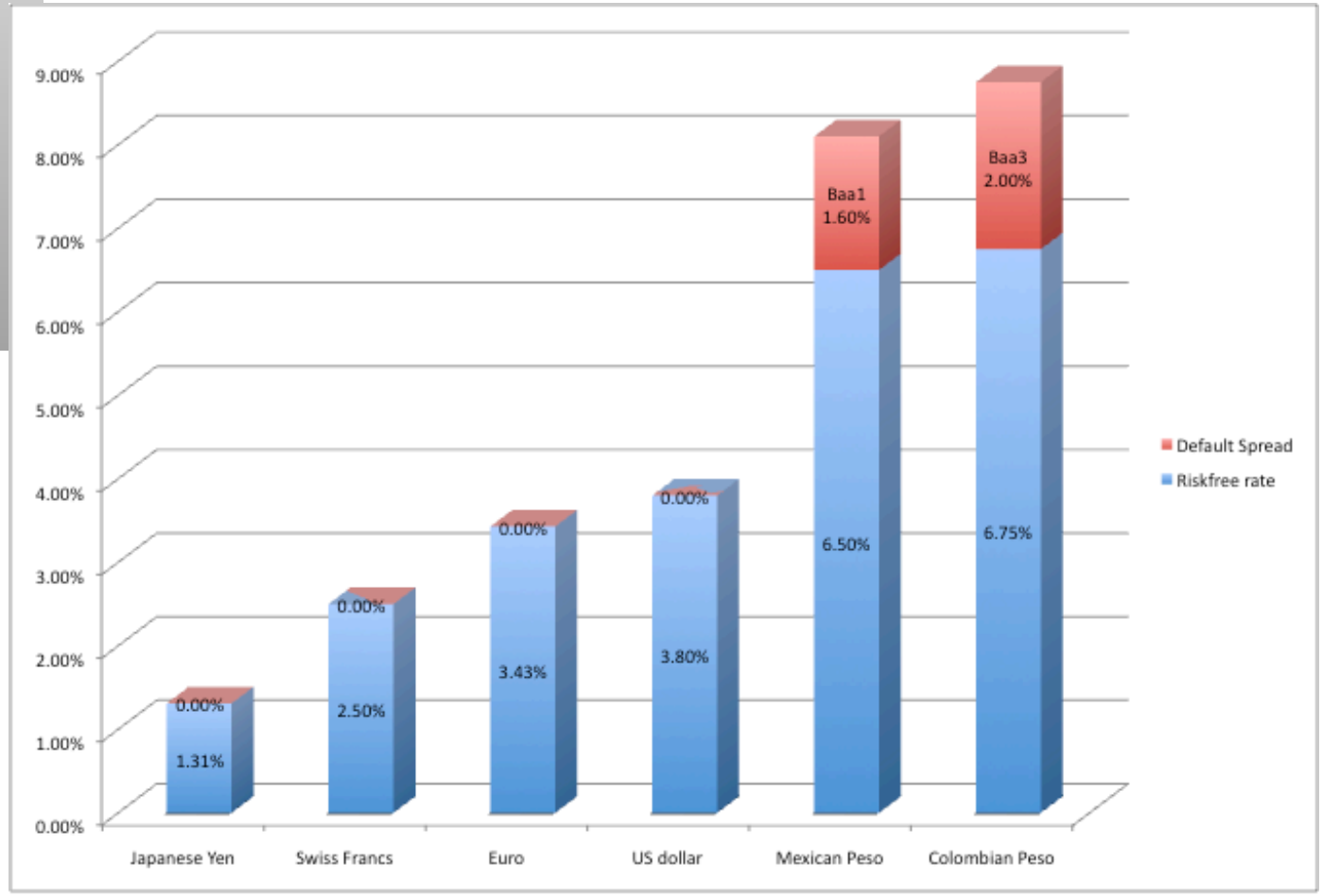


i. A Riskfree Rate

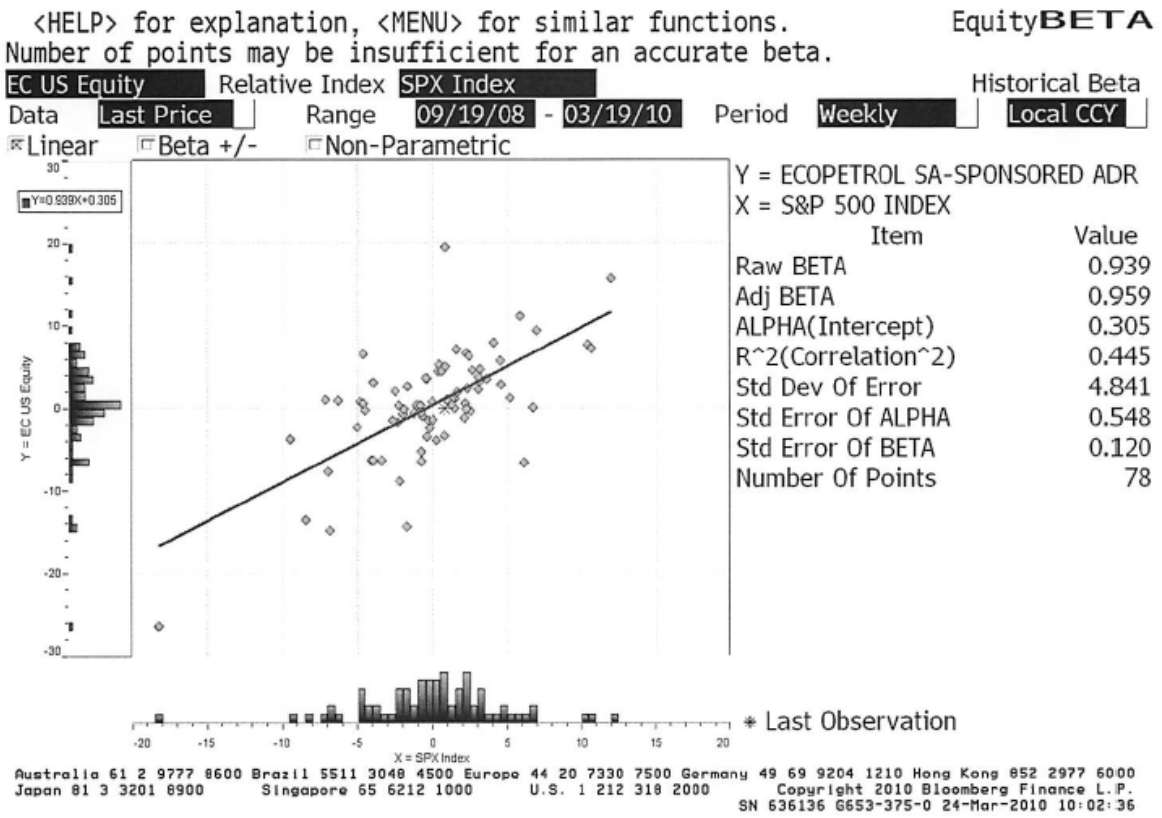
- On a riskfree asset, the actual return is equal to the expected return. Therefore, there is no variance around the expected return.
- For an investment to be riskfree, then, it has to have
  - No default risk
  - No reinvestment risk

1. Time horizon matters: Thus, the riskfree rates in valuation will depend upon when the cash flow is expected to occur and will vary across time.
2. Not all government securities are riskfree: Some governments face default risk and the rates on bonds issued by them will not be riskfree.

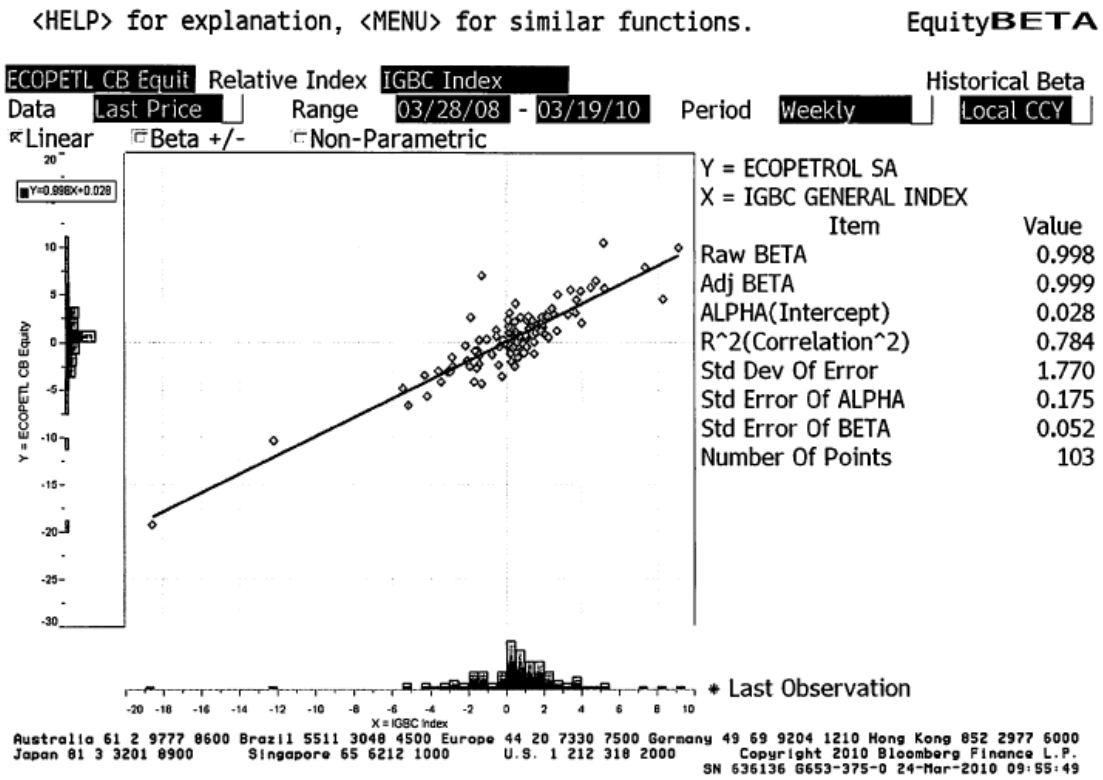
Comparing Riskfree Rates



ii. Beta Estimation: A regression is not the answer…



Beta Estimation: The Index Effect



One solution: Estimate sector (bottom up) betas – Ecopetrol

- The beta for a company measures its exposure to macro economic risk and should reflect:
  - The products and services it provides (and how discretionary they are)
  - The fixed cost structure (higher fixed costs -> higher betas)
  - The financial leverage (higher D/E ratio -> higher betas)
- For Ecopetrol:

Business	Revenues	Weight	Unlevered beta
Production	16.7	51.07%	0.89
Distribution	16.0	48.93%	0.50
Ecopetrol			0.70

Levered beta = 0.70 (1 + (1-.33)(6151/109275)) = 0.73

Proposition: When a firm is in multiple businesses with differing risk profiles, it should have different hurdle rates for each business.

iii. And equity risk premiums matter..

	Arithmetic Average		Geometric Average	
	Stocks – T. Bills	Stocks – T. Bonds	Stocks – T. Bills	Stocks – T. Bonds
1928-2009	7.53%	6.03%	5.56%	4.29%
	(2.28%)	(2.40%)		
1960-2009	5.48%	3.78%	4.09%	2.74%
	(2.42%)	(2.71%)		←
2000-2009	-1.59%	-5.47%	-3.68%	-7.22%
	(6.73%)	(9.22%)		

Historical premium

In 2010, the actual cash returned to stockholders was 40.38. That was down about 40% from 2008 levels.

Analysts expect earnings to grow 21% in 2010, resulting in a compounded annual growth rate of 7.2% over the next 5 years. We will assume that dividends & buybacks will keep pace.

After year 5, we will assume that earnings on the index will grow at 3.84%, the same rate as the entire economy (= riskfree rate).

43.29 46.40 49.74 53.32 57.16

$$1115.10 = \frac{43.29}{(1+r)} + \frac{46.40}{(1+r)^2} + \frac{49.74}{(1+r)^3} + \frac{53.32}{(1+r)^4} + \frac{57.16}{(1+r)^5} + \frac{57.16(1.0384)}{(r-.0384)(1+r)^5}$$

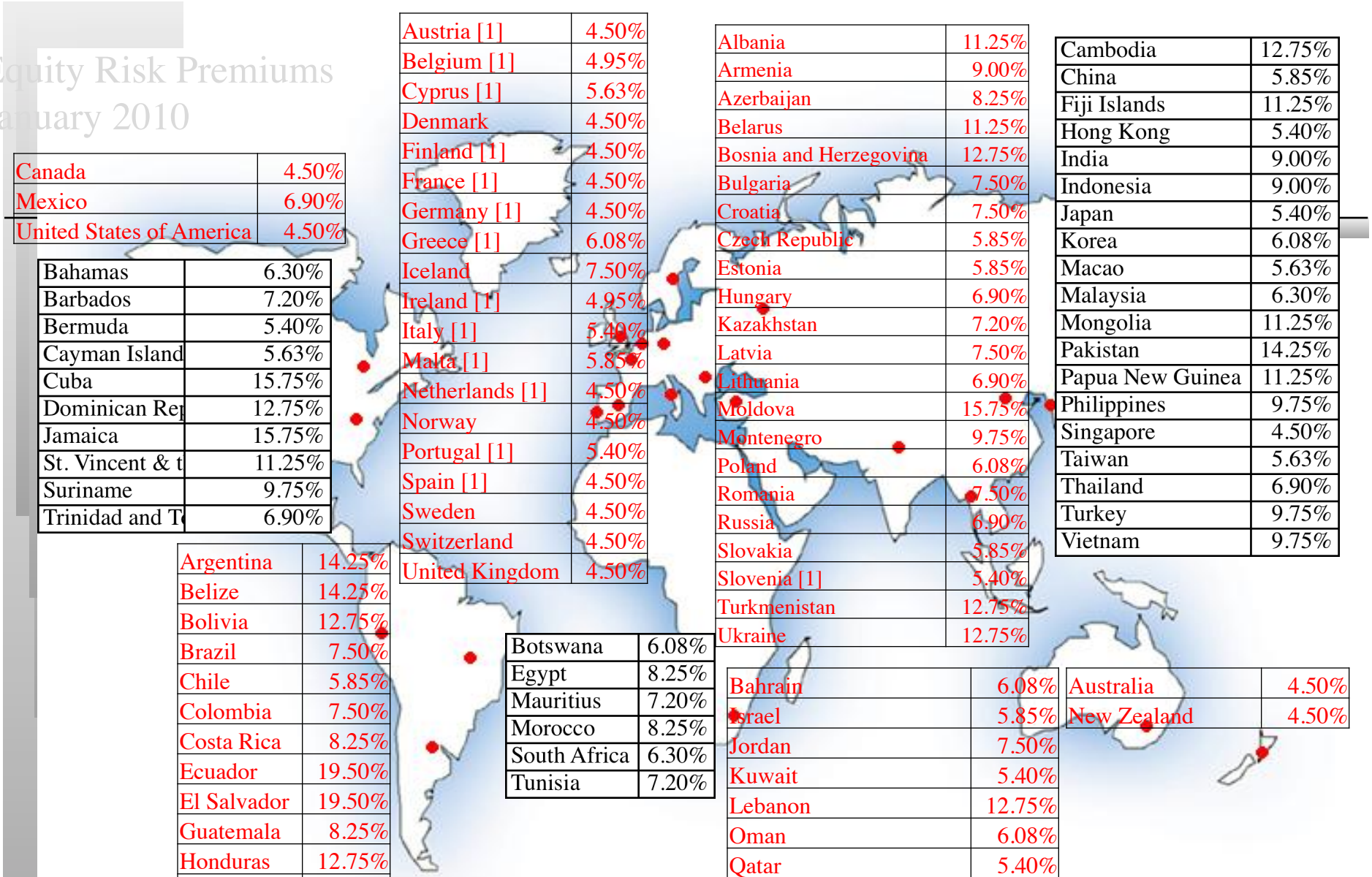
January 1, 2010
S&P 500 is at 1115.10
Adjusted Dividends & Buybacks for 2008 = 40.38

Expected Return on Stocks (1/1/10) = 8.20%
T.Bond rate on 1/1/10 = 3.84 %
Equity Risk Premium = 8.20% - 3.84% = 4.36%

Additional country risk?

- Even if we accept the proposition that an equity risk premium of about 4.5% is reasonable for a mature market, you would expect a larger risk premium when investing in an emerging market.
- Consider Colombia. There is clearly more risk investing in Colombian equities than there is in investing in a mature market. To estimate the additional risk premium that should be charged, we follow a 3-step process:
  - Step 1: Obtain a measure of country risk for Colombia. For instance, the sovereign rating for Colombia is Baa2 and the default spread associated with that rating in early 2010 was 2%,
  - Step 2: Estimate how much riskier equities are, relative to bonds. The standard deviation in weekly returns over the last 2 years for Colombian equities was 24% and the standard deviation in equities was 12%.
  - Step 3: Additional risk premium for Colombia = 2% (24/12) = 3%
  - Step 4: Total equity risk premium for Colombia = 4.5%+3%=7.5%

Equity Risk Premiums
January 2010



Canada	4.50%
Mexico	6.90%
United States of America	4.50%

Bahamas	6.30%
Barbados	7.20%
Bermuda	5.40%
Cayman Island	5.63%
Cuba	15.75%
Dominican Rep	12.75%
Jamaica	15.75%
St. Vincent & t	11.25%
Suriname	9.75%
Trinidad and T	6.90%

Argentina	14.25%
Belize	14.25%
Bolivia	12.75%
Brazil	7.50%
Chile	5.85%
Colombia	7.50%
Costa Rica	8.25%
Ecuador	19.50%
El Salvador	19.50%
Guatemala	8.25%
Honduras	12.75%
Nicaragua	14.25%
Panama	8.25%
Paraguay	14.25%
Peru	7.50%
Uruguay	9.75%
Venezuela	11.25%

Austria [1]	4.50%
Belgium [1]	4.95%
Cyprus [1]	5.63%
Denmark	4.50%
Finland [1]	4.50%
France [1]	4.50%
Germany [1]	4.50%
Greece [1]	6.08%
Iceland	7.50%
Ireland [1]	4.95%
Italy [1]	5.40%
Malta [1]	5.85%
Netherlands [1]	4.50%
Norway	4.50%
Portugal [1]	5.40%
Spain [1]	4.50%
Sweden	4.50%
Switzerland	4.50%
United Kingdom	4.50%

Botswana	6.08%
Egypt	8.25%
Mauritius	7.20%
Morocco	8.25%
South Africa	6.30%
Tunisia	7.20%

Albania	11.25%
Armenia	9.00%
Azerbaijan	8.25%
Belarus	11.25%
Bosnia and Herzegovina	12.75%
Bulgaria	7.50%
Croatia	7.50%
Czech Republic	5.85%
Estonia	5.85%
Hungary	6.90%
Kazakhstan	7.20%
Latvia	7.50%
Lithuania	6.90%
Moldova	15.75%
Montenegro	9.75%
Poland	6.08%
Romania	7.50%
Russia	6.90%
Slovakia	5.85%
Slovenia [1]	5.40%
Turkmenistan	12.75%
Ukraine	12.75%

Bahrain	6.08%
Israel	5.85%
Jordan	7.50%
Kuwait	5.40%
Lebanon	12.75%
Oman	6.08%
Qatar	5.40%
Saudi Arabia	5.85%
United Arab Emirates	5.40%

Cambodia	12.75%
China	5.85%
Fiji Islands	11.25%
Hong Kong	5.40%
India	9.00%
Indonesia	9.00%
Japan	5.40%
Korea	6.08%
Macao	5.63%
Malaysia	6.30%
Mongolia	11.25%
Pakistan	14.25%
Papua New Guinea	11.25%
Philippines	9.75%
Singapore	4.50%
Taiwan	5.63%
Thailand	6.90%
Turkey	9.75%
Vietnam	9.75%

Australia	4.50%
New Zealand	4.50%

An example: Rio Disney
Expected Cash flow in US $ (in April 2009)

	0	1	2	3	4	5	6	7	8	9	10
Operating Income		-$50	-$150	-$84	$106	$315	$389	$467	$551	$641	$658
Taxes		-$19	-$57	-$32	$40	$120	$148	$178	$209	$244	$250
Operating Income after Taxes		-$31	-$93	-$52	$66	$196	$241	$290	$341	$397	$408
+ Depreciation & Amortization		$50	$425	$469	$444	$372	$367	$364	$364	$366	$368
- Capital Expenditures	$2,500	$1,000	$1,188	$752	$276	$258	$285	$314	$330	$347	$350
- Change in Working Capital	$0	$0	$63	$25	$38	$31	$16	$17	$19	$21	$5
Cash flow to Firm	-$2,500	-$981	-$918	-$360	$196	$279	$307	$323	$357	$395	$422
+ Pre-Project Investment	500										
- Pre-project Deprecn * t		$19	$19	$19	$19	$19	$19	$19	$19	$19	$19
+ Fixed G&A (1-t)		$0	$78	$109	$155	$194	$213	$234	$258	$284	$289
Incremental Cash flow to Firm	-$2,000	-$1,000	-$859	-$270	$332	$454	$501	$538	$596	$660	$692

Rio Disney: Risk Adjusted Discount Rate

- Since the cash flows were estimated in US dollars, the riskfree rate is the US treasury bond rate of 3.5% (at the time of the analysis.
- The beta for the theme park business is 0.7829. This was estimated by looking at publicly traded theme park companies.
- The risk premium is composed of two parts, a mature market premium of 6% and an additional risk premium of 3.95% for Brazil.

Country risk premium for Brazil = 3.95%

Cost of Equity in US$= 3.5% + 0.7829 (6%+3.95%) = 11.29%

- Using this estimate of the cost of equity, we use Disney's theme park debt ratio of 35.32% and its after-tax cost of debt of 3.72%, we can estimate the cost of capital for the project:

Cost of Capital in US$ = 11.29% (0.6468) + 3.72% (0.3532) = 8.62%

Rio Disney: Risk Adjusted Value
Risk Adjusted Discount Rates

Discounted at Rio Disney cost of capital of 8.62%

Year	Annual Cashflow	Terminal Value	Present Value
0	-$2,000		-$2,000
1	-$1,000		-$921
2	-$860		-$729
3	-$270		-$211
4	$332		$239
5	$453		$300
6	$502		$305
7	$538		$302
8	$596		$307
9	$660		$313
10	$692	$10,669	$4,970
Net Present Value =			$2,877

b. Certainty Equivalent Cashflows

Step 1: Convert your expected cash flow to a certainty equivalent. There are three ways you can do this:

a. Compute certainty equivalents, using utility functions (forget this)

b. Convert your expected cash flow to a certainty equivalent

$$\text{Certainty Equivalent CF} = \frac{(1+\text{Riskfree rate})^t}{(1+\text{Risk adjusted Discount Rate})^t} E(CF_t)$$

c. Subjectively estimate a haircut to the expected cash flows

Step 2: Discount the certainty equivalent cash flows at the riskfree rate.

Rio Disney: Risk Adjusted Value
Certainty Equivalent Cash flows

CF_t* 1.035^t/1.0862^t **Discount at 3.5%**

Year	Annual Cashflow	Terminal Value	Certainty Equivalent	Present Valiue
0	-$2,000		-$2,000	-$2,000
1	-$1,000		-$953	-$921
2	-$860		-$780	-$729
3	-$270		-$234	-$211
4	$332		$274	$239
5	$453		$356	$300
6	$502		$375	$305
7	$538		$384	$302
8	$596		$405	$307
9	$660		$427	$313
10	$692	$10,669	$7,011	$4,970
				$2,877

II. Probabilistic Approaches

- The essence of risk that you are unclear about what the outcomes will be from an investment. In the risk adjusted cash flow approach, we make the adjustment by either raising discount rates or lowering cash flows.
- In probabilistic approaches, we deal with uncertainty more explicitly by
  - Asking what if questions about key inputs and looking at the impact on value (Sensitivity Analysis)
  - Looking at the cash flows/value under different scenarios for the future (Scenario Analysis)
  - Using probability distributions for key inputs, rather than expected values, and computing value as a distribution as well (Simulations)

a. Sensitivity Analysis and What-if Questions…

- The NPV, IRR and accounting returns for an investment will change as we change the values that we use for different variables.
- One way of analyzing uncertainty is to check to see how sensitive the decision measure (NPV, IRR..) is to changes in key assumptions. While this has become easier and easier to do over time, there are caveats that we would offer.

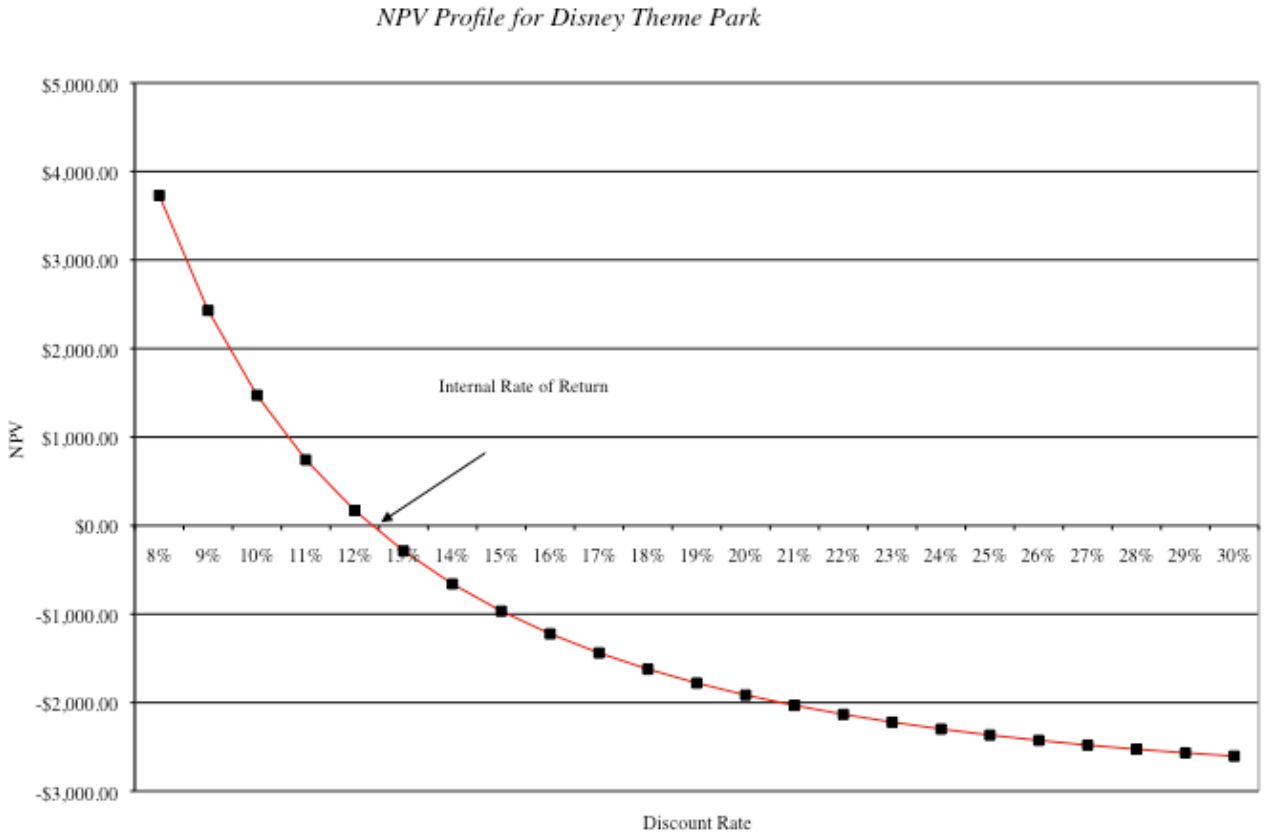
Caveat 1: When analyzing the effects of changing a variable, we often hold all else constant. In the real world, variables move together.

Caveat 2: The objective in sensitivity analysis is that we make better decisions, not churn out more tables and numbers.

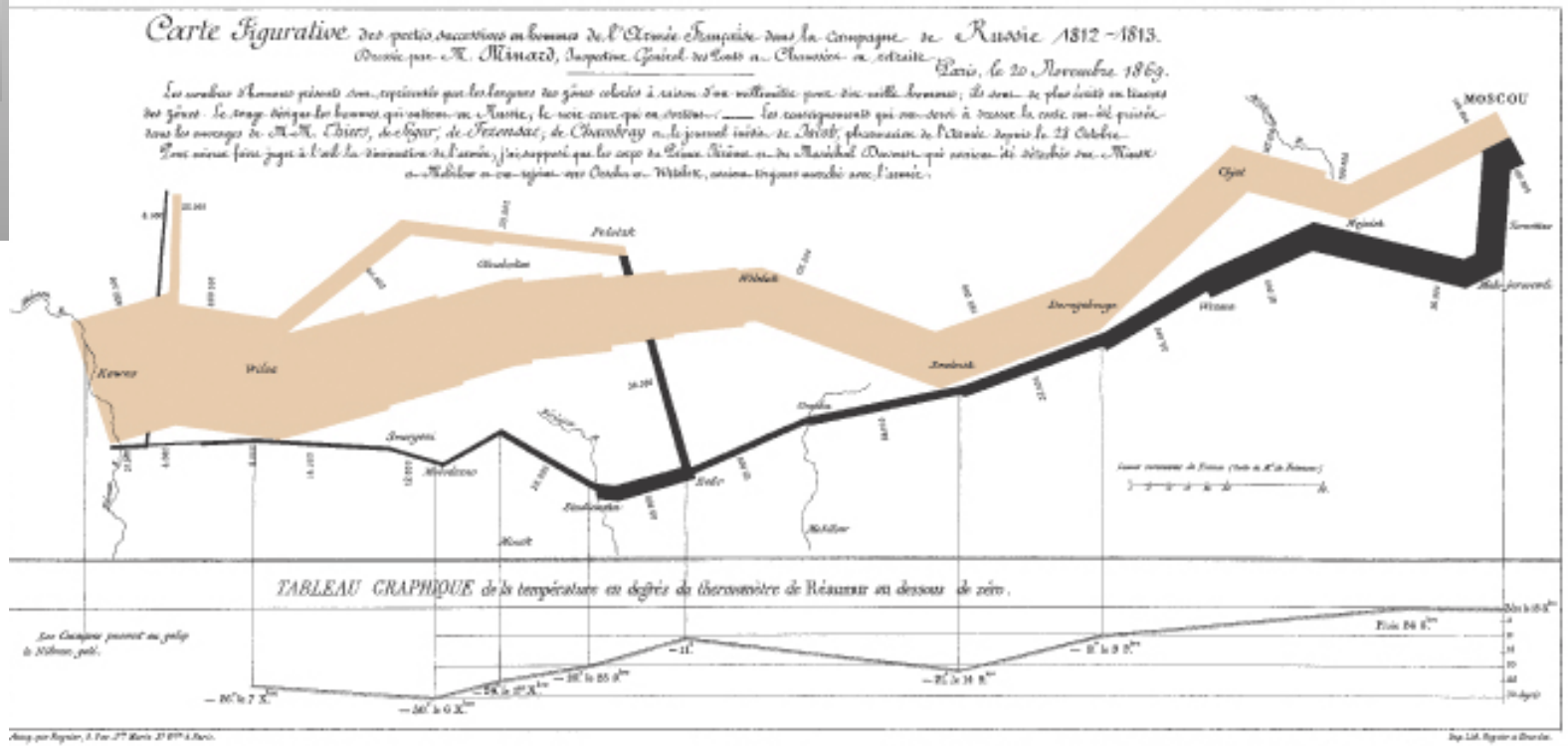
Corollary 1: Less is more. Not everything is worth varying…

Corollary 2: A picture is worth a thousand numbers (and tables).

What if the cost of capital for Rio Disney were different (from 8.62%)?



And here is a really good picture…



b. Scenario Analysis

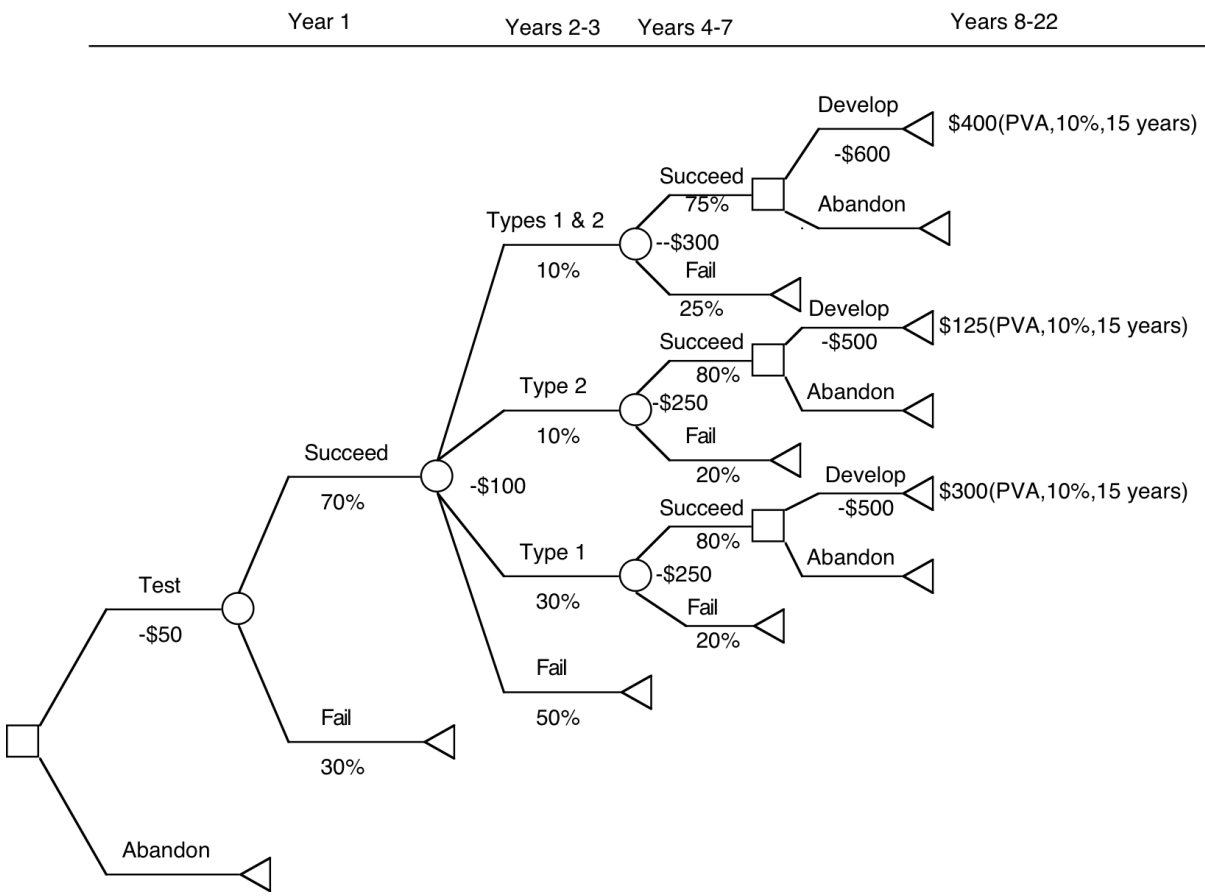
- Scenario analysis is best employed when the outcomes of a project are a function of the macro economic environment and/or competitive responses.
- As an example, assume that Boeing is considering the introduction of a new large capacity airplane, capable of carrying 650 passengers, called the *Super Jumbo*, to replace the Boeing 747. The cash flows will depend upon two major "uncontrollable" factors:
  - The growth in the long-haul, international market, relative to the domestic market. Arguably, a strong Asian economy will play a significant role in fueling this growth, since a large proportion of it will have to come from an increase in flights from Europe and North America to Asia.
  - The likelihood that Airbus, Boeing's primary competitor, will come out with a larger version of its largest capacity airplane, the A-300, over the period of the analysis.

The scenarios…

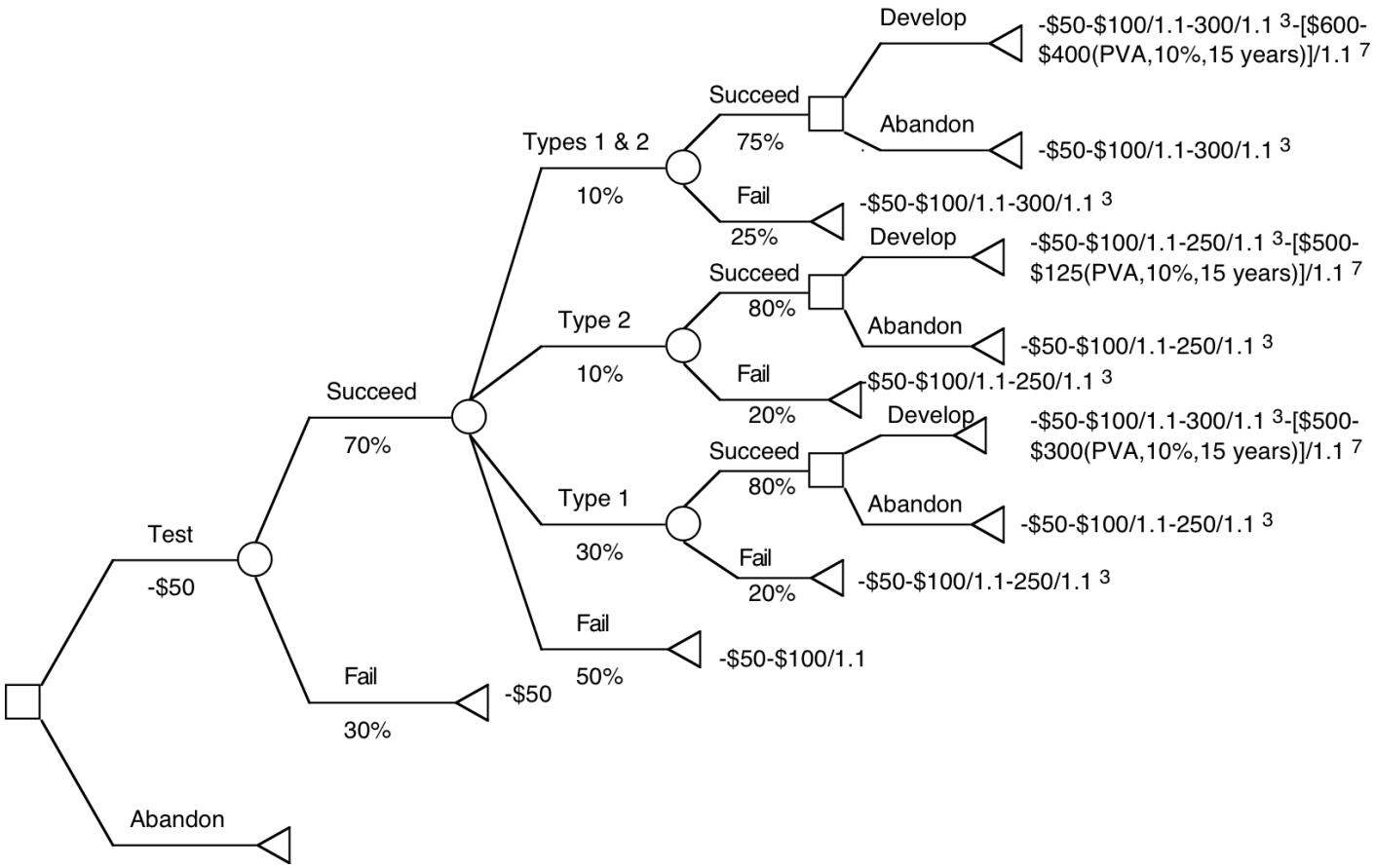
Number of planes sold under each scenario (and probability of each scenario)

	Airbus Large Jet	Airbus A-300	Airbus abandons large capacity airplane
High Growth in Asia	120 (12.5%)	150 (12.5%)	200 (0%)
Average Growth in Asia	100 (15%)	135 (25%)	160 (10%)
Low Growth in Asia	75 (5%)	110 (10%)	120 (10%)

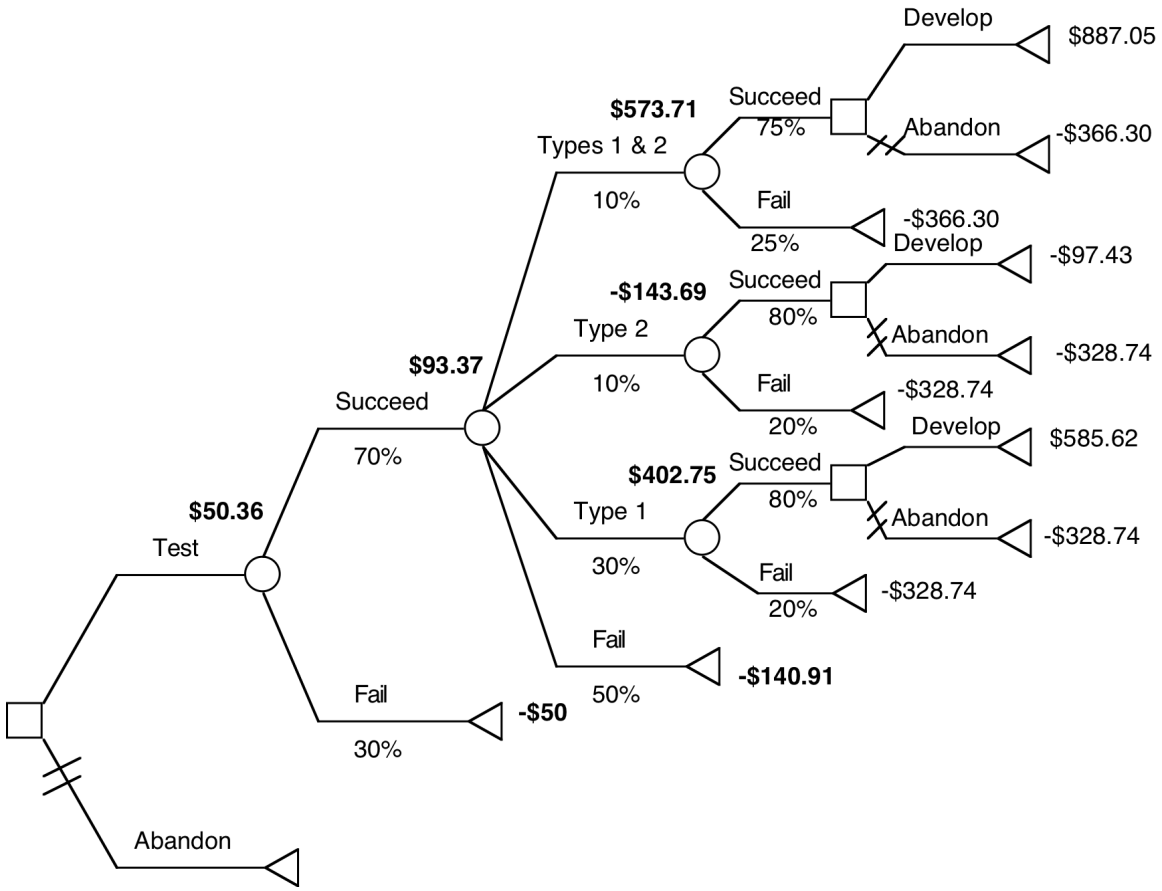
c. Decision Trees



With cash flows…

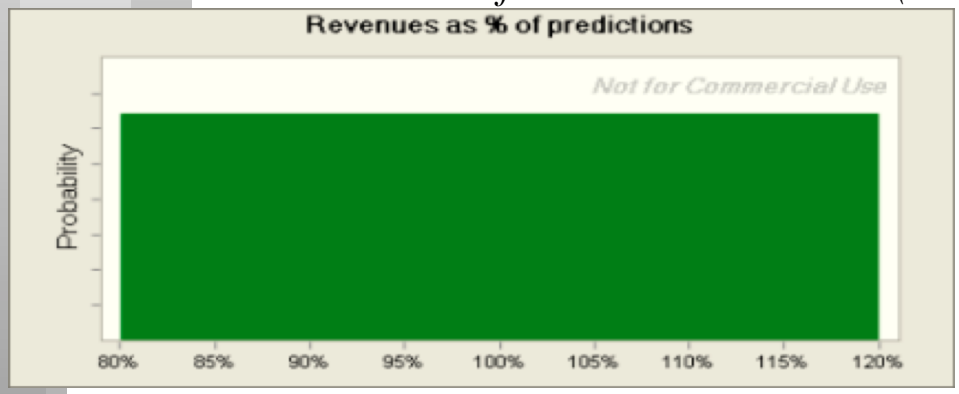


And on outcome…

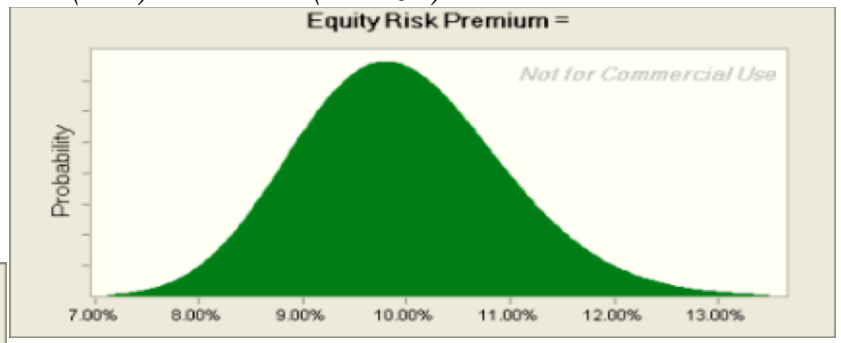


d. Simuations

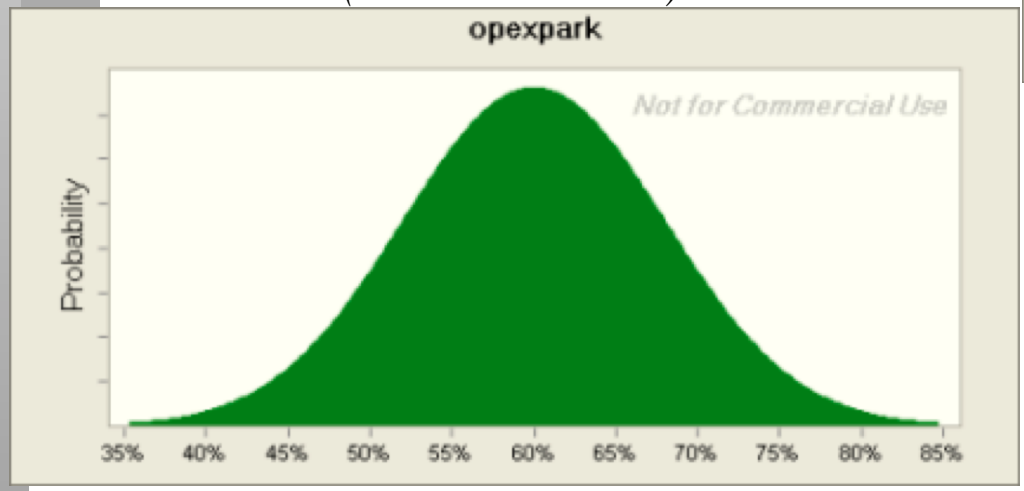
Actual Revenues as % of Forecasted Revenues (Base case = 100%)



Equity Risk Premium (Base Case = 6% (US)+ 3.95% (Brazil) = 9.95%

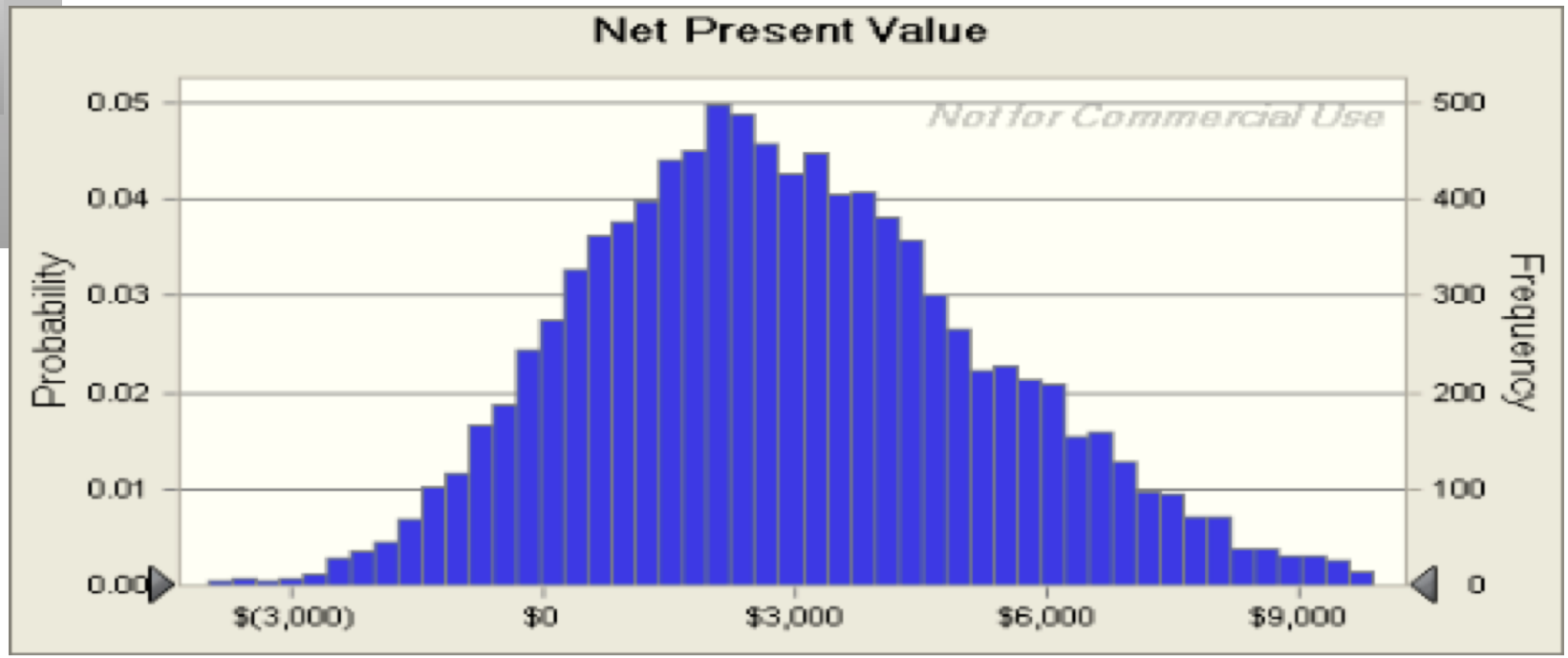


Operating Expenses at Parks as % of Revenues (Base Case = 60%)



The resulting outcome…

Average = $2.95 billion
Median = $2.73 billion



NPV ranges from -$4 billion to +$14 billion. NPV is negative 12% of the time.

Choosing a Probabilistic Approach

Discrete/Continuous	*Correlated/Independent*	*Sequential/Concurrent*	*Risk Approach*
Discrete	Independent	Sequential	Decision Tree
Discrete	Correlated	Concurrent	Scenario Analysis
Continuous	Either	Either	Simulations

III. Value at Risk (VaR)

- Value at Risk measures the potential loss in value of a risky asset or portfolio over a defined period for a given confidence interval. Thus, if the VaR on an asset is $ 100 million at a one-week, 95% confidence level, there is a only a 5% chance that the value of the asset will drop more than $ 100 million over any given week.
- There are three key elements of VaR – a specified level of loss in value, a fixed time period over which risk is assessed and a confidence interval. The VaR can be specified for an individual asset, a portfolio of assets or for an entire firm
- VaR has been used most widely at financial service firms, where the risk profile is constantly shifting and a big loss over a short period can be catastrophic (partly because the firms have relatively small equity, relative to the bets that they make, and partly because of regulatory constraints)

Key Ingredients in VaR

- To estimate the probability of the loss, with a confidence interval, we need to
  a. Define the probability distributions of individual risks,
  b. Estimate the correlation across these risks and
  c. Evaluate the effect of such risks on value.
- The focus in VaR is clearly on downside risk and potential losses. Its use in banks reflects their fear of a liquidity crisis, where a low-probability catastrophic occurrence creates a loss that wipes out the capital and creates a client exodus. .

VaR Approaches

I. Variance Covariance Matrix: If we can estimate how each asset moves over time (variance) and how it moves with every other asset (covariance), we can mathematically estimate the VaR.

   Weakness: The variances and covariances are usually estimated using historical data and are notoriously unstable (especially covariances_

II. Historical data simulation: If we know how an asset or portfolio has behaved in the past, we can use the historical data to make judgments of VaR.

   Weakness: The past may not be a good indicator of the future.

III. Monte Carlo Simulation: If we can specify return distributions for each asset/portfolio, we can run simulations to determine VaR.

   Weakness: Garbage in, garbage out. A simulation is only as good as the distributions that go into it.

Limitations of VaR

- Focus is too narrow: The focus on VaR is very narrow. For instance, consider a firm that wants to ensure that it does not lose more than $ 100 million in a month and uses VaR to ensure that this happens. Even if the VaR is estimated correctly, the ensuing decisions may not be optimal or even sensible.
- The VaR can be wrong: No matter which approach you use to estimate VaR, it remains an estimate and can be wrong. Put another way, there is a standard error in the VaR estimate that is large.
- The Black Swan: VaR approaches, no matter how you frame them, have their roots in the past. As long as markets are mean reverting and stay close to historical norms, VaR will work. If there is a structural break, VaR may provide little or no protection against calamity.

Task 2: Risk Assessment at your organization

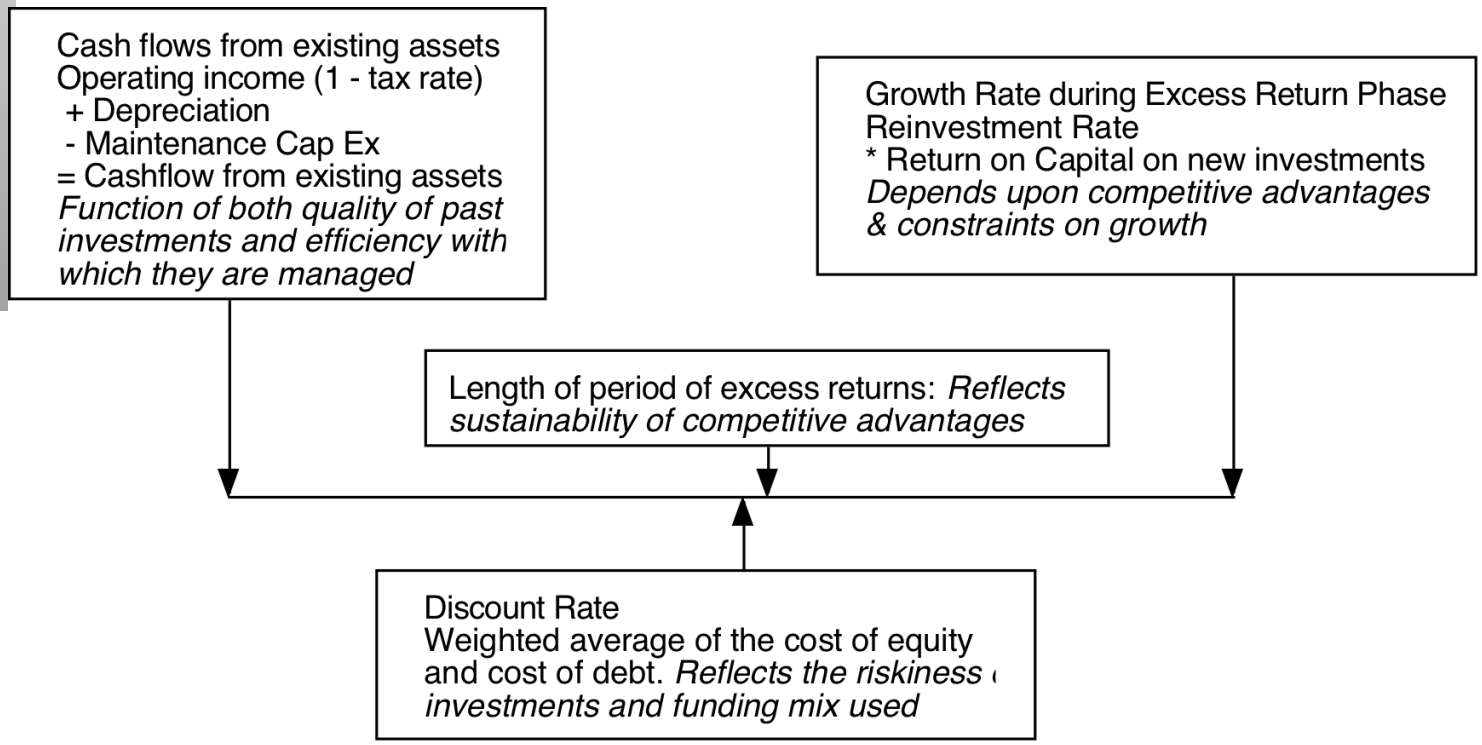
- What risk assessment approaches do you use in your organization? (You can pick more than one)

a) Risk adjusted Value
b) Sensitivity Analysis
c) Decision Trees
d) Simulation
e) All of the above
f) None of the above

If you picked none of the above, what do you do about risk in decision making?

How do we manage risk?

Determinants of Value



When Risk Hedging/Management Matters..

- For an action to affect value, it has to affect one or more of the following inputs into value:
  - Cash flows from existing assets
  - Growth rate during excess return phase
  - Length of period of excess returns
  - Discount rate

Proposition 1: Risk hedging/management can increase value only if they affect cash flows, growth rates, discount rates and/or length of the growth period.

Proposition 2: When risk hedging/management has no effect on cash flows, growth rates, discount rates and/or length of the growth period, it can have no effect on value.

Risk Hedging/ Management and Value

Valuation Component	*Effect of Risk Hedging*	*Effect of Risk Management*
Costs of equity and capital	Reduce cost of equity for private and closely held firms. Reduce cost of debt for heavily levered firms with significant distress risk	May increase costs of equity and capital, if a firm increases its exposure to risks where it feels it has a differential advantage.
Cash flow to the Firm	Cost of risk hedging will reduce earnings. Smoothing out earnings may reduce taxes paid over time.	More effective risk management may increase operating margins and increase cash flows.
Expected Growth rate during high growth period	Reducing risk exposure may make managers more comfortable taking risky (and good) investments. Increase in reinvestment rate will increase growth.	Exploiting opportunities created by risk will allow the firm to earn a higher return on capital on its new investments.
Length of high growth period	No effect	Strategic risk management can be a long-term competitive advantage and increase length of growth period.

Steps in Developing a Risk Strategy: Potential Problems and Possible Opportunities

	What is it?	*Who does it now?*	*Limitations/ Problems*	*Possible Improvements*
Step 1	Make an inventory of all of the risks that the firm is faced with – firm specific, sector and market.	Internal. Managers of firms do this now, but often haphazardly and in reaction to events.	Managers may be good at identifying firm-specific problems but may not be very good at assessing sector or market risks. They may miss some risks and inflate others.	A team with sector expertise and experience can do a much more comprehensive job.
Step 2	Decide what risks should be hedged and should not.	Managers of the firm with significant input (and sales pitches) from investment bankers and insurance companies.	Conflict of interest. Not surprisingly, the investment banker or insurance company will want managers to over hedge risk and argue that their products are the best ones.	Look for unbiased advice on both components; in effect, you want an outsider with no ax to grind to assess risk hedging products to find cheapest and best alternatives.
Step 3	For the risks to be hedged, pick the risk hedging products which can be derivatives or insurance products			
Step 4	Determine the risk dimensions where you have an advantage over your competitors either because you understand the risk better or you control a resource.	If it occurs, it is usually part of strategic management and consultants and is packaged with other strategic objectives.	Risk gets short shrift since the focus is on rewards. In other words, strategies that offer higher growth will win out over ones which emphasize risk advantages.	Develop a team that focuses only on strategic risk taking. Draw on services that offer advice purely on this dimension
Step 5	Take strategic steps to ensure that you can use this risk advantage to gain over your competition.			

Step 1: Developing a risk profile

1. List the risks you are exposed to as a business, from the risk of a supplier failing to deliver supplies to environmental/social risk.
2. Categorize the risk into groups: Not all risks are made equal and it makes sense to break risks down into:
    a) Economic versus non-Economic risks
    b) Market versus Firm-specific risks
    c) Operating versus Financial risk
    d) Continuous versus Discrete risk
    e) Catastrophic versus smaller risks
3. Measure exposure to each risk (if possible): Use historical data and subjective judgments to make your best estimates.

Task 1: Risk in your organization

- List the five biggest risks that you see your firm (organization) facing, and then categorize them.

Risk	Micro or Macro	Discrete or Continuous	Catastrophic or Small
1.			
2.			
3.			
4.			
5.			

Step 2: Decide on what risks to take, which ones to avoid and which ones to pass through

- Every business (individual) is faced with a laundry list of risks. The key to success is to not avoid every risk, or take every one but to classify these risks into
  - Risks to pass through to the investors in the business.
  - Risks to avoid or hedge.
  - Risks to seek out
- In practice, firms often hedge risk that they should be passing through, seek out some risks that they should not be seeking out and avoid risks that they should be taking.

a. Risk Hedging: Potential Benefits

a. Tax Benefits: Hedging may reduce taxes paid by either smoothing out earnings or from the tax treatment of hedging expenses.

b. Better investment decisions: Hedging against macroeconomic risk factors may create better investment decisions because

- Managers are risk averse and protecting against some "uncontrollable" risks may allow them to focus better on business decisions.
- Capital markets are imperfect

c. Distress costs: Hedging may reduce the chance that a firm will face distress (and cease to exist) and thus reduce indirect bankruptcy costs.

d. Capital Structure: Hedging risk may allow a firm to borrow more money and take advantage of the tax code's bias to debt.

e. Informational benefits: Hedging against macroeconomic risks makes earnings more informative, by eliminating the noise create by shifts in macroeconomic variables.

And costs…

- Explicit costs: When companies hedge risk against risk by either buying insurance or put options, the cost of hedging is the cost of buying the protection against risk. It increases costs and reduces income.
- Implicit costs: When you buy/sell futures or forward contracts, you have no upfront explicit cost but you have an implicit cost. You give up upside to get downside protection.

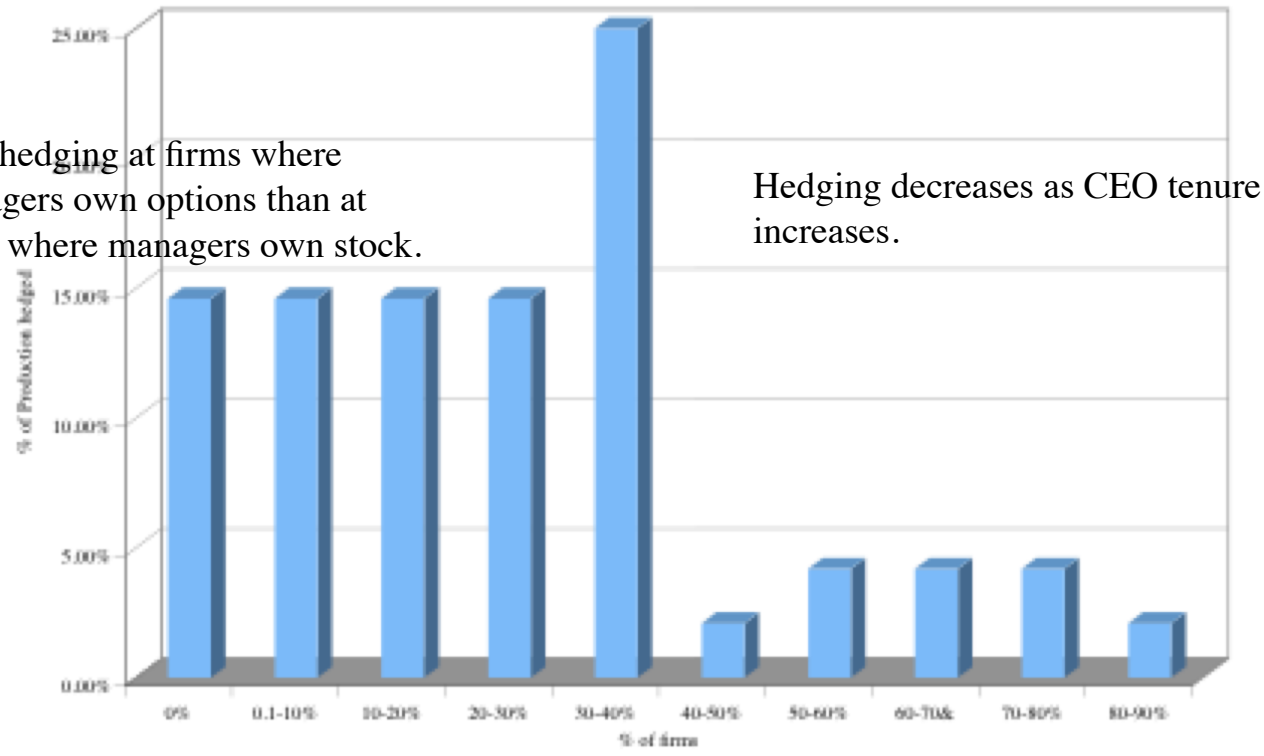
  A related and subjective implicit cost is that buying protection may give managers too much insulation against that risk and provide them with a false sense of security.

Evidence on hedging..

- Hedging is common: In 1999, Mian studied the annual reports of 3,022 companies in 1992 and found that 771 of these firms did some risk hedging during the course of the year.
- Large firms hedge more: Looking across companies, he concluded that larger firms were more likely to hedge than smaller firms, indicating that economies of scale allow larger firms to hedge at lower costs.
- Some risks are hedged more frequently: Exchange rate risk is the most commonly hedged risk because it is easy and relatively cheap to hedge and also because it affects accounting earnings (through translation exposure). Commodity risk is the next most hedged risk by both suppliers of the commodity and users.

At commodity companies..
Hedging at gold mining companies.

Figure 10.1: Production Hedging at Gold Mining Companies: 1990-93



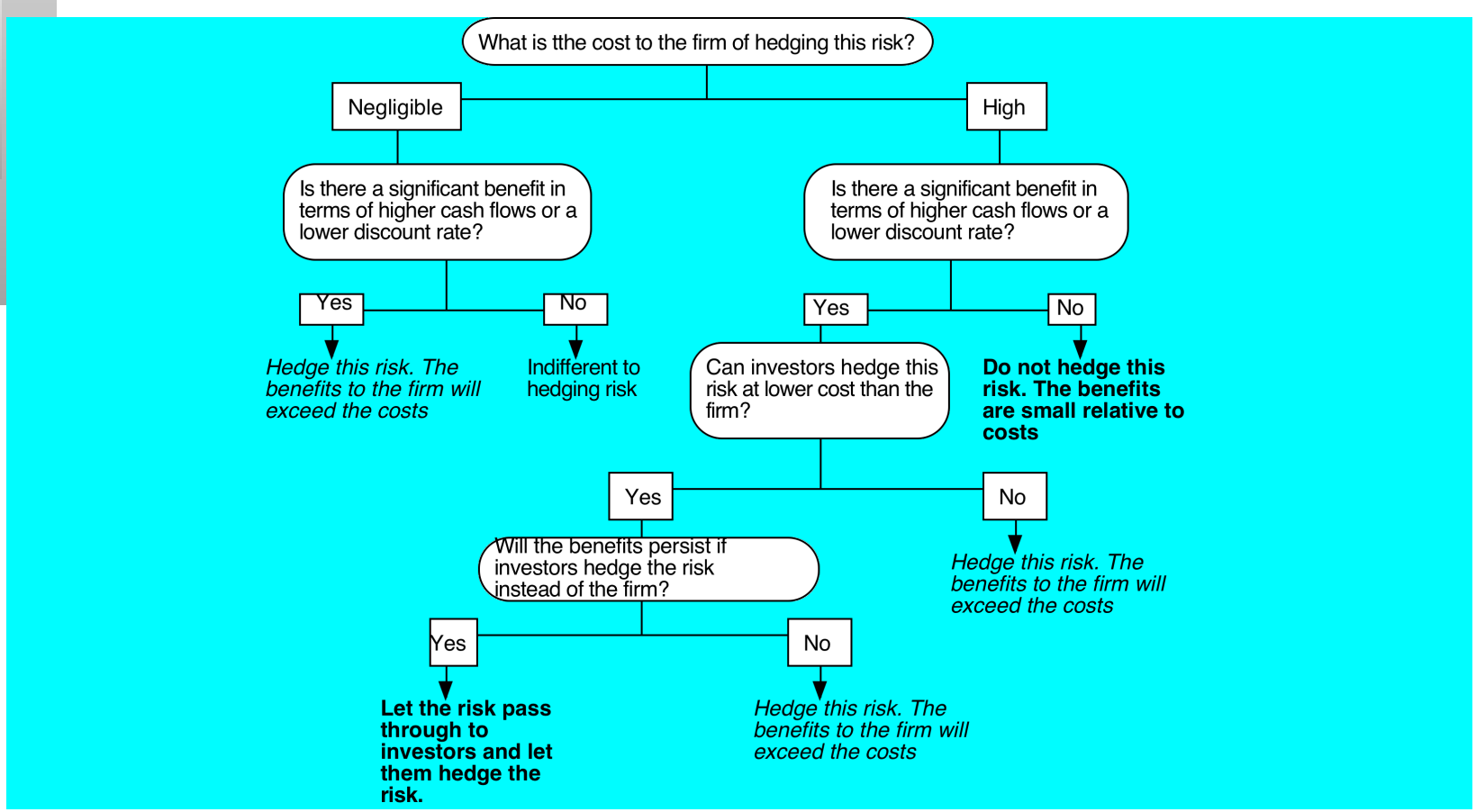
Less hedging at firms where managers own options than at firms where managers own stock.

Hedging decreases as CEO tenure increases.

Does hedging affect value?

- Studies that examine whether hedging increase value range from finding marginal gains to mild losses.
  - Smithson presents evidence that he argues is consistent with the notion that risk management increases value, but the increase in value at firms that hedge is small and not statistically significant.
  - Mian finds only weak or mixed evidence of the potential hedging benefits– lower taxes and distress costs or better investment decisions. In fact, the evidence in inconsistent with a distress cost model, since the companies with the greatest distress costs hedge the least.
  - Tufano's study of gold mining companies finds little support for the proposition that hedging is driven by the value enhancement
- In summary, the benefits of hedging are hazy at best and non-existent at worst, when we look at publicly traded firms. A reasonable case can be made that most hedging can be attributed to managerial interests being served rather than increasing stockholder value.

A framework for risk hedging..



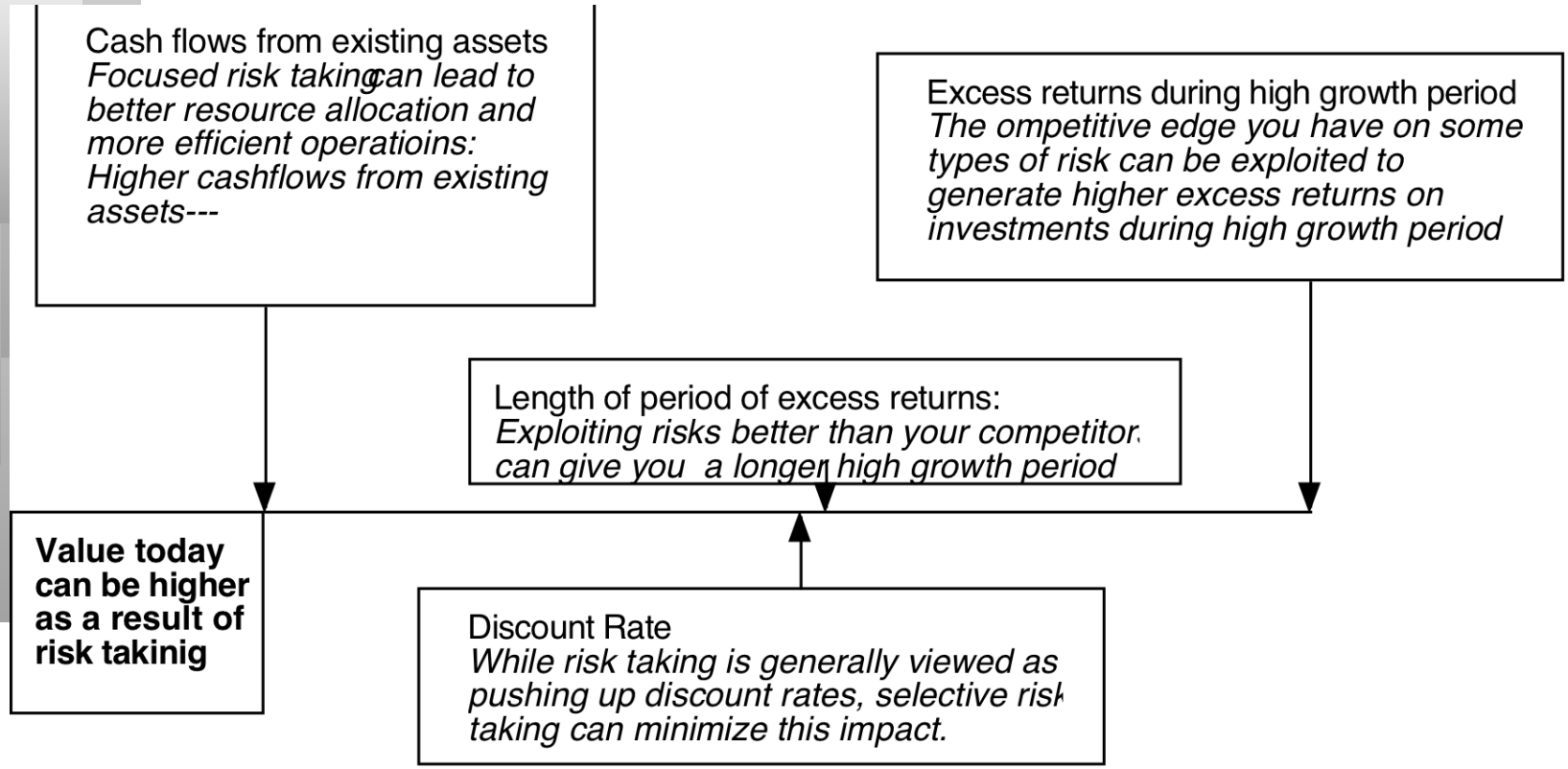
Hedging Alternatives..

- Investment Choices: By investing in many projects, across geographical regions or businesses, a firm may be able to get at least partial hedging against some types of risk.
- Financing Choices: Matching the cash flows on financing to the cash flows on assets can also mitigate exposure to risk. Thus, using peso debt to fund peso assets can reduce peso risk exposure.
- Insurance: Buying insurance can provide protection against some types of risk. In effect, the firm shifts the risk to the insurance company in return for a payment.
- Derivatives: In the last few decades, options, futures, forward contracts and swaps have all been used to good effect to reduce risk exposure.

The right tool for hedging…

- If you want complete, customized risk exposure, *forward contracts* can be designed to a firm's specific needs, but only if the firm knows these needs. The costs are likely to be higher and you can be exposed to credit risk (in the other party to the contract).
- *Futures contracts* provide a cheaper alternative to forward contracts, since they are traded on the exchanges and not customized and there is no credit risk. However, they may not provide complete protection against risk.
- *Option contracts* provide protection against only downside risk while preserving upside potential. This benefit has to be weighed against the cost of buying the options, which will vary with the amount of protection desired.
- In combating event risk, a firm can either *self-insure* or use a *third party insurance* product. Self insurance makes sense if the firm can achieve the benefits of risk pooling on its own, does not need the services or support offered by insurance companies and can provide the insurance more economically than the third party.

b. Risk Taking: Effect on Value



Evidence on risk taking and value..

- The most successful companies in any economy got there by seeking out and exploiting risks and uncertainties and not by avoiding these risks.
- Across time, on average, risk taking has paid off for investors and companies.
- At the same time, there is evidence that some firms and investors have been destroyed by either taking intemperate risks or worse, from the downside of taking prudent risks.
- In conclusion, then, there is a positive payoff to risk taking but not if it is reckless. Firms that are selective about the risks they take can exploit those risks to advantage, but firms that take risks without sufficiently preparing for their consequences can be hurt badly.

How do you exploit risk?

- To exploit risk better than your competitors, you need to bring something to the table. In particular, there are five possible advantages that successful risk taking firms exploit:

a. Information Advantage: In a crisis, getting better information (and getting it early) can allow be a huge benefit.

b. Speed Advantage: Being able to act quickly (and appropriately) can allow a firm to exploit opportunities that open up in the midst of risk.

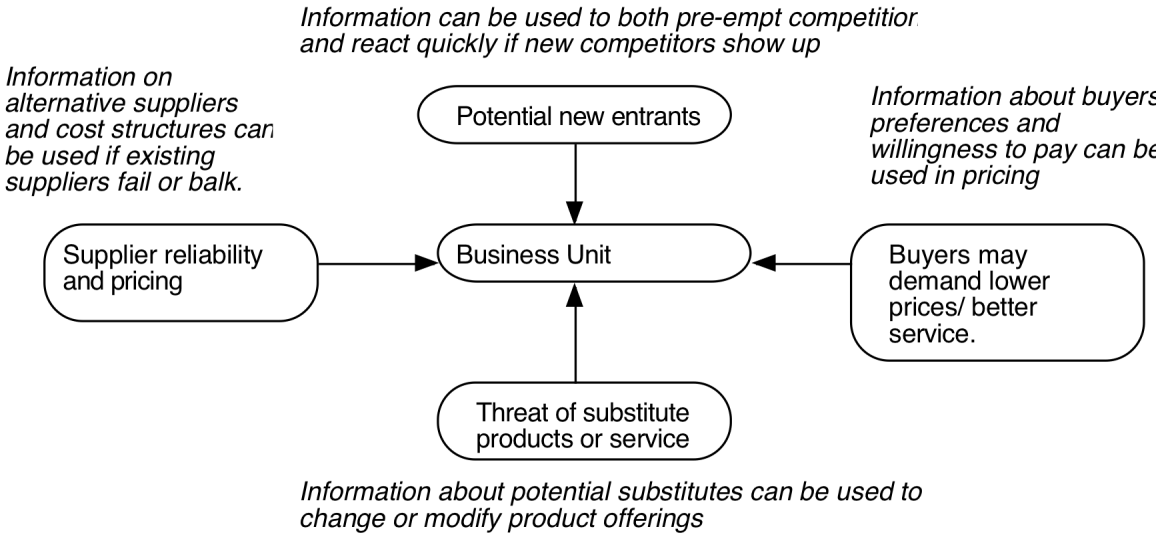
c. Experience/Knowledge Advantage: Firms (and managers) who have been through similar crises in the past can use what they have learned.

d. Resource Advantage: Having superior resources can allow a firm to withstand a crisis that devastates its competition.

e. Flexibility: Building in the capacity to change course quickly can be an advantage when faced with risk.

a. The Information Advantage

- Invest in information networks. Businesses can use their own employees and the entities that they deal with – suppliers, creditors and joint venture partners – as sources of information.
- Test the reliability of the intelligence network well before the crisis hits with the intent of removing weak links and augmenting strengths.
- Protect the network from the prying eyes of competitors who may be tempted to raid it rather than design their own.



b. The Speed Advantage

- Improve the quality of the information that you receive about the nature of the threat and its consequences. Knowing what is happening is often a key part of reacting quickly.
- Recognize both the potential short term and long-term consequences of the threat. All too often, entities under threat respond to the near term effects by going into a defensive posture and either downplaying the costs or denying the risks when they would be better served by being open about the dangers and what they are doing to protect against them.
- Understand the audience and constituencies that you are providing the response for. A response tailored to the wrong audience will fail.

c. The Experience/Knowledge Advantage

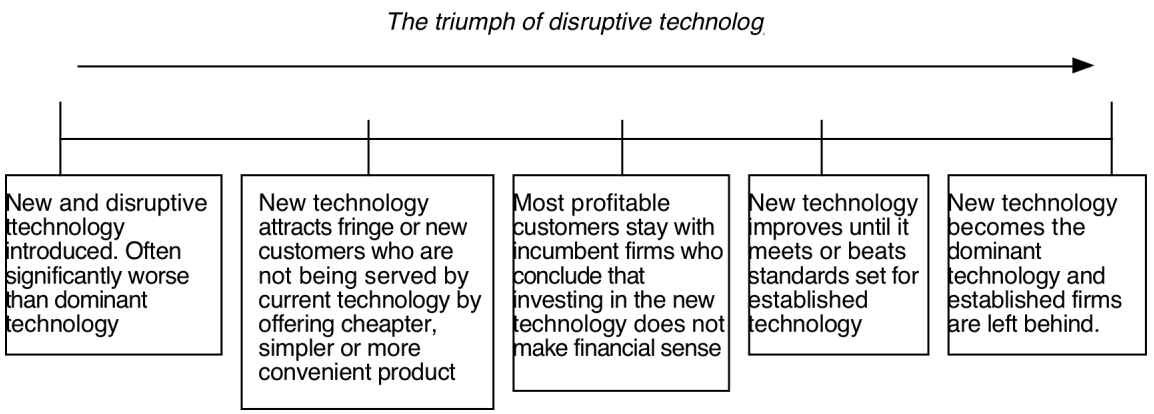
- Expose the firm to new risks and learn from mistakes. The process can be painful and take decades but experience gained internally is often not only cost effective but more engrained in the organization.
- Acquire firms in unfamiliar markets and use their personnel and expertise, albeit at a premium.. The perils of this strategy, though, are numerous, beginning with the fact that you have to pay a premium in acquisitions and continuing with the post-merger struggle of trying to integrate firms with two very different cultures. Studies of cross border acquisitions find that the record of failure is high.
- Try to hire away managers of firms or share (joint ventures) in the experience of firms that have lived through specific risks.
- Find a way to build on and share the existing knowledge/experience within the firm.

d. The Resource Advantage

- Capital Access: Being able to access capital markets allows firms to raise funds in the midst of a crisis. Thus, firms that operate in more accessible capital markets should have an advantage over firms that operate in less accessible capital markets.
- Debt capacity: One advantage of preserving debt capacity is that you can use it to meet a crisis. Firms that operate in risky businesses should therefore hold less debt than they can afford. In some cases, this debt capacity can be made explicit by arranging lines of credit in advance of a crisis.

e. The Flexibility Advantage

- Being able to modify production, operating and marketing processes quickly in the face of uncertainty and changing markets is key to being able to take advantage of risk. Consequently, this may require having more adaptable operating models (with less fixed costs), even if that requires you to settle for lower revenues.
- In the 1990s, corporate strategists argued that as firms become more successful, it becomes more difficult for them to adapt and change.



Task 2: Risk actions

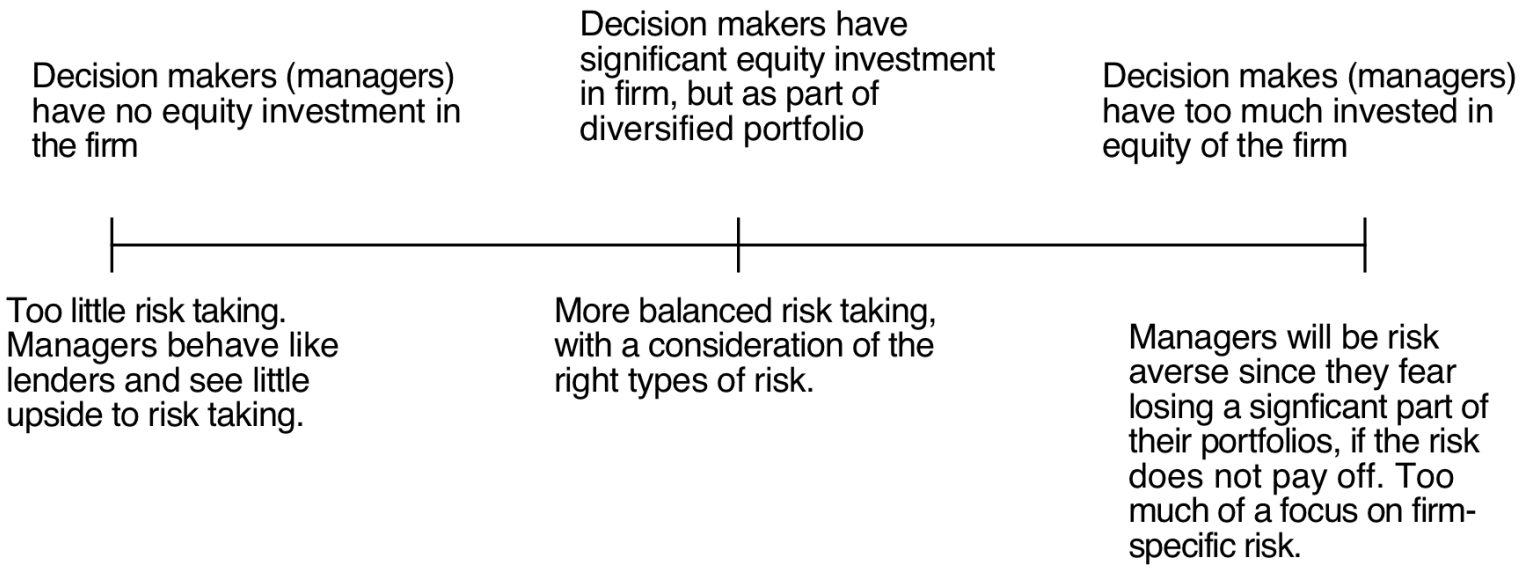
- Take the five risks that you listed in task 1 and consider for each one, whether you will pass the risk through to your investors, hedge the risk or seek out and exploit the risk.

Risk	Action (Hedge, Pass through or exploit)	Why?

Step 3: Build a successful risk taking organization..

- While firms sometimes get lucky, consistently successful risk taking cannot happen by accident.
- In particular, firms have to start preparing when times are good (and stable) for bad and risky times.

3.1: Align interests…

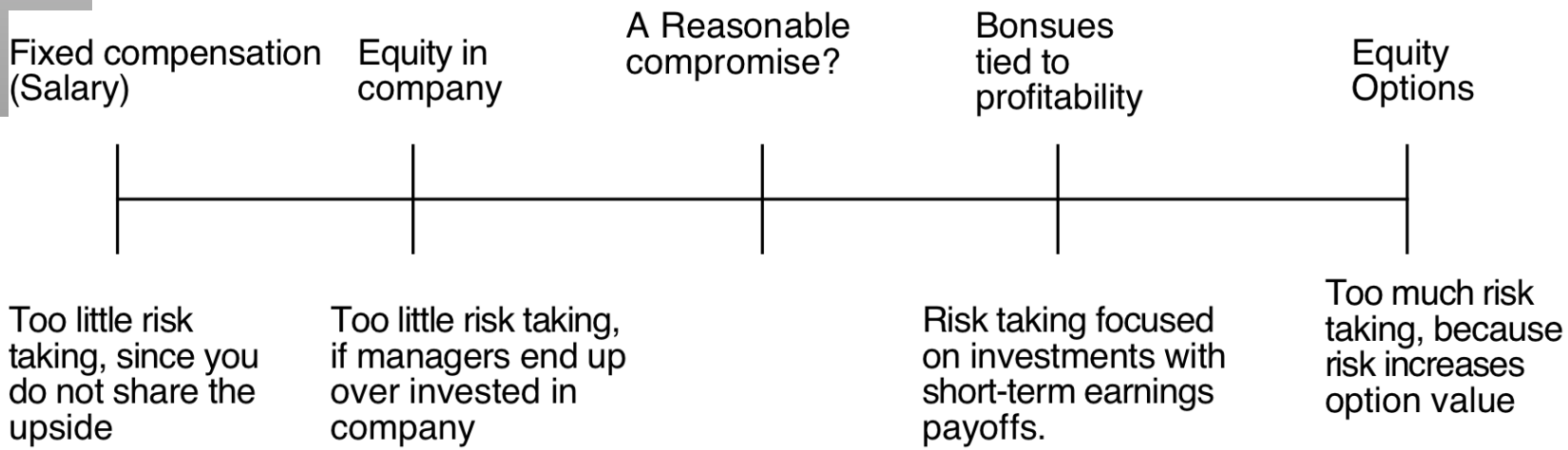


3.2: Pick the right people

- Good risk takers
  - Are realists who still manage to be upbeat.
  - Allow for the possibility of losses but are not overwhelmed or scared by its prospects.
  - Keep their perspective and see the big picture.
  - Make decisions with limited and often incomplete information
- To hire and retain good risk takers
  - Have a hiring process that looks past technical skills at crisis skills
  - Accept that good risk takers will not be model employees in stable environments.
  - Keep them challenged, interested and involved. Boredom will drive them away.
  - Surround them with kindred spirits.

3.3: Make sure that the incentives for risk taking are set correctly…

- You should reward good risk taking behavior, not good outcomes and punish bad risk taking behavior, even if it makes money.



3.4: Make sure the organizational size and culture are in tune..

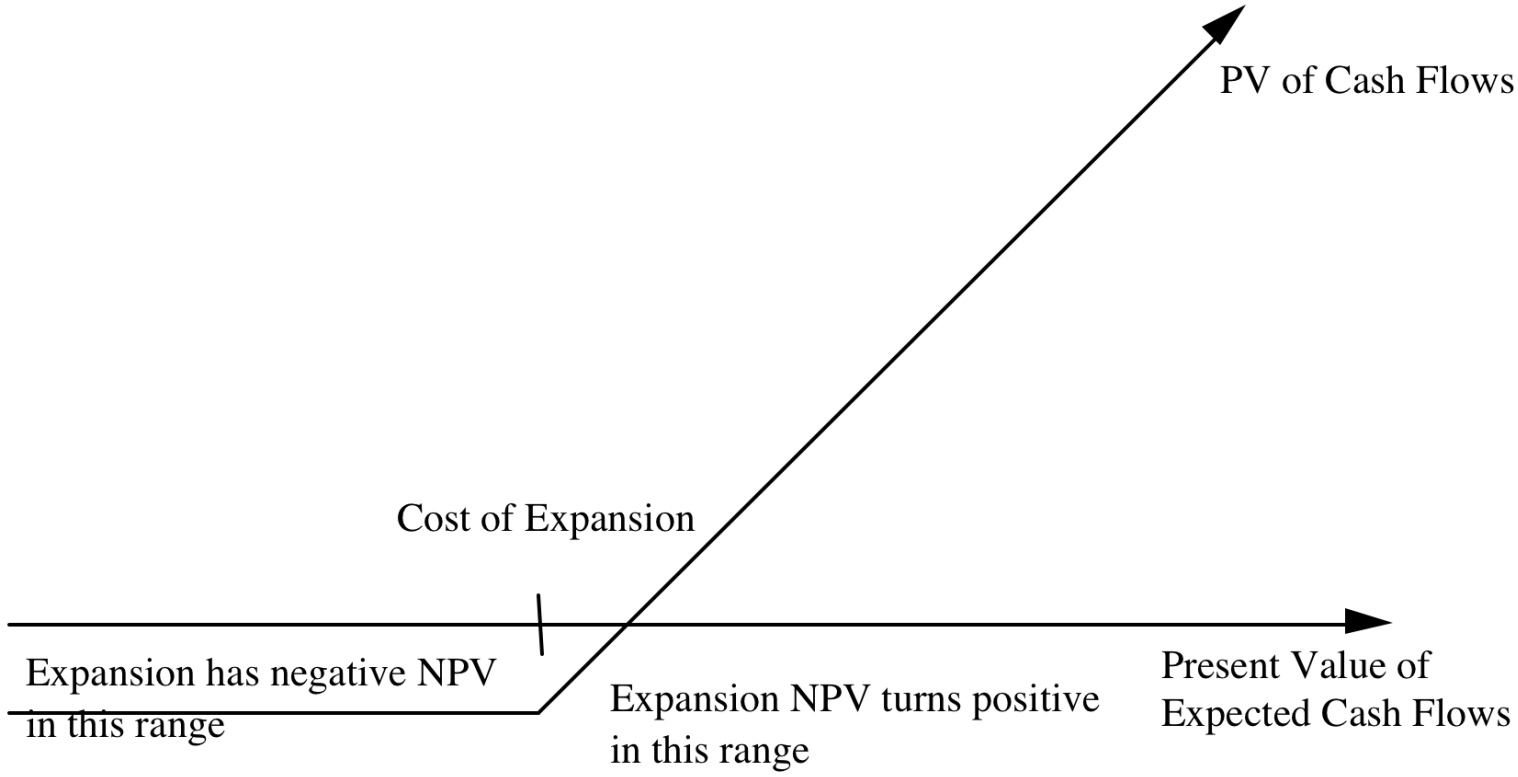
- Organizations can encourage or discourage risk based upon how big they are and how they are structured. Large, layered organizations tend to be better at avoiding risk whereas smaller, flatter organizations tend to be better at risk taking. Each has to be kept from its own excesses.
- The culture of a firm can also act as an engine for or as a brake on sensible risk taking. Some firms are clearly much more open to risk taking and its consequences, positive as well as negative. One key factor in risk taking is how the firm deals with failure rather than success; after all, risk takers are seldom punished for succeeding.

3.5. Preserve your options..

- Even if you are a sensible risk taker and measure risks well, you will be wrong a substantial portion of the time. Sometimes, you will be wrong on the upside (you under estimate the potential for profit) and sometimes, you will be wrong on the downside.
- Successful firms preserve their options to take advantage of both scenarios:
  - The option to expand an investment, if faced with the potential for more upside than expected.
  - The option to abandon an investment, if faced with more downside than expected.

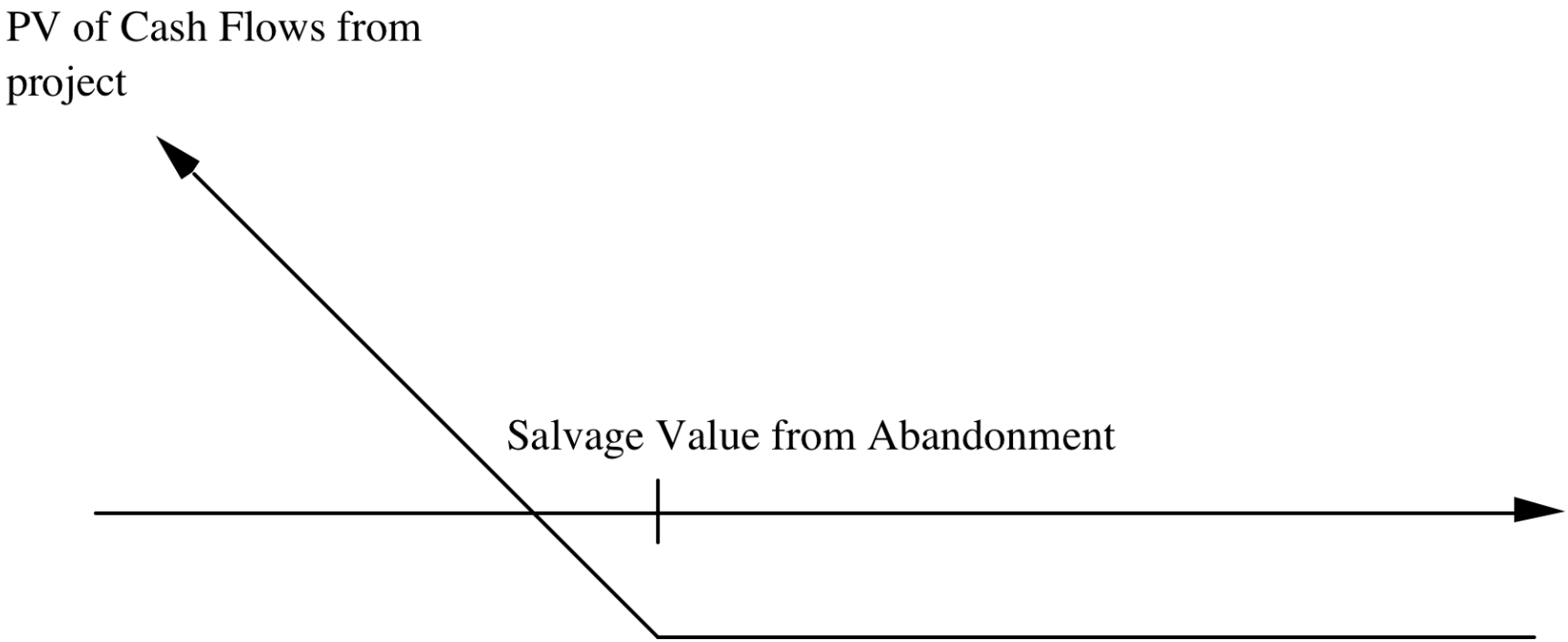
The option to expand

Figure 8.6: The Option to Expand a Project



The option to abandon

Figure 8.8: The Option to Abandon a Projectt



Task 3: Assess the "risk taking" capacity of your organization

Dimension	Your organization's standing
1. Are the interests of managers aligned with the interests of capital providers?	❑Aligned with stockholders ❑Aligned with bondholders ❑Aligned with their own interests
2. Do you have the right people in place to deal with risk?	❑Too many risk takers ❑Too many risk avoiders ❑Right balance
3. Is the incentive process designed to encourage good risk taking?	❑Discourages all risk taking ❑Encourages too much risk taking ❑Right balance
4. What is the risk culture in your organization?	❑Risk seeking ❑Risk avoiding ❑No risk culture
5. Have much flexibility is there in terms of exploiting upside risk and protecting against downside risk?	❑Good on exploiting upside risk ❑Good in protecting against downside ❑Good on both

And here is the most important ingredient in risk management: Be lucky…

- There is so much noise in this process that the dominant variable explaining success in any given period is luck and not skill.

Proposition 1: Today's hero will be tomorrow's goat (and vice verse) There are no experts. Let your common sense guide you.

Proposition 2: Don't mistake luck for skill: Do not over react either to success or to failure. Chill.

Proposition 3: Life is not fair: You can do everything right and go bankrupt. You can do everything wrong and make millions.

Propositions about risk

1. Risk is everywhere
2. Risk is threat and opportunity
3. We (as human beings) are ambivalent about risk and not always rational in the way we deal with it.
4. Not all risk is created equal: Small versus Large, symmetric versus asymmetric, continuous vs discrete, macro vs micro.
5. Risk can be measured
6. Risk measurement/assessment should lead to better decisions
7. The key to risk management is deciding what risks to hedge, what risks to pass through and what risks to take.