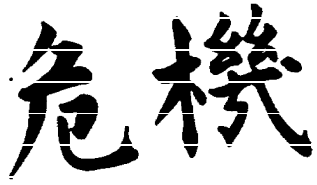
Danger and Opportunity: Musings on Risk

Aswath Damodaran

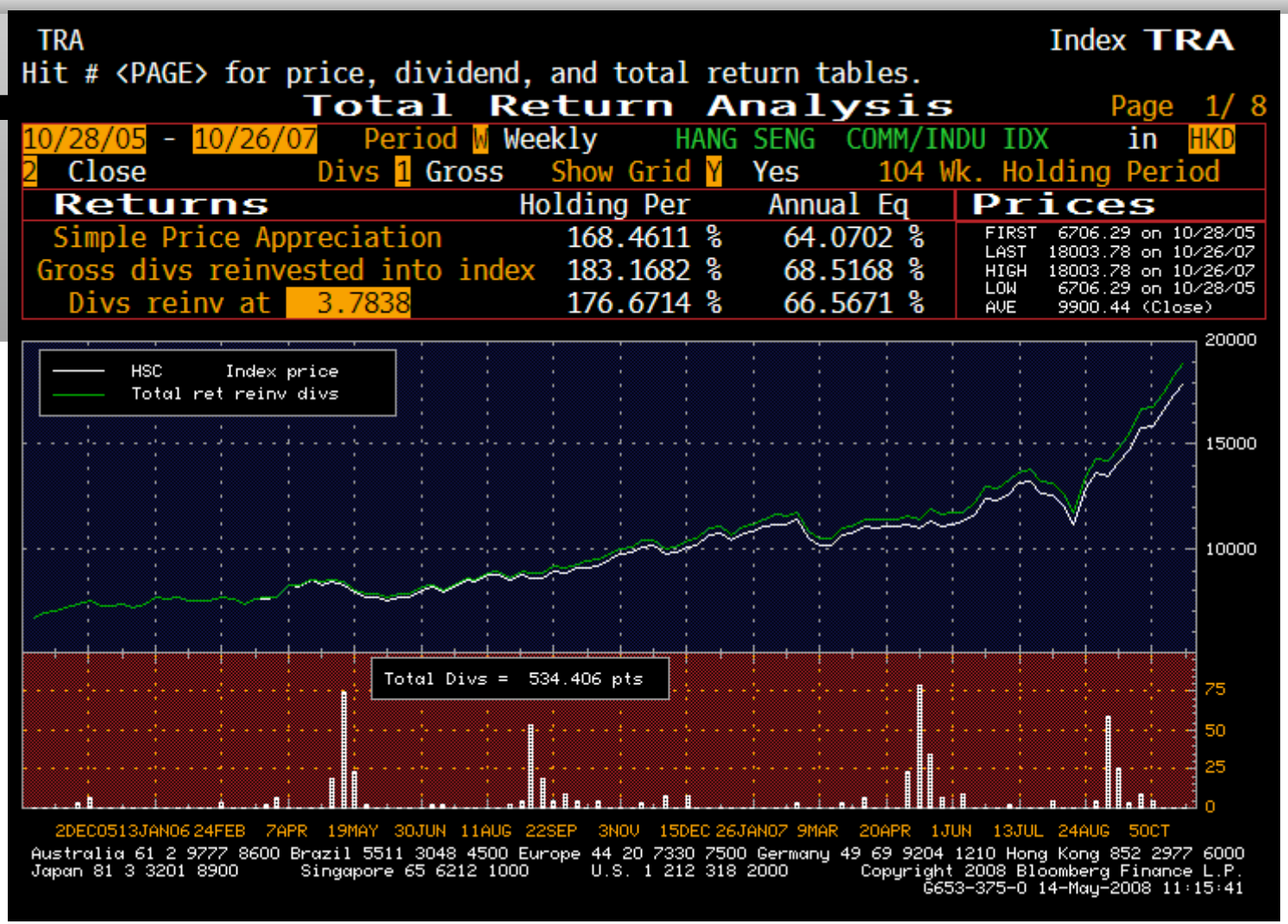
The essence of risk…

- 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.

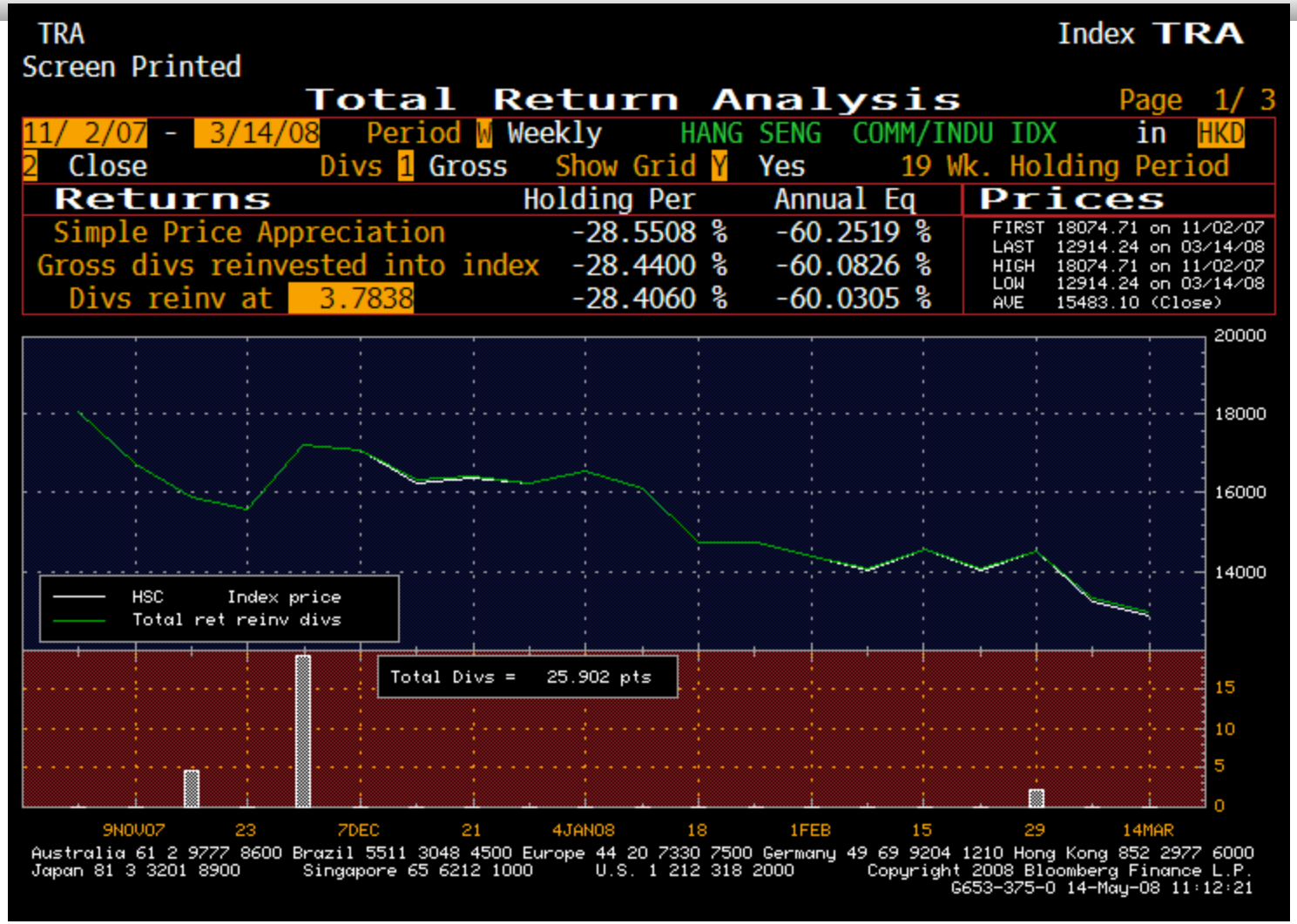
1. Where there is upside..



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.

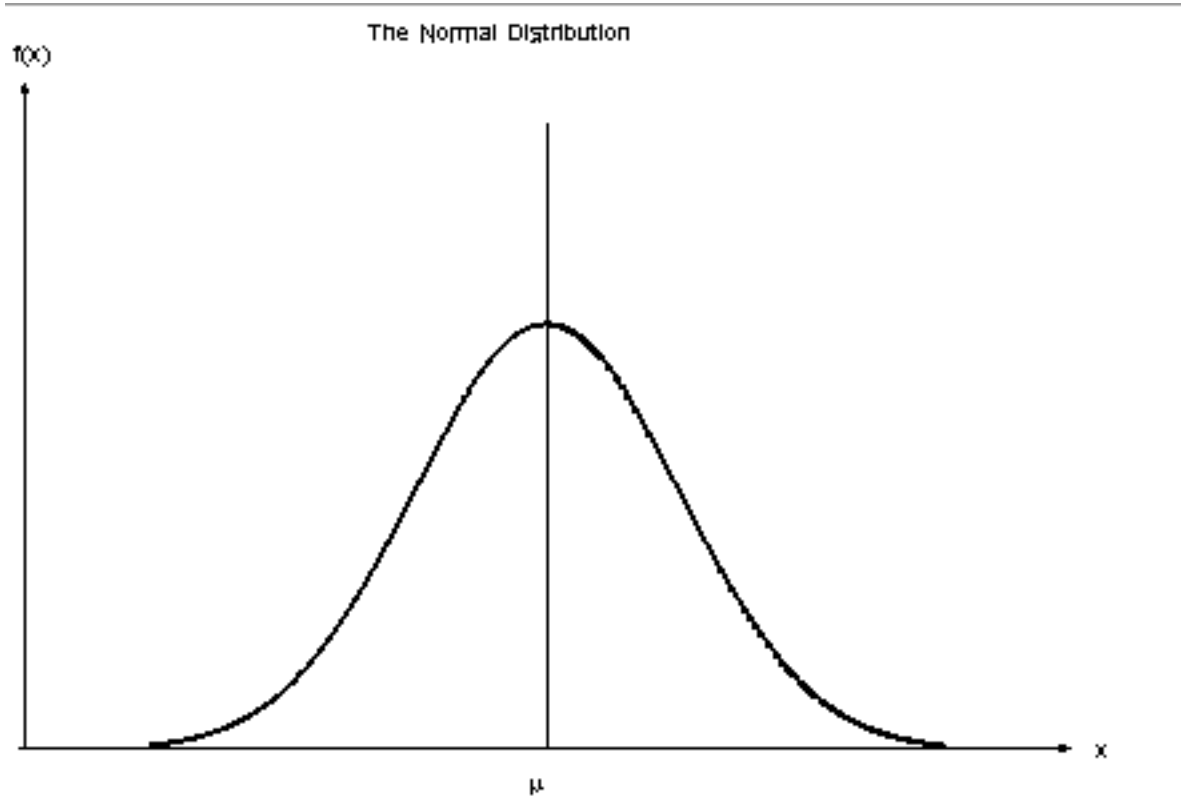
2. There is no arbitrage (File under: There is no free lunch)

- The essence of arbitrage is that you take no risks, invest no money and walk away with a profit.
- In practice, what passes for arbitrage can be categorized into either pseudo or fake arbitrage.
  - Under pseudo arbitrage, we would categorize most arbitrage based upon option and future pricing models. The arbitrage is dependent on both the model's assumptions and transactions costs.
  - Under fake arbitrage, we would categorize pretty much everything else that goes by that name – merger arbitrage, paired trading arbitrage. These are all speculative strategies with some or substantial risk associated with them.
- The danger in mislabeling strategies is not only that you mislead others but that you may fall for your own hype and "finance" these strategies as if they were riskless (The Long Term Capital Curse…)

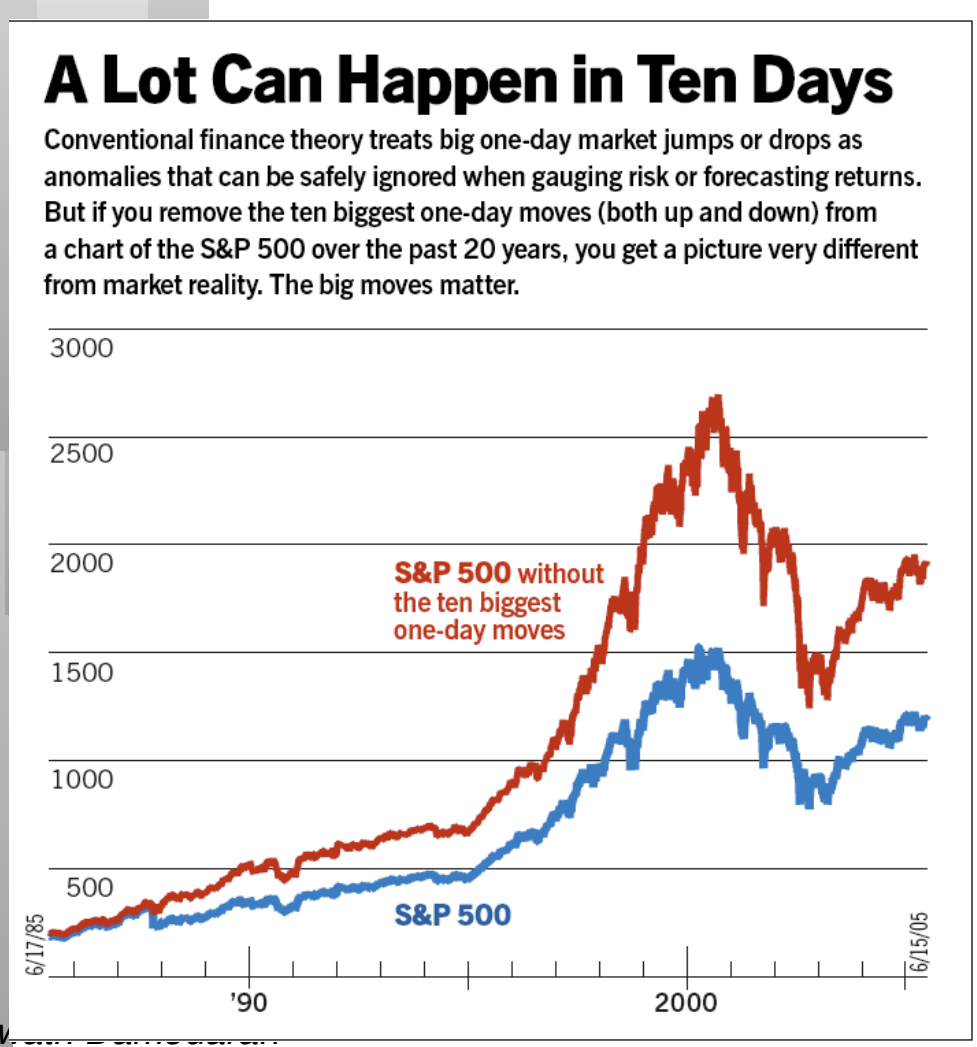
2.1: The model fixation…

- We have access to more data (and in a more timely form) than ever before and have the capacity to build bigger and more sophisticated models than every before. But some would argue that our mistakes are getting bigger, not smaller.
- Some potential reasons:
  - The complexity of the models cannot keep up with the complexity of the assets that they are valuing.
  - Complex models require more data inputs (with the resulting errors) than simpler models.
  - Complex models create output that is far more difficult to understand than simple models.

2.2: The Normal Distribution trap..

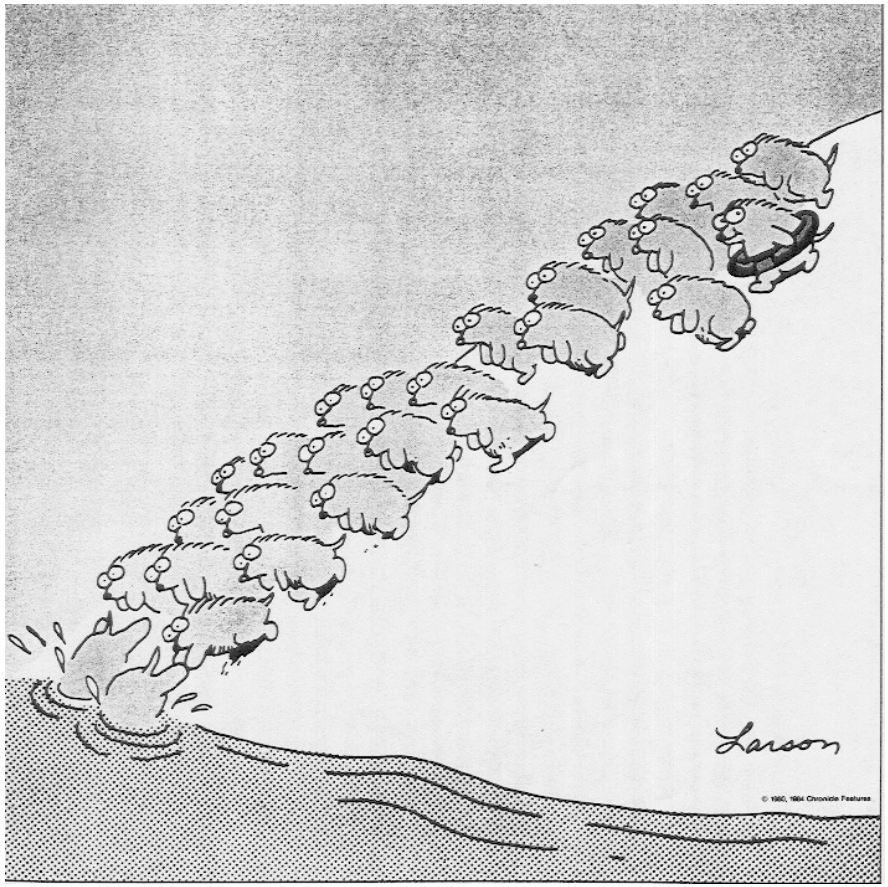


And the consequences…



	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

2.3: Smarter than the average lemming..



3. There is no risk in the past, it is all in the future..

- When measuring risk, we almost always look backwards because that is where the data lies.
  - We are implicitly assuming that was happened over the past is a good indicator of what will happen in the future (mean reversion) and that the fundamentals that generated those past numbers have not changed significantly.
  - To the extent that one or both these assumptions is wrong, past data is not a good indicator of the future.
- We also tend to measure risk and come up with risk assessments for the assets classes that we are most comfortable with – high yield bonds, real estate, stocks – and do not check for consistency across different risky asset classes.

3.1: When you use historical data, consider the error in your estimates…

- The historical premium is the premium that stocks have historically earned over riskless securities.
- For instance, looking at the US:

	Arithmetic average		*Geometric Average*	
	Stocks -		Stocks -	Stocks -	Stocks -
Historical Period	T.Bills	T.Bonds	T.Bills	T.Bonds
1928-2007	7.78%	6.42%	5.94%	4.79%
1967-2007	5.94%	4.33%	4.75%	3.50%
1997-2007	5.26%	2.68%	4.69%	2.34%

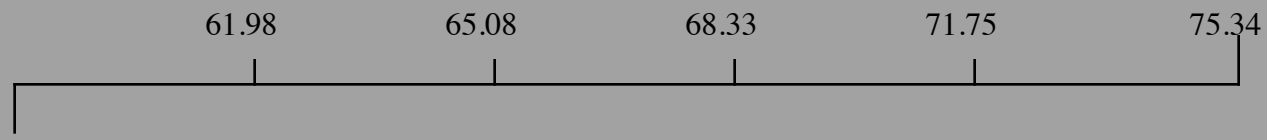
Consider the equity risk premium between 1997 and 2007. The average risk premium is 2.34%. What is the standard error in this estimate?

3.2: Look forwards, not backwards…

Between 2001 and 2007 dividends and stock buybacks averaged 4.02% of the index each year.

Analysts expect earnings to grow 5% a year for the next 5 years. We will assume that dividends & buybacks will keep pace..
Last year's cashflow (59.03) growing at 5% a year

After year 5, we will assume that earnings on the index will grow at 4.02%, the same rate as the entire economy (= riskfree rate).



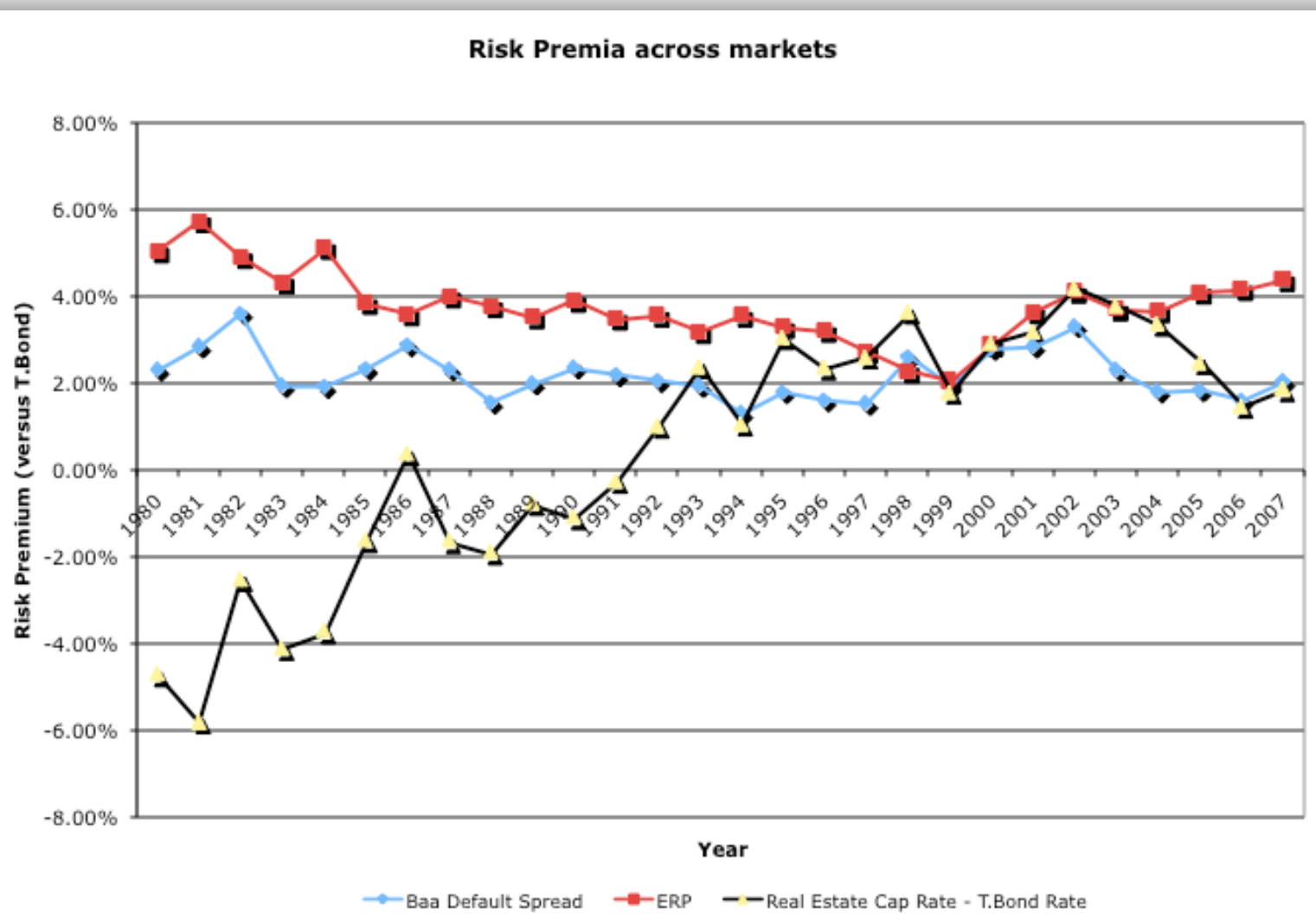
January 1, 2008
S&P 500 is at 1468.36
4.02% of 1468.36 = 59.03

- If we know what investors paid for equities at the beginning of 2007 and we can estimate the expected cash flows from equities, we can solve for the rate of return that they expect to make (IRR):

$$1468.36 = \frac{61.98}{(1+r)} + \frac{65.08}{(1+r)^2} + \frac{68.33}{(1+r)^3} + \frac{71.75}{(1+r)^4} + \frac{75.34}{(1+r)^5} + \frac{75.35(1.0402)}{(r-.0402)(1+r)^5}$$

- Expected Return on Stocks = 8.39%
- Implied Equity Risk Premium = Expected Return on Stocks - T.Bond Rate =8.39% - 4.02% = 4.37%

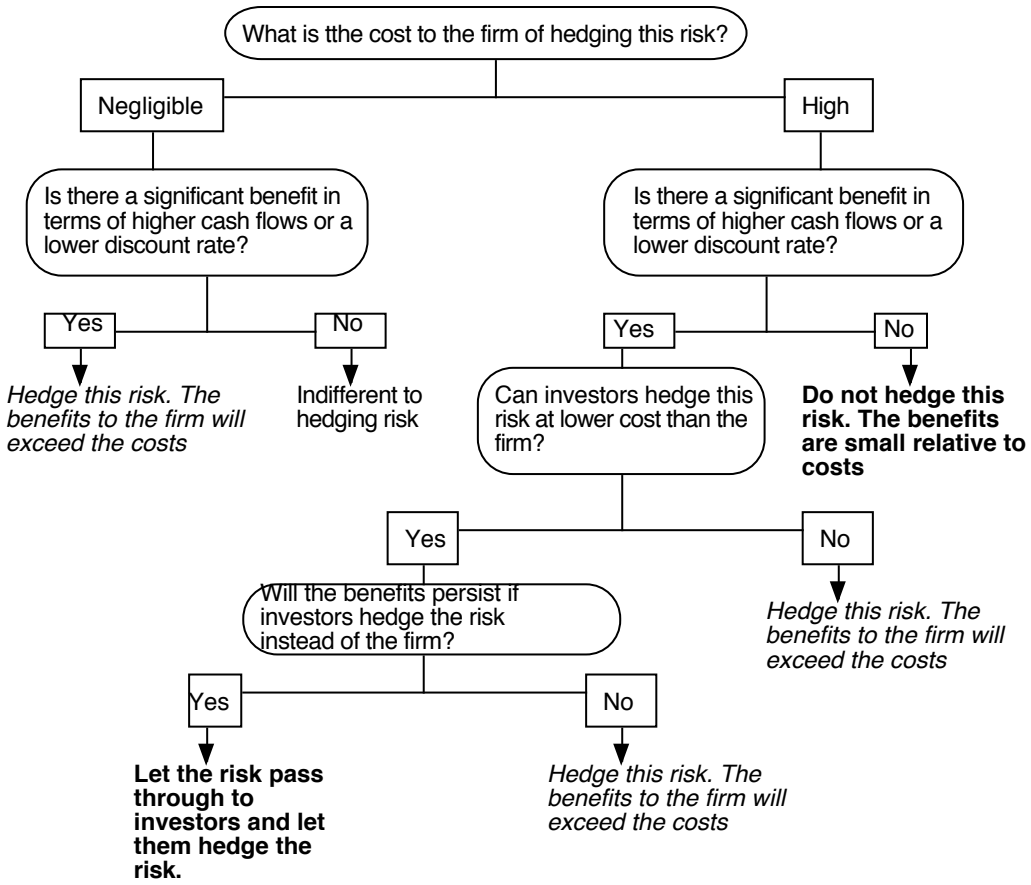
3.3. Check across markets for consistency…



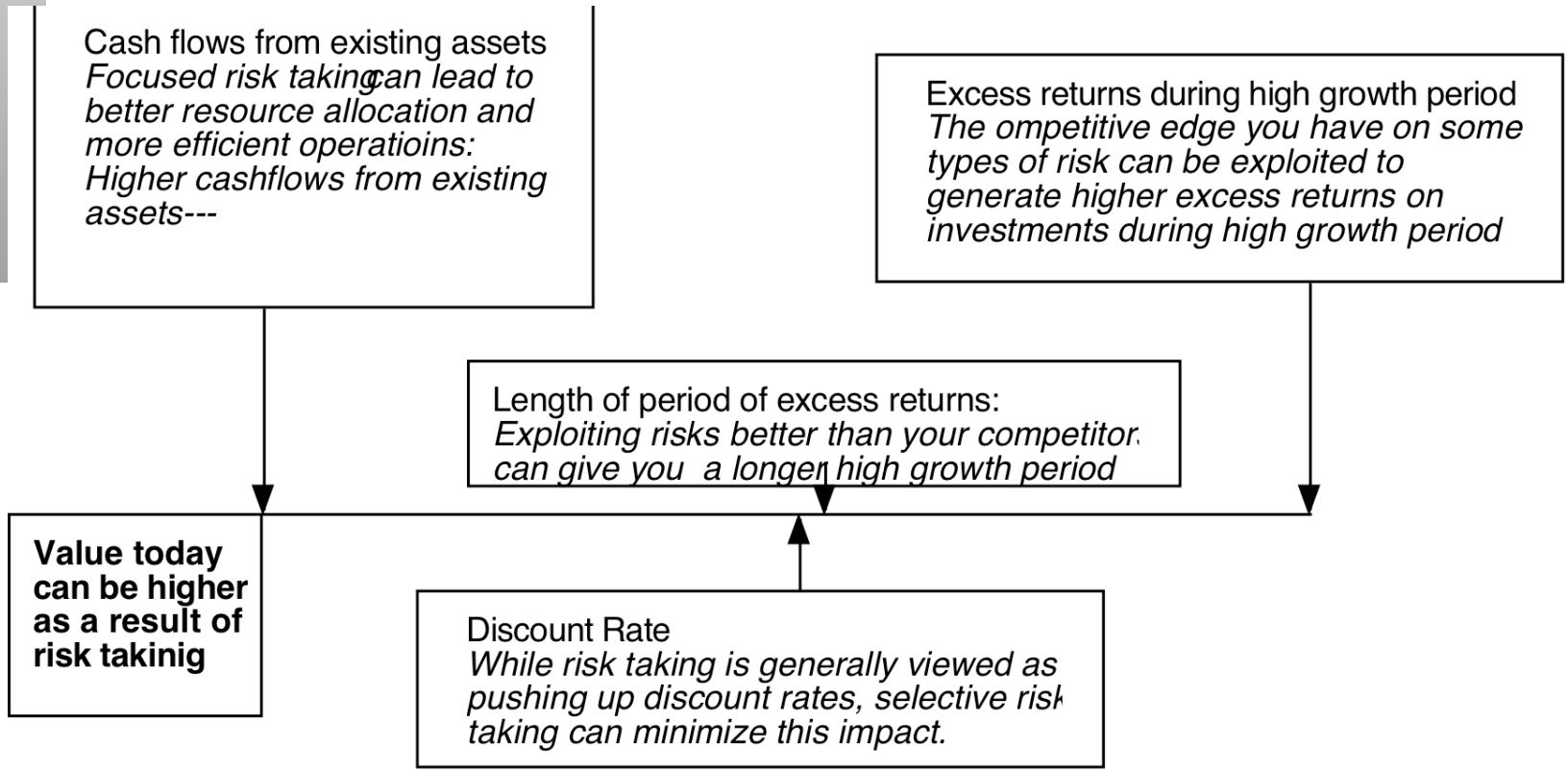
4. Decide on what risks to take, which ones to avoid and which ones to pass through

- 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.

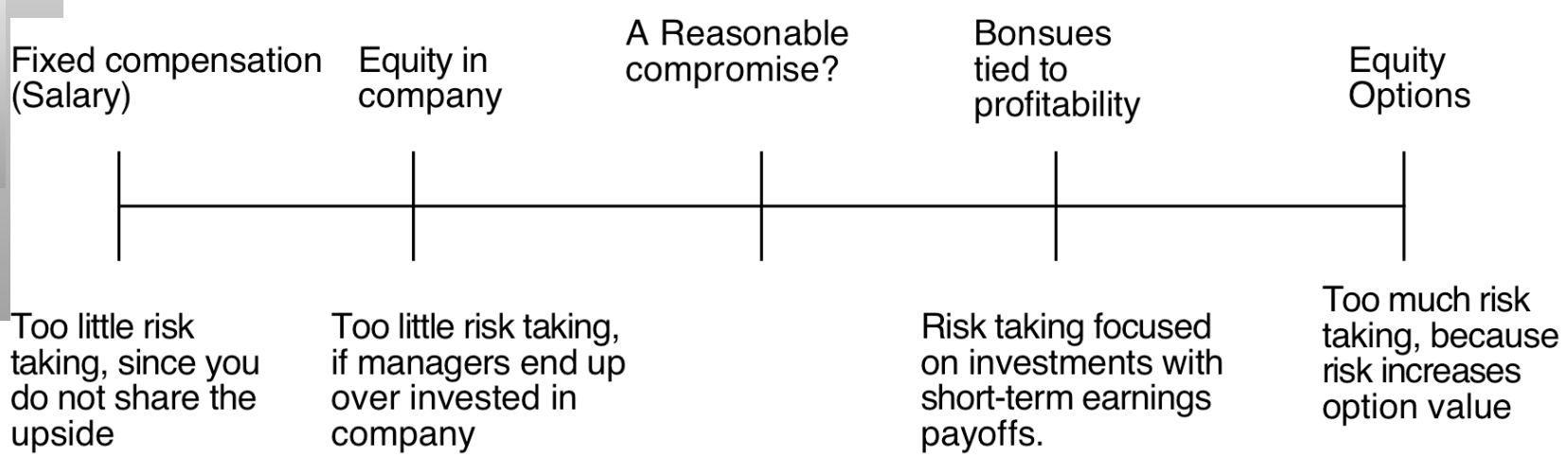
4.1: To hedge or not to hedge, that is the question…



4.2: The pay off to risk seeking..



4.3: But only if the incentives for risk taking are set correctly…

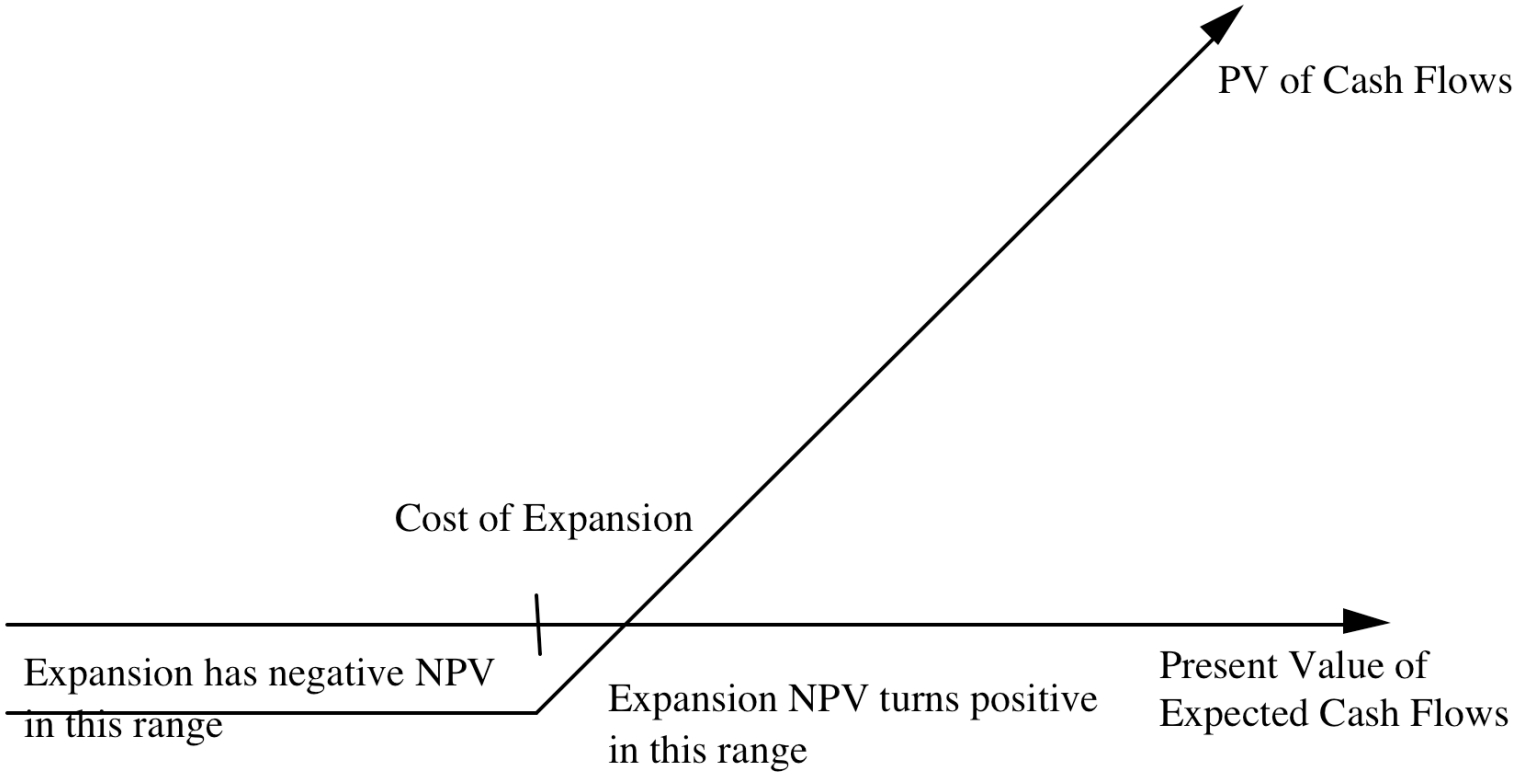


5. Preserve your options..

- 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.

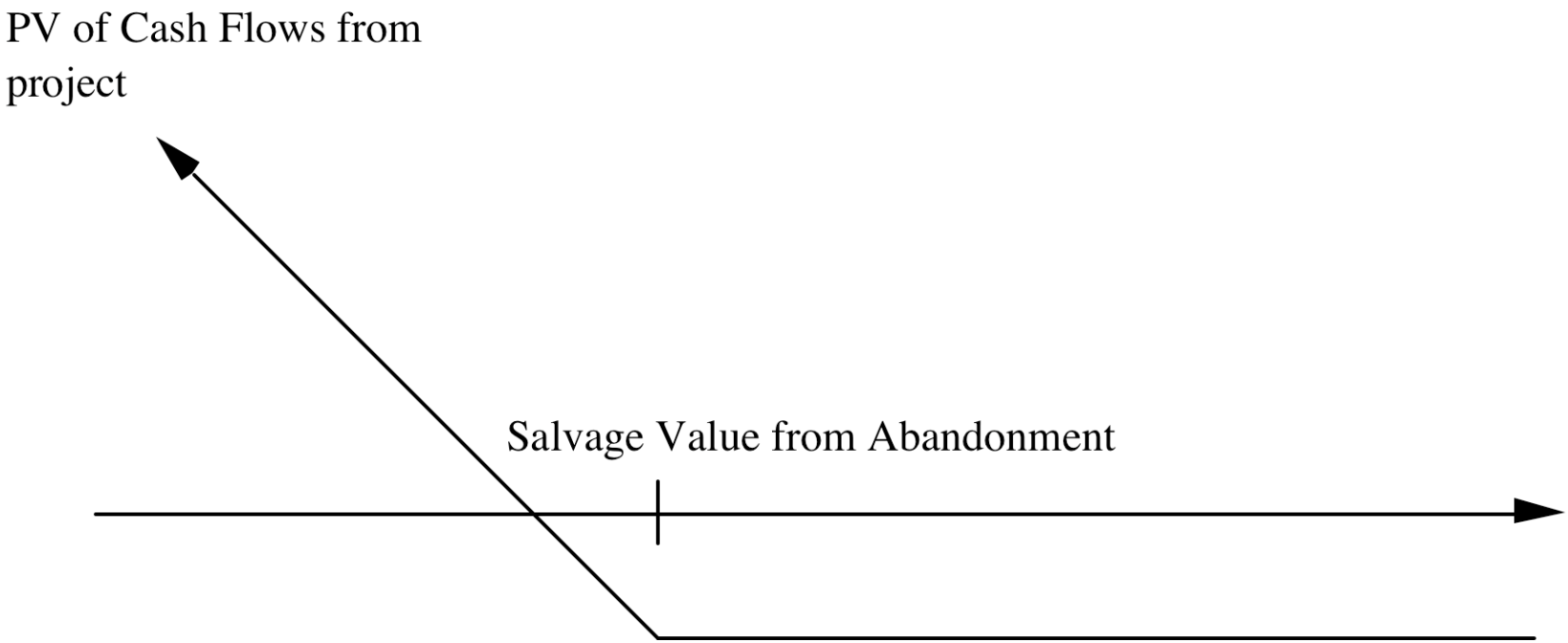
5.1: The option to expand

Figure 8.6: The Option to Expand a Project



5.2: The option to abandon

Figure 8.8: The Option to Abandon a Projectt



6. 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.

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

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

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