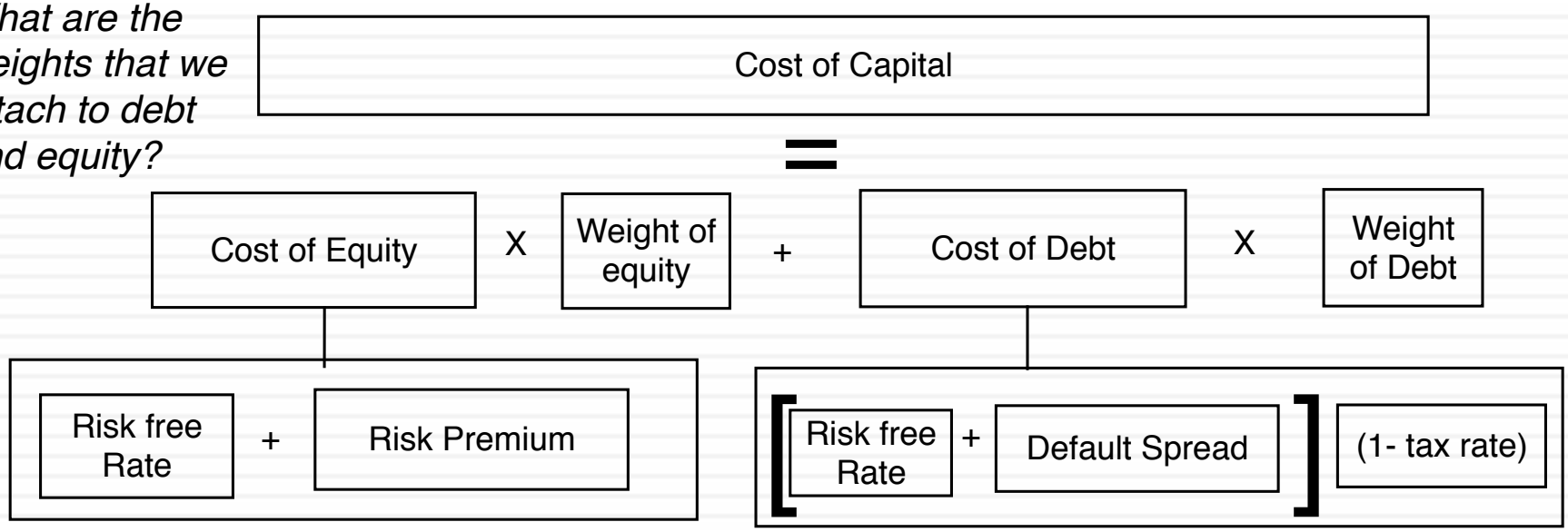
THE COST OF CAPITAL: MISUNDERSTOOD, MISESTIMATED AND MISUSED!

Aswath Damodaran

THE ULTIMATE MULTI-PURPOSE TOOL: AN OPPORTUNITY COST & OPTIMIZING TOOL

The Mechanics of Computing the Cost of Capital

What are the weights that we attach to debt and equity?



What should we use as the risk free rate?
What equity risks are rewarded?
Should we scale equity risk across companies?
How do we measure the risk premium per unit of risk?

How do we estimate the default spread?
What tax rate do we use?

In investment analysis: The cost of capital as a hurdle rate & opportunity cost

Accounting Test
Return on invested capital (ROIC) > Cost of Capital

Time Weighted CF Test
NPV of the Project > 0

Time Weighted % Return
IRR > Cost of Capital

The Hurdle Rate

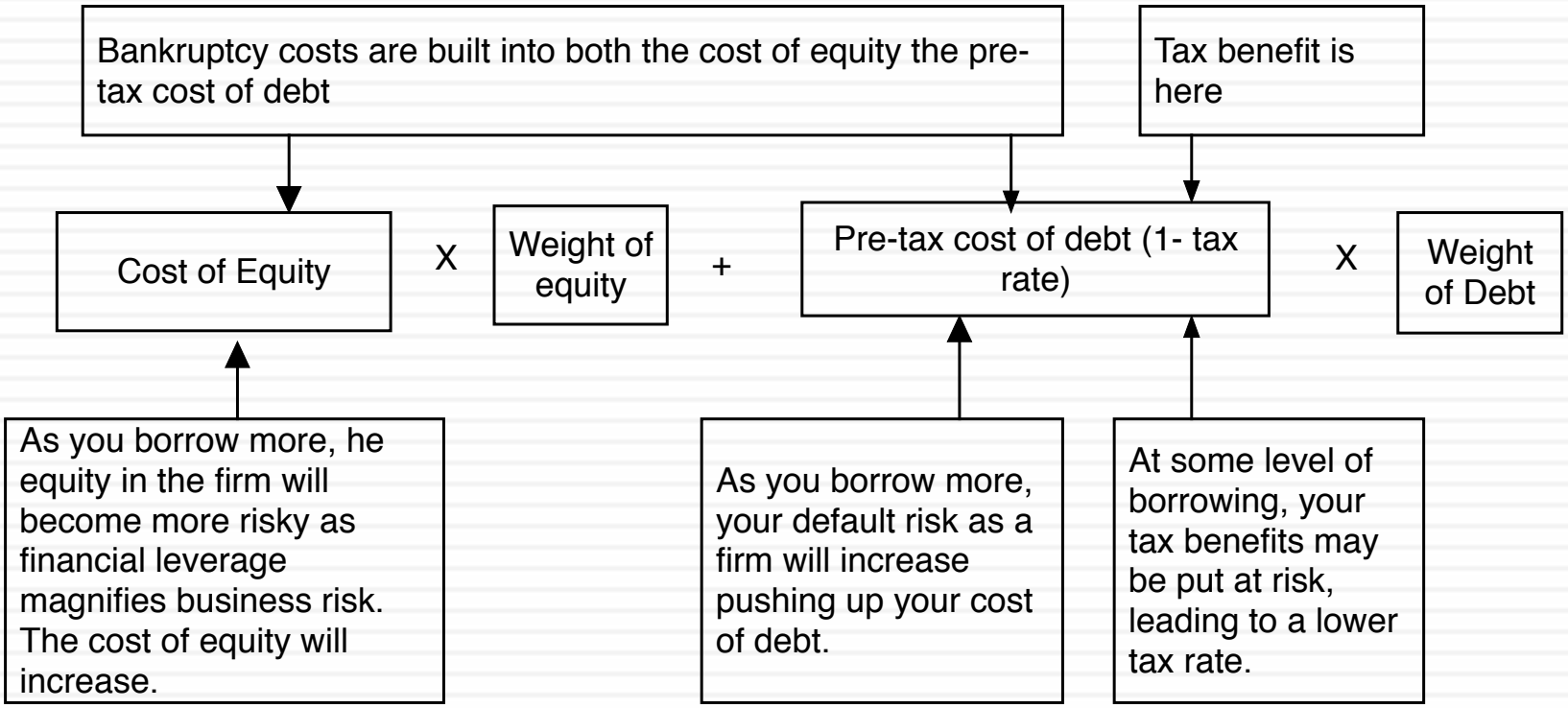
The cost of capital for an investment

Should reflect the risk of the investment, not the entity taking the investment.
Should use a debt ratio that is reflective of the investment's cash flows.

No risk subsidies
If you use the cost of capital of the company as your hurdle rate for all investments, risky investments (and businesses) will be subsidized by safe investments.(and businesses).

No debt subsidies
If you fund an investment disprportionately with debt, you are using the company's debt capacity to subsidize the investment.

In capital structure: The cost of capital as "optimizing" tool

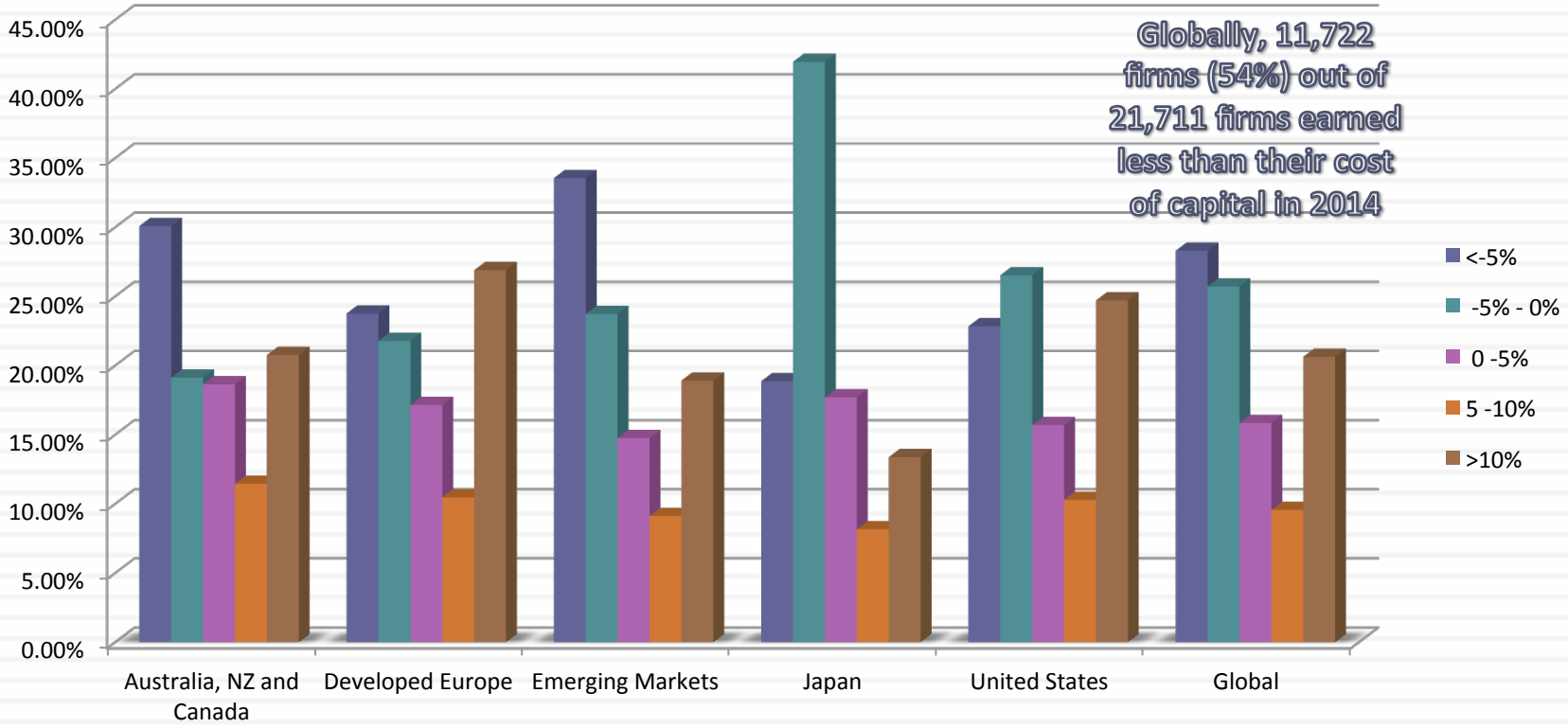


The trade off: As you use more debt, you replace more expensive equity with cheaper debt but you also increase the costs of equity and debt. The net effect will determine whether the cost of capital will increase, decrease or be unchanged as debt ratio changes.

The optimal debt ratio is the one at which the cost of capital is minimized

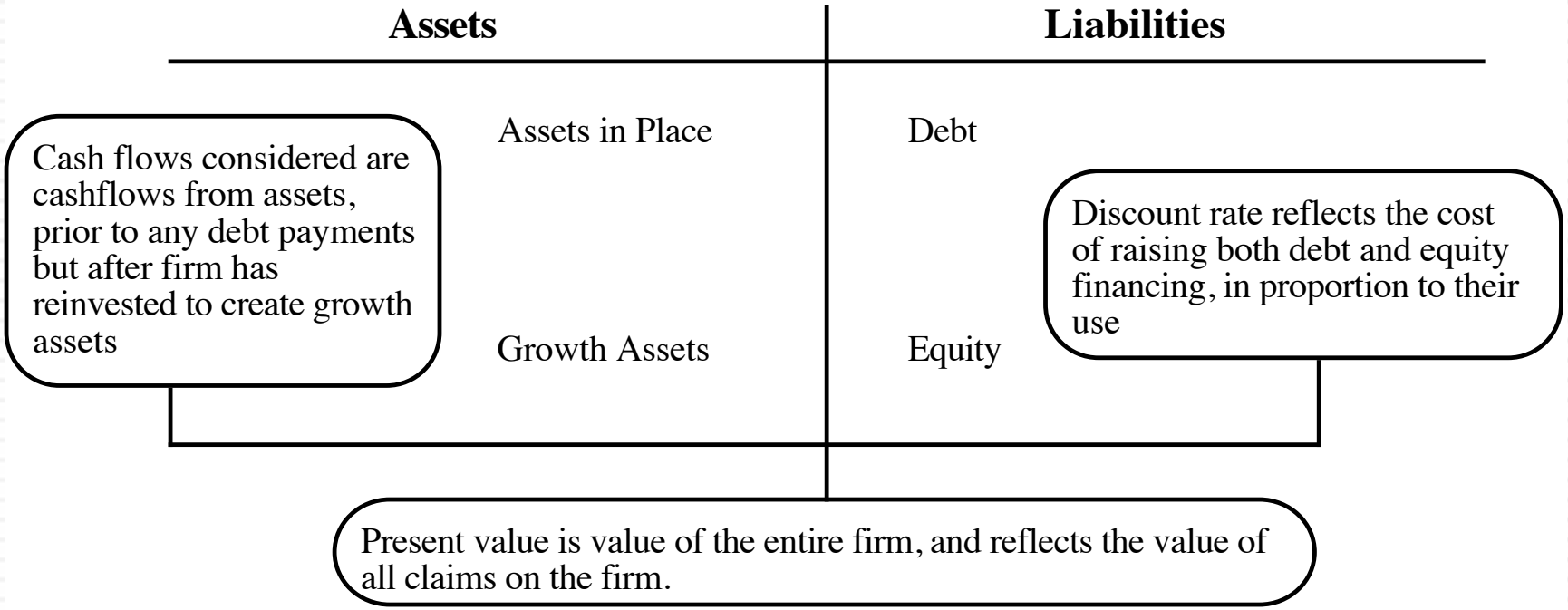
In dividend policy: It is the divining rod for returning cash

Excess Return (ROC minus Cost of Capital) for firms with market capitalization> $50 million: Global in 2014



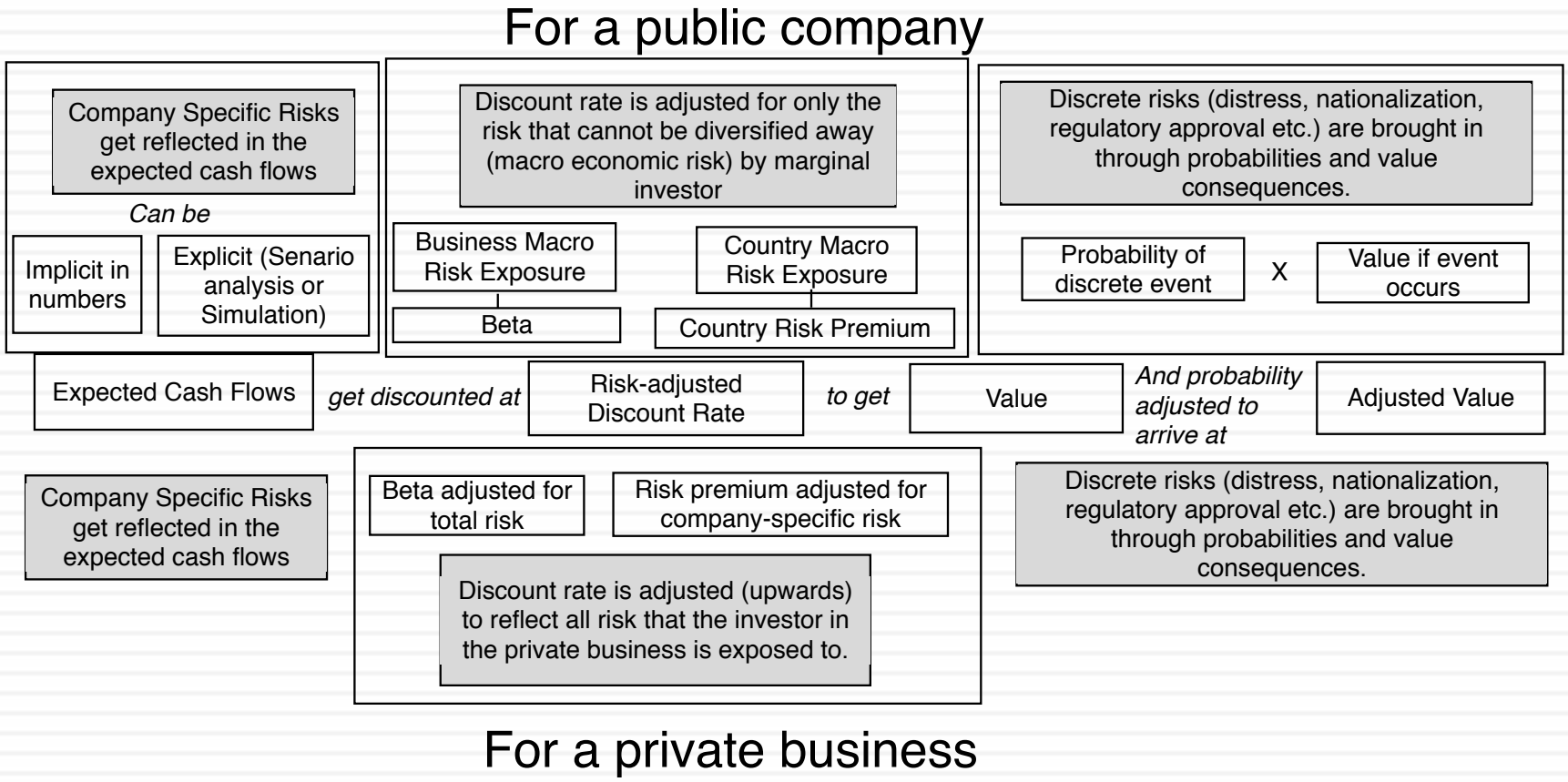
In valuation: It is the mechanism for adjusting for risk..

Figure 5.6: Firm Valuation



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

A Template for Risk Adjusting Value



What the cost of capital is not..

1. It is not the cost of equity: There is a time and a place to use the cost of equity and a time a place for the cost of capital. You cannot use them interchangeably.
2. It is not a return that you would like to make: Both companies and investors mistake their "hopes" fore expectations. The fact that you would like to make 15% is nice but it is not your cost of capital.
3. It is not a receptacle for all your hopes and fears: Some analysts take the "risk adjusting" in the discount rate too far, adjusting it for any and all risks in the company and their "perception" of those risks.
4. It is not a mechanism for reverse engineering a desired value: A cost of capital is not that discount rate that yields a value you would like to see.
5. It is not the most important input in your valuation: The discount rate is an input into a discounted cash flow valuation but it is definitely not the most critical.
6. It is not a constant across time, companies or even in your company's valuation.

I. THE RISK FREE RATE

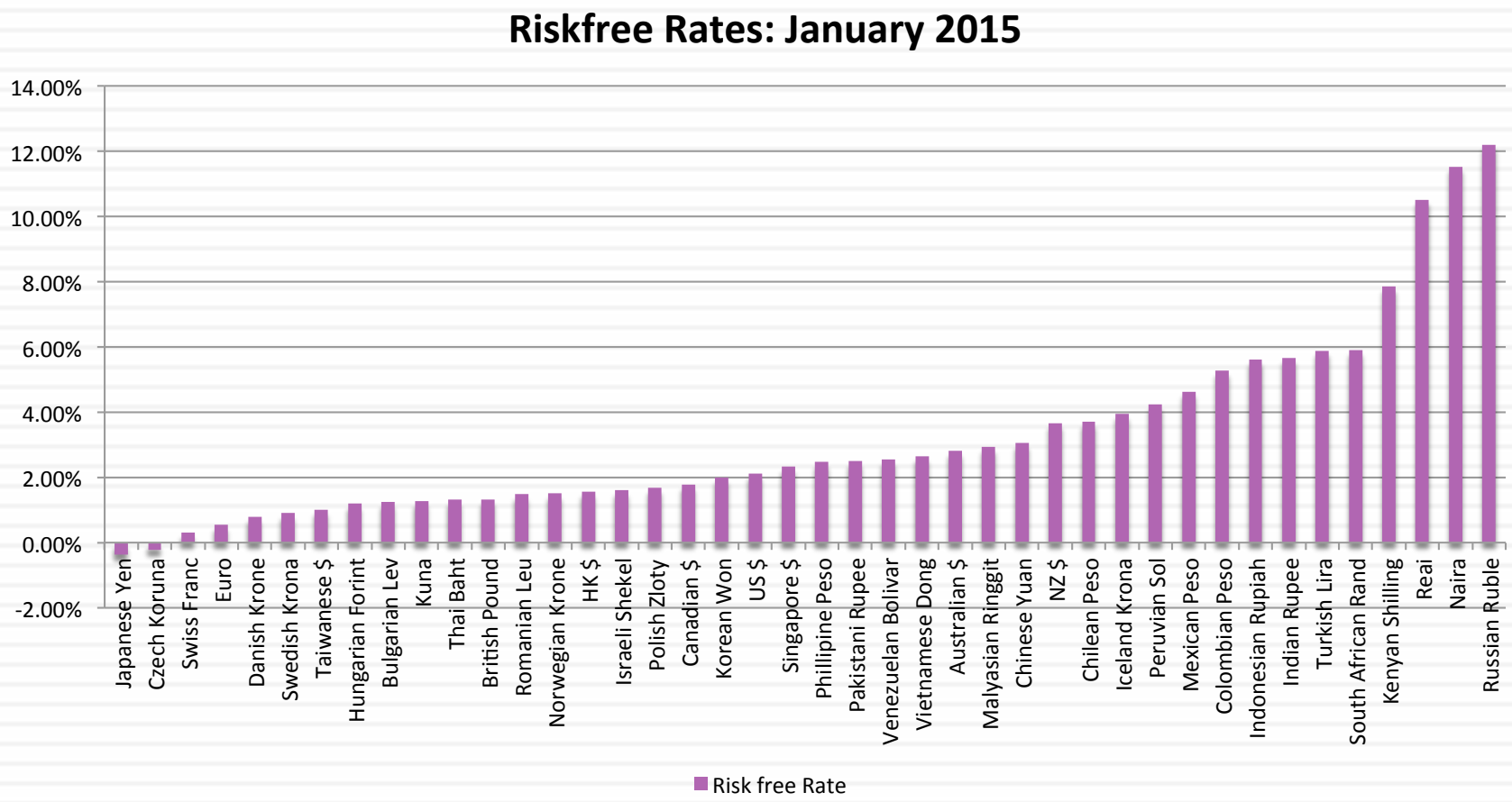
Feel the urge to normalize?

What is the risk free rate?

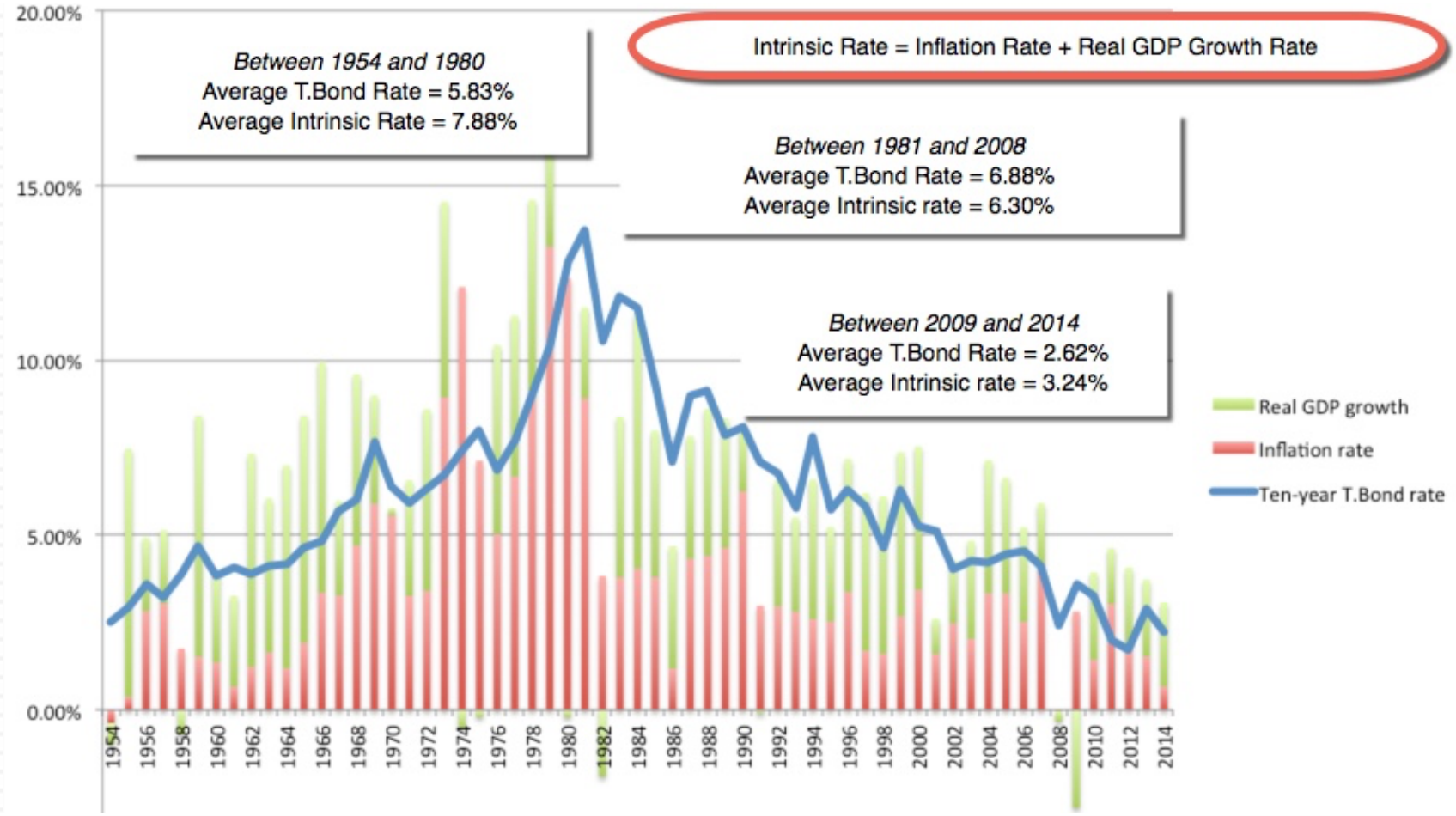
- On a riskfree asset, the actual return is equal to the expected return. Therefore, there is no variance around the expected return.
- For an investment to be riskfree, then, it has to have
  - No default risk
  - No reinvestment risk
- Following up, here are three broad implications:

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. Currency matters: The risk free rate will vary across currencies.
3. Not all government securities are riskfree: Some governments face default risk and the rates on bonds issued by them will not be riskfree.

Risk free rate by currency



Why is the risk free rate so low?



When the risk free rate changes, the rest of your inputs will as well!

Precipitating factor	*Effect of precipitating factor on*			
	Interest rates	*Equity Risk Premium*	*Expected growth*	*Value*
A crisis	Decrease (Flight to quality)	Increase (Fear Factor)	Decrease (Feedback to real economy)	Decrease
Bad economic news	Decrease	Increase	Decrease	Depends on whether rates drop more or less than expected growth.
Lower inflation or deflation	Decrease	Unclear	Decrease (in nominal terms)	Depends on which effect (interest rate or growth) dominates.
Central Bank action (Lower Fed rate or QE)	Decrease	Unclear	Decrease (since the central bank is signaling that growth is low now.	Increase, if the economy responds quickly and positively to interest rate drop.

II. THE EQUITY RISK PREMIUM

Using history as a crutch?

What is the Equity Risk Premium?

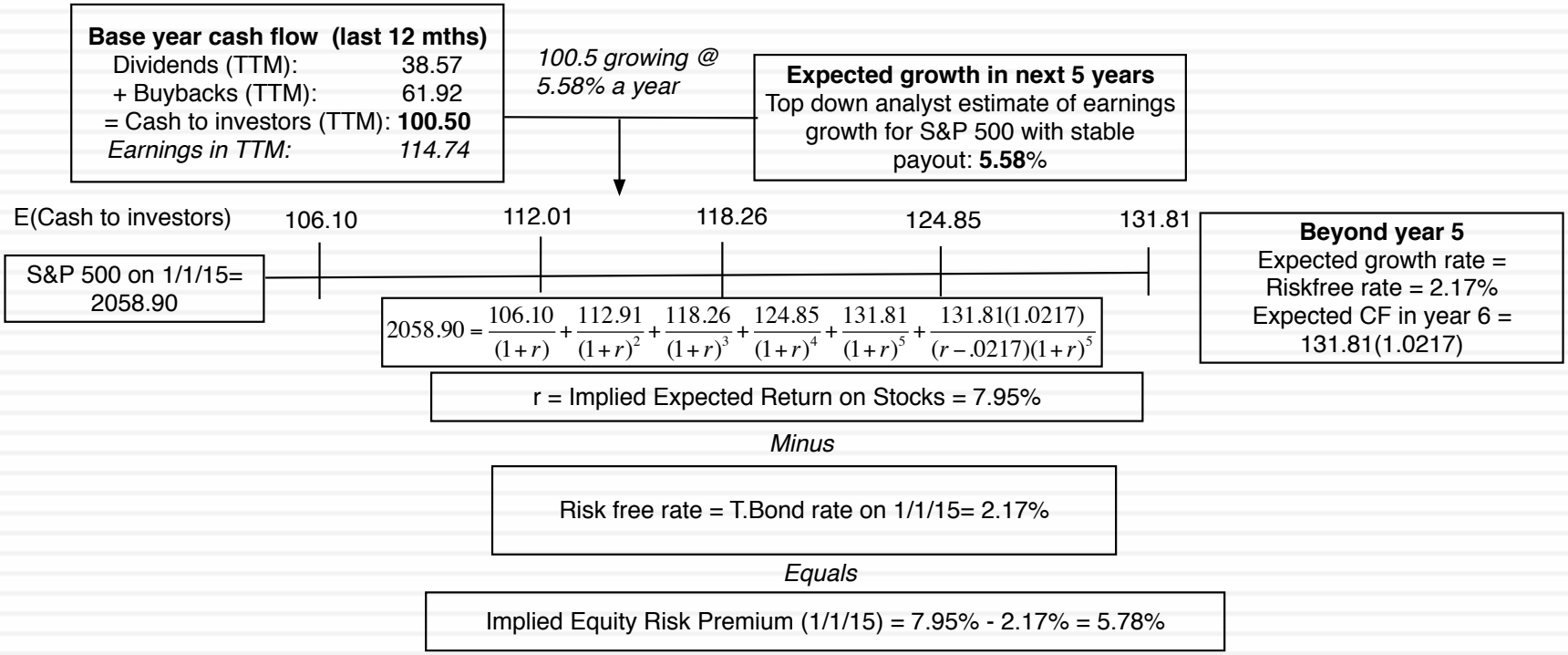
- Intuitively, the equity risk premium measures what investors demand over and above the riskfree rate for investing in equities as a class. Think of it as the market price for taking on average equity risk.
- It should depend upon
  - The risk aversion of investors
  - The perceived risk of equity as an investment class
- Unless you believe that investor risk aversion and/or that the perceived risk of equity as a class does not change over time, the equity risk premium is a dynamic number (not a static one).

The Historical Risk Premium

- The historical premium is the premium that stocks have historically earned over riskless securities.
- While the users of historical risk premiums act as if it is a fact (rather than an estimate), it is sensitive to
  - How far back you go in history…
  - Whether you use T.bill rates or T.Bond rates
  - Whether you use geometric or arithmetic averages.
- For instance, looking at the US:

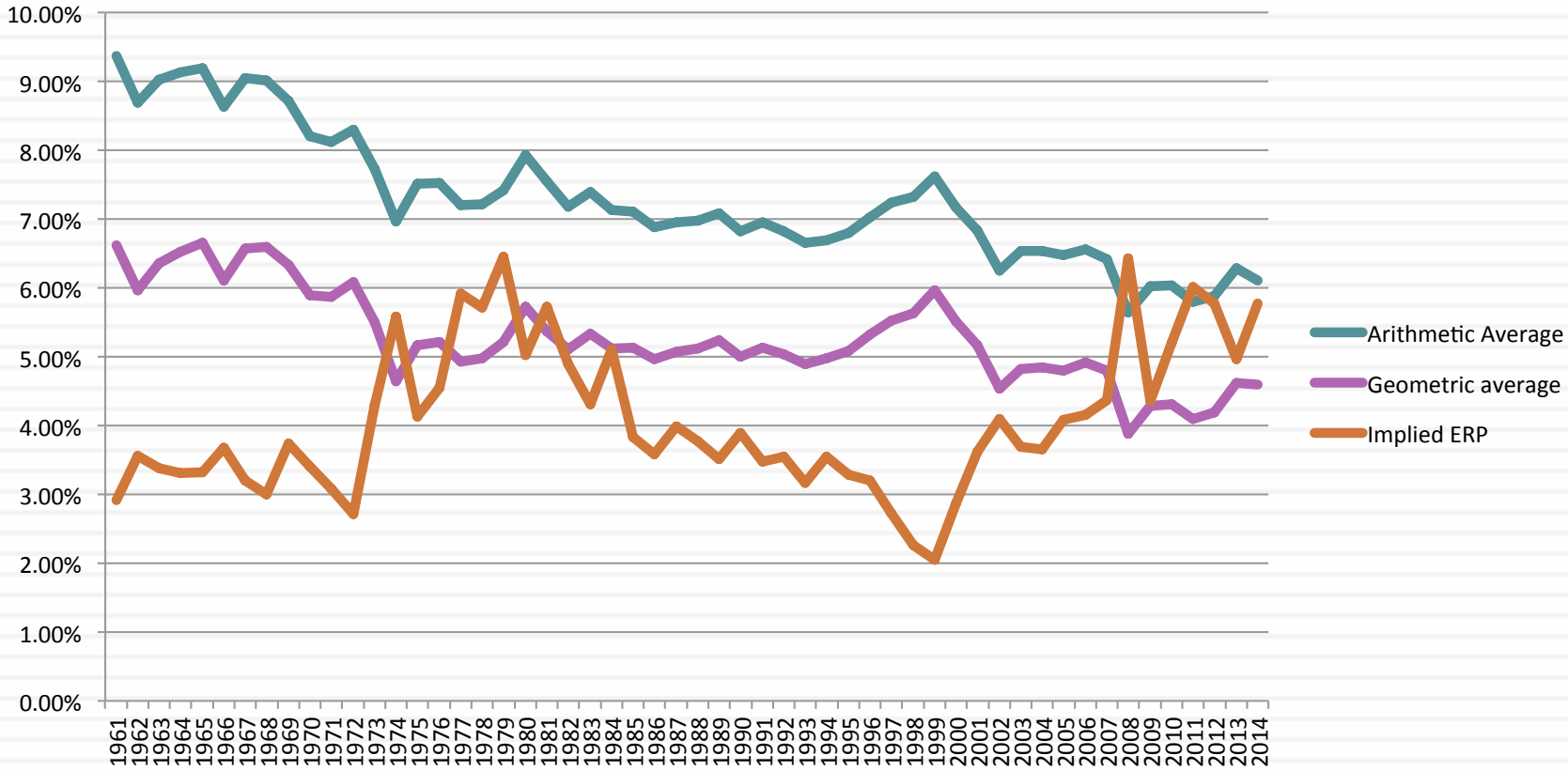
	Arithmetic Average		*Geometric Average*	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2014	8.00%	6.25%	6.11%	4.60%
	2.17%	2.32%		
1965-2014	6.19%	4.12%	4.84%	3.14%
	2.42%	2.74%		
2005-2014	7.94%	4.06%	6.18%	2.73%
	6.05%	8.65%		

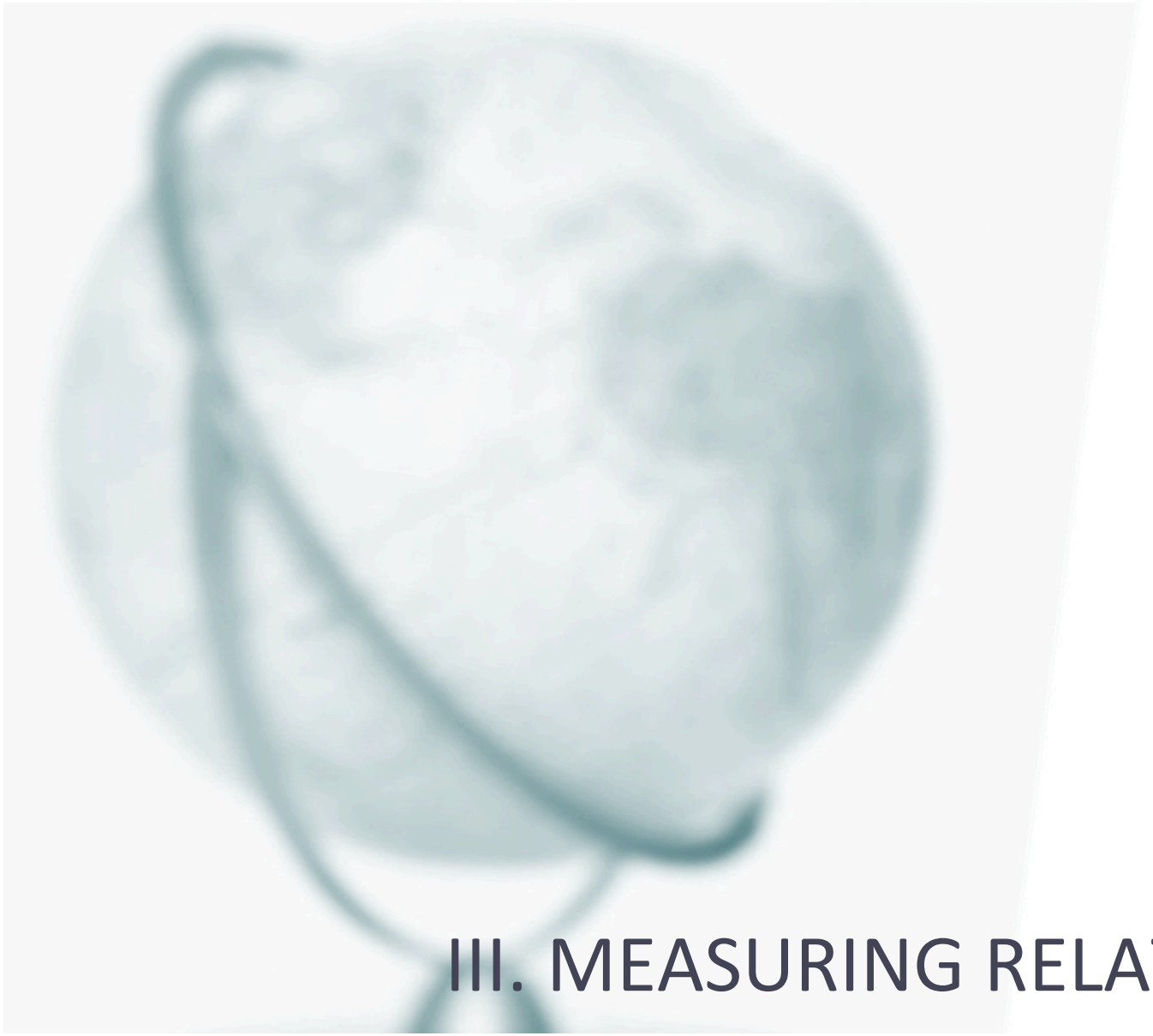
A forward-looking ERP?



The Implied ERP over time.. Relative to a historical premium

Figure 10: Historical versus Implied Premium - 1961- 2014

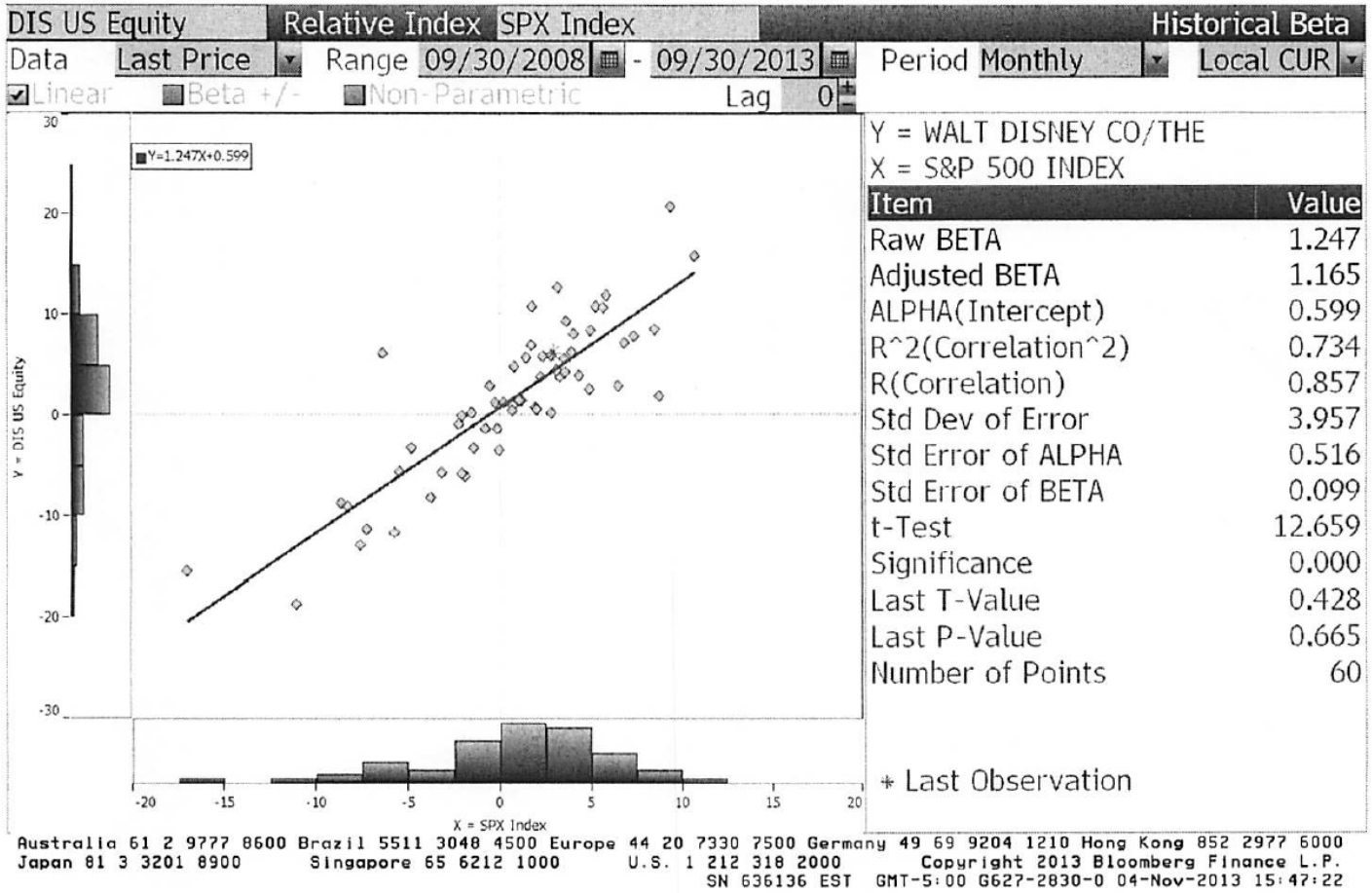




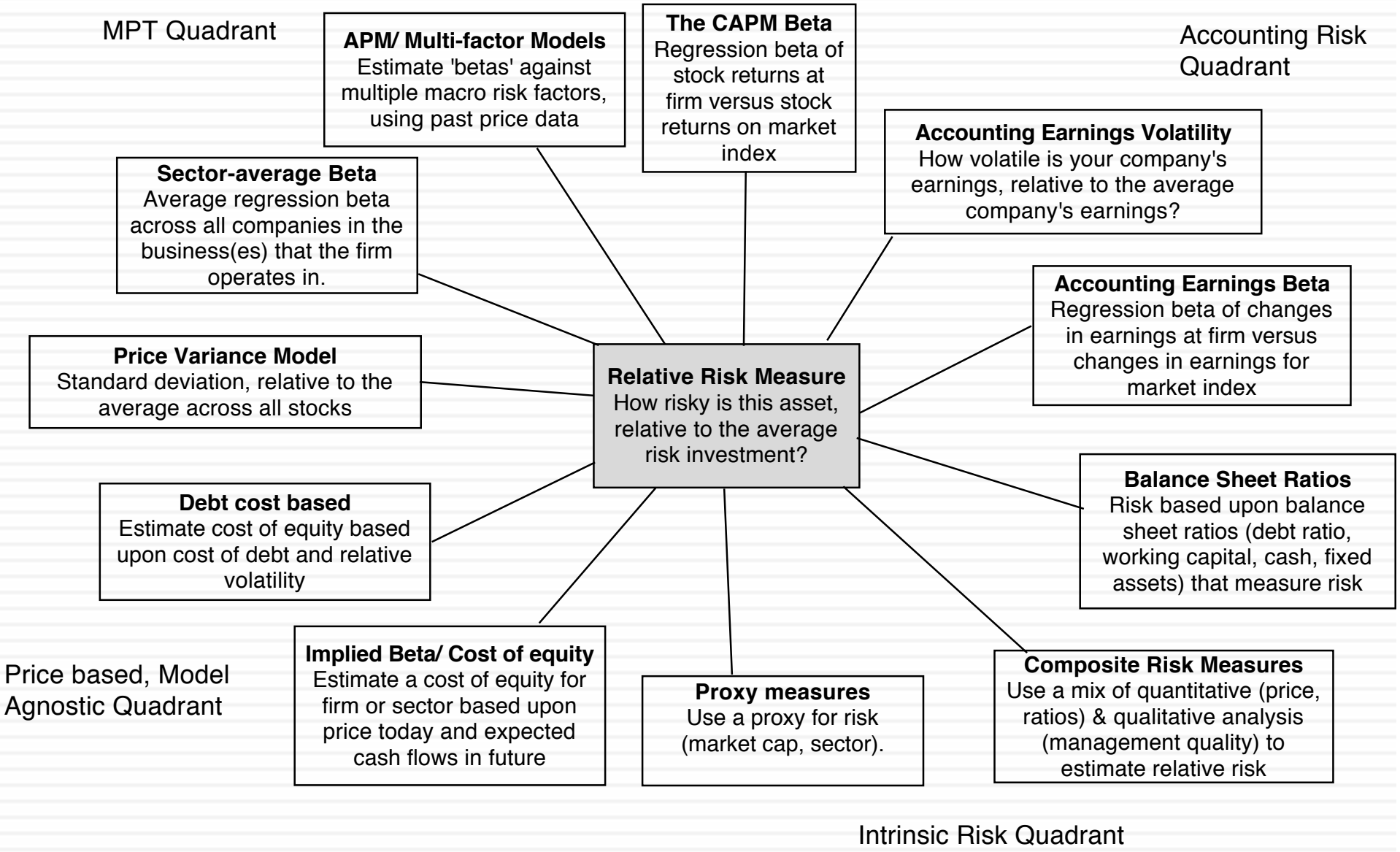
III. MEASURING RELATIVE RISK

It should not be Greek to you!

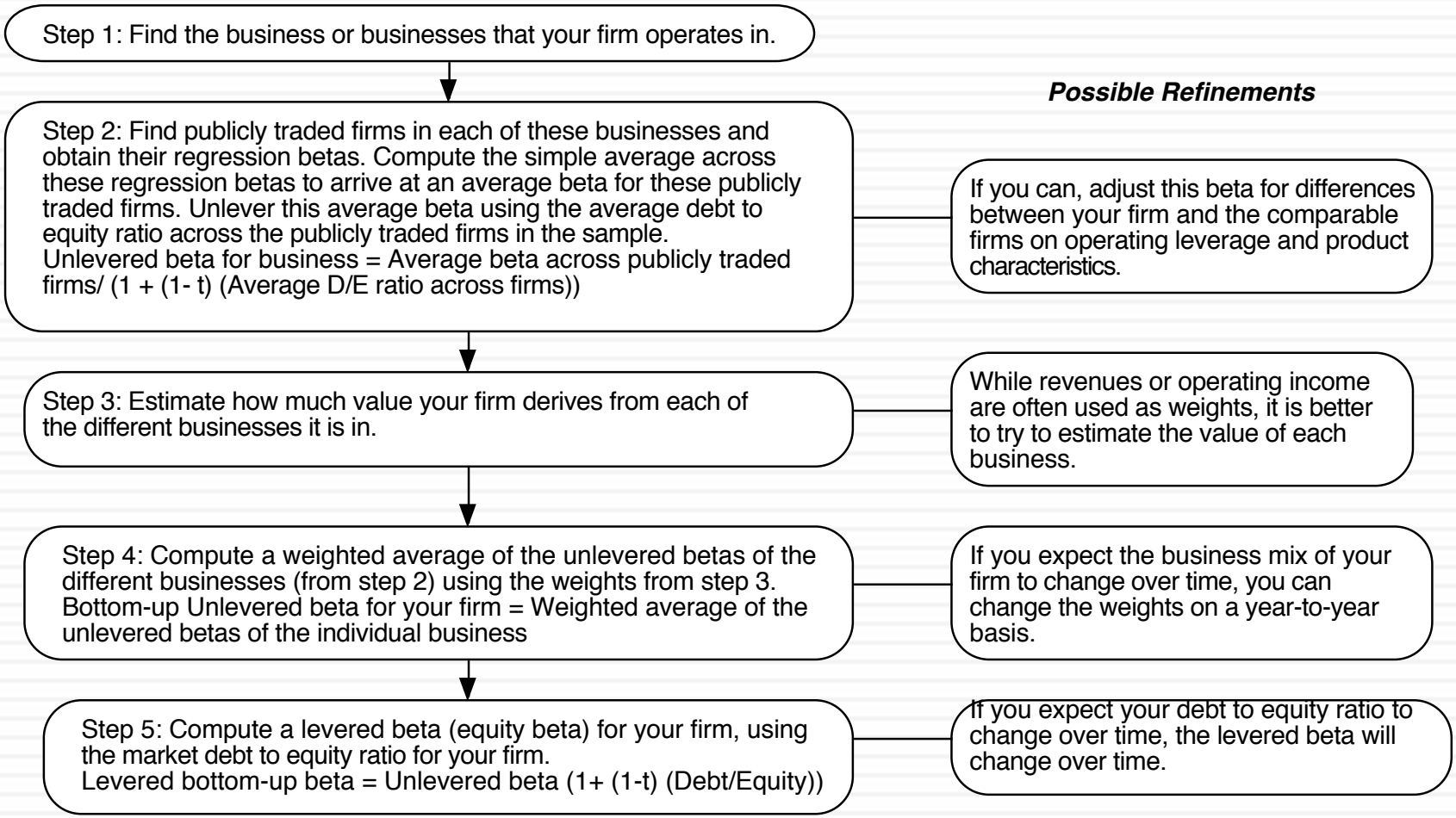
Beta Estimation: Using a Service (Bloomberg)



Measuring Relative Risk



Bottom-up Betas



Estimating Bottom Up Betas & Costs of Equity: Disney

Business	*Revenues*	*EV/Sales*	*Value of Business*	*Proportion of Disney*	*Unlevered beta*	*Value*	*Proportion*
Media Networks	$20,356	3.27	$66,580	49.27%	1.03	$66,579.81	49.27%
Parks & Resorts	$14,087	3.24	$45,683	33.81%	0.70	$45,682.80	33.81%
Studio Entertainment	$5,979	3.05	$18,234	13.49%	1.10	$18,234.27	13.49%
Consumer Products	$3,555	0.83	$2,952	2.18%	0.68	$2,951.50	2.18%
Interactive	$1,064	1.58	$1,684	1.25%	1.22	$1,683.72	1.25%
Disney Operations	$45,041		$135,132	100.00%	0.9239	$135,132.11	

Business	*Unlevered beta*	*Value of business*	*D/E ratio*	*Levered beta*	*Cost of Equity*
Media Networks	1.0313	$66,580	10.03%	1.0975	9.07%
Parks & Resorts	0.7024	$45,683	11.41%	0.7537	7.09%
Studio Entertainment	1.0993	$18,234	20.71%	1.2448	9.92%
Consumer Products	0.6752	$2,952	117.11%	1.1805	9.55%
Interactive	1.2187	$1,684	41.07%	1.5385	11.61%
Disney Operations	0.9239	$135,132	13.10%	1.0012	8.52%

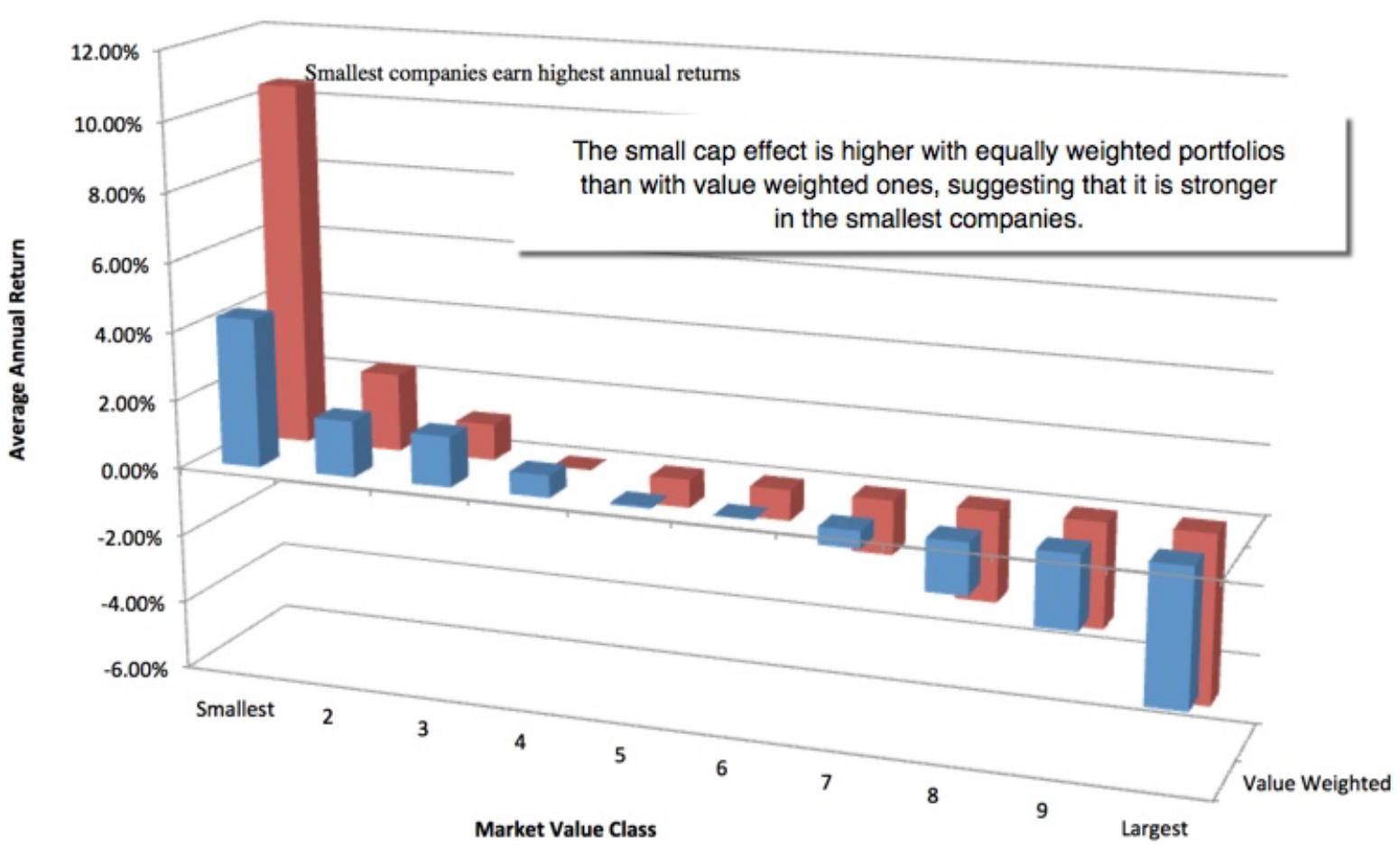
III. THE GARNISHING

Here a premium, there a premium..

The Build up Approach

- For many analysts, the risk free rate and equity risk premium are just the starting points to get to a cost of equity. The required return that you obtain is then augmented with premiums for "other" risks to arrive at a built up cost of equity.
- The justifications offered for these premiums are varied but can be broadly classified into:
  - Historical premium: The historical data justifies adding a premium (for small capitalization, illiquidity)
  - Intuition: There are risks that are being missed that have to be built in
  - Reasonableness: The discount rate that I am getting looks too low.

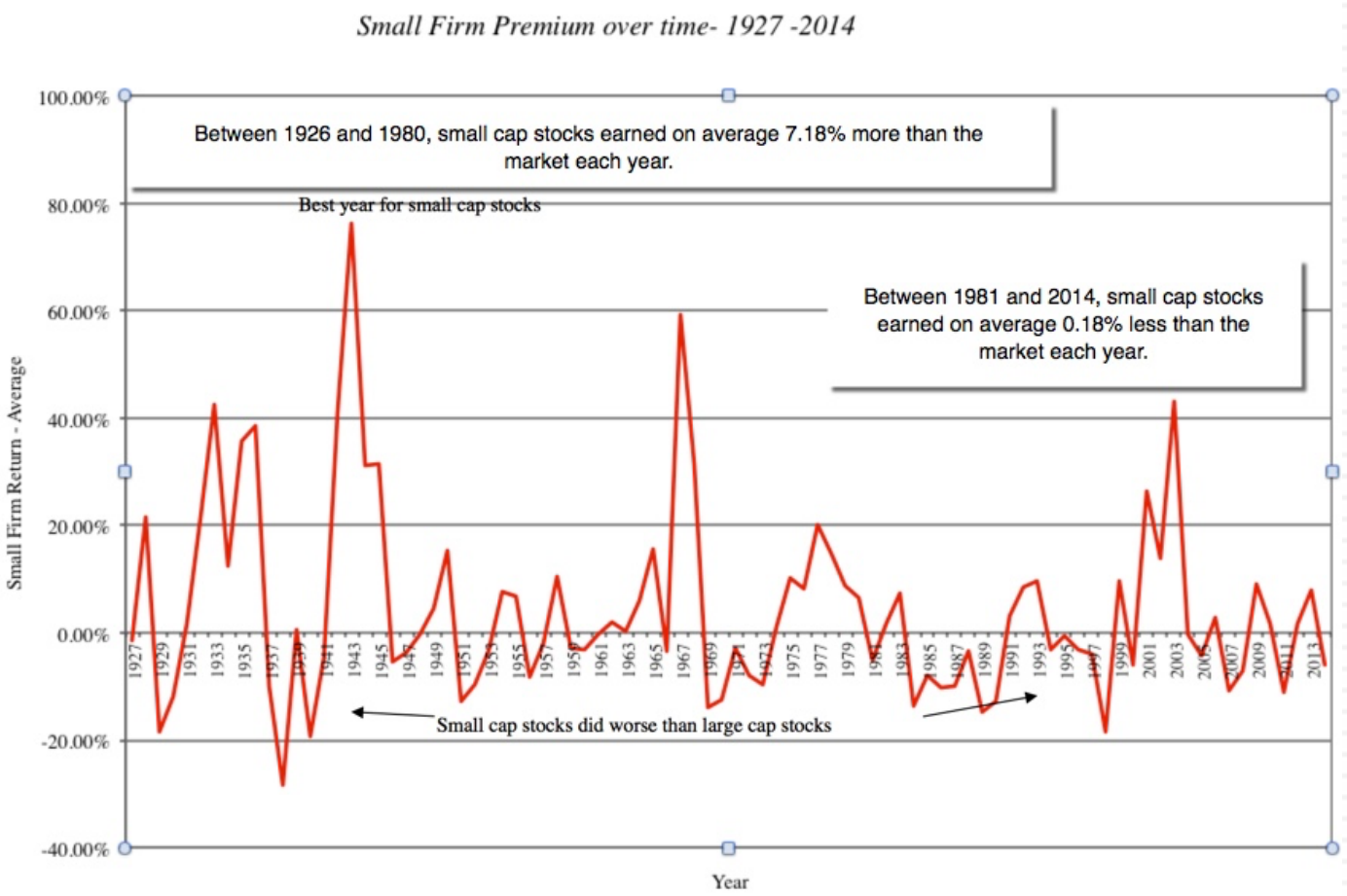
The Most Added Premium: The Small Cap Premium



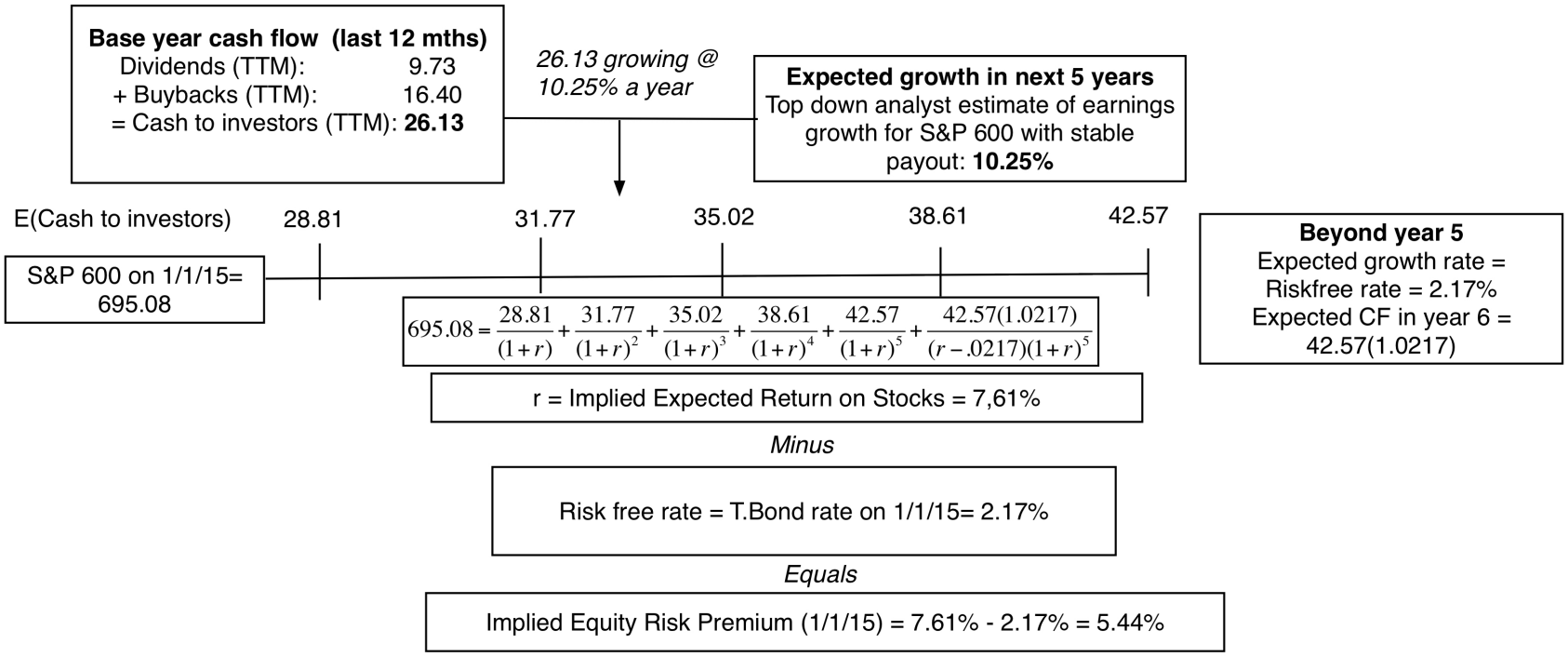
Historical premiums are noisy..

Decile	Average	Standard Error	Maximum	Minimum
Smallest	4.33%	1.96%	76.28%	-28.42%
2	1.63%	1.14%	41.25%	-17.96%
3	1.47%	0.77%	41.98%	-13.54%
4	0.64%	0.55%	15.56%	-7.33%
5	0.05%	0.53%	11.63%	-16.05%
6	-0.01%	0.51%	15.21%	-14.01%
7	-0.51%	0.55%	7.48%	-19.50%
8	-1.50%	0.81%	11.20%	-29.42%
9	-2.13%	1.02%	21.96%	-36.09%
Largest	-3.98%	1.56%	31.29%	-65.57%

Historical data can hide trends..



And the market does not seem to be pricing it in..



The implied ERP for the S&P 500 was 5.78%. If there is a small cap premium, where is it?

But, but.. My company is risky..

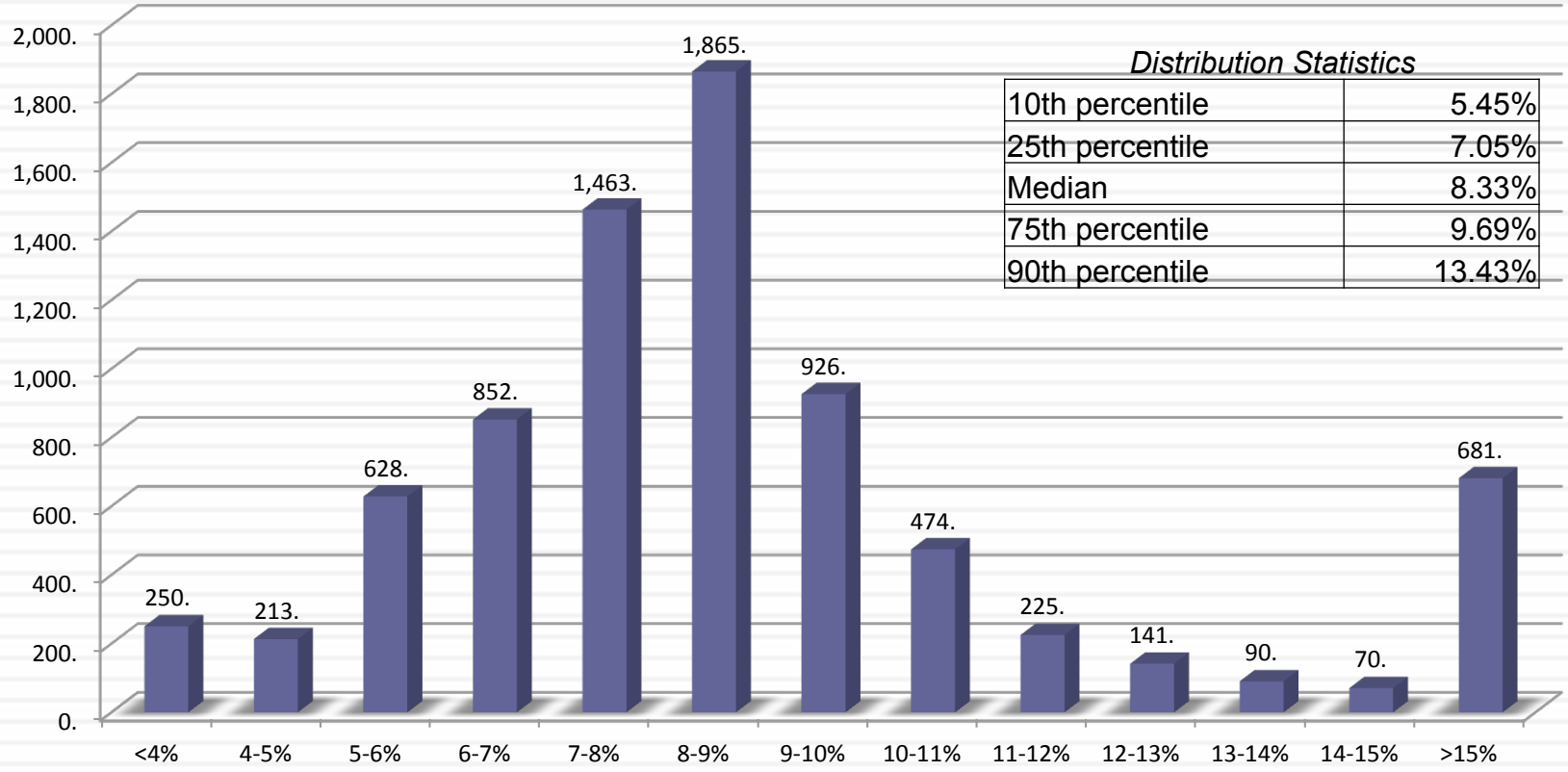
- Estimation versus Economic uncertainty
  - Estimation uncertainty reflects the possibility that you could have the "wrong model" or estimated inputs incorrectly within this model.
  - Economic uncertainty comes the fact that markets and economies can change over time and that even the best models will fail to capture these unexpected changes.
- Micro uncertainty versus Macro uncertainty
  - Micro uncertainty refers to uncertainty about the potential market for a firm's products, the competition it will face and the quality of its management team.
  - Macro uncertainty reflects the reality that your firm's fortunes can be affected by changes in the macro economic environment.
- Discrete versus continuous uncertainty
  - Discrete risk: Risks that lie dormant for periods but show up at points in time. (Examples: A drug working its way through the FDA pipeline may fail at some stage of the approval process or a company in Venezuela may be nationalized)
  - Continuous risk: Risks changes in interest rates or economic growth occur continuously and affect value as they happen.

Risk and Cost of Equity: The role of the marginal investor

- Not all risk counts: While the notion that the cost of equity should be higher for riskier investments and lower for safer investments is intuitive, what risk should be built into the cost of equity is the question.
- Risk through whose eyes? While risk is usually defined in terms of the variance of actual returns around an expected return, risk and return models in finance assume that the risk that should be rewarded (and thus built into the discount rate) in valuation should be the risk perceived by the marginal investor in the investment
- The diversification effect: Most risk and return models in finance also assume that the marginal investor is well diversified, and that the only risk that he or she perceives in an investment is risk that cannot be diversified away (i.e, market or non-diversifiable risk). In effect, it is primarily economic, macro, continuous risk that should be incorporated into the cost of equity.

The Cost of Equity (for diversified investors)

Cost of equity for Publicly traded US firms - January 2015

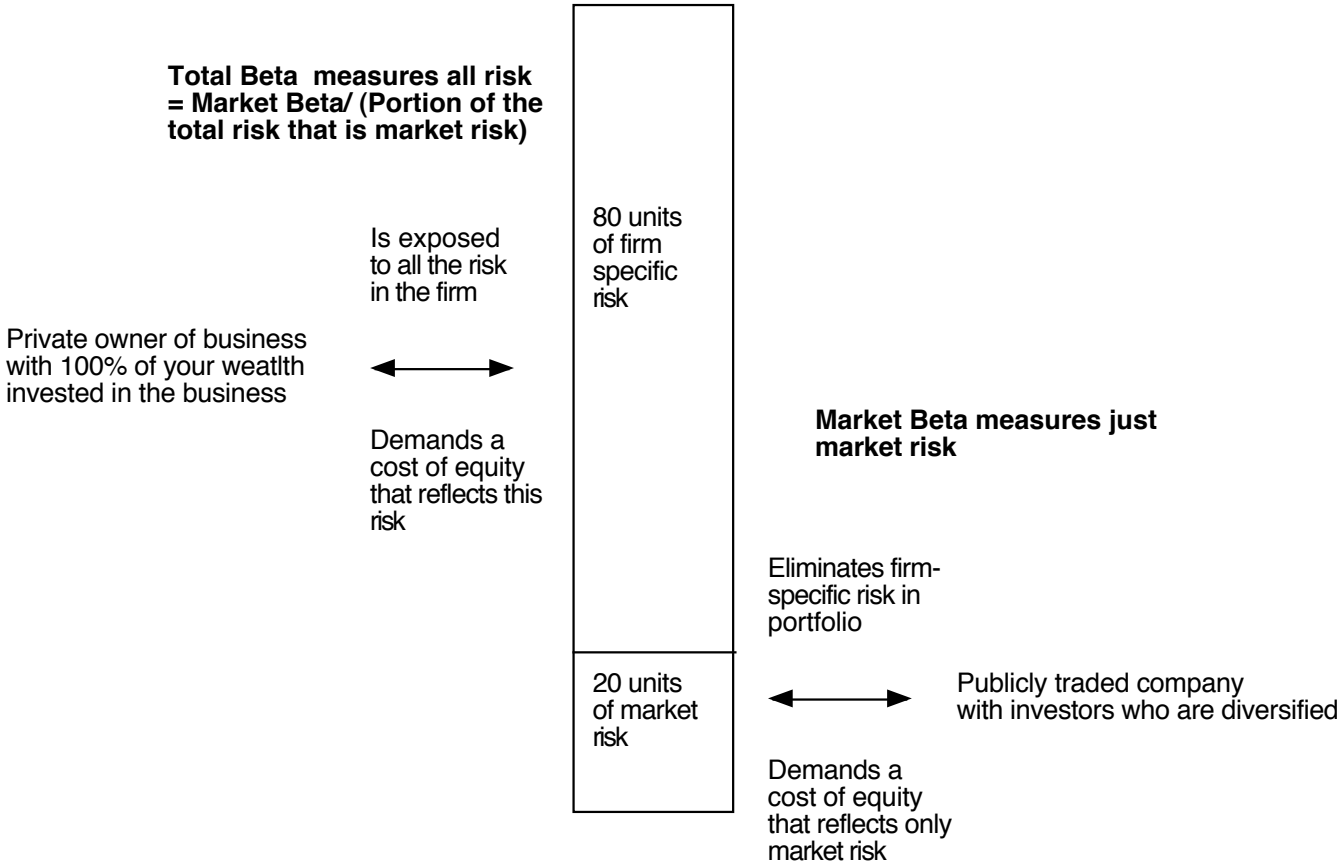


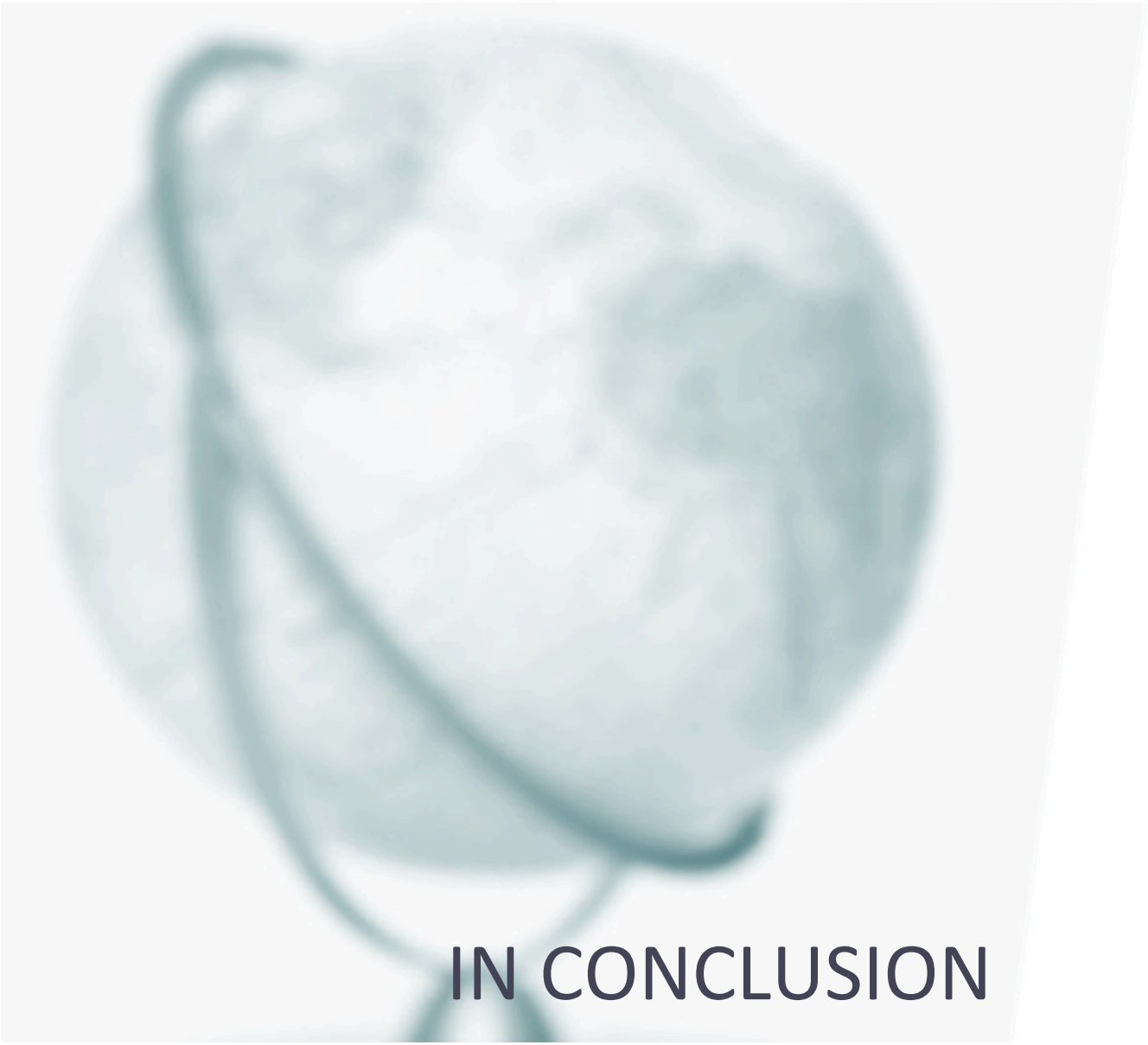
Distribution Statistics

10th percentile	5.45%
25th percentile	7.05%
Median	8.33%
75th percentile	9.69%
90th percentile	13.43%

If the "buyer" is not diversified..

Private Owner versus Publicly Traded Company Perceptions of Risk in an Investment





IN CONCLUSION

Less rules, more first principles

Lesson 1: It's important, but not that important..

- The cost of capital is a driver of value but it is not as much of a driver as you think.
- This is particularly true, with young growth companies and when there is a great deal of uncertainty about the future.
- As a general rule, we spend far too much time on the cost of capital and far too little on cash flows and growth rates.

Lesson 2: There are many ways of estimating cost of capital, but most of them are wrong or inconsistent

- It is true that there are competing risk and return models, that a wide variety of estimation practices exist for estimating inputs to these model and that there are multiple data sources for each input.
- That does not imply that you have license to mix and match models, practices and data sources to get whatever number you want.
- Many estimates of cost of capital are just plain wrong, because they are based on bad data, ignore basic statistical rules or just don't pass the common sense test.
- Other estimates of cost of capital are internally inconsistent, because they mix and match models and practices that were never meant to be mixed.

Lesson 3: Just because a practice is established does not make it right

- There is a valuation establishment and it likes writing rules that lay out the templates for established or acceptable practice.
- Those rules are then enforced by legal and regulatory systems that insist that everyone follow the rules.
- At some point, the strongest rationale for why we do what we do is that everyone does it and has always done it.
- In the legal and regulatory settings, this gets reinforced by the fact that it is easier to defend a bad practice of long standing than it is to argue for a better practice.

Lesson 4: Watch out for agenda-driven (or bias-driven) costs of capital

- Much as we would like to pose as objective analysts with no interest in tilting the value of a company of an asset one way or the other, once we are paid to do valuations, bias will follow.
- The strongest determinant of what practices you will use to get a cost of capital is that bias that you have to push the value up (or down).
  - If your bias is upwards (to make value higher), you will find every rationale you can for reducing your cost of capital.
  - If your bias is downwards (to make value lower), you will find every rationale you can for increasing your cost of capital.