THE COST OF CAPITAL: MISUNDERSTOOD, MISESTIMATED AND MISUSED!

Aswath Damodaran

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

Accounting Test	**Time Weighted CF Test**	**Time Weighted % Return**
Return on invested capital (ROIC) > Cost of Capital	NPV of the Project > 0	IRR > Cost of Capital

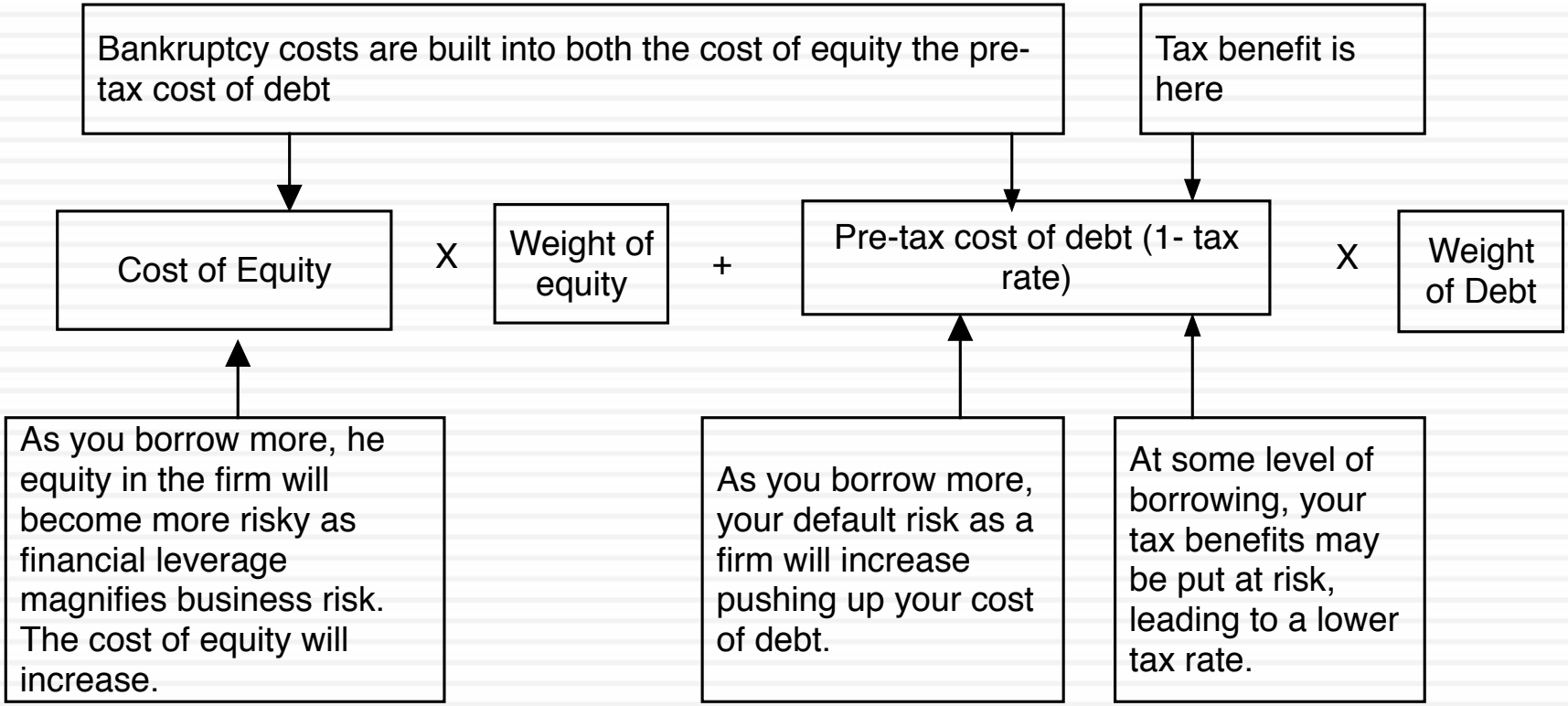
The Hurdle Rate

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



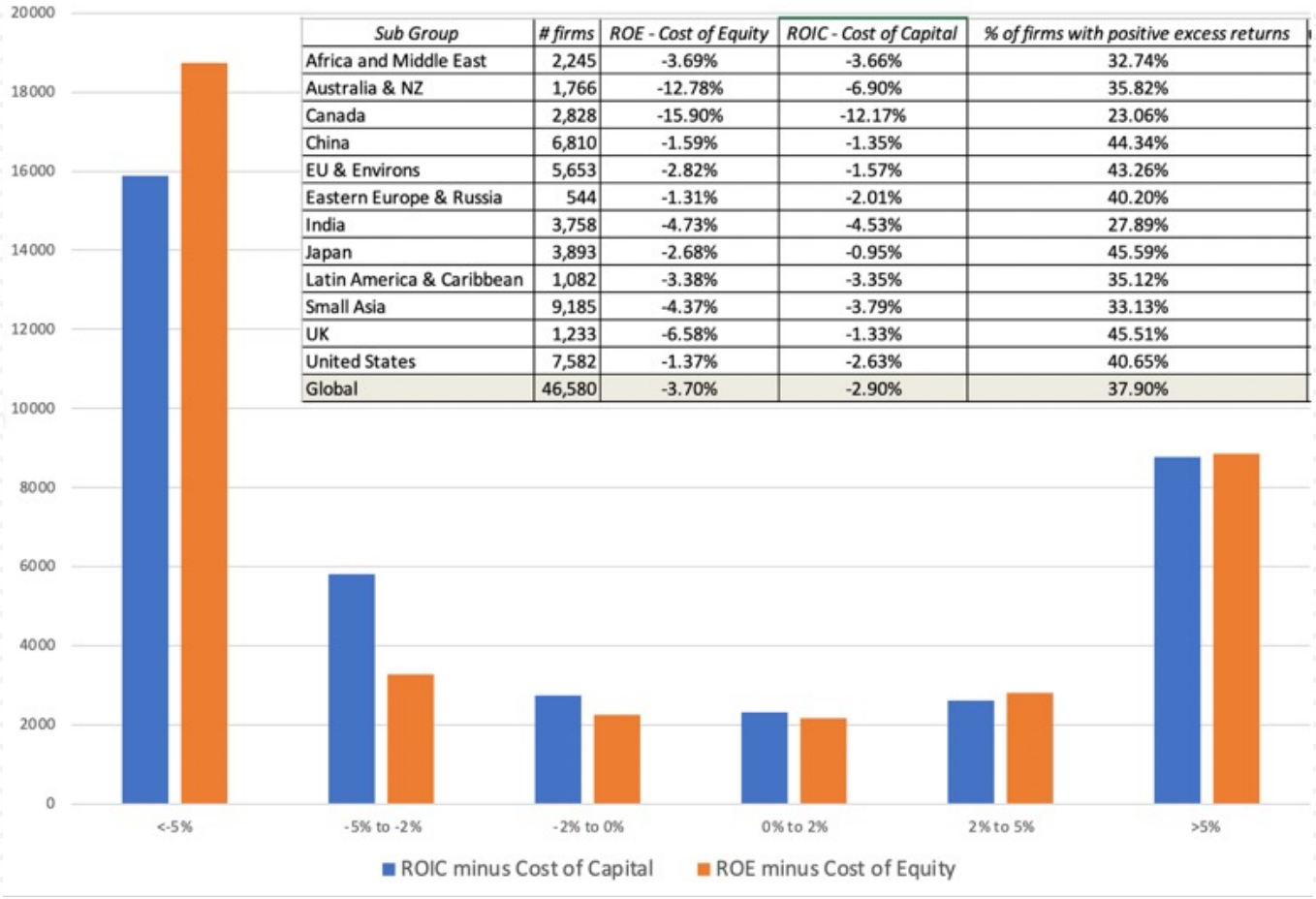
The trade off: As you use more debt, you replace more expensive equity with cheaper debt but you also increase the costs of equity and debt. The net effect will determine whether the cost of capital will increase, decrease or be unchanged as debt ratio changes.

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

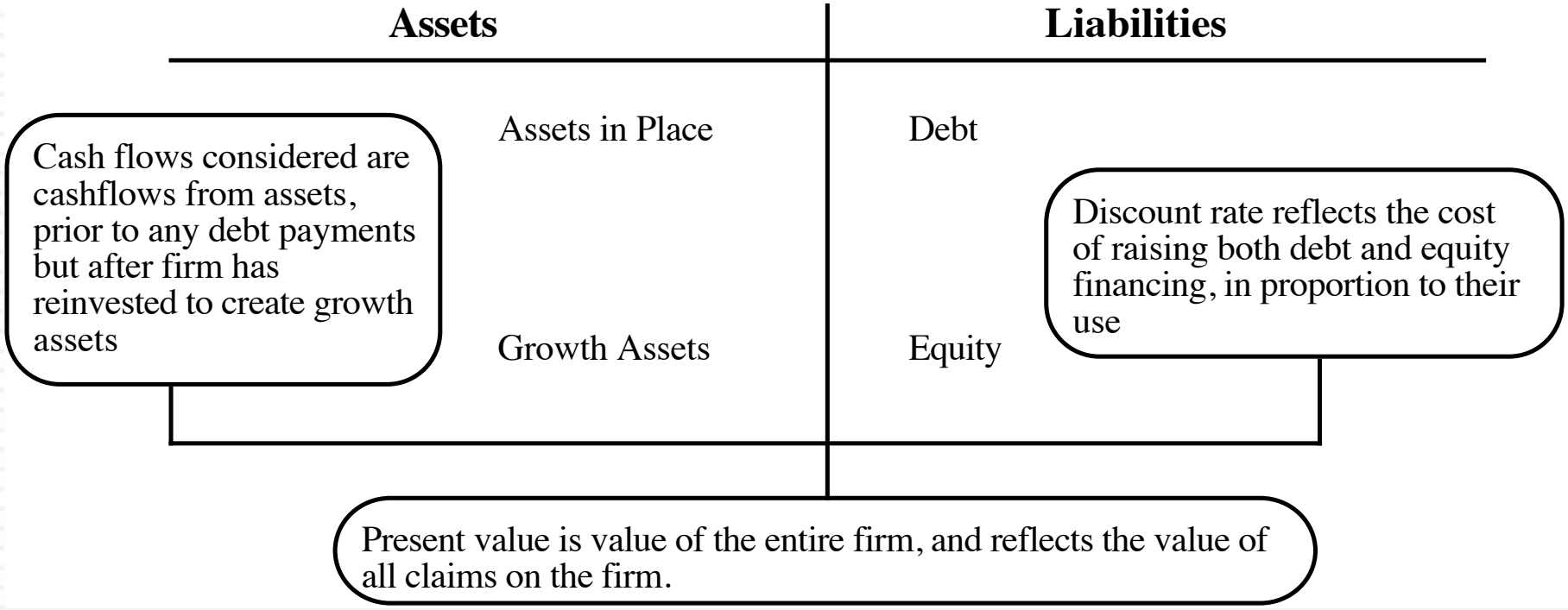
Return Spreads in 2020: Global Breakdown

Sub Group	# firms	ROE - Cost of Equity	ROIC - Cost of Capital	% of firms with positive excess returns
Africa and Middle East	2,245	-3.69%	-3.66%	32.74%
Australia & NZ	1,766	-12.78%	-6.90%	35.82%
Canada	2,828	-15.90%	-12.17%	23.06%
China	6,810	-1.59%	-1.35%	44.34%
EU & Environs	5,653	-2.82%	-1.57%	43.26%
Eastern Europe & Russia	544	-1.31%	-2.01%	40.20%
India	3,758	-4.73%	-4.53%	27.89%
Japan	3,893	-2.68%	-0.95%	45.59%
Latin America & Caribbean	1,082	-3.38%	-3.35%	35.12%
Small Asia	9,185	-4.37%	-3.79%	33.13%
UK	1,233	-6.58%	-1.33%	45.51%
United States	7,582	-1.37%	-2.63%	40.65%
Global	46,580	-3.70%	-2.90%	37.90%



In valuation, it is the mechanism for adjusting for risk..

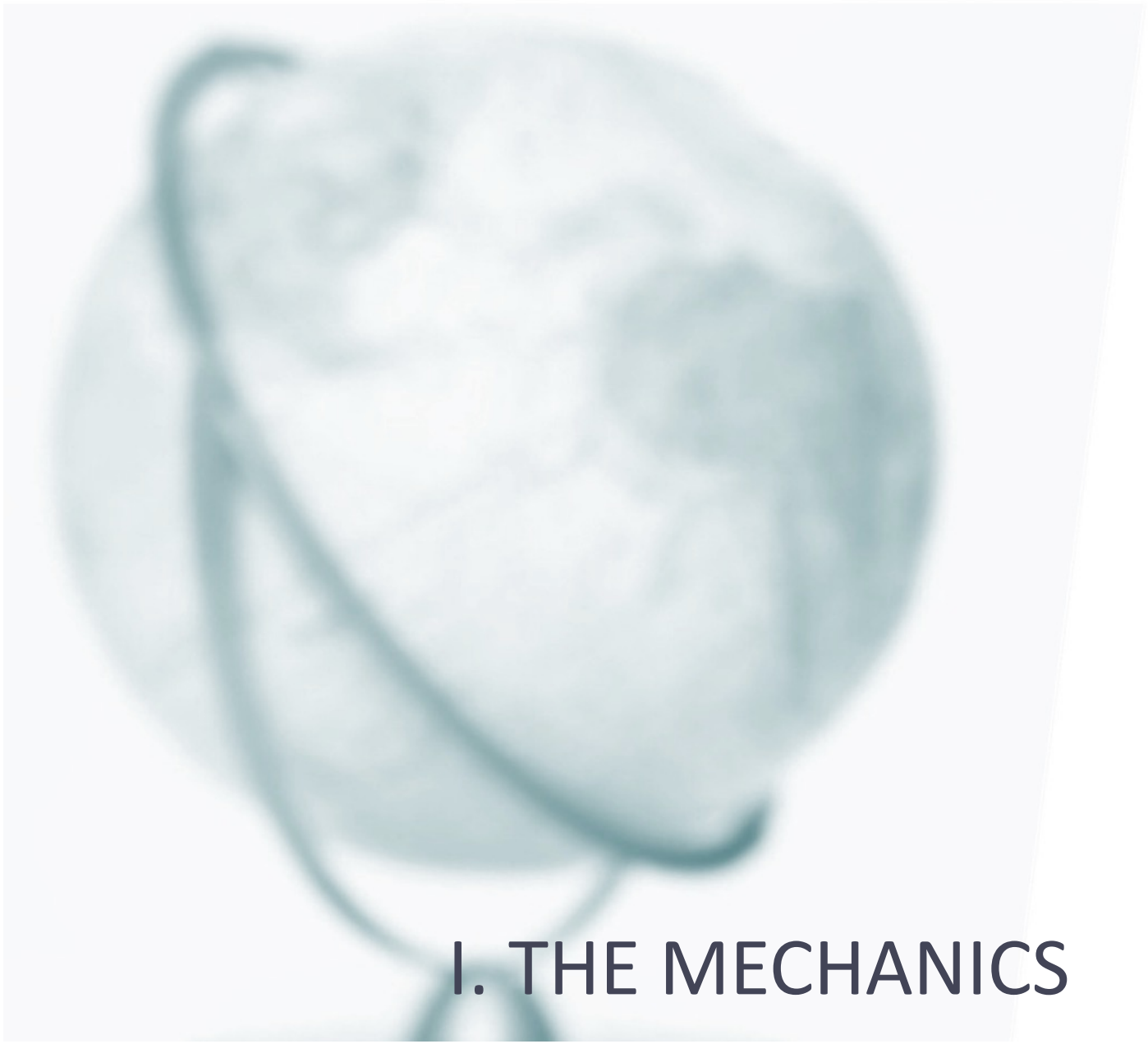
Figure 5.6: Firm Valuation



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

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.

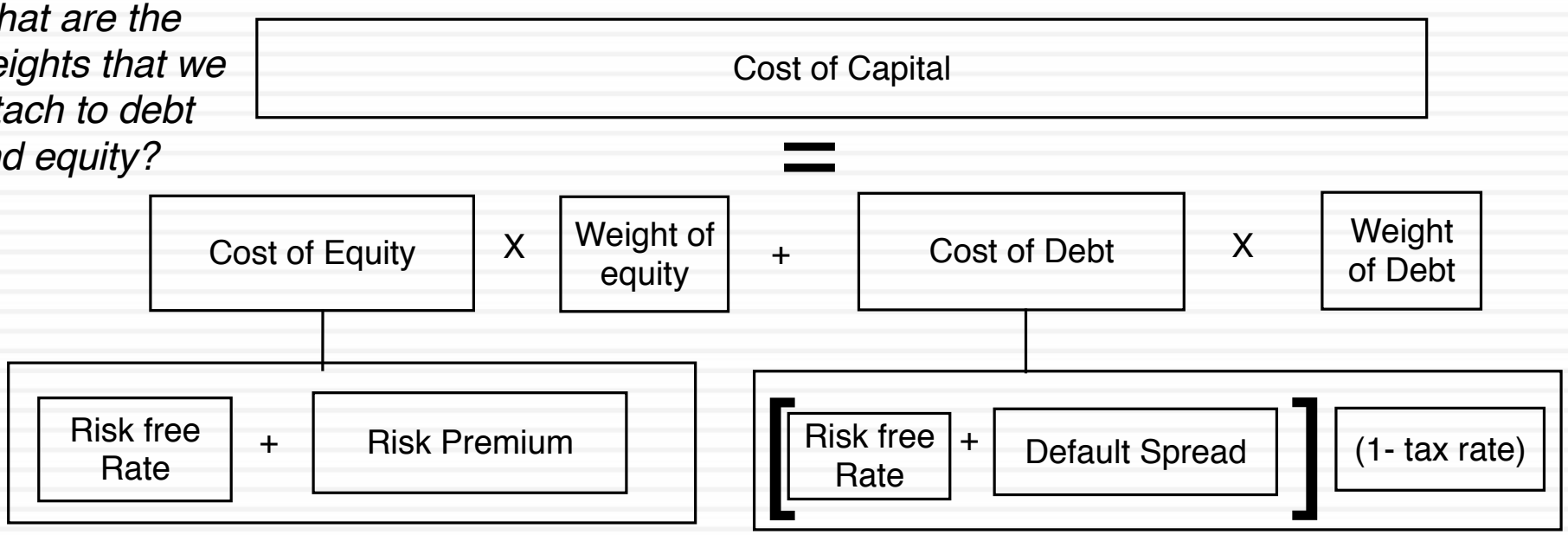


I. THE MECHANICS

Feel the urge to normalize?

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?

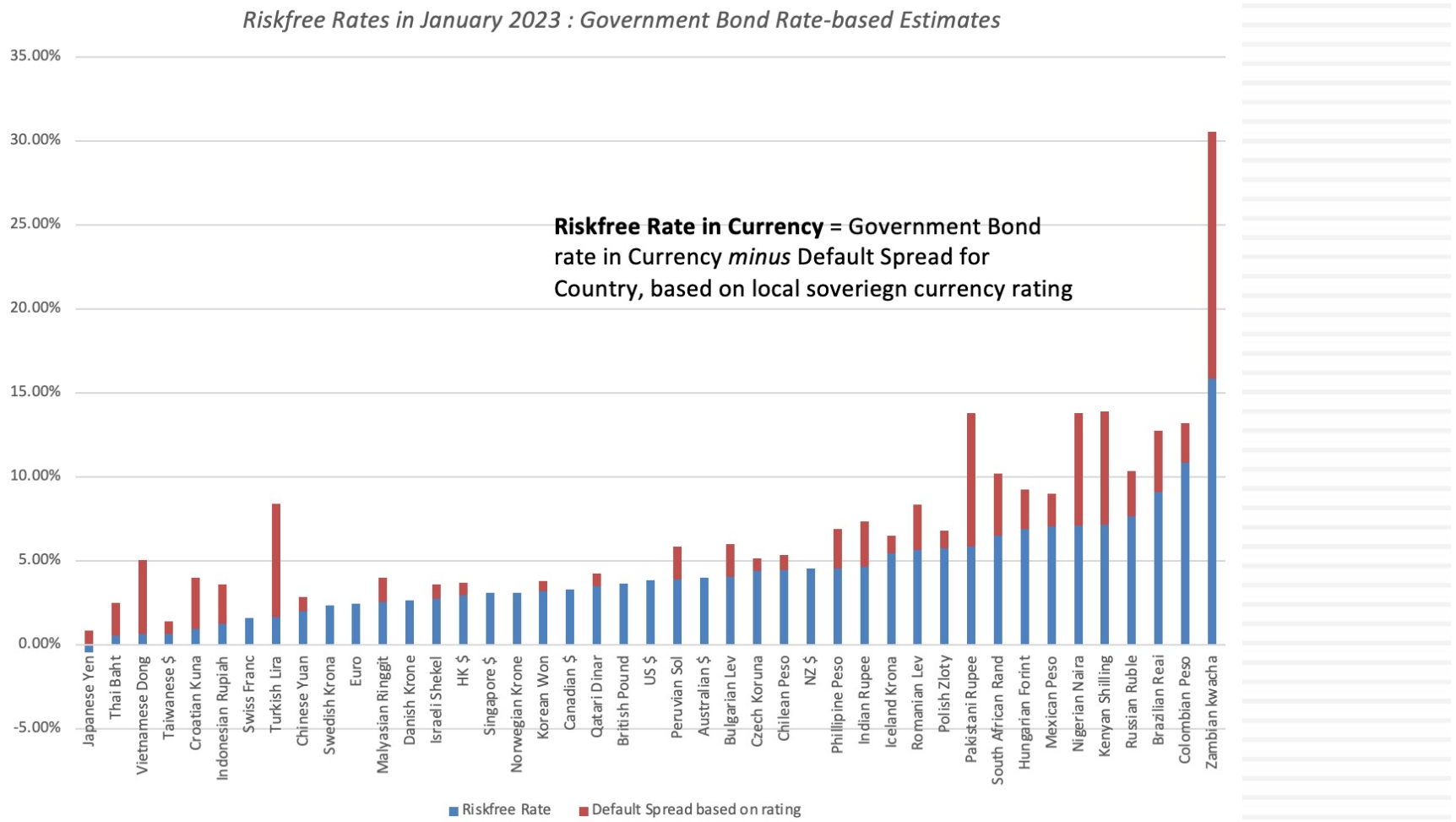
How do we estimate the default spread?
What tax rate do we use?

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.

Why do risk free rates vary across currencies? January 2023 Risk free rates



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
1928-2022	8.17%	6.64%	6.34%	5.06%
Std Error	*2.05%*	*2.15%*		
1973-2022	7.30%	5.14%	5.87%	4.12%
Std Error	*2.51%*	*2.75%*		
2013-2022	12.64%	13.08%	11.50%	12.32%
Std Error	*5.50%*	*4.81%*		

An Updated Estimate: ERP in 2023

In the trailing 12 months, across all companies in the index.

Base year cash flow (last 12 mths)
Dividends (TTM): 65.54
+ Buybacks (TTM): 116.46
= Cash to investors (TTM): **181.99**

Expected earnings/cashflow growth in next 5 years
Earnings growth rate of 6.41% based upon analyst estimates for 2023 and 2024 and growth dropping to 3.88% over the following years.

Modified Payout
This computation assumes that the payout ratio changes over time to reflect a sustainable payout ratio = g/ROE, in the stable growth. The resulting ERP is 5.11%.

Actual numbers | Forecasted numbers

	Last 12 months	1	2	3	4	5	*Term Year*
Earnings	219.49	233.55	248.52	264.44	281.38	299.41	*311.03*
Expected growth	89.78%	89.78%	89.78%	89.78%	89.78%	89.78%	*89.78%*
Dividends + Buybacks =	181.99	209.68	223.12	237.41	252.62	268.81	*279.24*

Earnings and Cash flows grow @3.88% (set equal to risk free rate) a year forever.

S&P 500 on 1/1/23= **3839.50**

$$3839.50 = \frac{209.68}{(1+r)} + \frac{223.12}{(1+r)^2} + \frac{237.41}{(1+r)^3} + \frac{252.62}{(1+r)^4} + \frac{268.81}{(1+r)^5} + \frac{279.24}{(r-.0388)(1+r)^5}$$

The last term in this equation is the expected index level at the end of year 5 (capturing price appreciation)

Solve for r

r = Implied Expected Return on Stocks = 9.82%

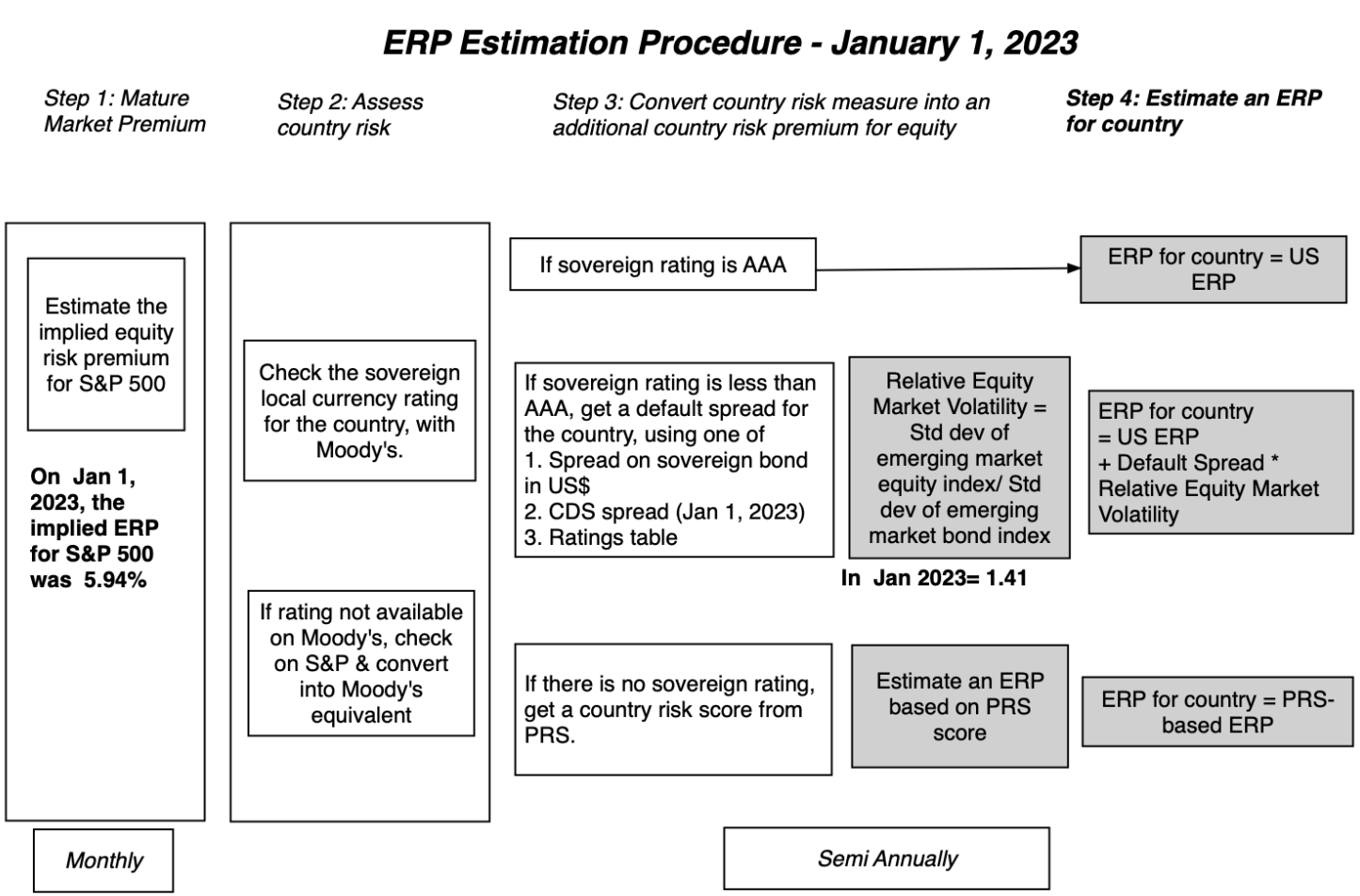
Minus

Risk free rate = T.Bond rate on 1/1/23= 3.88%

Equals

Implied Equity Risk Premium (1/1/23) = 9.82% - 3.88% = 5.94%

A Template for Estimating the ERP



ERP : Jan 2023

Andorra	Baa2	3.29%	9.23%
Austria	Aa1	0.69%	6.63%
Belgium	Aa3	1.03%	6.97%
Cyprus	Ba1	4.32%	10.26%
Denmark	Aaa	0.00%	5.94%
Finland	Aa1	0.69%	6.63%
France	Aa2	0.85%	6.79%
Germany	Aaa	0.00%	5.94%
Greece	Ba3	6.21%	12.15%
Guernsey (States of)	Aaa	0.00%	5.94%
Iceland	A2	1.46%	7.40%
Ireland	A1	1.22%	7.16%
Isle of Man	Aa3	1.03%	6.97%
Italy	Baa3	3.79%	9.73%
Jersey (States of)	Aaa	0.00%	5.94%
Liechtenstein	Aaa	0.00%	5.94%
Luxembourg	Aaa	0.00%	5.94%
Malta	A2	1.46%	7.40%
Netherlands	Aaa	0.00%	5.94%
Norway	Aaa	0.00%	5.94%
Portugal	Baa2	3.29%	9.23%
Spain	Baa1	2.76%	8.70%
Sweden	Aaa	0.00%	5.94%
Switzerland	Aaa	0.00%	5.94%
Turkey	B3	11.22%	17.16%
United Kingdom	Aa3	1.03%	6.97%
Western Europe		**1.51%**	**7.45%**

Albania	B1	7.77%	13.71%
Armenia	Ba3	6.21%	12.15%
Azerbaijan	Ba1	4.32%	10.26%
Belarus	Ca	20.71%	26.65%
Bosnia and Herzegovina	B3	11.22%	17.16%
Bulgaria	Baa1	2.76%	8.70%
Croatia	Baa2	3.29%	9.23%
Czech Republic	Aa3	1.03%	6.97%
Estonia	A1	1.22%	7.16%
Georgia	Ba2	5.19%	11.13%
Hungary	Baa2	3.29%	9.23%
Kazakhstan	Baa2	3.29%	9.23%
Kyrgyzstan	B3	11.22%	17.16%
Latvia	A3	2.07%	8.01%
Lithuania	A2	1.46%	7.40%
Macedonia	Ba3	6.21%	12.15%
Moldova	B3	11.22%	17.16%
Montenegro	B1	7.77%	13.71%
Poland	A2	1.46%	7.40%
Romania	Baa3	3.79%	9.73%
Russia	Caa1	12.94%	18.88%
Serbia	Ba2	5.19%	11.13%
Slovakia	A2	1.46%	7.40%
Slovenia	A3	2.07%	8.01%
Tajikistan	B3	11.22%	17.16%
Ukraine	Caa3	17.26%	23.20%
Uzbekistan	B1	7.77%	13.71%
E. Europe & Russia		**7.79%**	**13.73%**

Country	PRS	CRP	ERP
Algeria	69.25	5.19%	11.13%
Brunei	79.5	1.46%	7.40%
Gambia	65	9.49%	15.43%
Guinea	57.25	15.54%	21.48%
Guinea-Bissau	64	11.22%	17.16%
Guyana	75.75	2.76%	8.70%
Haiti	54.25	20.71%	26.65%
Iran	66.5	7.77%	13.71%
Korea, D.P.R.	51	20.71%	26.65%
Liberia	58	15.54%	21.48%
Libya	70.75	5.19%	11.13%
Madagascar	62.5	11.22%	17.16%
Malawi	51	20.71%	26.65%
Myanmar	55.75	17.26%	23.20%
Sierra Leone	53.5	20.71%	26.65%
Somalia	52	20.71%	26.65%
Sudan	43	24.69%	30.63%
Syria	43.75	24.69%	30.63%
Yemen, Republic	48.25	24.69%	30.63%
Zimbabwe	61.5	12.94%	18.88%

Canada	Aaa	0.00%	5.94%
United States	Aaa	0.00%	5.94%
North America		0.00%	5.94%

Caribbean	**NA**	**11.19%**	**17.13%**

Angola	B3	11.22%	17.16%
Benin	B1	7.77%	13.71%
Botswana	A3	2.07%	8.01%
Burkina Faso	Caa1	12.94%	18.88%
Cameroon	B2	9.49%	15.43%
Cape Verde	B3	11.22%	17.16%
Congo (DR)	B3	11.22%	17.16%
Congo (Rep of)	Caa2	15.54%	21.48%
Côte d'Ivoire	Ba3	6.21%	12.15%
Egypt	B2	9.49%	15.43%
Ethiopia	Caa2	15.54%	21.48%
Gabon	Caa1	12.94%	18.88%
Ghana	Ca	20.71%	26.65%
Kenya	B2	9.49%	15.43%
Mali	Caa2	15.54%	21.48%
Mauritius	Baa3	3.79%	9.73%
Morocco	Ba1	4.32%	10.26%
Mozambique	Caa2	15.54%	21.48%
Namibia	B1	7.77%	13.71%
Niger	B3	11.22%	17.16%
Nigeria	B3	11.22%	17.16%
Rwanda	B2	9.49%	15.43%
Senegal	Ba3	6.21%	12.15%
South Africa	Ba2	5.19%	11.13%
Swaziland	B3	11.22%	17.16%
Tanzania	B2	9.49%	15.43%
Togo	B3	11.22%	17.16%
Tunisia	Caa1	12.94%	18.88%
Uganda	B2	9.49%	15.43%
Zambia	Ca	20.71%	26.65%
Africa		**9.64%**	**15.58%**

Abu Dhabi	Aa2	0.85%	6.79%
Bahrain	B2	9.49%	15.43%
Iraq	Caa1	12.94%	18.88%
Israel	A1	1.22%	7.16%
Jordan	B1	7.77%	13.71%
Kuwait	A1	1.22%	7.16%
Lebanon	C	24.69%	30.63%
Oman	Ba3	6.21%	12.15%
Qatar	Aa3	1.03%	6.97%
Ras Al Khaimah	A3	2.07%	8.01%
Saudi Arabia	A1	1.22%	7.16%
Sharjah	Ba1	4.32%	10.26%
United Arab Emirates	Aa2	0.85%	6.79%
Middle East		**2.51%**	**8.45%**

Bangladesh	Ba3	6.21%	12.15%
Cambodia	B2	9.49%	15.43%
China	A1	1.22%	7.16%
Fiji	B1	7.77%	13.71%
Hong Kong	Aa3	1.03%	6.97%
India	Baa3	3.79%	9.73%
Indonesia	Baa2	3.29%	9.23%
Japan	A1	1.22%	7.16%
Korea	Aa2	0.85%	6.79%
Laos	Caa3	17.26%	23.20%
Macao	Aa3	1.03%	6.97%
Malaysia	A3	2.07%	8.01%
Maldives	Caa1	12.94%	18.88%
Mongolia	B3	11.22%	17.16%
Pakistan	Caa1	12.94%	18.88%
Papua New Guinea	B2	9.49%	15.43%
Philippines	Baa2	3.29%	9.23%
Singapore	Aaa	0.00%	5.94%
Solomon Islands	Caa1	12.94%	18.88%
Sri Lanka	Ca	20.71%	26.65%
Taiwan	Aa3	1.03%	6.97%
Thailand	Baa1	2.76%	8.70%
Vietnam	Ba2	5.19%	11.13%
Asia		**1.93%**	**7.87%**

Argentina	Ca	20.71%	26.65%
Belize	Caa2	15.54%	21.48%
Bolivia	B2	9.49%	15.43%
Brazil	Ba2	5.19%	11.13%
Chile	A2	1.46%	7.40%
Colombia	Baa2	3.29%	9.23%
Costa Rica	B2	9.49%	15.43%
Ecuador	Caa3	17.26%	23.20%
El Salvador	Caa3	17.26%	23.20%
Guatemala	Ba1	4.32%	10.26%
Honduras	B1	7.77%	13.71%
Mexico	Baa2	3.29%	9.23%
Nicaragua	B3	11.22%	17.16%
Panama	Baa2	3.29%	9.23%
Paraguay	Ba1	4.32%	10.26%
Peru	Baa1	2.76%	8.70%
Suriname	Caa3	17.26%	23.20%
Uruguay	Baa2	3.29%	9.23%
Venezuela	C	24.69%	30.63%
Latin America		**6.57%**	**12.51%**

Australia	Aaa	0.00%	5.94%
Cook Islands	B1	7.77%	13.71%
New Zealand	Aaa	0.00%	5.94%
Australia & NZ		**0.00%**	**5.94%**

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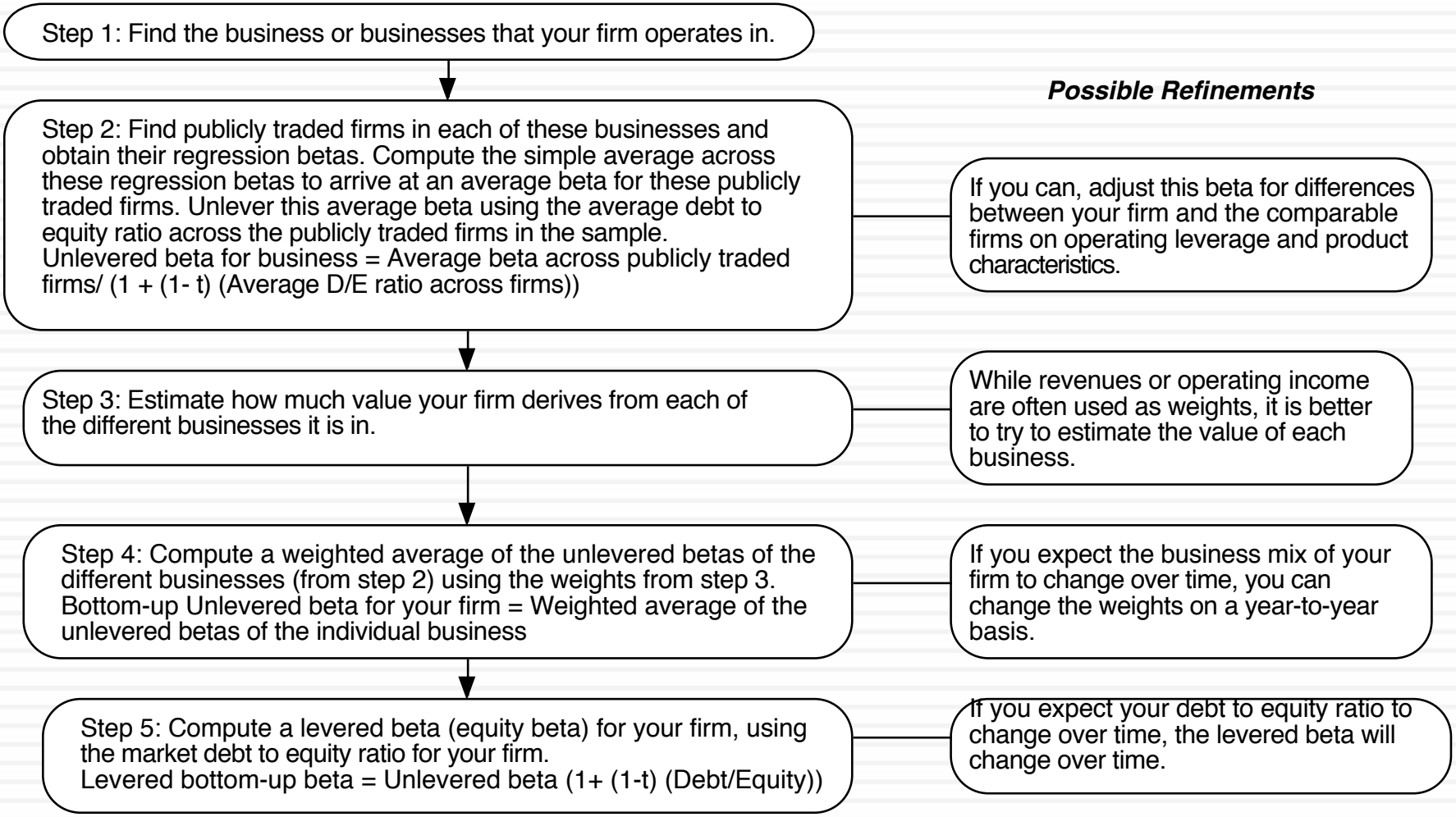
Blue: Moody's Rating
Red: Added Country Risk
Green #: Total ERP

Bottom-up Betas



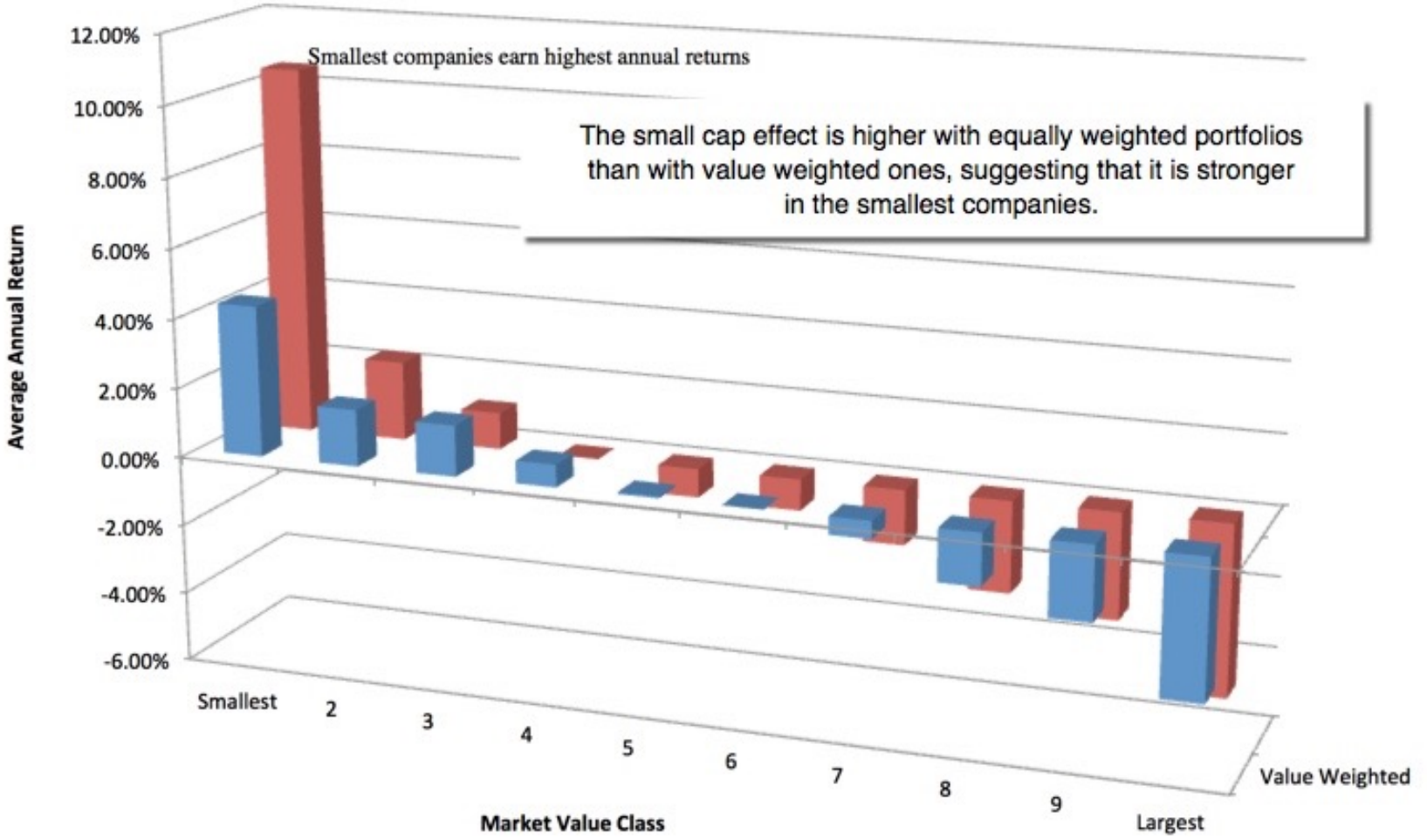
III. THE GARNISHING

Here a premium, there a premium..

The Build up Approach

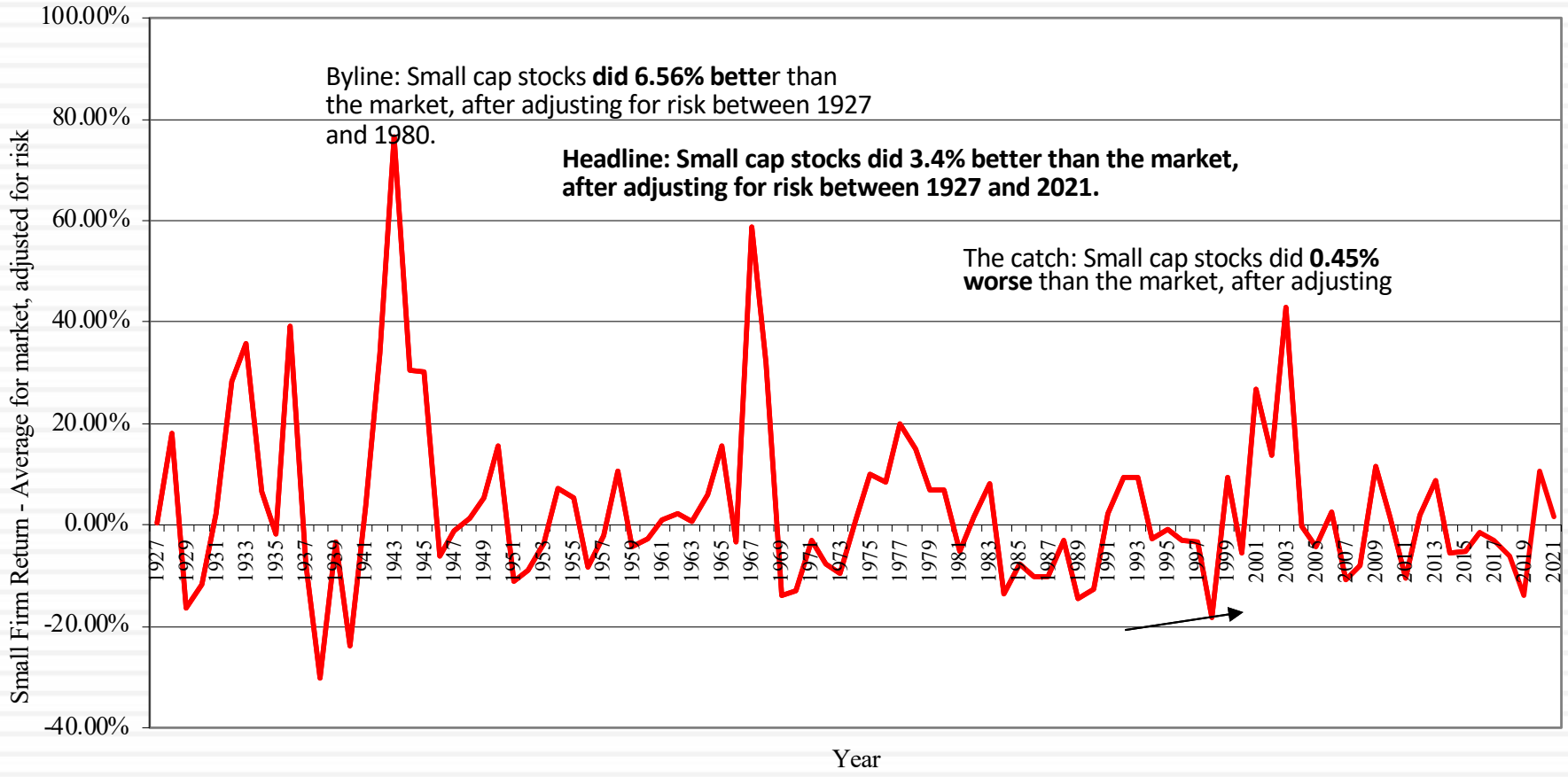
- For many analysts, the risk free rate and equity risk premium are just the starting points to get to a cost of equity. The required return that you obtain is then augmented with premiums for "other" risks to arrive at a built up cost of equity.
- The justifications offered for these premiums are varied 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



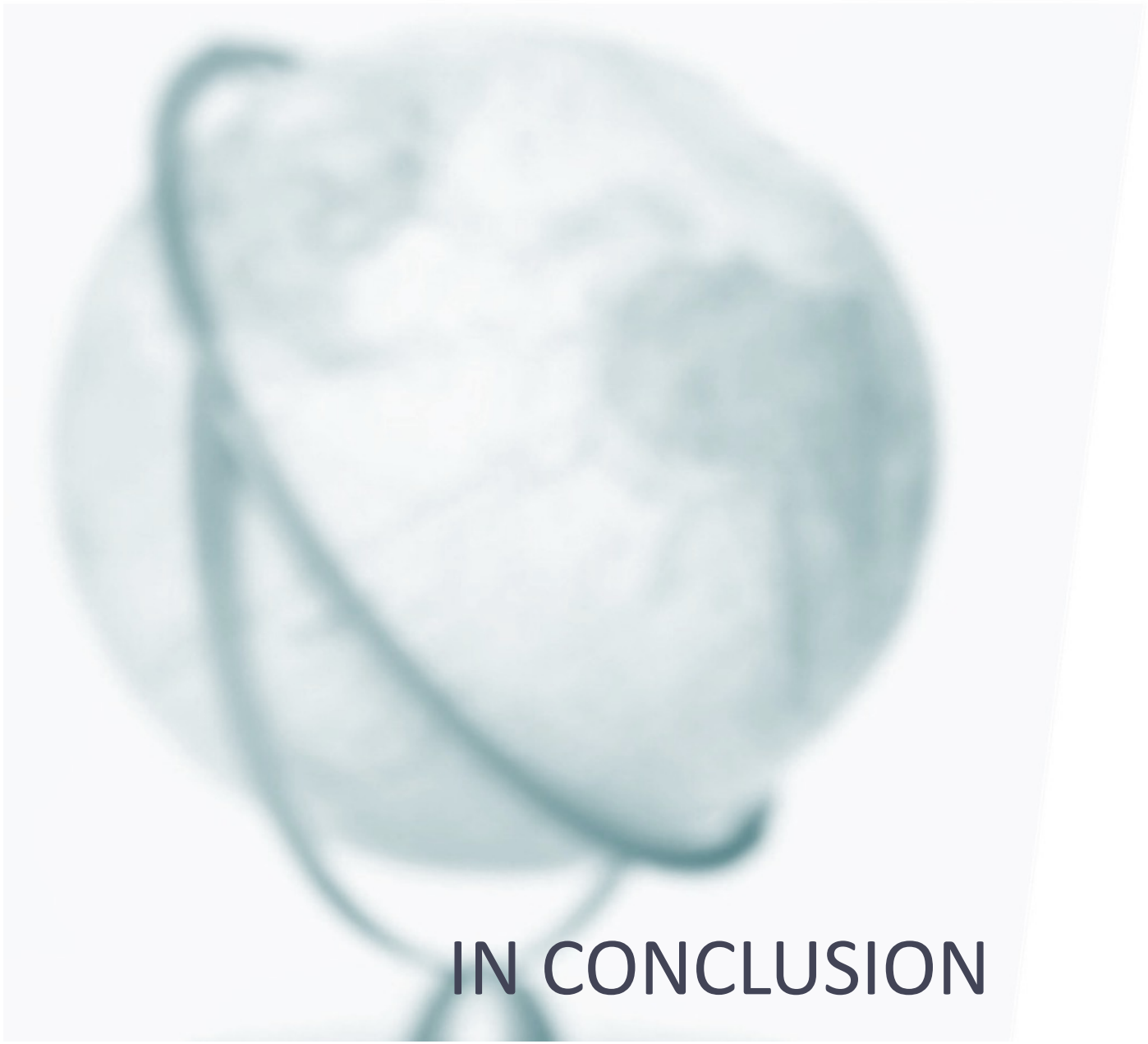
Historical data can hide trends..

Small Firm Premium over time- 1927 -2021



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.



IN CONCLUSION

Less rules, more first principles

Proposition 1: A hurdle rate is an opportunity cost, not a funding cost

- Most people, when asked what a cost of capital is, will respond with the answer that it is the cost of raising capital. In the context of its usage as a hurdle rate, that is not true.
- It is an opportunity cost, a rate of return that you (as a company or investor) can earn on other investments in the market of equivalent risk.
- *Implication: When valuing a company for an acquisition, it is the cost of capital for the target company, not the acquiring company that should be used in valuation.*

Proposition 2: A company-wide hurdle rate can be misleading and dangerous

- In corporate finance, the hurdle rate becomes the number to beat, when you do investment analysis. Most companies claim to have a corporate hurdle rate, a number that all projects that are assessed within the company get measured against.
- If your company operates in only one business and one country, this may work, but to the extent that companies operate in many businesses across multiple countries, there can be no one hurdle rate. Even if you use only one currency in analysis, your cost of capital will be a function of which business a project is in, and what country it is aimed at.
- The consequences of not making these differential adjustments will be that your safe businesses will end up subsidizing your risky businesses, and over time, both will be hurt, in what I term the "curse of the lazy conglomerate".

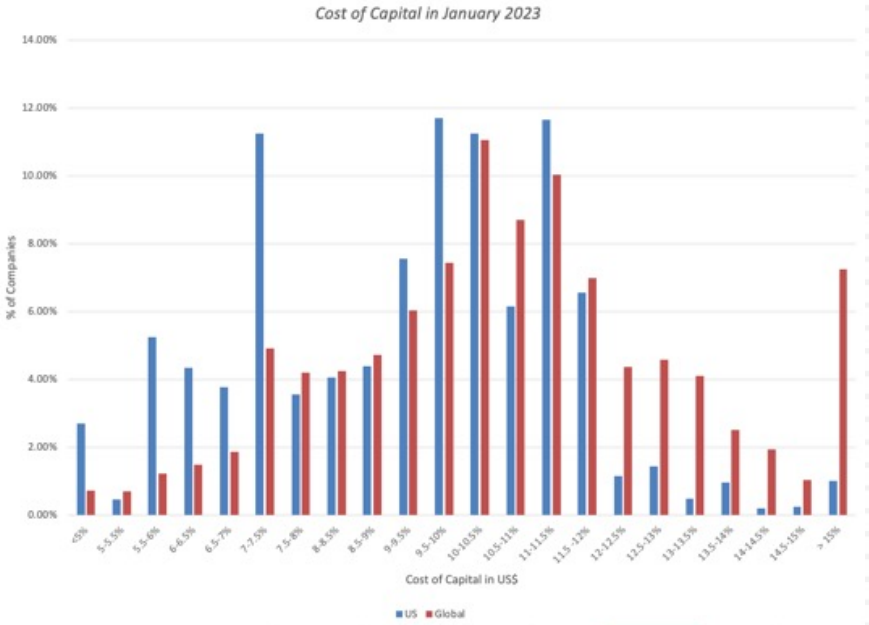
Proposition 3: Currency is a choice, but one that should not change outcomes

- If you follow the consistency rule on currency, incorporating inflation into both cash flows and discount rates, your analyses should be currency neutral.
- In other words, a project that looks like it is a bad project, when the analysis is done in US dollar terms, cannot become a good project, just because you decide to do the analysis in Indian rupees.
- If you do get divergent answers with different currencies, it is because there are inflation inconsistencies in your assessments of discount rates and cash flows.

Proposition 4: Your cost of capital cannot be insulated from the market

- There are many who remain wary of financial markets and their capacity to be irrational and volatile.
- Consequently, they try to generate hurdle rates that are unaffected by market movements, a futile and dangerous exercise, because we have to be price takers on at least some of the inputs into hurdle rates.
- Your cost of capital will change, and should change, as risk free rates and the prices of risk (equity risk premiums and default spreads) change.

Proposition 5: Gain perspective on cost of capital



Sub Group	# firms	Average	10th	25th	**Median**	75th	90th
Africa and Middle East	2,409	12.19%	7.77%	9.08%	**11.35%**	14.26%	18.22%
Australia & NZ	1,895	9.67%	7.09%	8.76%	**10.39%**	10.49%	11.44%
Canada	2,900	10.05%	7.35%	9.67%	**10.44%**	10.50%	11.58%
China	7,266	10.72%	7.86%	9.24%	**10.97%**	11.74%	13.09%
EU & Environs	5,952	10.90%	7.24%	8.71%	**10.37%**	12.06%	14.90%
Eastern Europe & Russia	357	11.39%	7.94%	8.97%	**10.96%**	13.29%	15.05%
India	4,149	11.80%	8.43%	9.80%	**12.00%**	13.74%	14.56%
Japan	3,974	10.48%	7.71%	9.07%	**10.72%**	11.50%	13.10%
Latin America & Caribbean	1,023	13.08%	8.00%	9.57%	**11.96%**	14.62%	20.08%
Small Asia	9,591	11.94%	8.25%	9.66%	**11.23%**	12.86%	15.83%
UK	1,232	10.31%	7.44%	8.41%	**10.67%**	11.67%	12.95%
United States	7,165	9.27%	6.03%	7.26%	**9.63%**	10.88%	11.63%
Global	47,913	10.88%	7.39%	9.08%	**10.60%**	12.07%	14.04%