

# The **CORPORATE LIFECYCLE**

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BUSINESS,  
INVESTMENT, AND  
MANAGEMENT  
IMPLICATIONS

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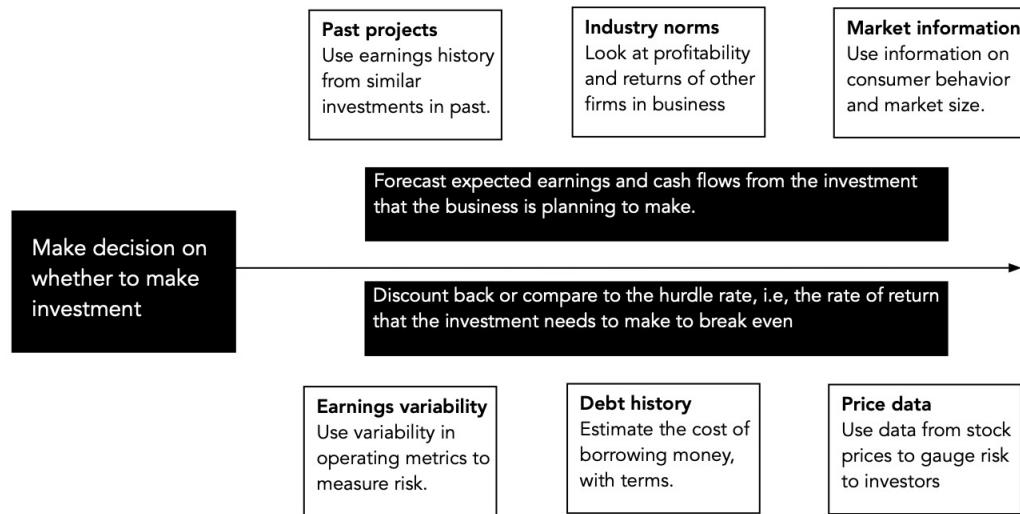
**ASWATH  
DAMODARAN**

## THE INVESTING DECISION ACROSS THE LIFE CYCLE

*Aswath Damodaran*



# THE INVESTMENT PROCESS



# THE HURDLE RATE: COST OF CAPITAL

Assets		Liabilities	
Expected Value of investments already made	<i>Assets in Place</i>	<i>Debt</i>	Borrowed money
Expected Value Added (or Destroyed) by future investments	<i>Growth Assets</i>	<i>Equity</i>	Owner's funds
The <b>cost of capital</b> is the overall cost of funding the firm's business, reflecting the costs of equity and debt, and how much of each is used in financing the firm/project (debt and equity weights).			

The **cost of debt** is the interest rate that those lending long term to the firm will demand today, given their perception of the default risk in the debt, adjusted for any tax benefits from interest expenses.

The **cost of equity** is the rate of return that equity investors demand on their investments, given their perception of the risk in the equity.



# THE COST OF DEBT

## *The Cost of Borrowing (Debt): Pre and Post Tax*

$$\text{After-tax Cost of Debt} = \left[ \text{Risk free Rate} + \text{Default Spread} \right] \times (1 - \text{tax rate})$$

**After-tax Cost of Debt**  
Current cost of borrowing long-term, adjusted for the tax savings on debt.

**Risk free Rate**  
Return that can be earned on an investment with guaranteed return, in currency of choice.

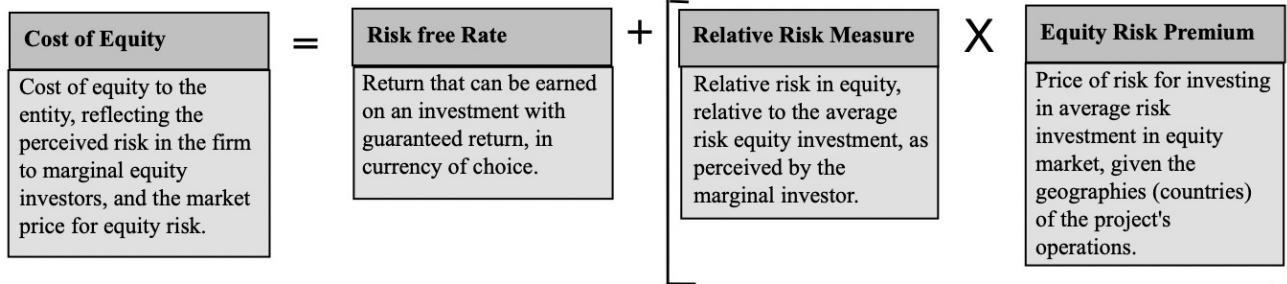
**Default Spread**  
Default spread charged by long-term lenders to reflect credit risk in the entity.

**(1- tax rate)**  
Interest expenses are tax deductible, at the marginal tax rate of the entity.



# THE COST OF EQUITY

## *The Cost of Equity*



# INPUTS TO COST OF CAPITAL:

## 1. RISKFREE RATE

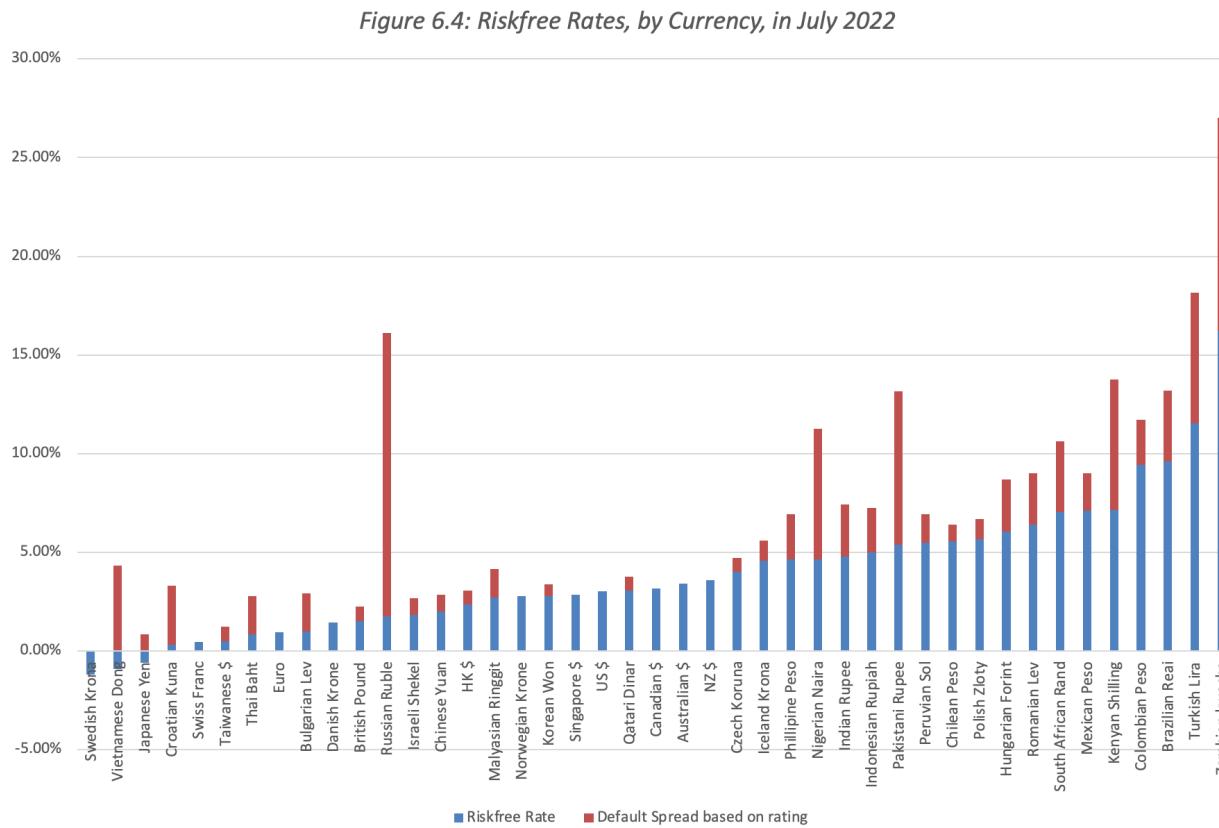
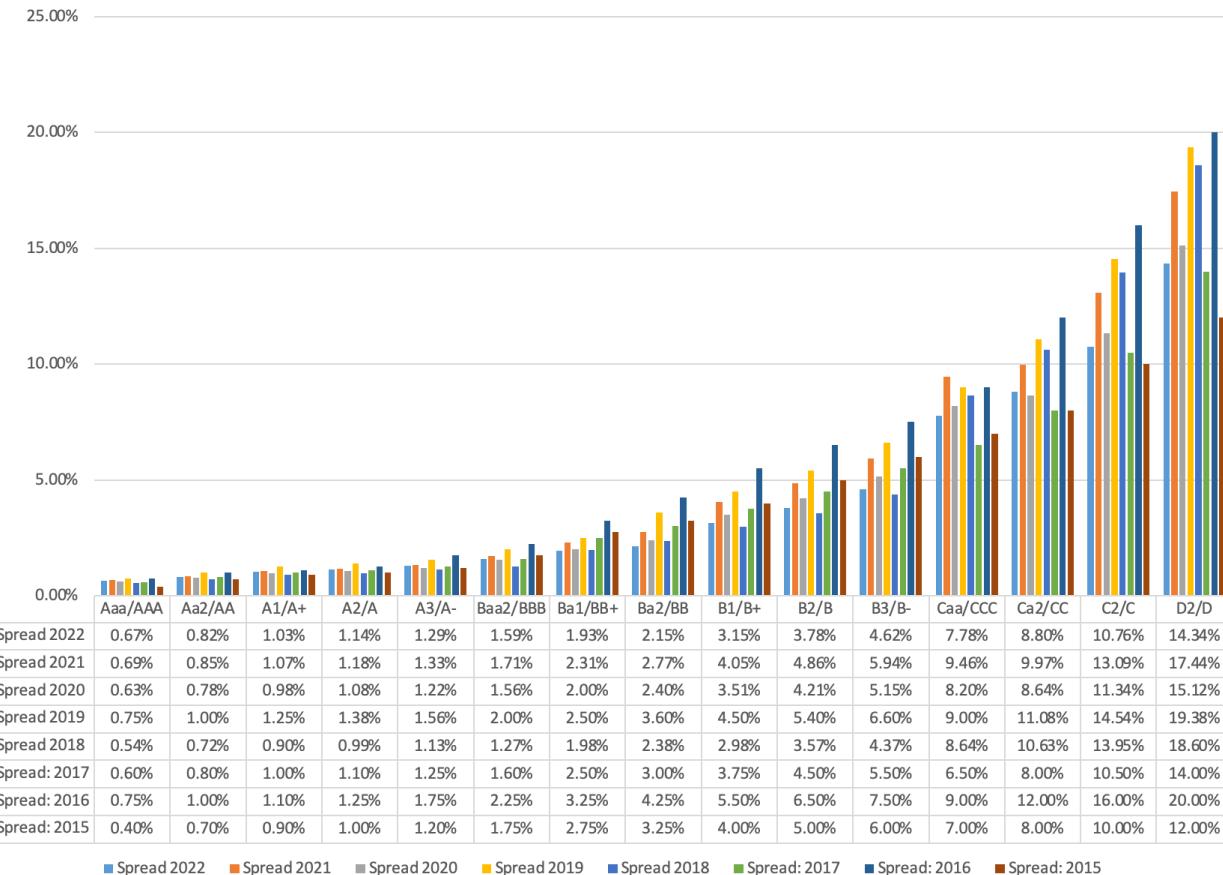


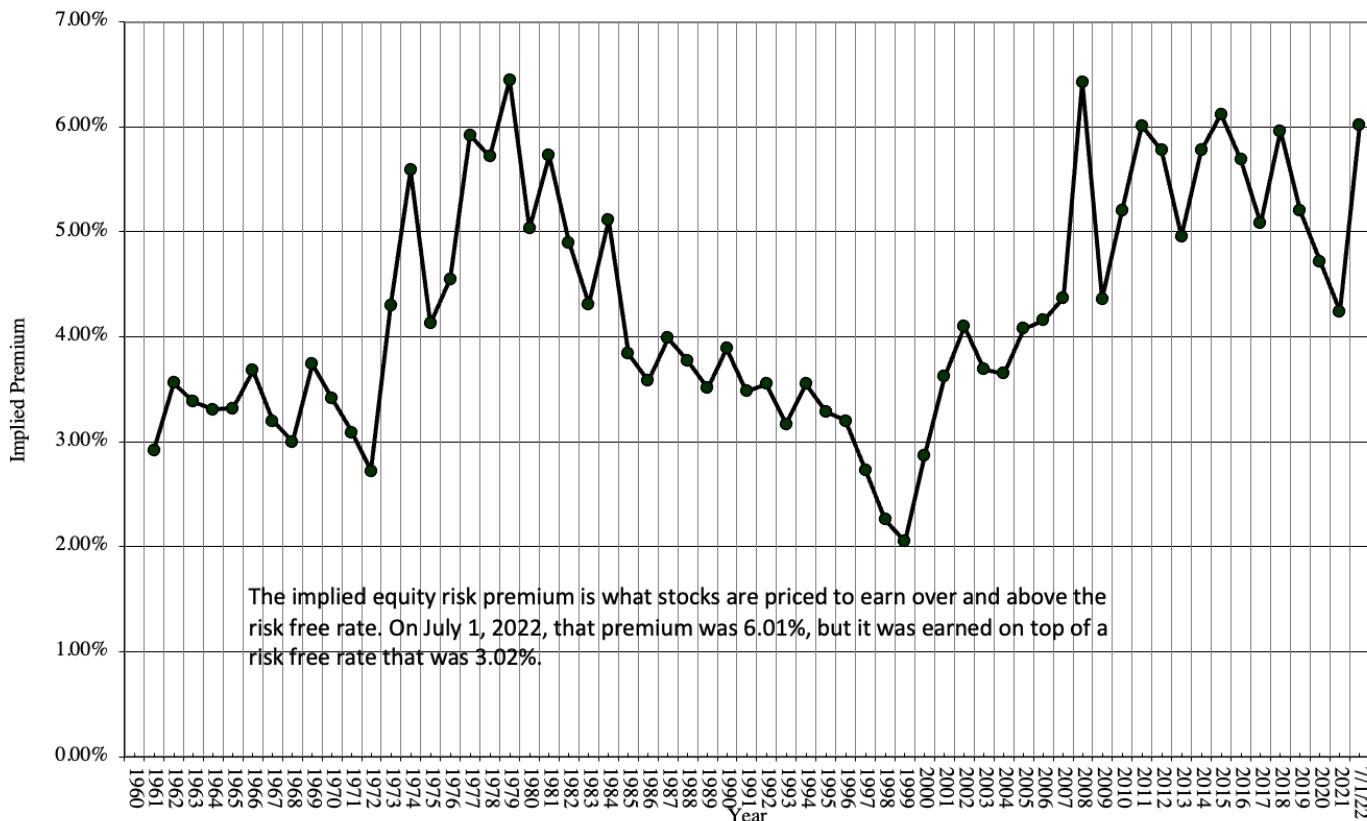
Figure 6.5: Corporate Bond Default Spreads from 2015- 2022



## 2. DEFAULT SPREADS



### 3. EQUITY RISK PREMIUM



# AND BY COUNTRY, IN 2022

ERP: July 2022

Andorra (Principality of)	Baa2	2.66%	8.67%	Italy	Baa3	3.07%	9.08%
Austria	Aa1	0.56%	6.57%	Jersey (States of)	Aaa	0.00%	6.01%
Belgium	Aa3	0.84%	6.85%	Liechtenstein	Aaa	0.00%	6.01%
Cyprus	Ba1	3.50%	9.51%	Luxembourg	Aaa	0.00%	6.01%
Denmark	Aaa	0.00%	6.01%	Malta	A2	1.18%	7.19%
Finland	Aa1	0.56%	6.57%	Netherlands	Aaa	0.00%	6.01%
France	Aa2	0.69%	6.70%	Norway	Aaa	0.00%	6.01%
Germany	Aaa	0.00%	6.01%	Portugal	Baa2	2.66%	8.67%
Greece	Ba3	5.03%	11.04%	Spain	Baa1	2.23%	8.24%
Guernsey (States of)	Aaa	0.00%	6.01%	Sweden	Aaa	0.00%	6.01%
Iceland	A2	1.18%	7.19%	Switzerland	Aaa	0.00%	6.01%
Ireland	A1	0.99%	7.00%	Turkey	B2	7.69%	13.70%
Isle of Man	Aa3	0.84%	6.85%	United Kingdom	Aa3	0.84%	6.85%
				W. Europe		1.16%	7.17%
				EU		1.06%	7.07%
				Euro Zone		1.07%	7.08%

Canada	Aaa	0.00%	6.01%
United States	Aaa	0.00%	6.01%
US & Canada		0.00%	6.01%

Caribbean

Argentina	Ca	16.78%	22.79%
Belize	Caa3	13.98%	19.99%
Bolivia	B2	7.69%	13.70%
Brazil	Ba2	4.21%	10.22%
Chile	A1	0.99%	7.00%
Colombia	Baa2	2.66%	8.67%
Costa Rica	B2	7.69%	13.70%
Ecuador	Caa3	13.98%	19.99%
El Salvador	Caa3	13.98%	19.99%
Guatemala	Ba1	3.50%	9.51%
Honduras	B1	6.29%	12.30%
Mexico	Baa1	2.23%	8.24%
Nicaragua	B3	9.09%	15.10%
Panama	Baa2	2.66%	8.67%
Paraguay	Ba1	3.50%	9.51%
Peru	Baa1	2.23%	8.24%
Suriname	Caa3	13.98%	19.99%
Uruguay	Baa2	2.66%	8.67%
Venezuela	C	20.40%	26.41%
Latin America		5.20%	11.21%

Aswath Damodaran

Country	Rating	CRP	ERP
Angola	B3	9.09%	15.10%
Benin	B1	6.29%	12.30%
Botswana	A3	1.68%	7.69%
Burkina Faso	Caa1	10.48%	16.49%
Cameroon	B2	7.69%	13.70%
Cape Verde	B3	9.09%	15.10%
Congo (DR)	Caa1	10.48%	16.49%
Congo (Republic of)	Caa2	12.59%	18.60%
Côte d'Ivoire	Ba3	5.03%	11.04%
Egypt	B2	7.69%	13.70%
Ethiopia	Caa2	12.59%	18.60%
Gabon	Caa1	10.48%	16.49%
Ghana	Caa1	10.48%	16.49%
Kenya	B2	7.69%	13.70%
Mali	Caa2	12.59%	18.60%
Mauritius	Baa2	2.66%	8.67%
Morocco	Ba1	3.50%	9.51%
Mozambique	Caa2	12.59%	18.60%
Namibia	B1	6.29%	12.30%
Niger	B3	9.09%	15.10%
Nigeria	B2	7.69%	13.70%
Rwanda	B2	7.69%	13.70%
Senegal	Ba3	5.03%	11.04%
South Africa	Ba2	4.21%	10.22%
Swaziland	B3	9.09%	15.10%
Tanzania	B2	7.69%	13.70%
Togo	B3	9.09%	15.10%
Tunisia	Caa1	10.48%	16.49%
Uganda	B2	7.69%	13.70%
Zambia	Ca	16.78%	22.79%
Africa		7.36%	13.37%

Albania

Armenia

Azerbaijan

Belarus

Bosnia and Herzegovina

Bulgaria

Croatia

Czech Republic

Estonia

Georgia

Hungary

Kazakhstan

Kyrgyzstan

Latvia

Lithuania

Macedonia

Moldova

Montenegro

Poland

Romania

Russia

Serbia

Slovakia

Slovenia

Tajikistan

Ukraine

Uzbekistan

E. Europe & Russia

Country

PRS

CRP

ERP

Algeria

Brunei

Gambia

Guinea

Guinea-Bissau

Guyana

Haiti

Iran

Korea, D.P.R.

Liberia

Libya

Madagascar

Malawi

Myanmar

Sierra Leone

Somalia

Sudan

Syria

Yemen, Republic

Zimbabwe

Australia

Cook Islands

New Zealand

Aus & NZ

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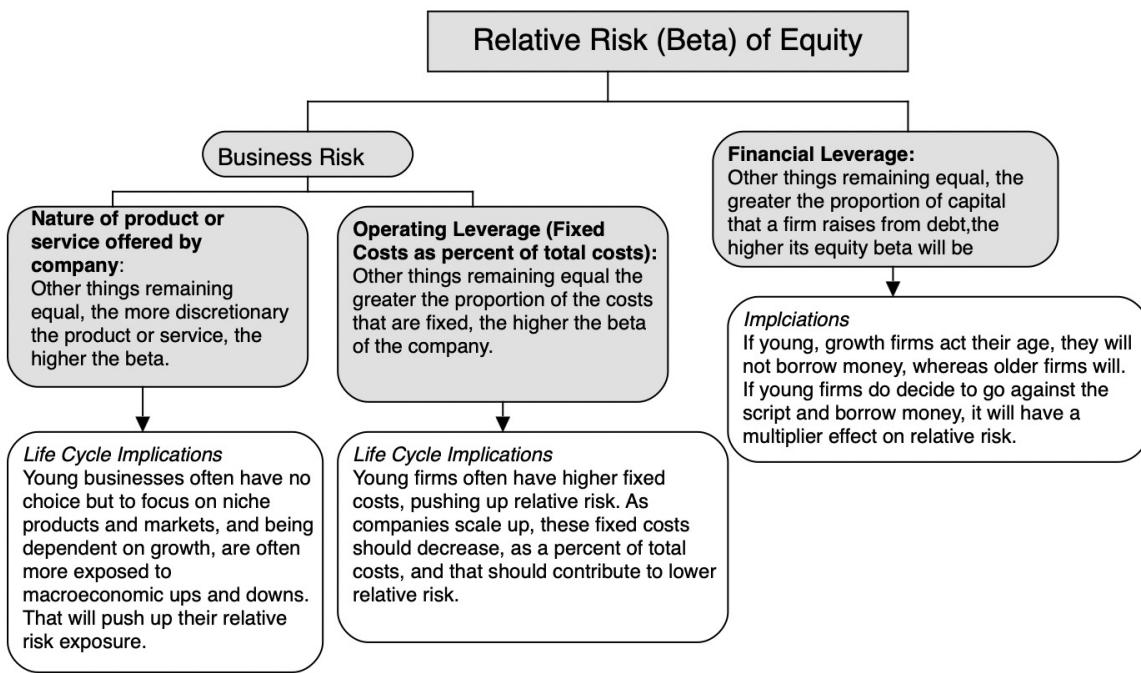
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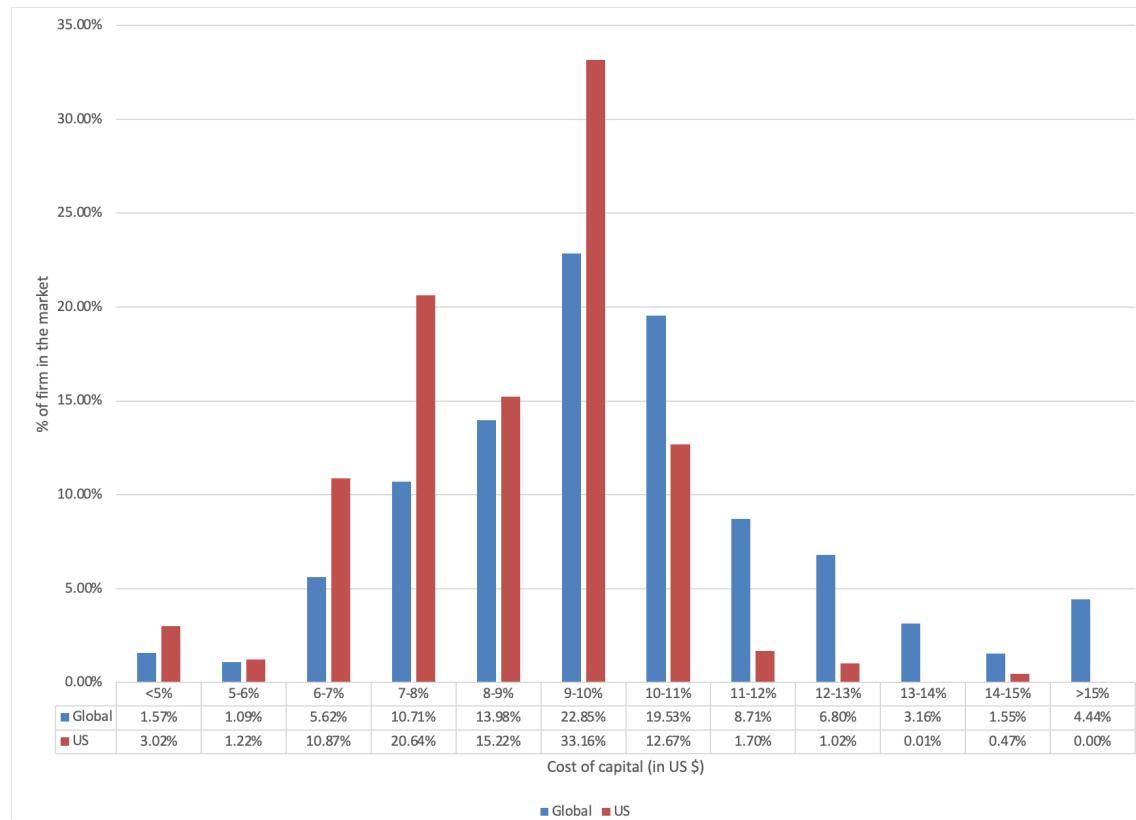
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## 4. RELATIVE RISK (BETA)



# COST OF CAPITAL – DISTRIBUTION (ALL FIRMS)



AND BY AGE  
DECILE...

<i>Cost of Capital in US \$</i>				
<i>Age Decile</i>	<i>Average Age</i>	<i>Lowest Quartile</i>	<i>Median</i>	<i>Highest Quartile</i>
Youngest	5.04	8.73%	9.27%	9.64%
2nd decile	9.43	8.58%	9.20%	9.64%
3rd decile	13.58	8.19%	9.19%	9.77%
4th decile	18.12	8.13%	9.15%	9.78%
5th decile	23.49	7.64%	9.12%	9.81%
6th decile	29.49	8.10%	9.15%	9.70%
7th decile	38.19	7.81%	9.05%	9.68%
8th decile	52.48	7.53%	8.94%	9.67%
9th decile	86.88	6.91%	8.59%	9.24%
Top decile	140.22	6.66%	7.03%	8.88%

# EXTENDING TO PRIVATE BUSINESSES (TOTAL RISK)

Age Decile	Number of firms	Correlation with market	Total Cost of Capital		
			First Quartile	Median	Third Quartile
Youngest	483	28.31%	20.86%	25.31%	28.73%
2nd decile	674	28.61%	20.64%	25.25%	27.96%
3rd decile	442	29.11%	19.52%	24.15%	27.75%
4th decile	731	29.11%	19.39%	24.01%	27.59%
5th decile	611	29.11%	17.85%	23.92%	27.45%
6th decile	560	29.28%	18.02%	23.33%	26.93%
7th decile	592	29.60%	17.84%	22.25%	26.36%
8th decile	621	30.97%	16.89%	20.63%	24.43%
9th decile	584	31.77%	12.70%	20.08%	23.01%
Oldest	595	33.52%	12.02%	12.70%	21.10%



# INVESTMENT DECISION RULES:

## 1. ACCOUNTING RETURNS

Assets	Liabilities
Operating Assets	<i>Capital Invested in operations</i>
Cash & Marketable Securities	<i>Capital held as cash</i>
<p><i>Debt</i> Includes long term and short term interest bearing debt,</p> <p><i>Equity</i> Includes cumulated retained earnings in the company.</p> <p>The firm, composed of both equity investors and lenders, gets the earnings generated prior to debt payments (interest expenses), i.e., <b>operating income on invested capital (debt + equity - cash)</b></p>	
$\text{Return on Invested Capital} = \frac{\text{Operating Income} \times (1 - \text{tax rate})}{\text{Book Value of Equity} + \text{Book Value of Debt} - \text{Cash & Marketable Securities}}$	
$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Book Value of Equity}}$	



# ACCOUNTING RETURNS – BY AGE DECILE

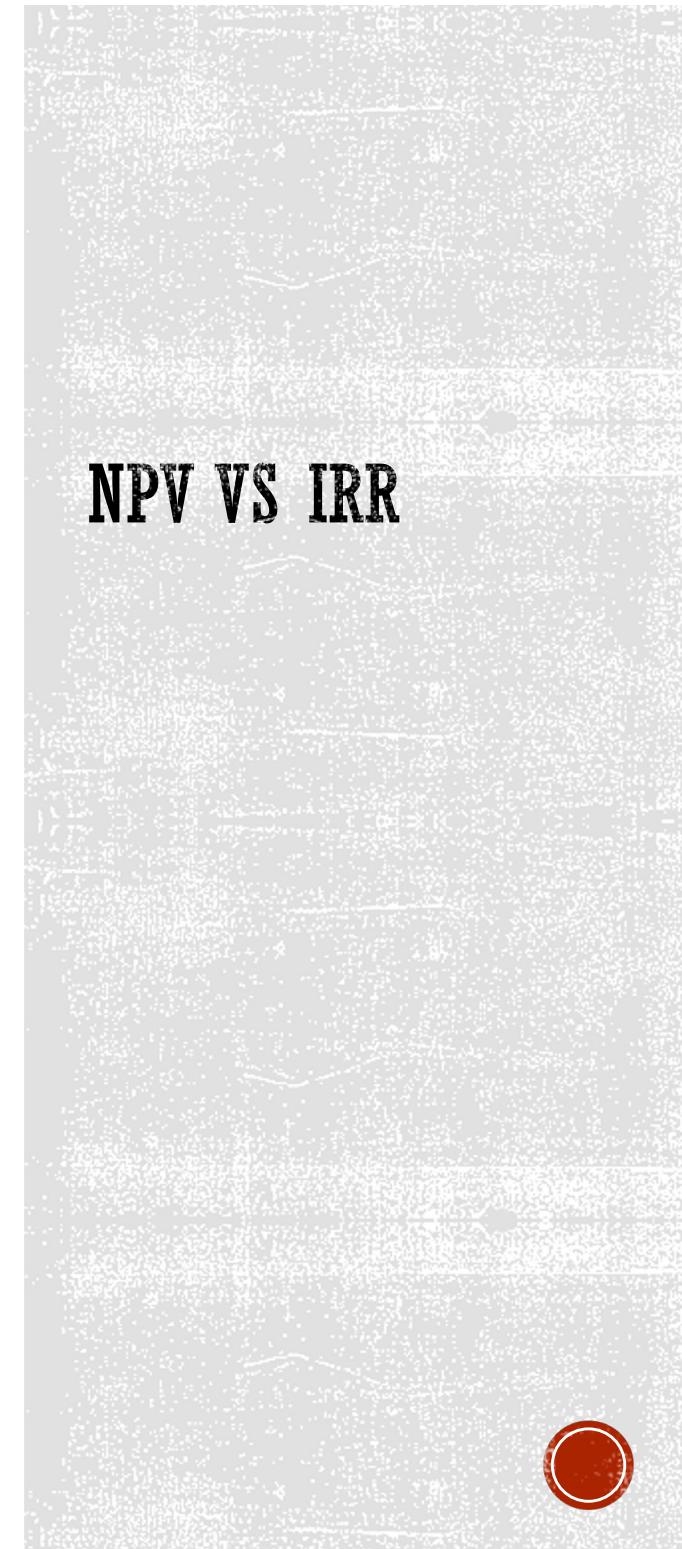
Age Decile	Average Age	Return on Capital			Return on Equity		
		Median	Aggregate	% Negative	Median	Aggregate	% Negative
Youngest	5.04	-74.99%	7.28%	47.41%	-15.50%	0.43%	73.91%
2nd decile	9.43	-57.06%	4.14%	43.92%	-15.96%	-4.21%	67.66%
3rd decile	13.58	-27.77%	-5.18%	42.08%	-9.40%	-8.74%	57.01%
4th decile	18.12	-7.40%	11.84%	36.94%	-4.84%	12.42%	51.03%
5th decile	23.49	0.10%	13.64%	28.81%	5.79%	18.23%	37.48%
6th decile	29.49	4.65%	11.38%	27.14%	6.83%	22.74%	34.11%
7th decile	38.19	6.26%	17.81%	24.32%	9.90%	18.64%	28.72%
8th decile	52.48	9.30%	10.24%	19.32%	12.65%	31.45%	19.16%
9th decile	86.88	10.22%	4.72%	18.15%	12.66%	22.04%	16.95%
Top decile	140.22	5.18%	7.83%	22.69%	11.84%	15.10%	8.57%

- The **net present value of a project** is the sum of the present values of the expected cash flows on the project, over its lifetime, discounted back at the hurdle rate, i.e., the cost of equity or capital. If the NPV is greater (less) than zero, the project is generating a return that exceeds (trails) its hurdle rate and is a good (bad) project.
- The **internal rate of return** is the discount rate that makes the aggregated present value of all cash flows on the project equal to zero. That internal rate of return can be compared to the hurdle rate for the project, and if it exceeds (falls below) the hurdle rate, the project is a good project

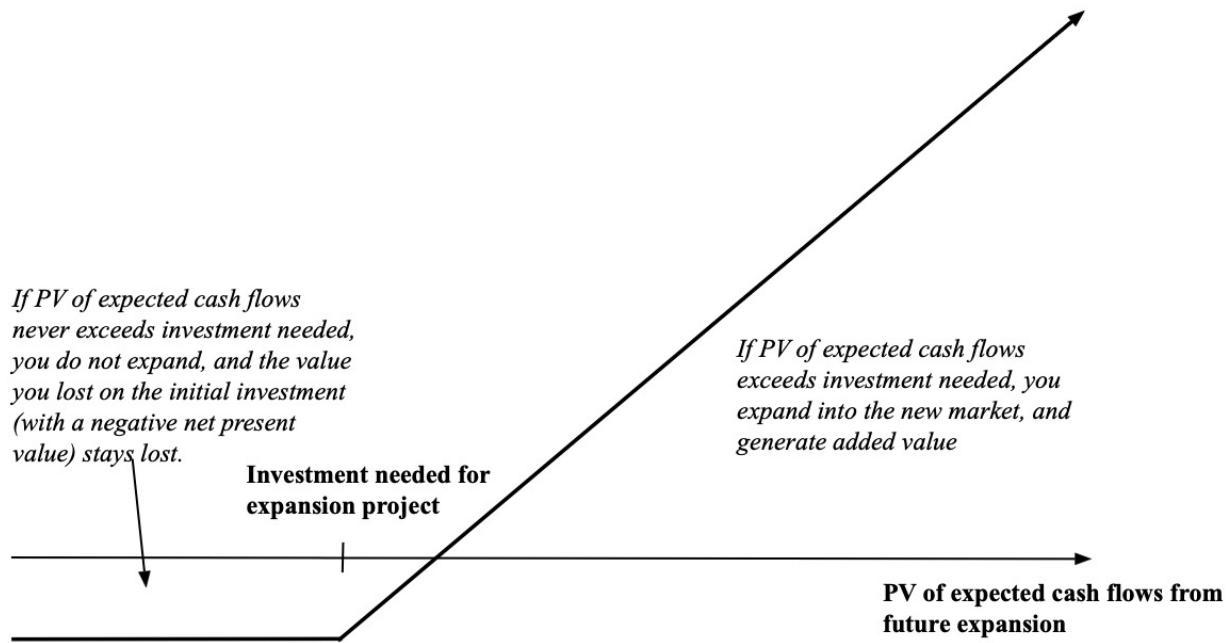
## INVESTMENT DECISION RULES: 2. DISCOUNTED CASHFLOW APPROACHES



- **Percent versus Absolute Value:** The first difference is that the NPV for a project is an absolute value, i.e., with expected dollar cash flows, the NPV will be a dollar value, biasing it towards investments that require more capital. The internal rate of return, as a percentage value, is likely to skew towards projects that require less capital, yielding rankings that diverge from the NPV rule.
- **Unique versus Multiple Values:** There can be only one net present value for a project, but if a project has cash flows that change sign more than once, going from negative to positive and then back to negative, over time, there can be more than one internal rate of return for the project.
- **Reinvestment of intermediate cash flows:** The NPV rule assumes that these intermediate cash flows are reinvested at the hurdle rate, a safe assumption if these hurdle rates represent what investors can earn in the market right now on investments of equivalent risk. The IRR rule assumes that intermediate cash flows get reinvested at the computed IRR for the project, an implicit assumption that the business will continue to have new projects very similar in quality and returns to the one that is being assessed, in the future.



# INVESTMENT DECISION RULES: 3. REAL OPTIONS



- Real options are notoriously difficult to value, since the option pricing models that we use to value listed options do not adapt well to valuing project options, where the underlying asset is not traded, the options are long term and early exercise is more the rule than the exception.
- However, recognizing that there is a real option embedded in a project can yield valuable insights and alter decision making. Thus, even without attaching a value to the option, we know that option to expand have the most value, when the market you plan to expand into is a big one and when you are most uncertain about its size, and whether you will be able to enter it.
- While businesses across the life cycle can and often do make real options arguments for investing in projects that don't pass financial muster (NPV is less than zero or return on capital is less than the cost of capital), you can see the appeal to young firms, especially those entering large markets, since they often face the most uncertainty about the future.

## REAL OPTIONS IN PRACTICE



# INVESTMENT DECISION RULES ACROSS THE LIFE CYCLE!

