THE FAT LADY IS SINGING: SPRING 2023

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Ponderous Thoughts, or maybe not

1. There are few facts and lots of opinions.
   a. Even the givens (cash & riskfree rate) are not.
   b. With accounting and market numbers, all bets are off, as different services report different numbers for the same company. If there is one lesson, it is buyer beware.
2. The real world is a messy place and ever-changing place
   a. Money making firms can become money losers
   b. Companies can be restructured/ given facelifts
   c. Markets are shifting and changing, as the environment changes
   d. Politics and governments can be key actors.
3. Models don't compute values and optimal paths. You do.

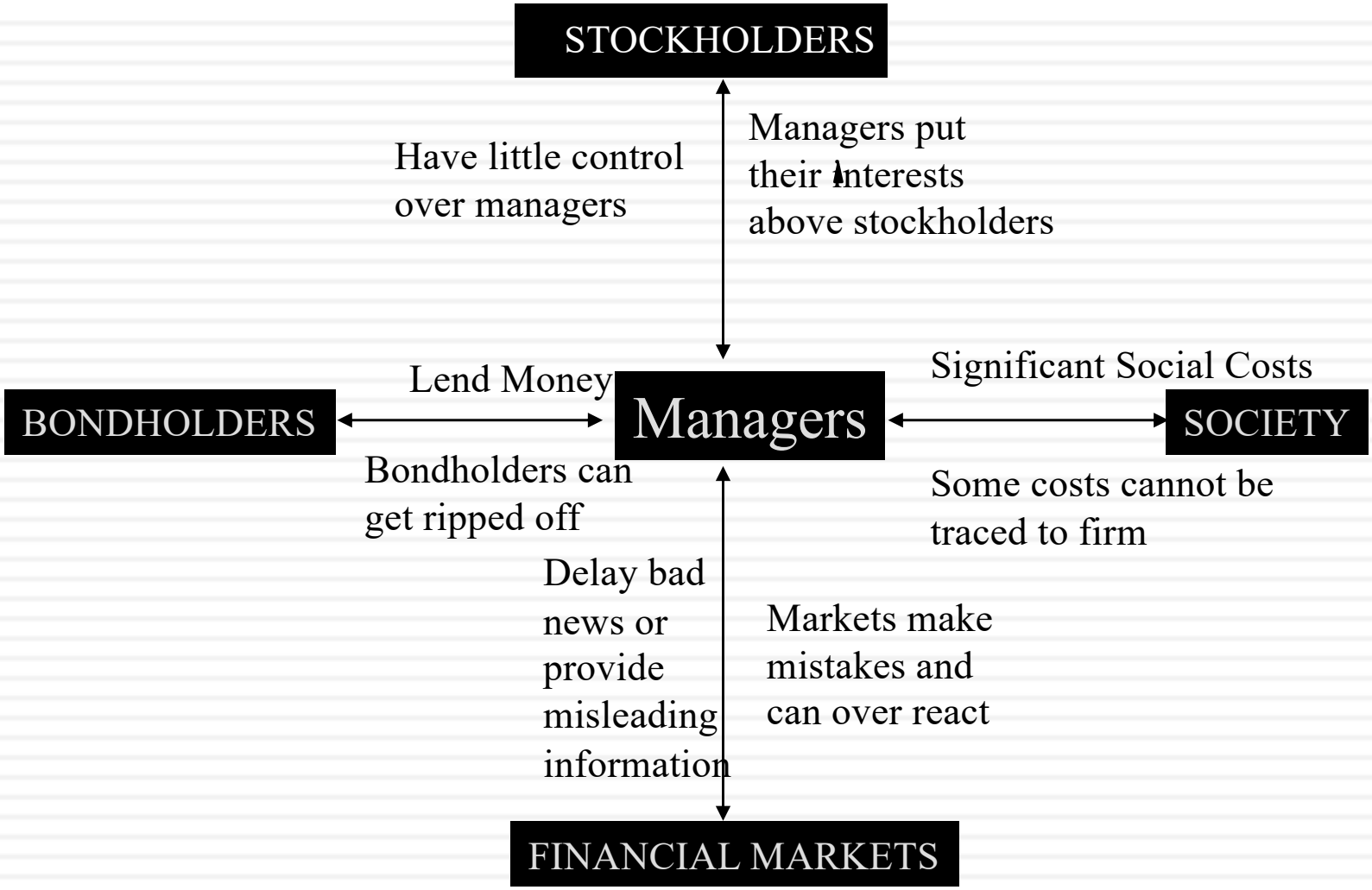
The most analyzed companies this semester were..

Company	Number of analyses
Nvidia	7
Netflix	6
Costco	5
Nike	4
Activision	3

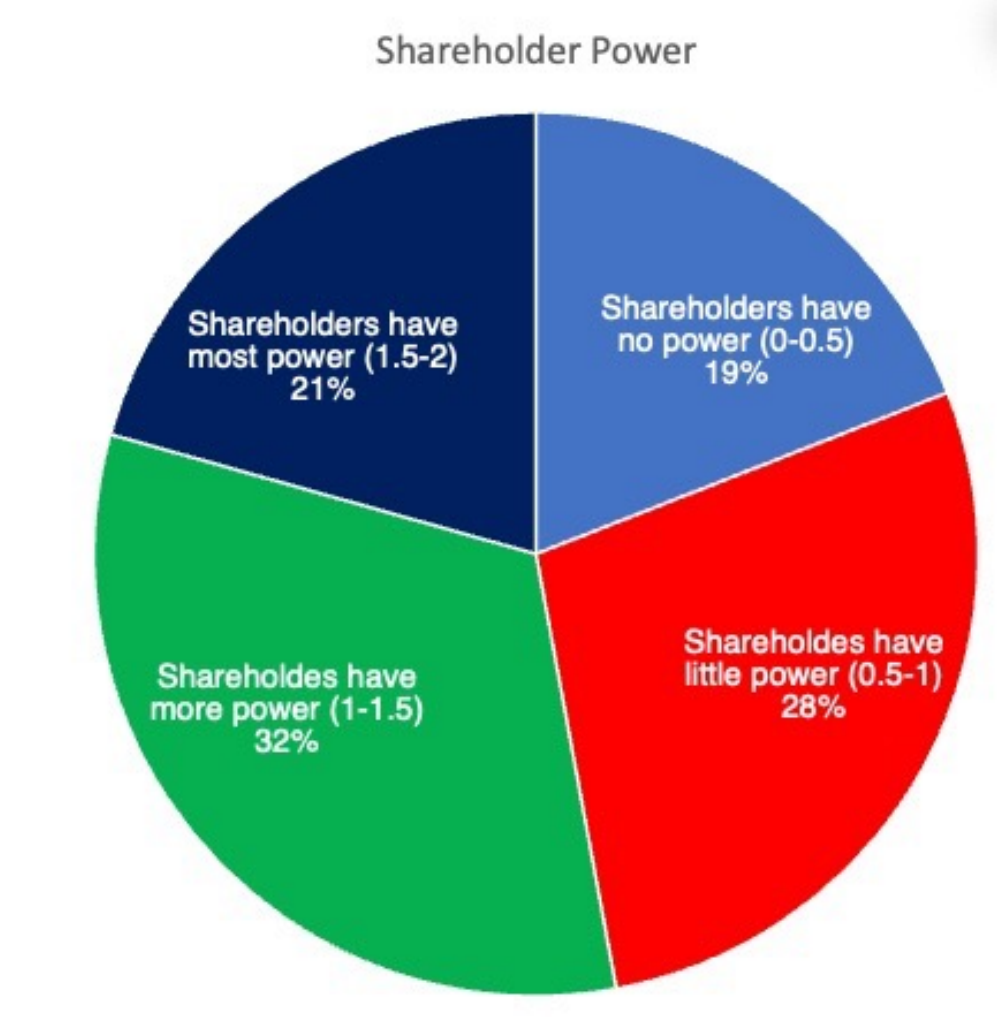
And here's why you can do the same company..

Company	CG (0-2)	Marginal Investor	Regression Beta	Jensen's Alpha (% annualized)	R Squared (%)	Bottom up Levered Beta (%)	Equity Risk Premium	Cost of equity (%)	Debt to Capital Ratio	Cost of debt (pre-tax) (%)	Cost of Capital (%)	Return on Equity (%)	Return on Capital	Optimal Debt Ratio (%)
Nvidia	1.5	Institutional	2.01	53.06%	54.30%	1.54	7.04%	14.26%	1.99%	4.86%	14.05%	25.10%	25.50%	0.00%
Nvidia	1.5	Institutional	1.81	41.00%	38.80%	1.39	6.92%	12.19%	1.83%	5.12%	12.07%	24.60%	20.40%	0.00%
Nvidia	1.5	Institutional	1.77	33.04%	41.70%	1.55	6.92%	14.26%	1.52%	4.53%	14.10%	14.83%	15.70%	1.50%
Nvidia	1.5	Institutional	1.72	17.65%	43.70%	1.63	5.94%	13.56%	1.67%	5.30%	13.40%	19.76%	13.61%	0.00%
Nvidia	1.5	Instituitonal	1.77	31.11%	41.70%	1.43	6.30%	14.33%	2.24%	4.70%	14.16%	53.13%	33.13%	0.00%
Nvidia	1.5	Institutional	1.60	35.00%	47.20%	1.36	6.47%	12.39%	1.40%	5.20%	12.27%	16.00%	28.00%	0.00%
Nvidia	1.5	Institutional	1.73	35.66%	46.30%	1.53	6.62%	13.40%	1.34%	4.85%	13.40%	16.41%	11.73%	5.00%

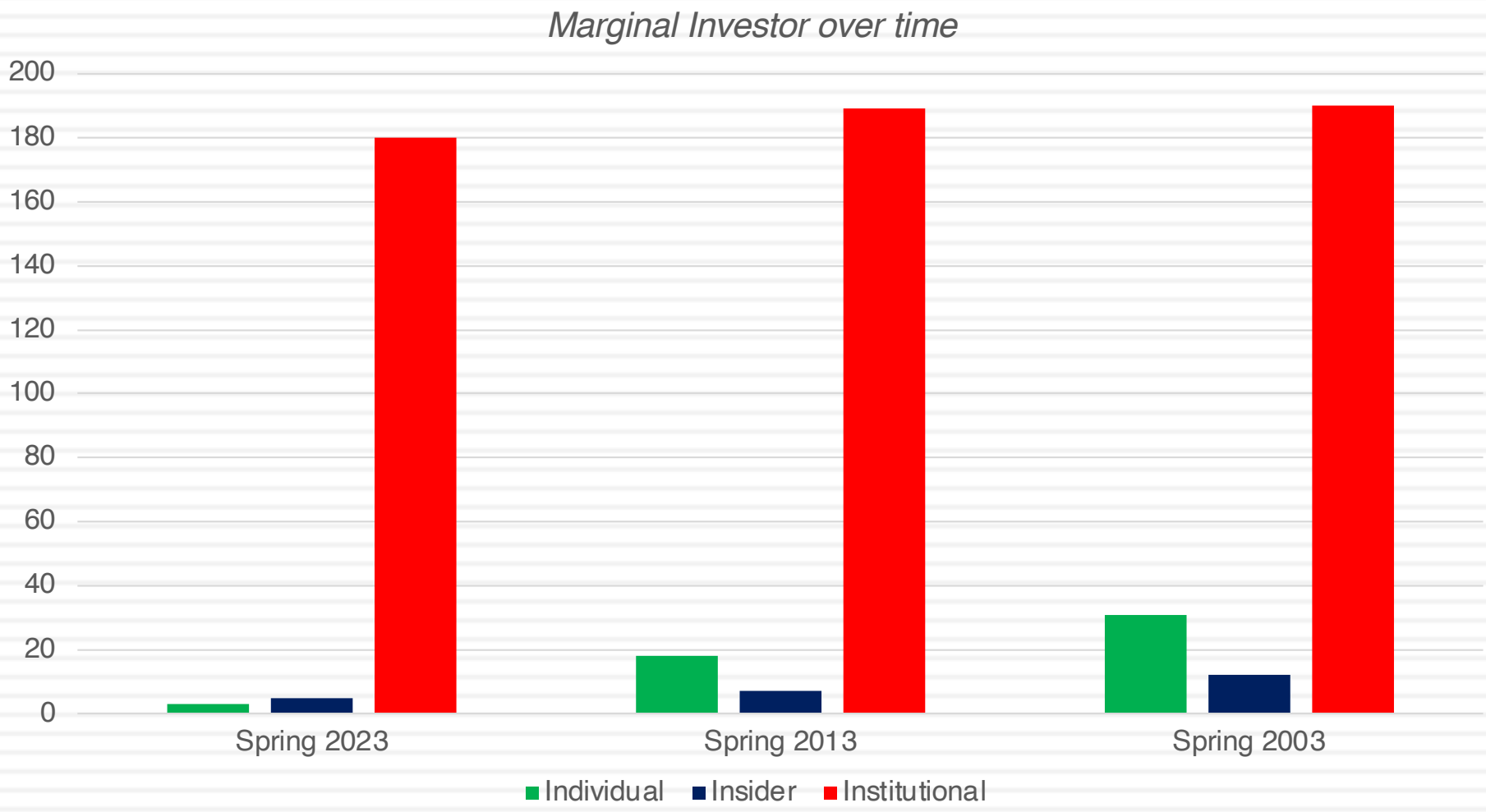
The Breakdown in the Classical Objective Function



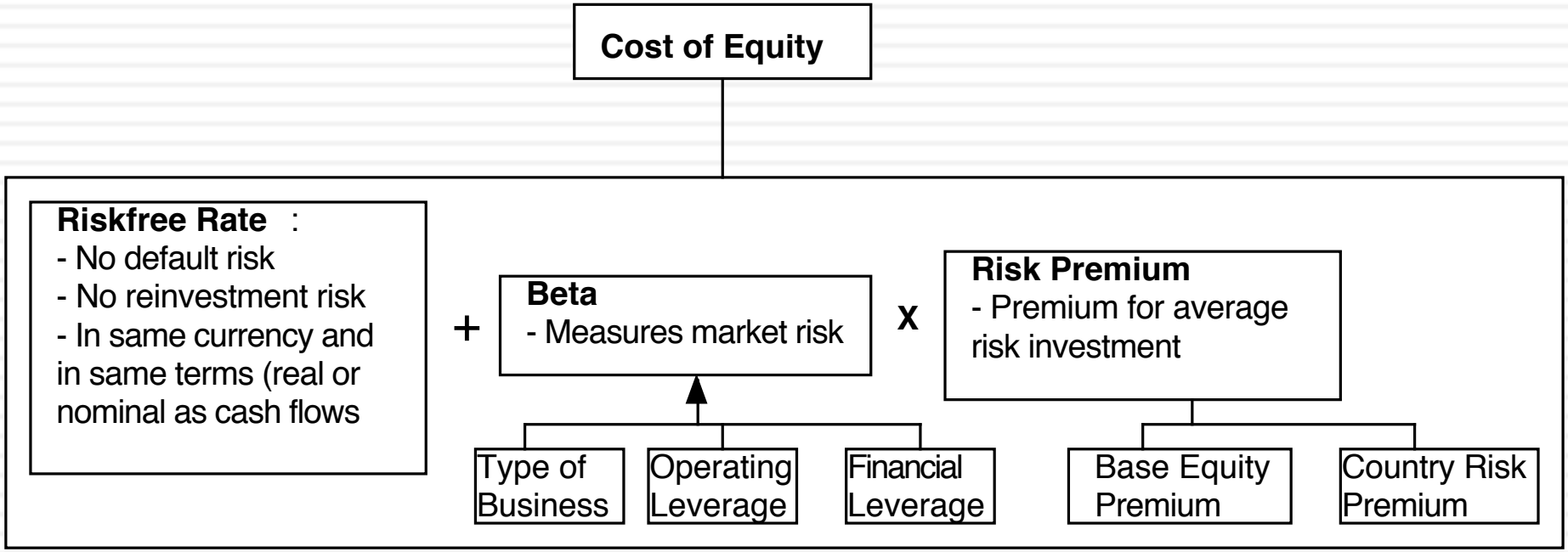
I. Where does the power lie?



II. Who is your marginal investor?

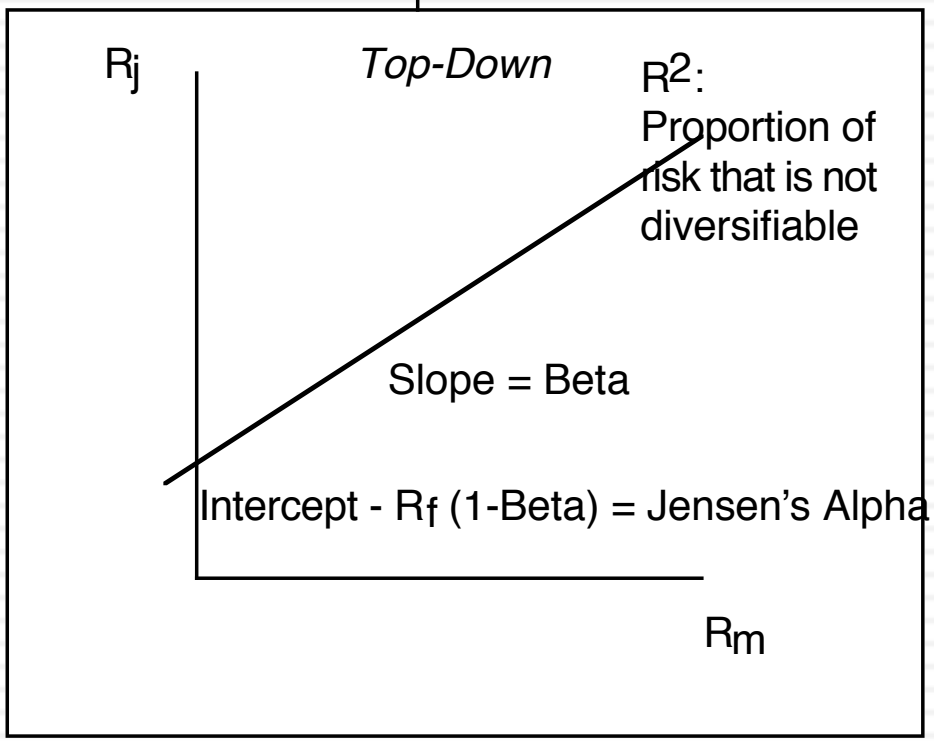


III. Risk Profiles and Costs of Equity



Beta: The Standard Approach

Beta of Equity

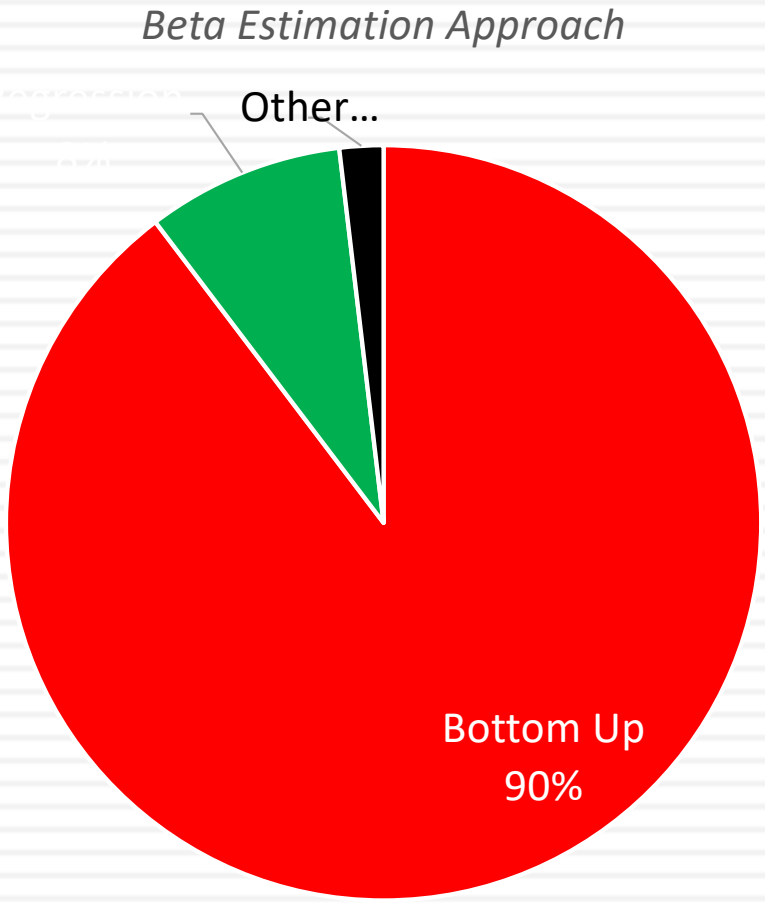


Bottom-up

1. Identify businesses that firm is in.
2. Take weighted average of the unlevered betas of other firms in the business
3. Compute the levered beta using the firm's current debt to equity ratio:

$$\beta_l = \beta_u [1 + (1\text{-tax rate}) (\text{Debt/Equity})]$$

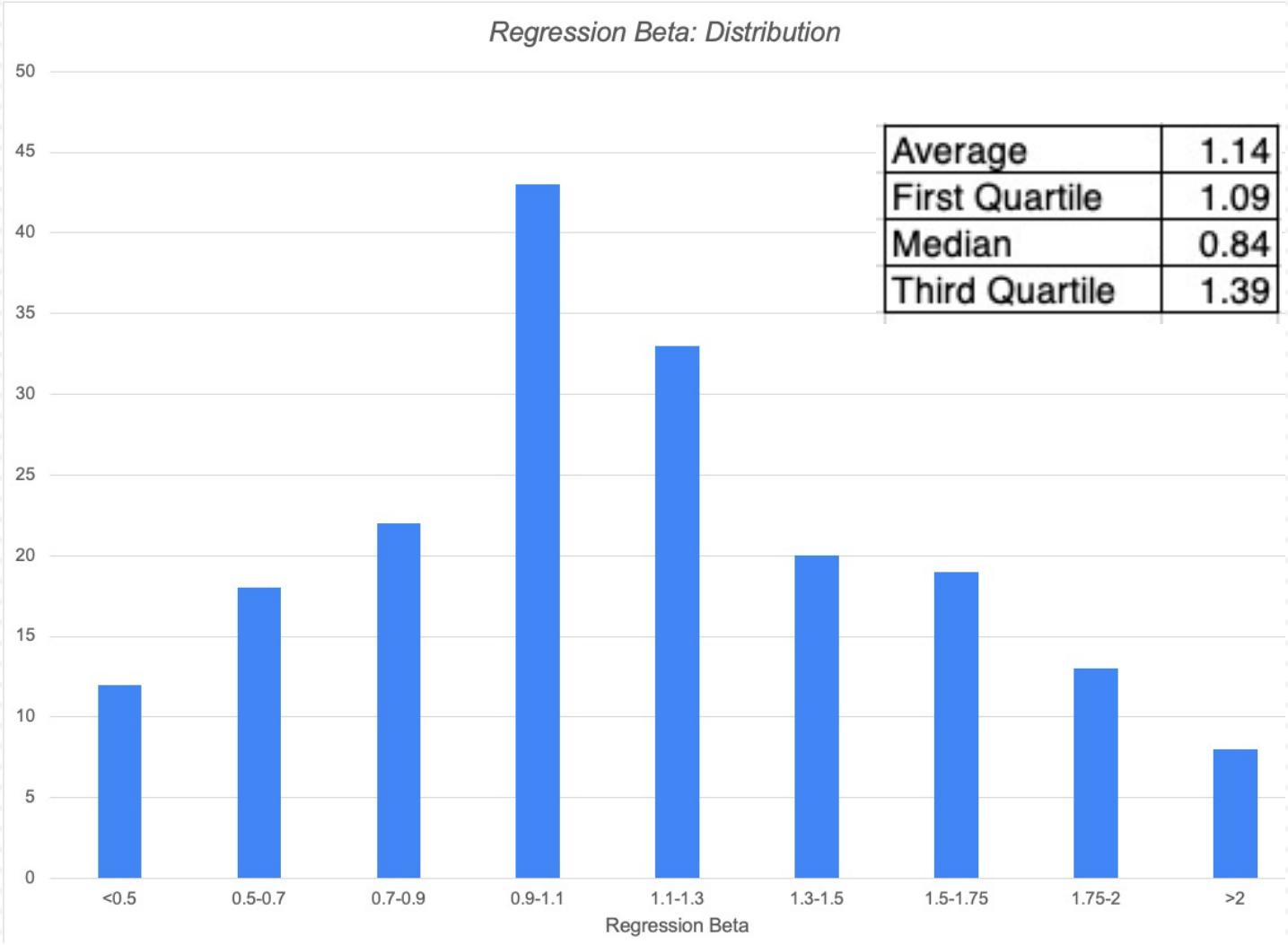
Choice on beta estimation: Spring 2022



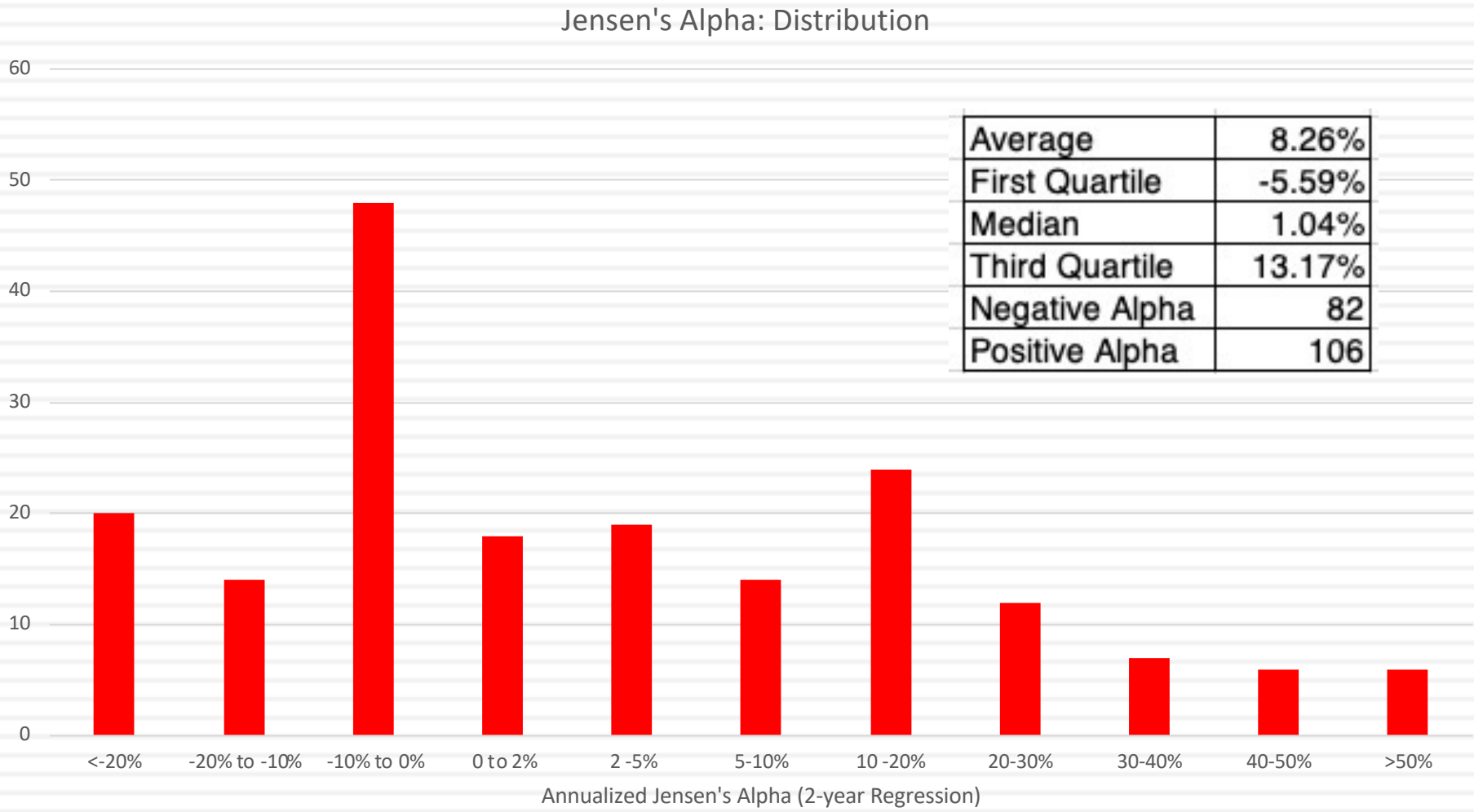
Typical reasons

1. My company is unique. I cannot find comparable firms.
2. My company is in only one line of business
3. My bottom-up beta is too different from my regression beta

Beta Distribution



Jensen's Alpha Distribution

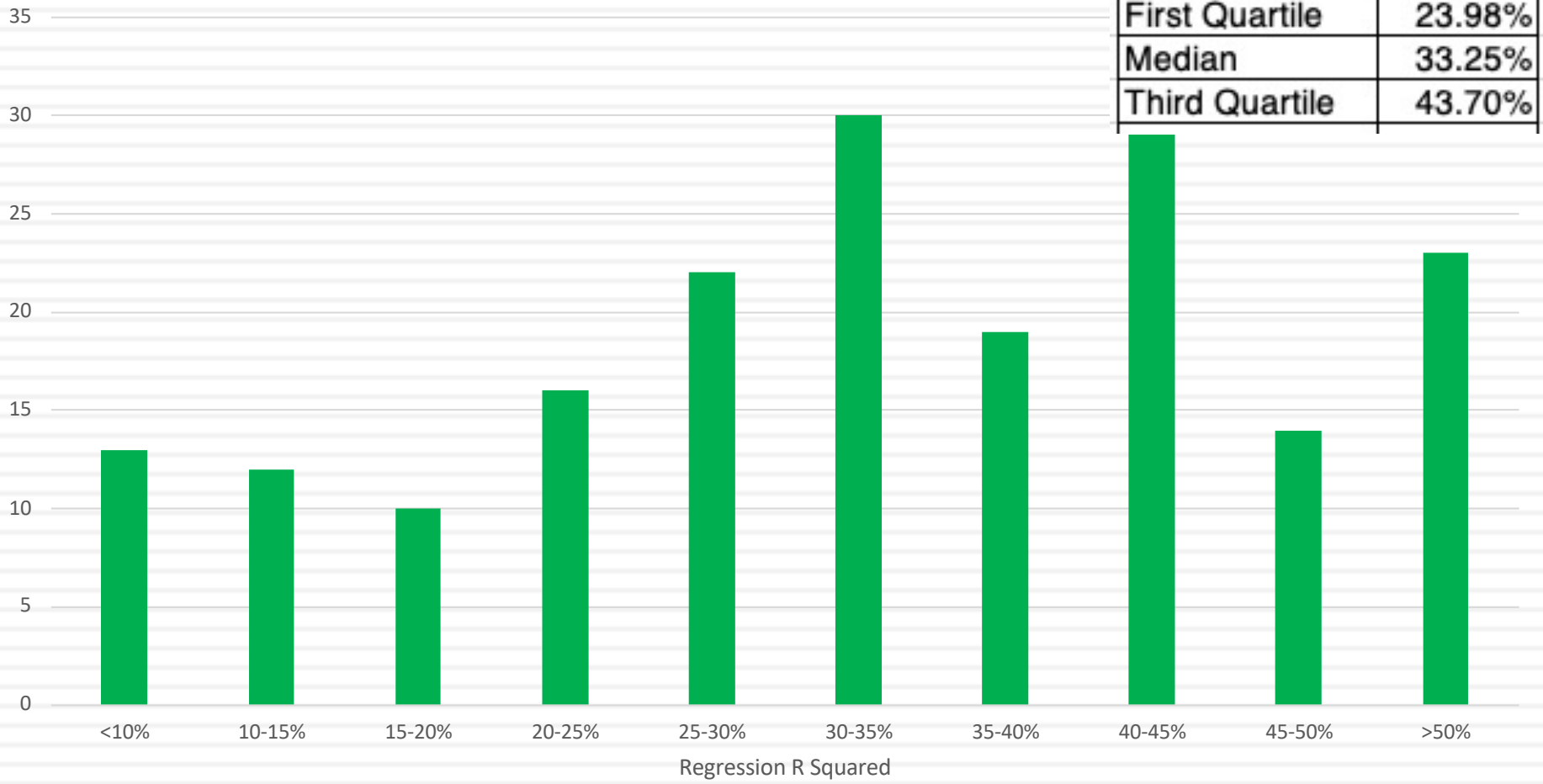


Average	8.26%
First Quartile	-5.59%
Median	1.04%
Third Quartile	13.17%
Negative Alpha	82
Positive Alpha	106

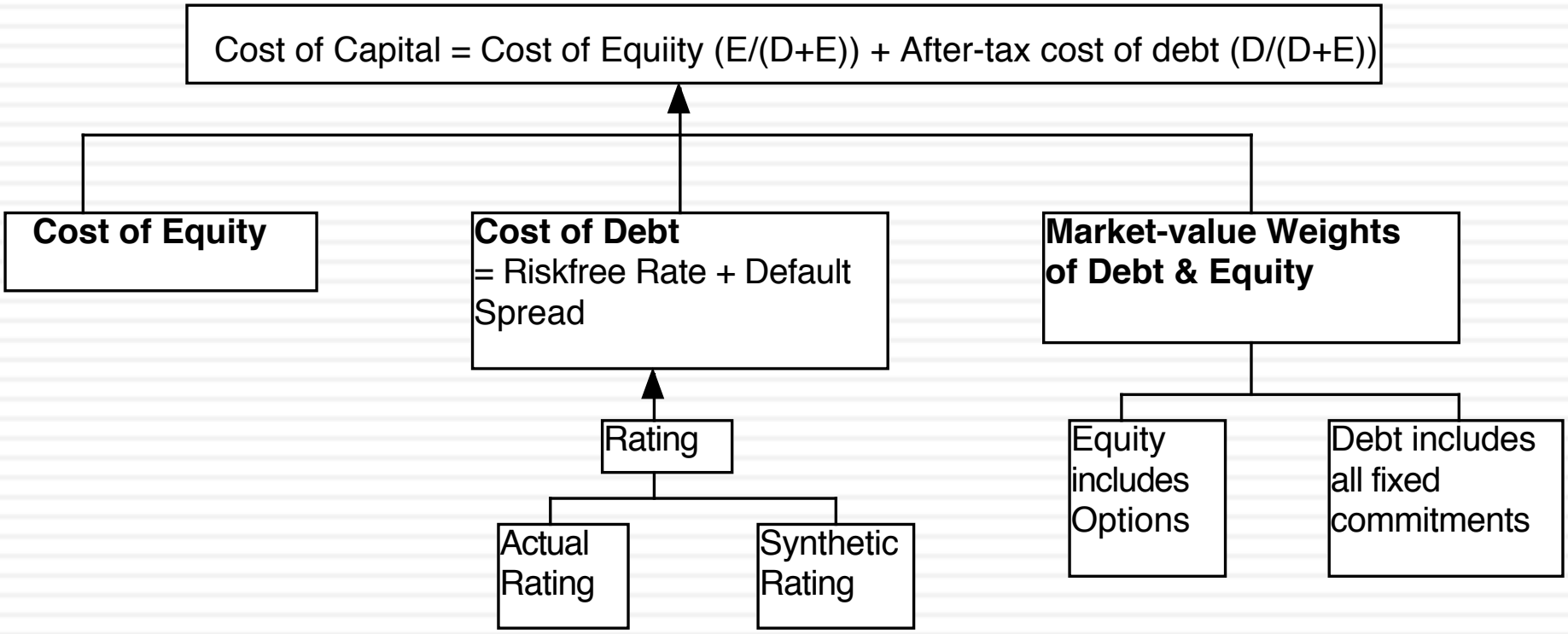
R Squared

Regression R Squared: Distribution

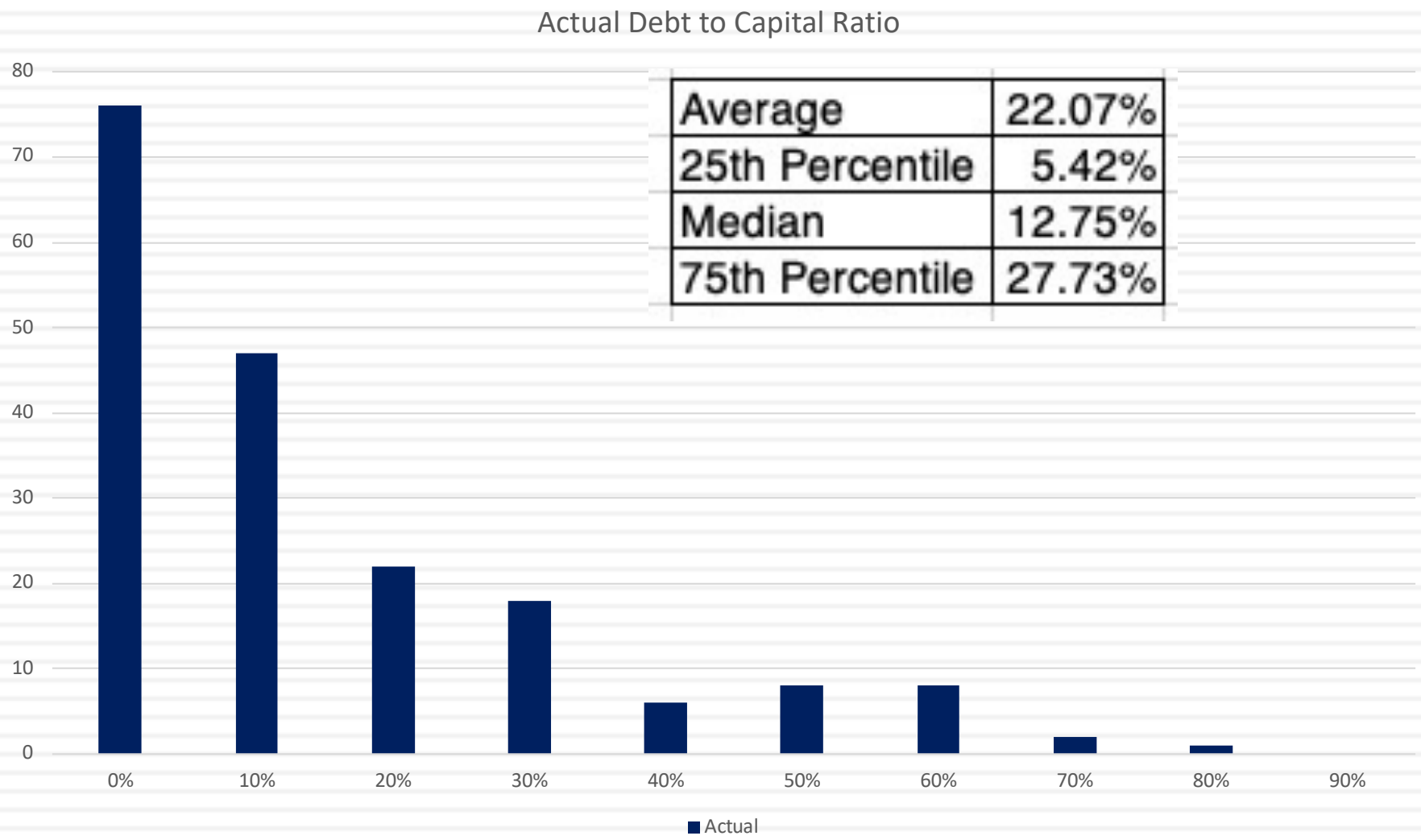
Average	33.24%
First Quartile	23.98%
Median	33.25%
Third Quartile	43.70%



Cost of Capital

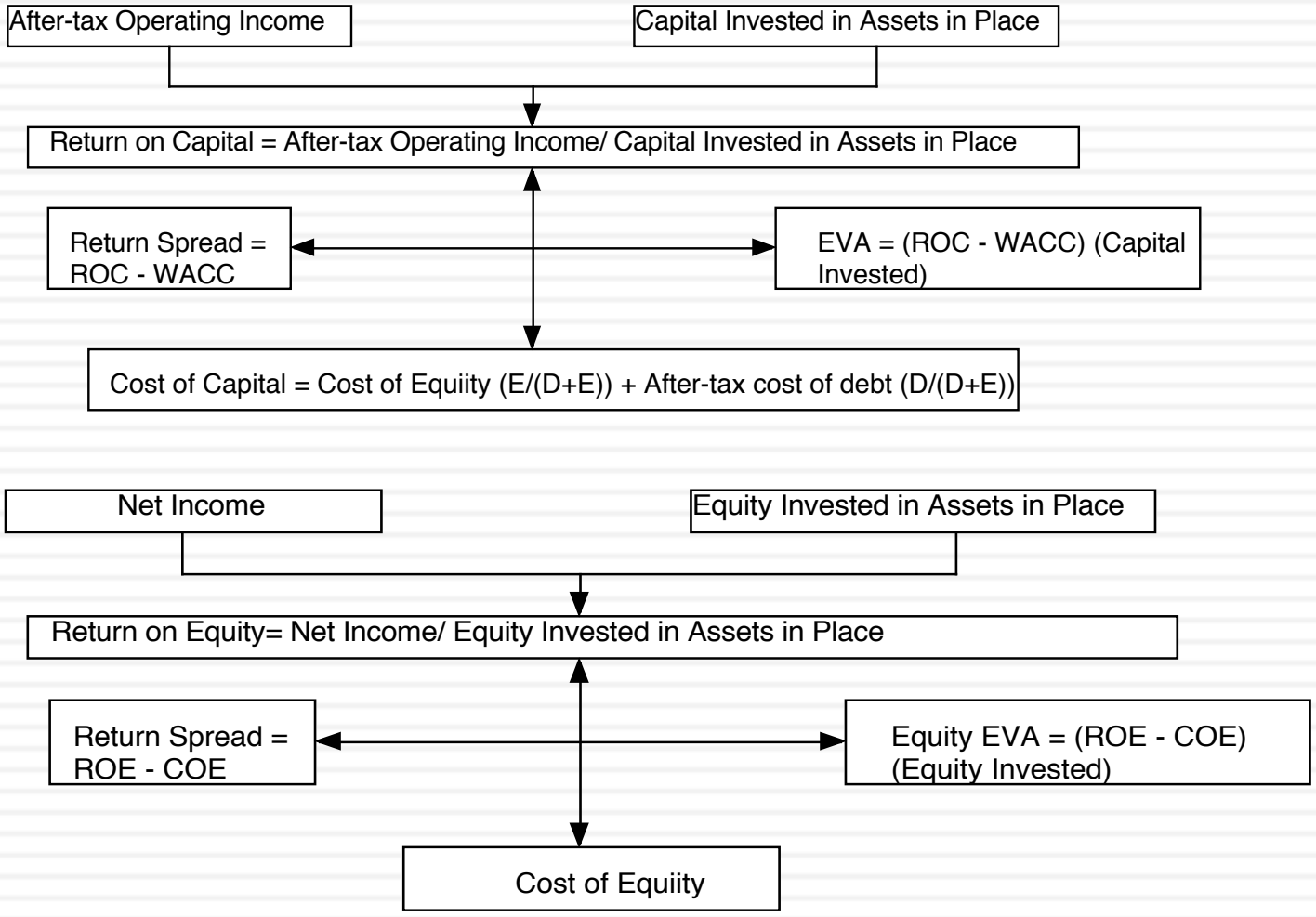


Distribution of Current Market Value Debt Ratios

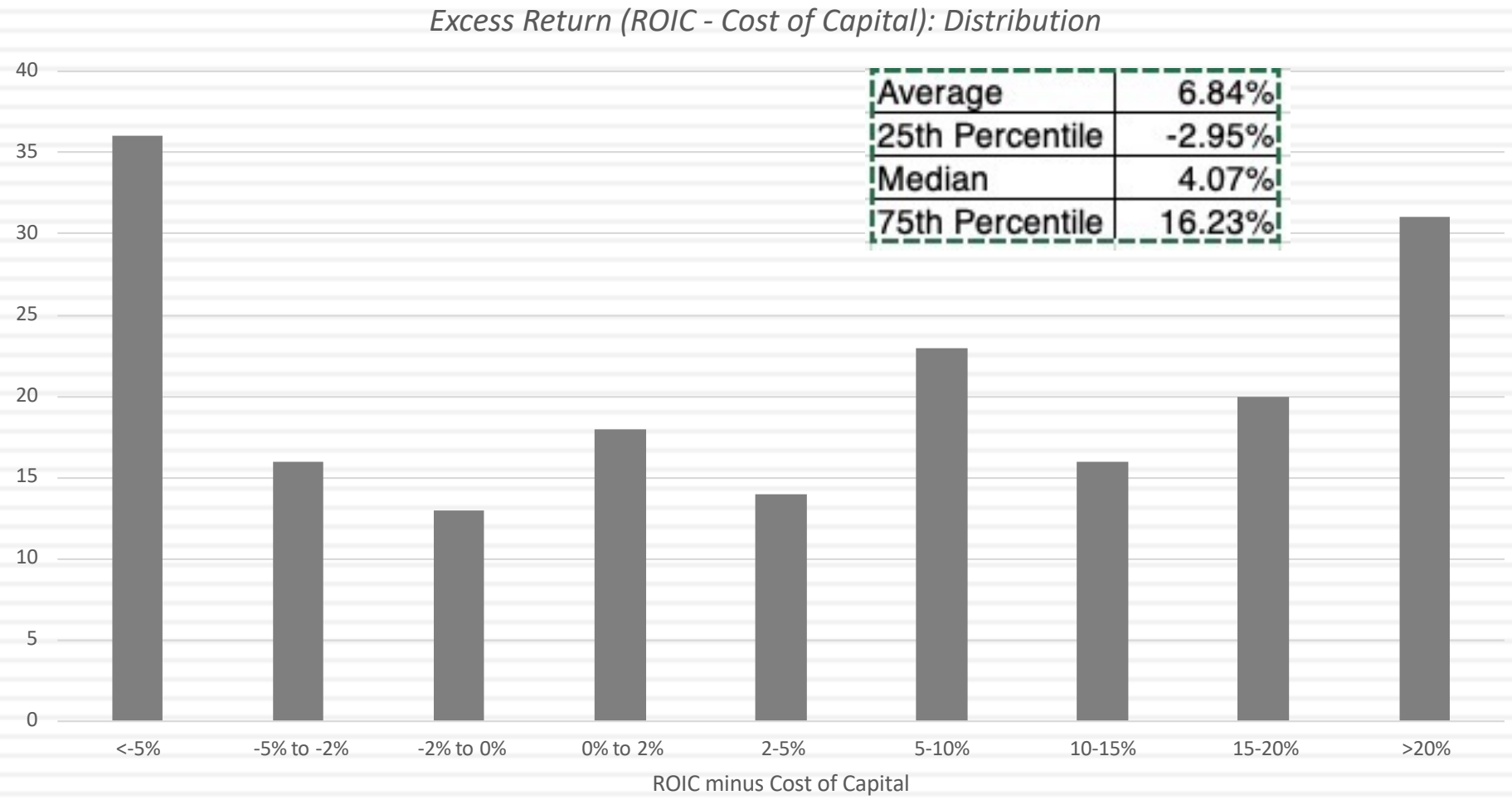


Average	22.07%
25th Percentile	5.42%
Median	12.75%
75th Percentile	27.73%

IV. The Quality of Investments: The Firm View

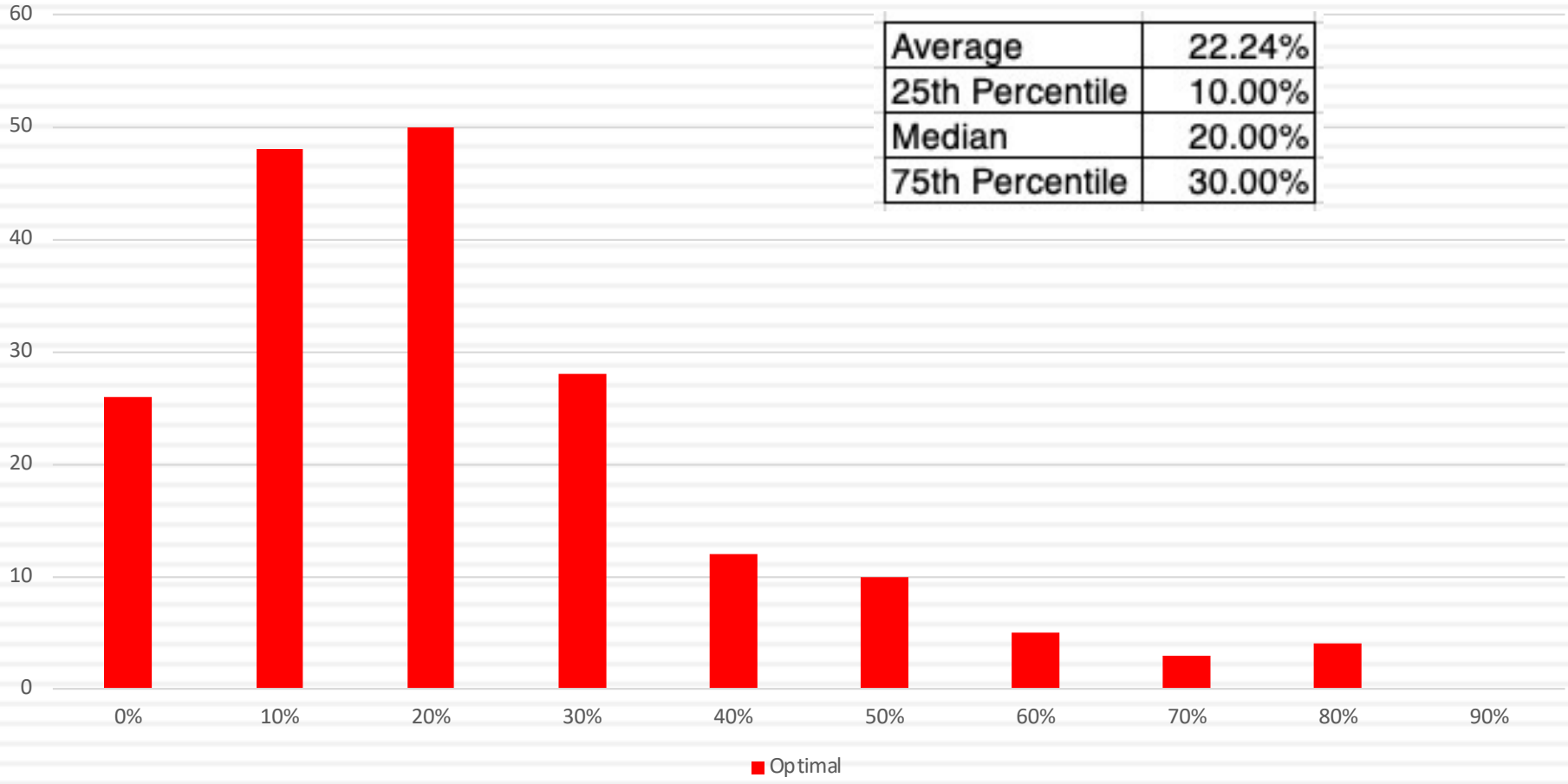


Return Spreads



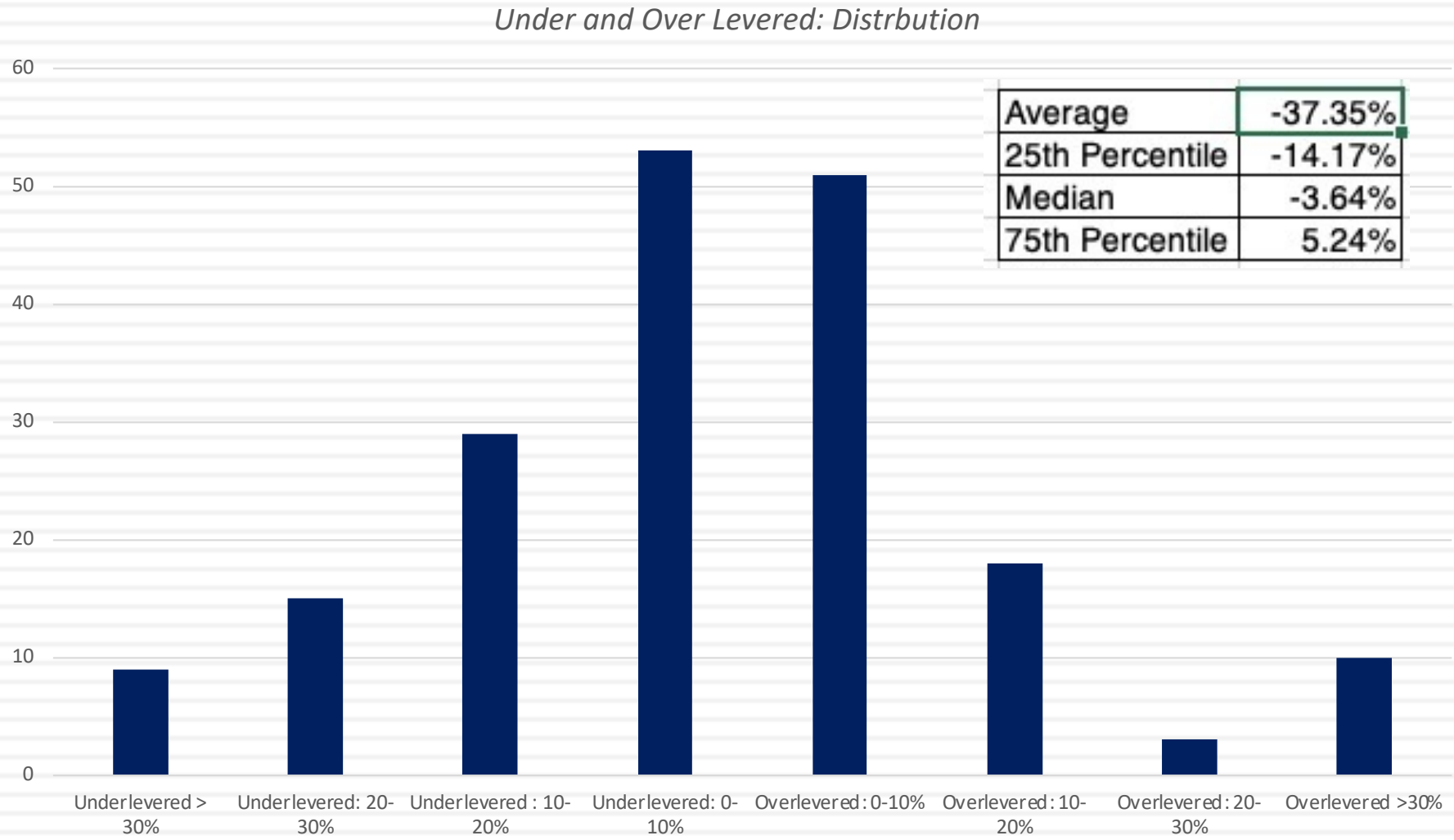
VI. The Optimal Financing Mix

Optimal Debt Ratios: Distribution



Average	22.24%
25th Percentile	10.00%
Median	20.00%
75th Percentile	30.00%

Under versus Over Levered Firms



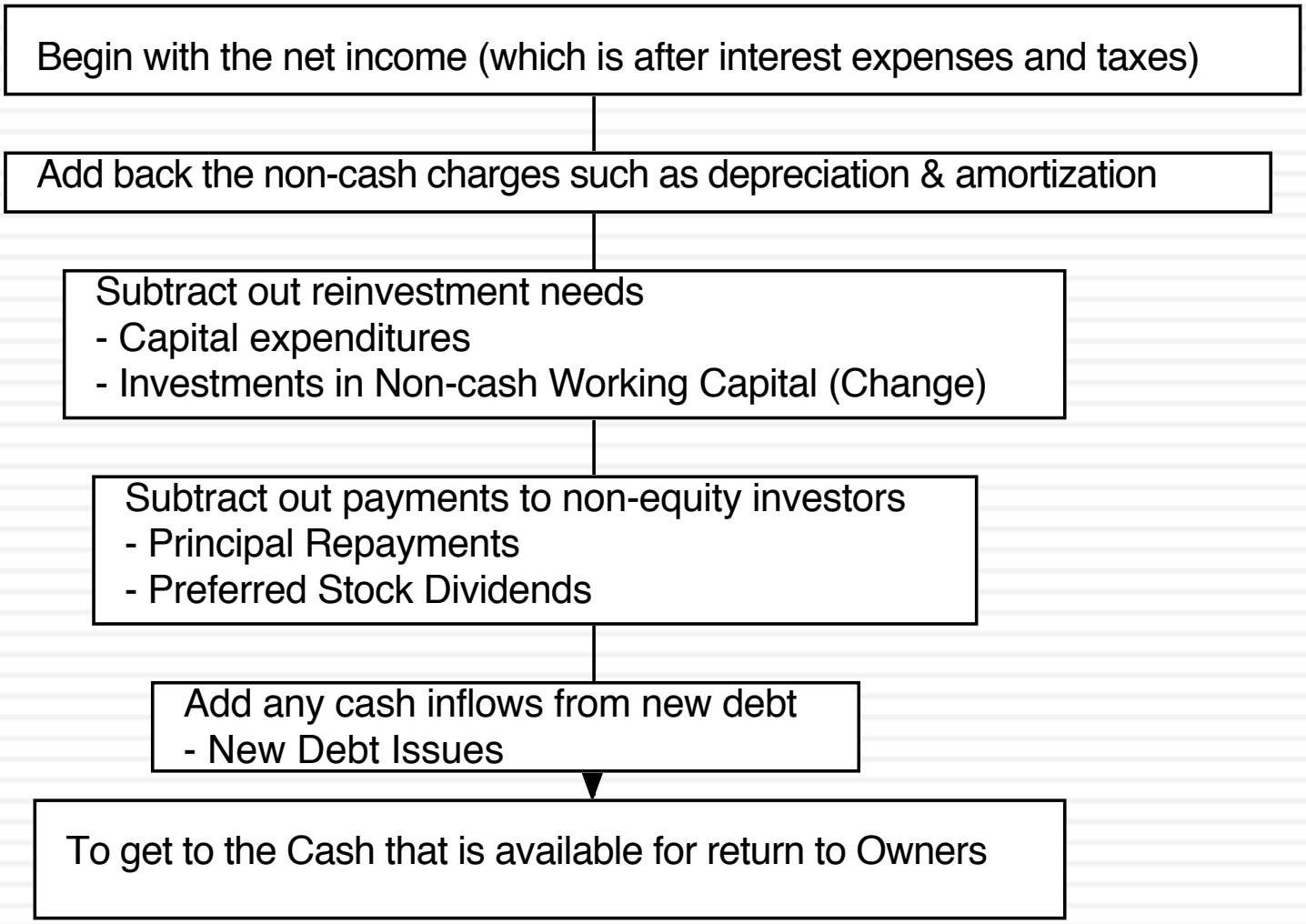
VIII. The Right Kind of Financing: The Matching Principle

- The objective when financing is to match up the cash flows on your debt as closely as you can to the cash flows on your assets.
- By doing so, you
  - You reduce your likelihood of default
  - Increase your capacity to borrow money
  - Lower your cost of capita

Ways to match

- Project-specific financing: When a company has large and potentially stand-alone projects, it can fund each project with financing that matches that project's cash flows (currency, time patterns)>
- Company-wide financing: When projects are smaller, and opaque (lenders cannot see what is going on), companies are better off funding portfolios of projects with financing that matches the cash flows on those portfolios.
- Derivatives and Swaps: A company can borrow opportunistically, not caring about matching financing to assets, and use futures, options and swaps to fix the mismatches.

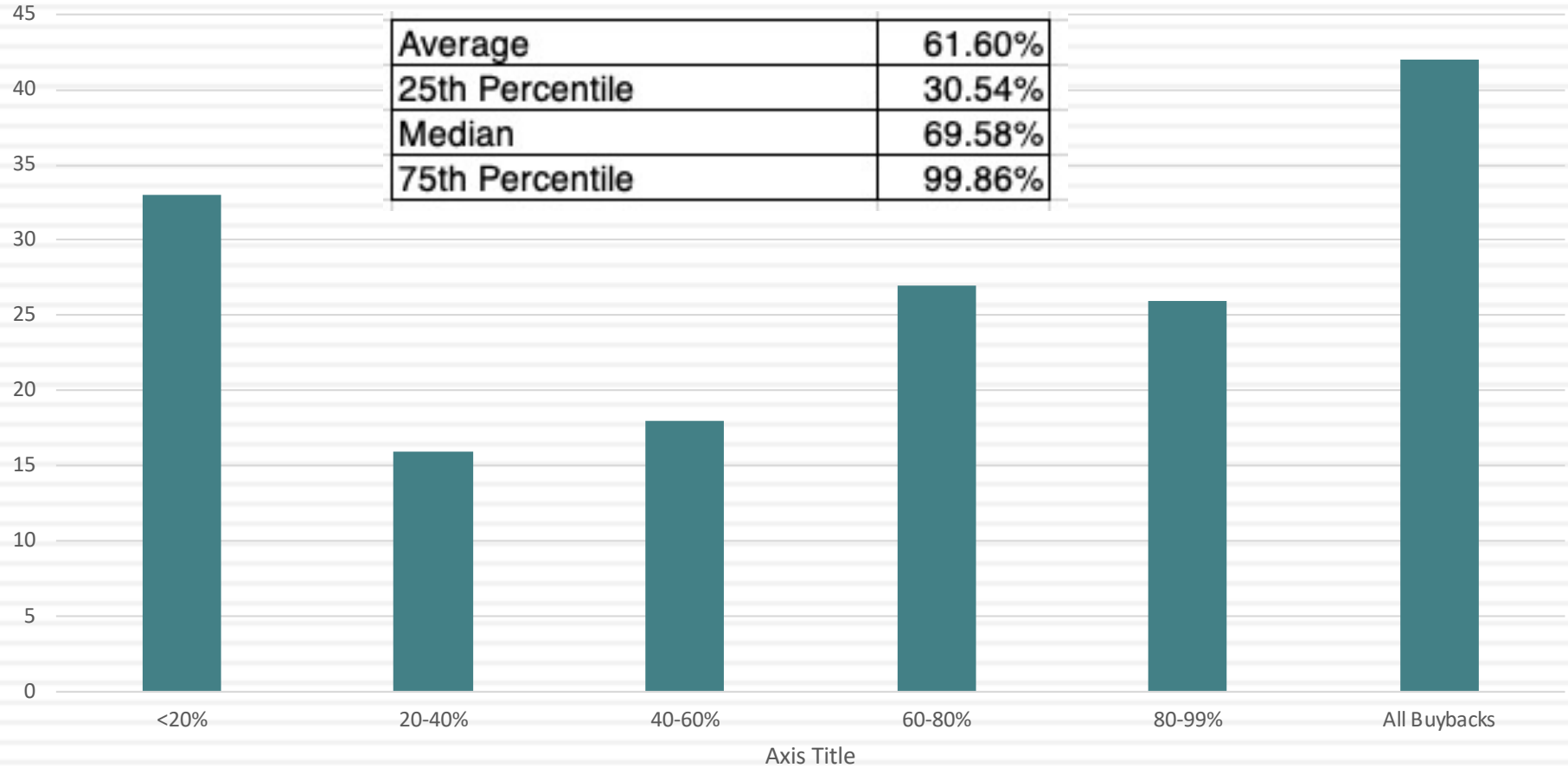
IX. Measuring Potential Dividends



Dividends versus Buybacks

Buybacks as % of Cash Returned

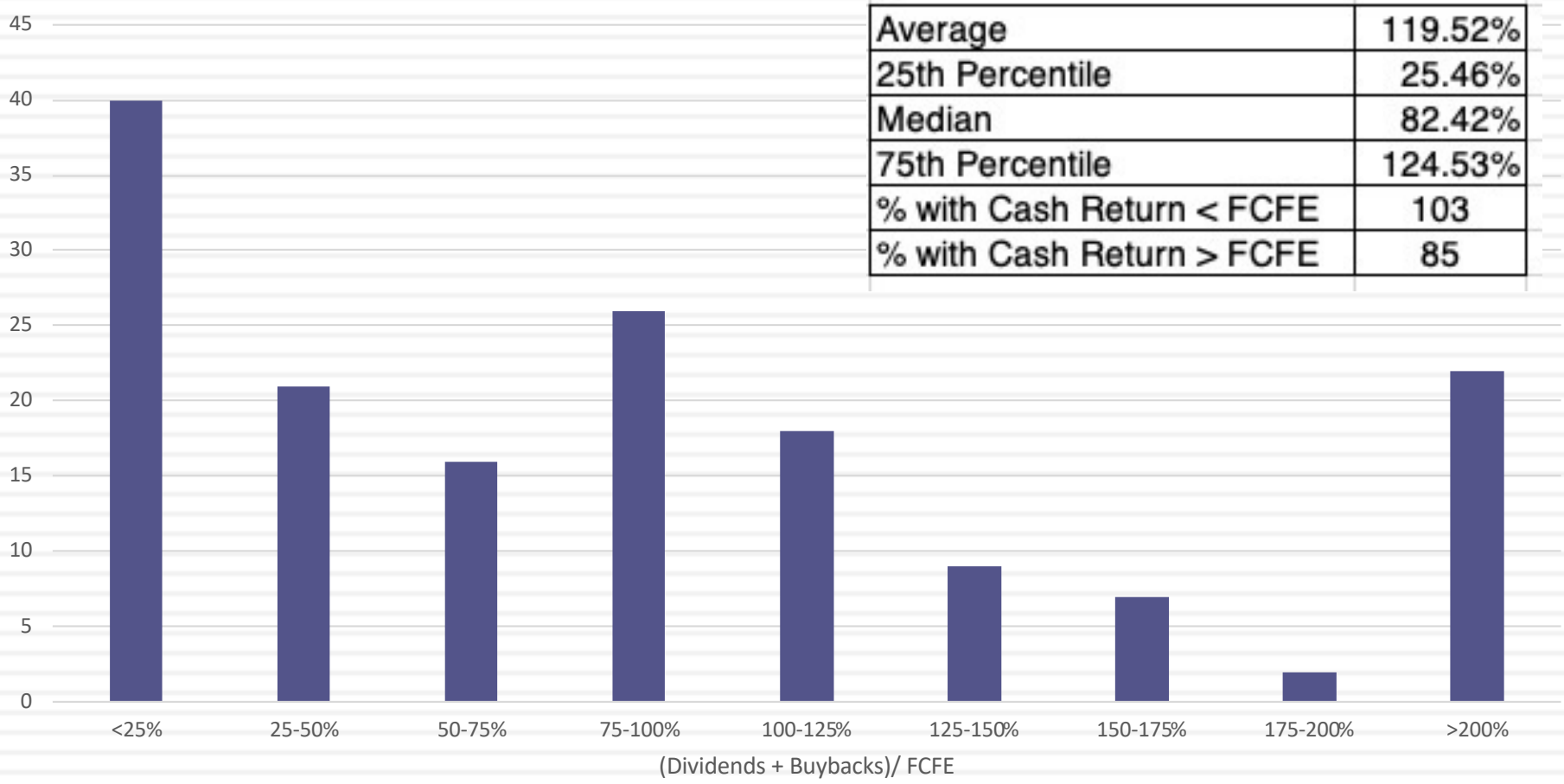
Average	61.60%
25th Percentile	30.54%
Median	69.58%
75th Percentile	99.86%



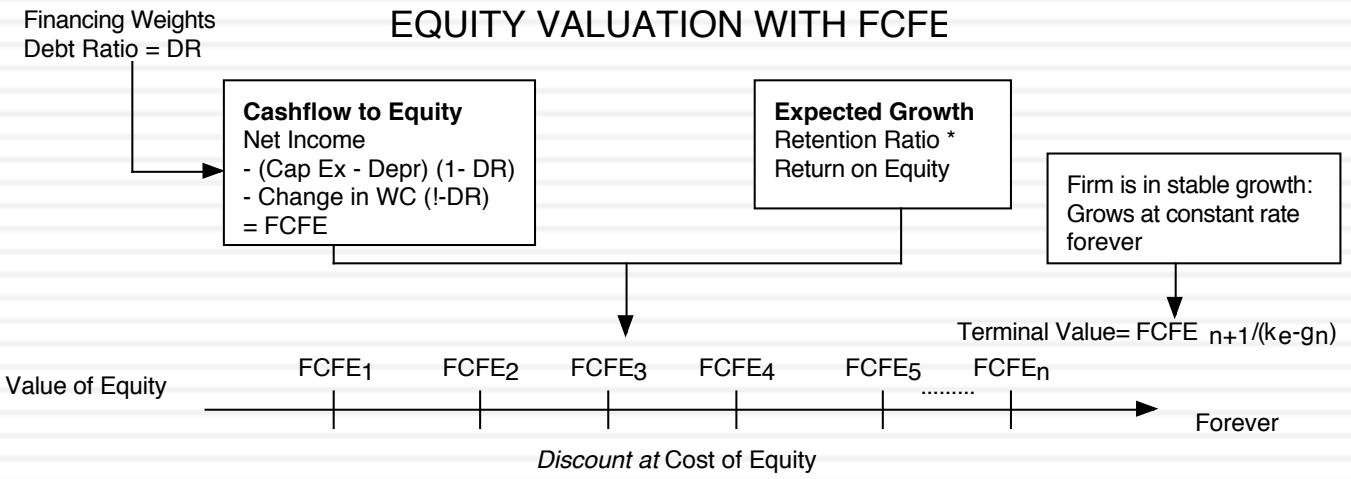
Cash Return versus FCFE

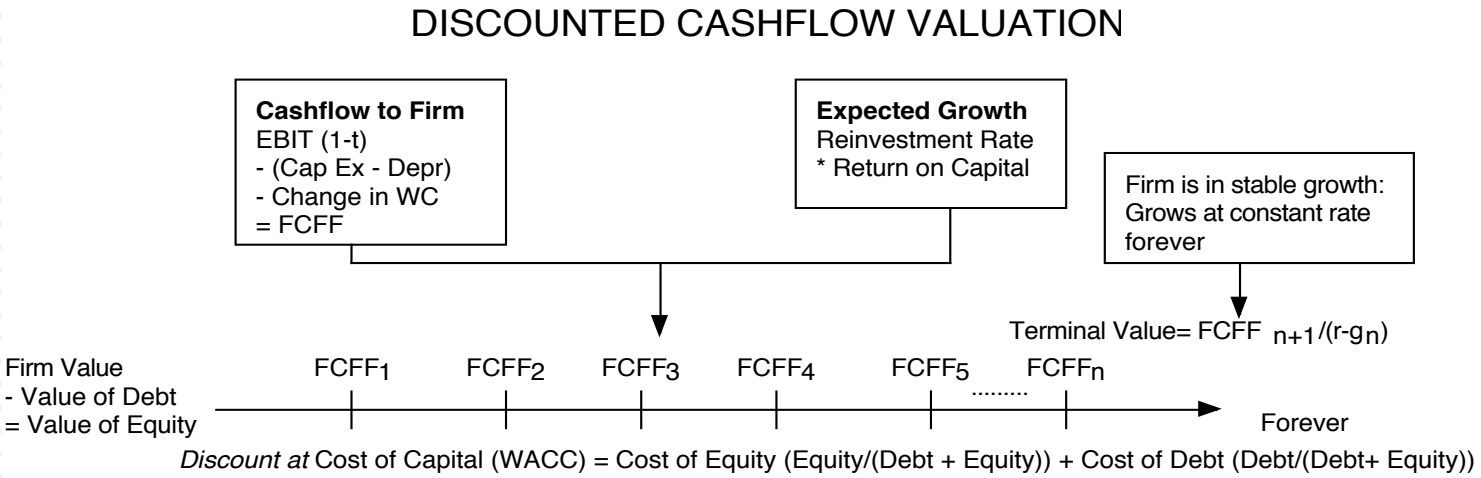
Cash Return as % of FCFE: Distribution

Average	119.52%
25th Percentile	25.46%
Median	82.42%
75th Percentile	124.53%
% with Cash Return < FCFE	103
% with Cash Return > FCFE	85



X. Valuation:
Match up cashflows and discount rates…





Valuing Deutsche Bank in early 2008

- To value Deutsche Bank, we started with the normalized income over the previous five years (3,954 million Euros) and the dividends in 2008 (2,146 million Euros). We assumed that the payout ratio and ROE, based on these numbers will continue for the next 5 years:
  - Payout ratio = 2,146/3954 = 54.28%
  - Expected growth rate = (1-.5428) * .1181 = 0.054 or 5.4%
  - Cost of equity = 9.23%

Year	*Net Income*	*Payout Ratio*	*Dividends*	*PV @ 9.23%*
2008	4,167 €	54.28%	2,262 €	2,071 €
2009	4,392 €	54.28%	2,384 €	1,998 €
2010	4,629 €	54.28%	2,513 €	1,928 €
2011	4,879 €	54.28%	2,648 €	1,861 €
2012	5,143 €	54.28%	2,791 €	1,795 €
				9,653 €

Deutsche Bank in stable growth

- At the end of year 5, the firm is in stable growth. We assume that the cost of equity drops to 8.5% (as the beta moves to 1) and that the return on equity also drops to 8.5 (to equal the cost of equity).

  Stable Period Payout Ratio = 1 – g/ROE = 1 – 0.03/0.085 = 0.6471 or 64.71%

  Expected Dividends in Year 6 = Expected Net Income$_5$ *(1+g_{Stable})* Stable Payout Ratio
  = €5,143 (1.03) * 0.6471 = €3,427 million

  Terminal Value = $\frac{\text{Expected Dividends}_6}{(\text{Cost of Equity-g})} = \frac{3,247}{(.085-.03)} = 62,318 \text{ million Euros}$

  PV of Terminal Value = $\frac{\text{Terminal Value}_n}{(1+\text{Cost of Equity}_{\text{High growth}})^n} = \frac{62,318}{(1.0923)^5} = 40,079 \text{ mil Euros}$

- Value of equity = €9,653+ €40,079 = €49,732 million Euros
- Value of equity per share= $\frac{\text{Value of Equity}}{\text{\# Shares}} = \frac{49,732}{474.2} = 104.88 \text{ Euros/share}$

  Stock was trading at 89 Euros per share at the time of the analysis.

From firm value to equity value per share

Approach used	To get to equity value per share
Discount dividends per share at the cost of equity	Present value is value of equity per share
Discount aggregate FCFE at the cost of equity	Present value is value of aggregate equity. Subtract the value of equity options given to managers and divide by number of shares.
Discount aggregate FCFF at the cost of capital	PV = Value of operating assets + Cash & Near Cash investments + Value of minority cross holdings -Debt outstanding = Value of equity -Value of equity options =Value of equity in common stock / Number of shares

Disney: Inputs to Valuation

	High Growth Phase	*Transition Phase*	*Stable Growth Phase*
Length of Period	5 years	5 years	Forever after 10 years
Tax Rate	31.02% (Effective) 36.1% (Marginal)	31.02% (Effective) 36.1% (Marginal)	31.02% (Effective) 36.1% (Marginal)
Return on Capital	12.61%	Declines linearly to 10%	Stable ROC of 10%
Reinvestment Rate	53.93% (based on normalized acquisition costs)	Declines gradually to 25% as ROC and growth rates drop:	25% of after-tax operating income. Reinvestment rate = g/ ROC = 2.5/10=25%
Expected Growth Rate in EBIT	ROC * Reinvestment Rate = 0.1261*.5393 = .068 or 6.8%	Linear decline to Stable Growth Rate of 2.5%	2.5%
Debt/Capital Ratio	11.5%	Rises linearly to 20.0%	20%
Risk Parameters	Beta = 1.0013, k_e = 8.52%% Pre-tax Cost of Debt = 3.75% Cost of capital = 7.81%	Beta changes to 1.00; Cost of debt stays at 3.75% Cost of capital declines gradually to 7.29%	Beta = 1.00; k_e = 8.51% Cost of debt stays at 3.75% Cost of capital = 7.29%

Disney - November 2013

Current Cashflow to Firm
EBIT(1-t)= 10,032(1-.31)= 6,920
- (Cap Ex - Deprecn) 3,629
- Chg Working capital 103
= FCFF 3,188
Reinvestment Rate = 3,732/6920 =53.93%
Return on capital = 12.61%

Reinvestment Rate 53.93%

Return on Capital 12.61%

Expected Growth
.5393*.1261=.068 or 6.8%

Stable Growth
g = 2.75%; Beta = 1.00;
Debt %= 20%; k(debt)=3.75
Cost of capital =7.29%
Tax rate=36.1%; ROC= 10%;
Reinvestment Rate=2.5/10=25%

Terminal Value$_{10}$= 7,980/(.0729-.025) = 165,323

Term Yr
10,639
2,660
7,980

First 5 years

Growth declines gradually to 2.75%

	1	2	3	4	5	6	7	8	9	10
EBIT * (1 - tax rate)	$7,391	$7,893	$8,430	$9,003	$9,615	$10,187	$10,704	$11,156	$11,531	$11,819
- Reinvestment	$3,985	$4,256	$4,546	$4,855	$5,185	$4,904	$4,534	$4,080	$3,550	$2,955
FCFF	$3,405	$3,637	$3,884	$4,148	$4,430	$5,283	$6,170	$7,076	$7,981	$8,864

Op. Assets 125,477
+ Cash: 3,931
+ Non op inv 2,849
- Debt 15,961
- Minority Int 2,721
=Equity 113,575
-Options 972
Value/Share $ 62.56

Cost of capital declines gradually to 7.29%

Cost of Capital (WACC) = 8.52% (0.885) + 2.40% (0.115) = 7.81%

Cost of Equity
8.52%

Cost of Debt
(2.75%+1.00%)(1-.361)
= 2.40%
Based on actual A rating

Weights
E = 88.5% D = 11.5%

In November 2013, Disney was trading at $67.71/share

Riskfree Rate:
Riskfree rate = 2.75%

+

Beta
1.0013

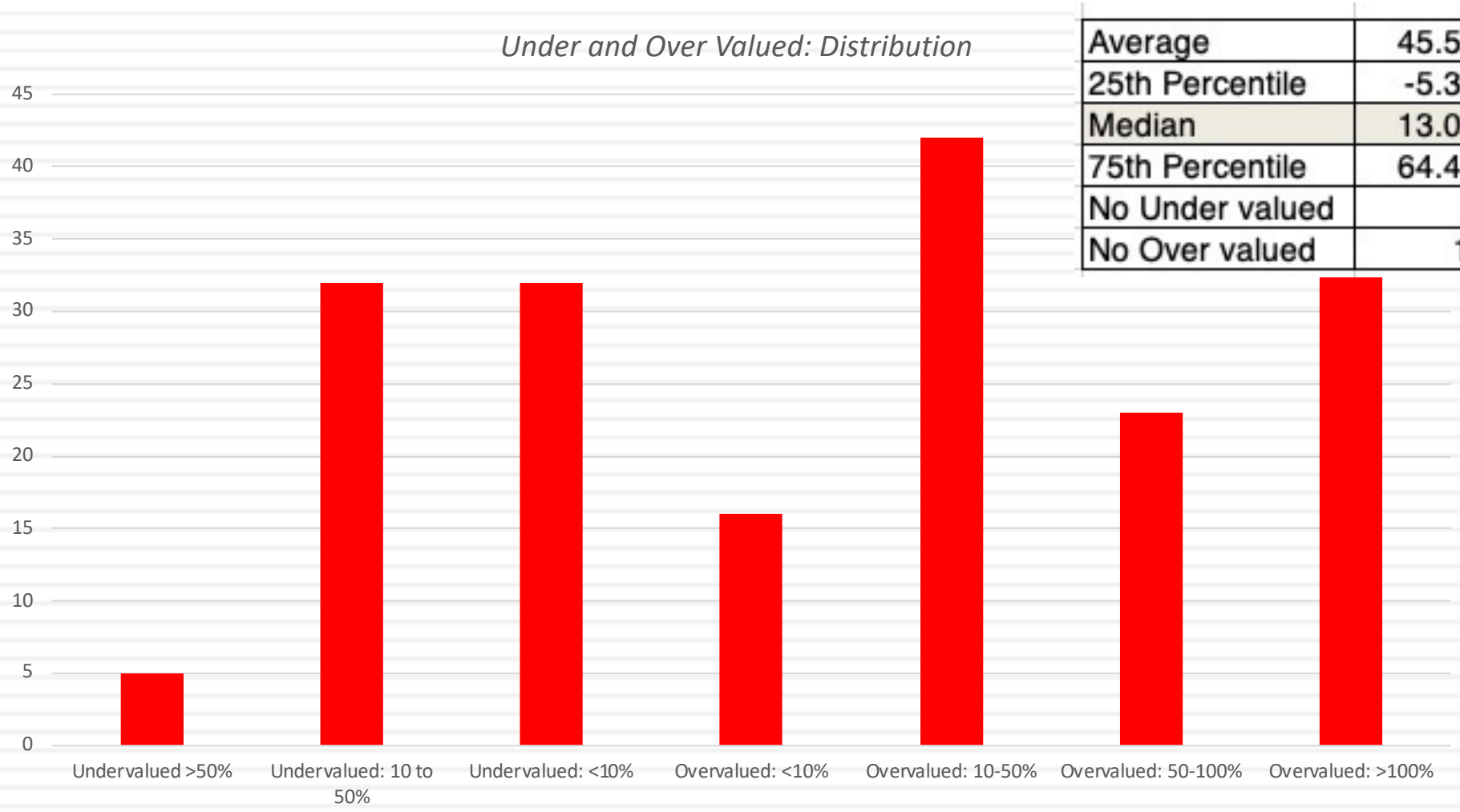
Unlevered Beta for Sectors: 0.9239

D/E=13.10%

X

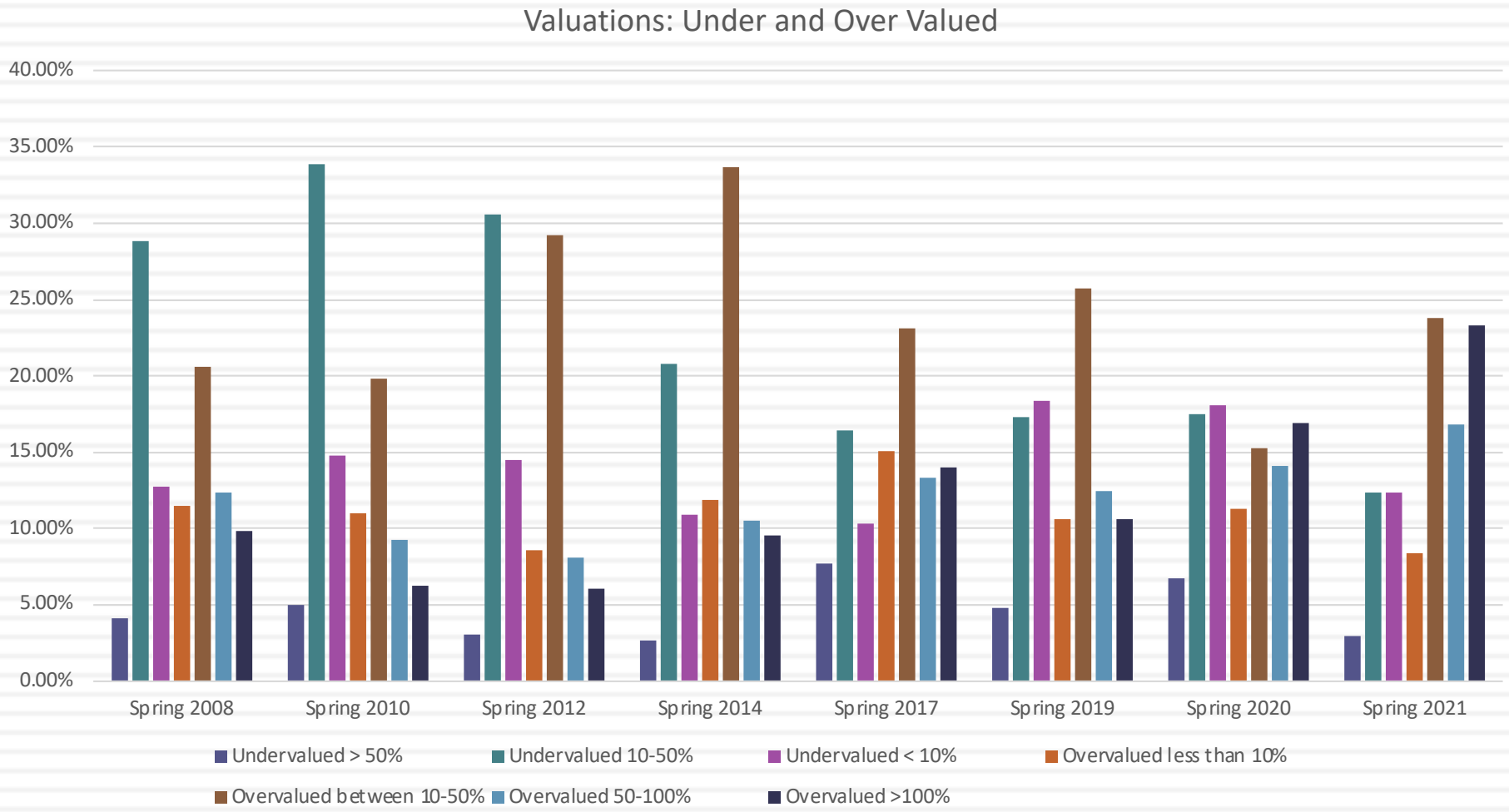
ERP for operations
5.76%

Under and Over Valued: Your findings

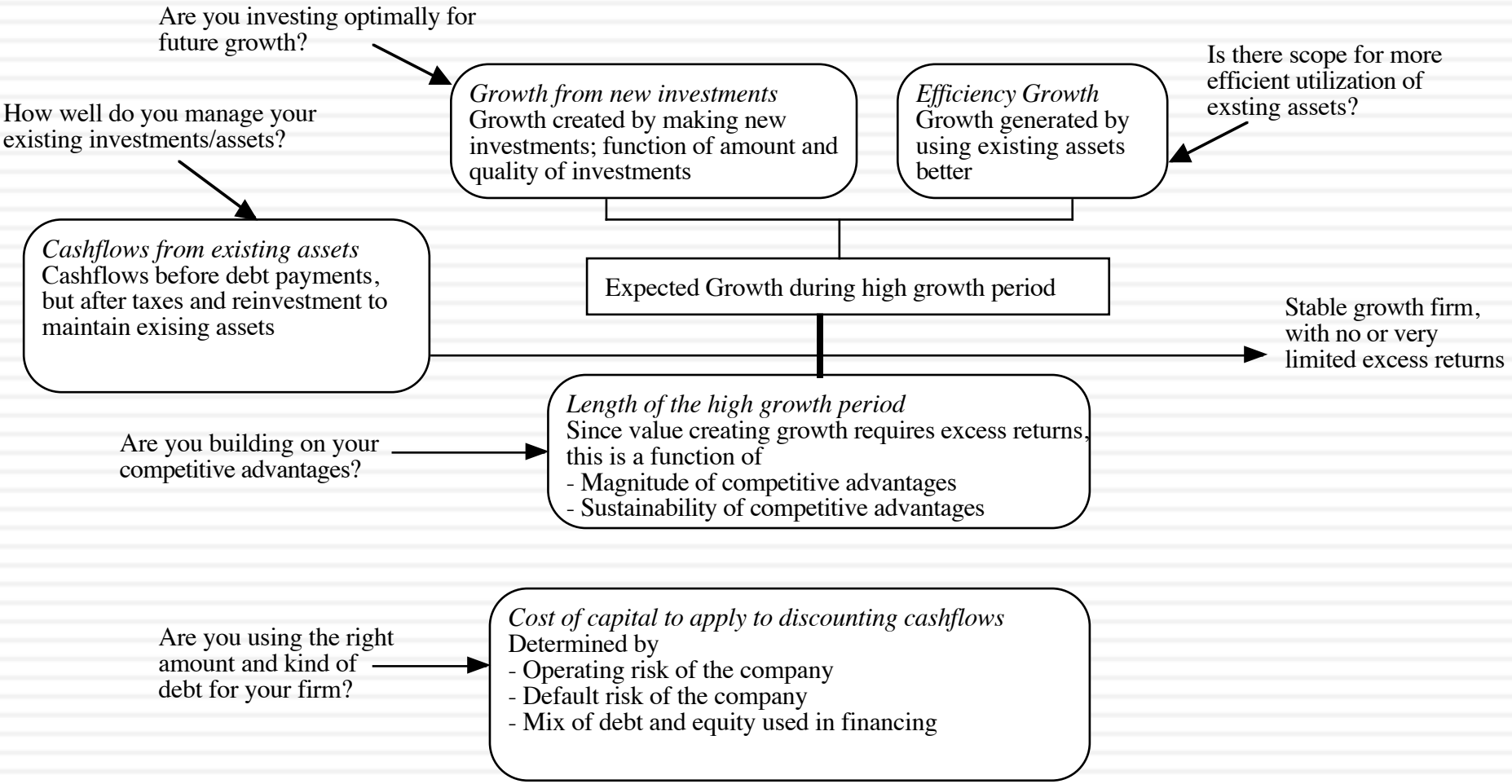


Average	45.56%
25th Percentile	-5.31%
Median	13.07%
75th Percentile	64.48%
No Under valued	69
No Over valued	119

Comparison to semesters past…



Ways of changing value…



Disney (Restructured)- November 2013

Current Cashflow to Firm
EBIT(1-t)= 10,032(1-.31)= 6,920
- (Cap Ex - Deprecn) 3,629
- Chg Working capital 103
= FCFF 3,188
Reinvestment Rate = 3,732/6920 =53.93%
Return on capital = 12.61%

Reinvestment Rate 50.00%

More selective acquisitions & payoff from gaming

Return on Capital 14.00%

Expected Growth
.50* .14 = .07 or 7%

Stable Growth
g = 2.75%; Beta = 1.20;
Debt %= 40%; k(debt)=3.75%
Cost of capital =6.76%
Tax rate=36.1%; ROC= 10%;
Reinvestment Rate=2.5/10=25%

Terminal Value$_{10}$= 9,206/(.0676-.025) = 216,262

First 5 years

Growth declines gradually to 2.75%

	1	2	3	4	5	6	7	8	9	10
EBIT * (1 - tax rate)	$7,404	$7,923	$8,477	$9,071	$9,706	$10,298	$10,833	$11,299	$11,683	$11,975
- Reinvestment	$3,702	$3,961	$4,239	$4,535	$4,853	$4,634	$4,333	$3,955	$3,505	$2,994
Free Cashflow to Firm	$3,702	$3,961	$4,239	$4,535	$4,853	$5,664	$6,500	$7,344	$8,178	$8,981

Term Yr
12,275
3,069
9,206

Op. Assets 147,704
+ Cash: 3,931
+ Non op inv 2,849
- Debt 15,961
- Minority Int 2,721
=Equity 135,802
-Options 972
Value/Share $ 74.91

Cost of capital declines gradually to 6.76%

Cost of Capital (WACC) = 8.52% (0.60) + 2.40%(0.40) = 7.16%

Cost of Equity
10.34%

Cost of Debt
(2.75%+1.00%)(1-.361)
= 2.40%
Based on synthetic A rating

Weights
E = 60% D = 40%

In November 2013, Disney was trading at $67.71/share

Move to optimal debt ratio, with higher beta.

Riskfree Rate:
Riskfree rate = 2.75%

+

Beta
1.3175

Unlevered Beta for Sectors: 0.9239

D/E=66.67%

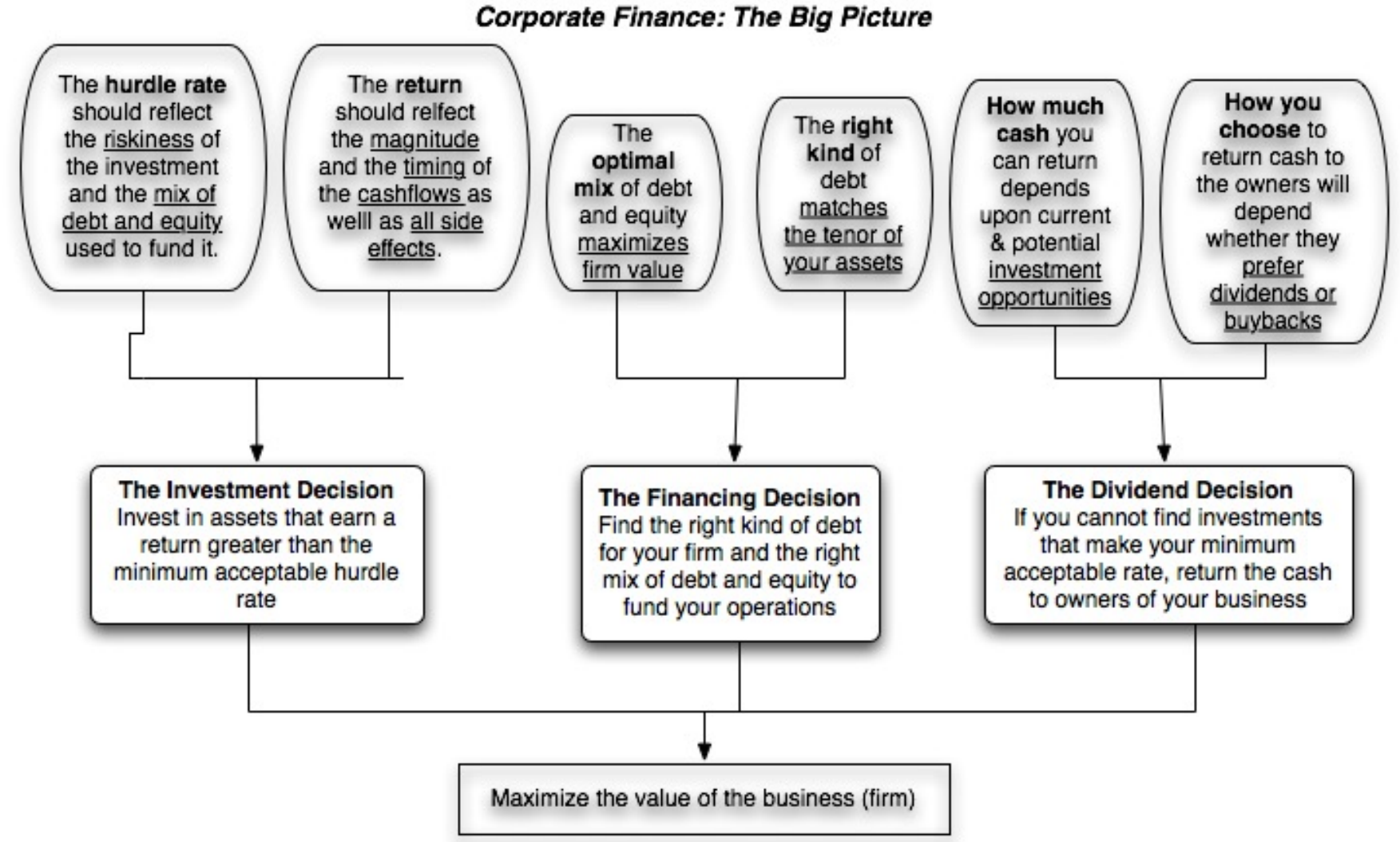
X

ERP for operations
5.76%

The Triple Whammy: Under levered , Cash Build-up and Under valued, all by at least 10%

Company	CG Measure	Debt to Capital Ratio	Cost of Capital (%)	Return on Capital	Optimal Debt Ratio (%)	Dividends in most recent periods (Total $)	Buybacks in most recent periods (Total $)	FCFE in most recent periods (Total $)	Price per share ($)	Value per share ($)	Optimal minus Actual Debt Ratio	(Dividends + Buybacks)/FCFE	Price/Value
Nintendo Co., Ltd. (NTDOY)	1	9.92%	6.25%	23.22%	20.00%	1367	789	$2,381	9.42	12.57	-10.08%	90.55%	74.94%
Weis Markets (NYSE: WMK)	2	6.39%	5.82%	7.33%	30.00%	35	0	$90	82.49	163.4	-23.61%	38.89%	50.48%
Nykaa	0.7	5.00%	11.40%	8.02%	35.00%	0	0	$251	$1.54	$1.75	-30.00%	0.00%	88.00%
Tyson Foods, Inc. (NYSE: TSN)	0.5	26.41%	7.77%	13.14%	60.00%	653	702	$1,991	65.93	97.3	-33.59%	68.06%	67.76%
Petrobras (NYSE: PBR)	0.25	50.80%	13.47%	33.30%	90.00%	$27,533.71	$0	$200,287	$4.64	$22.00	-39.20%	13.75%	21.09%
Albemarle (NYSE: ALB)	0.5	14.65%	11.16%	19.57%	60.00%	$185	$0	$14,394	$177.27	$207.14	-45.35%	1.29%	85.58%

First Principles



Objectives of this class

- If you get the big picture, the details will come (sooner or later)
- Tools are useful, but only in the larger context of answering bigger questions.
- Corporate finance is not so bad !