Capital Structure: Perfect Market

(Welch, Chapter 6 and 17)

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PCM Modigliani-Miller

Perfect Capital Market, M&M:

- No Taxes.
- No X-Costs.
- No Disagreements.
- Competitive Markets.

plus

- Risk Neutral
- Time Value of Money of 20%

Main Example

Firm value *next year*:

- with Prob=1/4: \$60 (rain).
- with Prob=3/4: \$100 (sun).

Raise $70 in Debt Today

What interest rate must you promise to raise $70 in debt today?

- $70 is not the promise but the need today!
- PCM ok: Debt will be due, firm will be sold.
- PCM ok: No liquidity vs value issue.

Recall E(r)=20%.

Prob 1/4 of $60, 3/4 of $100.

Payoff Table Template

	All Equity	Debt Equity	
Rain 1/4	A	B	C
Sun 3/4	D	E	F
EV@T=1	G	H	I
PV@T=0	J	K	L
Er@0to1	M	N	O

Solving Payoff Table

```
         All Equity||Debt Equity
-------------------------------------
Rain 1/4
Sun  3/4
-------------------------------------
EV@T=1
PV@T=0
Er@0to1
```

Arbitrage Pressure?

In a PCM, if the value of the firm was \$76 under the debt-laden capital structure (say, \$70+\$6), but the managers chose the \$75 capital structure (say, all equity), what would you do?

Arbitrage Pressure?

In a PCM, if the value of the firm was \$74 under the debt-laden capital structure (say, \$69+\$5), and the managers chose the \$74 capital structure, what would you do?

Debt and Equity

How can the value of the *firm* depend on the value of debt and equity?

Maximized Firm Value

Which share of debt or equity maximizes the firm's value?

Is This a General Insight?

But the world is not anywhere near risk-neutral.

Does this still work with risk-aversion,

or only in (near-) risk-neutral cases?

And how does leverage influence the CoC?

Same Example w/ Risk Aversion

- Perfect Markets (PCM): No Taxes. No X-Costs. No Disagreements. Competitive Markets.
- Prob 1/4, worth \$60 *next year*.
- Prob 3/4, worth \$100 *next year*.

The world is **NOT** risk-neutral.

- The CoC for *this* risky *firm* overall is 20%,
- . . . but not for its debt or equity!
- I-Banker: to raise \$65 in debt, you must *promise* investors a RoR of 16.92%.

Question of Interest

What is your cost of capital on debt?
What is your cost of capital on equity?
What is your leverage ratio?

World Sketch Template

	All Equity	Debt Equity	
Rain 1/4	A	B	C
Sun 3/4	D	E	F
EV@T=1	G	H	I
PV@T=0	J	K	L
Er@0to1	M	N	O

Solving World Sketch

```
         All Equity||Debt Equity
-------------------------------------
Rain 1/4
Sun  3/4
-------------------------------------
EV@T=1
PV@T=0
Er@0to1
weight      100\%
```

WACC

What is the weighted average cost of capital (WACC) of the debt+equity capital structure?

Leverage and Risk

If only \$0.01 in debt had been promised, what would have been the riskiness of debt and equity?

Maximized Firm Value

Which share of debt or equity maximizes firm value?

Debt, Risk and CoC

How does the risk and cost of capital of the **debt** depend on the firm's leverage ratio?

Equity, Risk and CoC

How does the risk and cost of capital of the **equity** depend on the firm's leverage ratio?

Consequences for CoC

1. If the CoC (and risk) of equity goes up, and
2. the CoC (and risk) of debt goes up, and
3. the firm consists only of debt and equity, then

does the CoC (and risk) of the firm go up?

Leverage Ratio, CoC, and Risk

How does the cost of capital (and risk) of the **firm** depend on the firm's leverage ratio?

In the formula, as leverage goes up, what goes up, what goes down?

Risk Splitting

In the above example ($65 debt), what is the riskiness of the two claims and what is the riskiness of the firm?

Graph: Normally Distributed

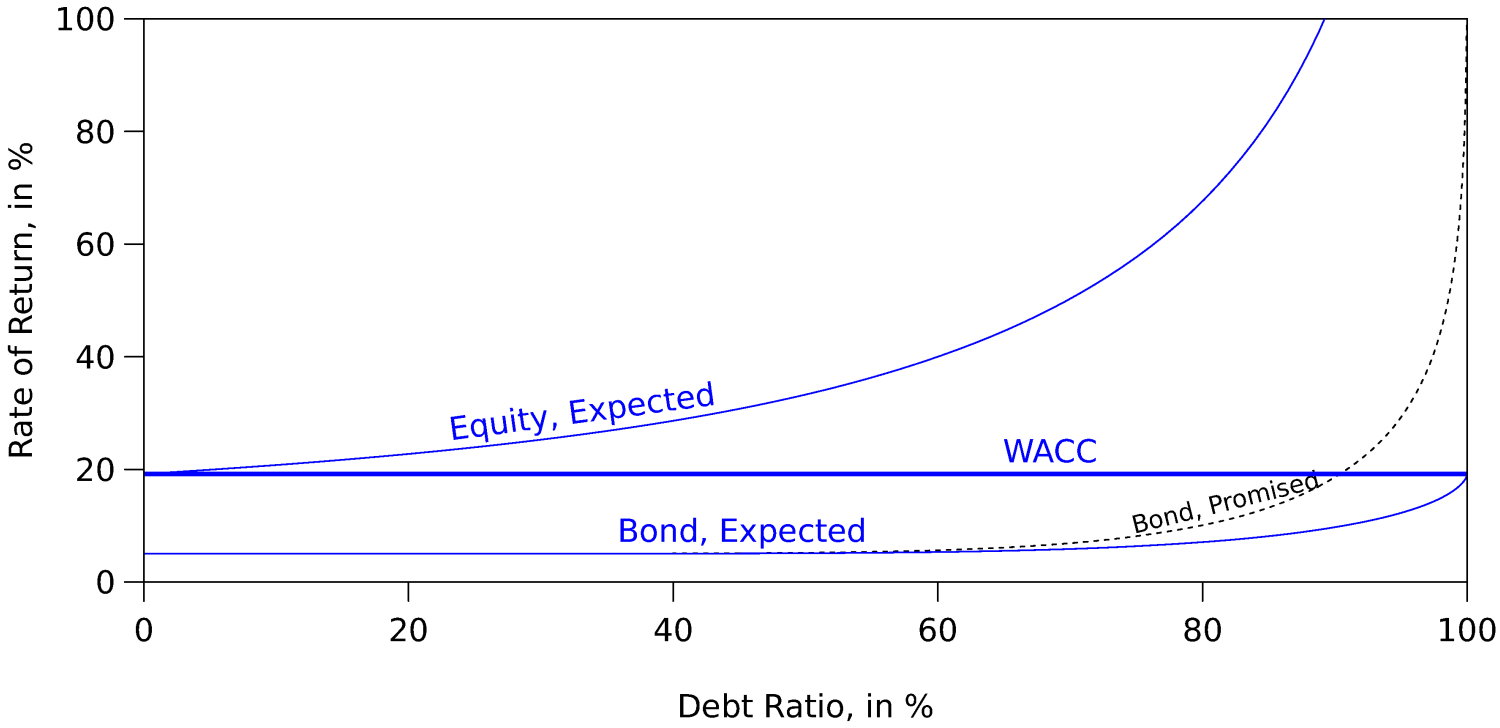

Figure 1: Payoff with Normal Distribution

Graph Footnotes

- The promised RoR on debt can be above the WACC!
- For reasonable debt ratios (say, 0% to 60%), the cost of the firm's debt really stays the same and hovers around the risk-free rate.
- However, the cost of the equity increases.