

5Capital Structure II: Stockholder & Bondholder Conflicts

Modigliani-Miller (MM I) theorem

If

- There are no taxes
- There are no bankruptcy costs
- The firm's investment policy is fixed

Then

- The value of the firm is independent of its capital structure

How does adding debt to the firm's capital structure affect equity holders' investment decisions?

How is the level of debt effecting the value of the shares / equity? Who pays the price of this debt? How can the firm reduce this cost?

Optimal investment policy

-The owner of an all-equity firm will take all positive NPV projects to maximize firm value

-However, in a levered firm, debt and equity holders sometimes disagree about the optimal investment policy

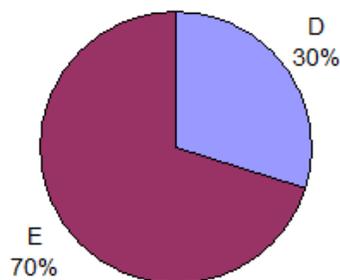
-Equity holders (to whom managers are responsible) have ultimate authority over investment decisions

-Does this situation create conflicts of interests between equity and debt holders? **(agency conflicts)**

• What are the costs of these conflicts? (agency costs)

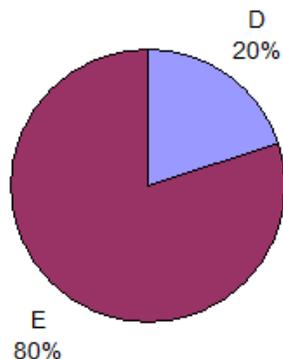
• How can these conflicts be solved?

Equity holders make the decisions. They take an investment with positive NPV, this increases the size of the pie but really all that is increasing is the value of the equity.



Here the firm has Value = 100 = E of 70 and D of 30.

Now the firm takes a project with negative NPV, say NPV = -10. The value of the equity will increase to 80% and the value of the debt will decrease to 20%. So the equity holders are willing to take this project even though it is bad (negative NPV). This project will increase their value!



The value of the firm is decreased but which part? Is Debt or Equity decreased? What proportion of each is decreased?

They (the managers) take the **bad** project because it increases the value of Equity by the amount of the negative NPV.

This demonstrates the conflict of interest with respect to which project is taken, **AGENCY CONFLICT**.

CONFLICTS OF INTEREST BETWEEN BONDHOLDERS AND STOCKHOLDERS

- 1. UNDERINVESTMENT (DEBT OVERHUNG)**
- 2. ASSET SUBSTITUTION (RISK-SHIFTING)**
- 3. CLAIM DILUTION**
- 4. DIVIDEND PAYOUT**

(explanation of each follows)

① Underinvestment Problem

WHEN THE FIRM IS CLOSE TO FINANCIAL DISTRESS, THE SHAREHOLDERS MAY HAVE INCENTIVES TO TURN DOWN POSITIVE NPV PROJECTS

Example:

Consider the following project, and assume the discount rate is zero ($r = 0$)

Assume further that the firm only has \$200 now, so the stockholders will have to supply an additional \$100 to finance the project

	0	1	
Current cash	\$200		
Project CF	-\$300	\$350	This project has NPV = 50 (Good)
Total CF	-\$100	\$350	

What is this company worth if it's financed entirely with equity?

The firm needs another \$100 to finance the project, takes it from it's equity (does not want more debt). Now we have...

Year 0 cash outflow of	-\$100 (change in working capital)
Year 1 cash inflow of	<u>350</u>
	\$250 value of firm if taking project.

Value **without** project = \$200

Difference between without project and with project is \$50 = NPV of project!

The NPV is positive so the firm should take the project. So an all equity firm (no debt) will take the project. This is the proper decision.

Now assume the firm is partially financed with debt, does the previous analysis hold? WHY?! How does this effect the decision to take the project???

Underinvestment problem

Assume at $t=0$ the company issues a bond maturing at $t=1$, with face value of \$300

	0	1
Cash flows	-\$100	\$350
Bond	?	-\$300

What is the market value of the bond at $t=0$? That is, how much would you pay for it? (still assuming $r = 0$, this is because imposing an r on all cash flows does nothing to advance the discussion)

How much are we willing to pay for the bond? With $r = 0$ we pay 300 and get 300 back a year later. The naïve answer is that the bond is worth \$300.

Naïve answer:

	0	1
Cash flows	-\$100	\$350
Bond	300	-\$300

-Why would paying \$300 for this bond be naïve?

We assume the firm will still take the project when we give them the \$300 loan. In order to make the money to pay us back the \$300 they must take the project.

But they may decide not to take the project ...

Underinvestment problem

Managers are obligated to make the best decisions for the **shareholders**, not the bond lenders. The managers must increase the value for the shareholders even if it means going into bankruptcy.

-Need to determine the **optimal investment policy (for shareholders!) when bondholders are naïve:**

	0	1
CF with project	-\$100	\$350
CF without project	\$0	\$200
Bond	300	-\$300

If taking the project:

We have sold the bond for \$300 which we must repay in 1 year (r=0). We earn the money to repay by investing in the project.

Cash Flows at time 0: $-100 + 300 = 200$
 Cash Flows at time 1: $200 + 350 - 300 = 250$

If not taking the project:

Not taking the project means certain bankruptcy, the \$200 which comes into the company at time 1 goes to the claimants.

Cash Flows at time 1: $300 + 0 = 300$ (no money made in period 1)

By not taking the project the company goes into bankruptcy in period 1 but still has the \$300 from the bond they sold at time 0! This is more than the \$250 they would have at the end of period 1 if they had taken the project.

Which is best for shareholders?

In this case the investment strategy of the company has changed according to the financial state of the company. This happens often with firms in financial distress.

Underinvestment problem

-Hence, given that bondholders are rational agents (i.e. can foresee shareholders' incentives!), what is the (non-naïve) price of debt? What is the value of the equity?

	0	1
CF without project	\$0	\$200
Bond	200	-\$200

If **taking** the project:

If **not taking** the project:

With Project: \$200

Without Project: -\$200

difference is -\$50(loss), this is equal to the NPV of the project.

Equity holder bears the risk here. Bond holders will pay much less for this risky investment.

We see here that changing the capital structure also changes the investment decision. Investment policy is not fixed. A project which should be taken is not taken! This is the underinvestment problem.

Result: The only good policy is to increase the size of the entire firm.

Equity holders are the ones who want this potential conflict. It is in their interest for the managers to take the project. They will require managers to write into the bond contract that the firm will take the money from the bond sale and use it to invest in the project.

Underinvestment problem

-How much is the residual loss here?

-Who bears this cost in this case? In general?

-Equity holders have strong incentives to structure contracts in ways that minimize adverse incentive costs.

Solutions to the underinvestment problem

(These are all contractual)

-Less debt in the capital structure:

The conflict of interest we just observed only arises with the possibility of default.

With a Less Debt approach there is no agency cost because the firm is not likely to go into bankruptcy.

-Sinking funds:

A bond with a sinking fund provides for some repayment of the principal before the bond issue matures

Paying the face value of the bond in pieces before maturity.

-Dividend restrictions:

The firm commits to paying no more than \$X in dividends per period until the bond is repaid in full

Refer to:

Smith C. and J. Warner, 1979, "On Financial Contracting: An Analysis of Bond Covenants," Journal of Financial Economics, 7, 117-161.

② Asset substitution problem

-The value of equity can be increased at bondholders' expense (pure wealth transfer) by replacing the firm's current (safe) assets with riskier projects

Shifting risk to the bondholders.

-Example:

You own an **all-equity** firm that at date 1 can take one of the following two **mutually exclusive** projects that do not require initial investment and generate immediate payoff:

		Bad state	Good state
		<hr/>	
Probability		1/2	1/2
Best →	Project A	\$60	\$120
	Project B	\$0	\$150

$$E(X_A) = \frac{60 + 120}{2} = 90$$

$$E(X_B) = \frac{0 + 150}{2} = 75$$

-Which project will you take?

A has the higher expected return, it is the better project.

Asset substitution problem

Continuing from last page...

-Now assume that at date 0 you issue bond with a face value of \$40 repayable at date 1

	Bad State	Good State	Expected	
Project A	60	120	90	
Debt	<u>-40</u>	<u>-40</u>	<u>-40</u>	$=(40 + 40)/2$
Equity	20	80	50	
Project B	0	150	75	
Debt	<u>0</u>	<u>-40</u>	<u>-20</u>	$=(0 + 40)/2$
Equity	<u>0</u>	110	55	



bankruptcy

-By substituting project A with project B, the stockholders increase the equity value, but decrease the firm value, and thereby, the debt value (who bears this cost?)

Took the lower NPV project and profited. **In the presence of debt the equity holders are changing their decisions on which project to take.** In fact they are taking the bad project in order to profit. The stockholders will want to take the riskier project. The company benefits if the riskier project is successful but the bond holders will pay the brunt if it is not successful. Bond holders expect this and pay less for the bond. **So the equity holders want to solve this problem in order to attract bond buyers.**

-**Restrictions on investments** that can change the risk of the firm

-**Restrictions on disposition** of (safe) assets

-**Security provisions:** Give bondholders title to pledged assets until the bonds are paid in full

-**Asset maintenance provisions:** Force stockholders to be proactive in maintaining the value of existing (safe) assets

-**Restrictions on mergers,** this can be difficult, may be assuming new risk of the merging company.

③ Claim dilution problem

-Shareholders can issue new bonds of equal or greater **seniority** to existing bonds, thereby diluting the claims of the original bondholders

(**Seniority** means having priority, first in line. But it doesn't count against bonds which come due sooner to others).

What do we mean by "senior"?

- Absolute priority
- Priority in time

Seniority holders are paid first but maturity date is also a factor. Seniority only exist for bonds which mature at the same time. Firm may try to put a new bond out which matures before the others and redirects the funds. The bond holders want to avoid this!

Example:

Consider a firm financed by both equity and debt, with a face value of \$60, engaging in the following project:

	Bad state	Good state	Expected
Project A	\$60	\$180	\$120
Debt	\$60	\$60	\$60
Equity	\$0	\$120	\$60

(Continued)

Claim dilution problem

-Now assume that at date 0 you the firm issues new debt with a face value of \$30 and use the proceeds to repurchase \$30 of the equity; Assume further that the new debt has the senior priority (issue new bonds and use proceeds to buy stock).

	Bad State	Good State	Expected
Project A	60	180	120
New Debt	30	30	30
Old Debt	<u>30</u>	<u>60</u>	<u>45</u>
Equity	0	90	45

(bankruptcy)

-By issuing new debt, the stockholders increase the equity value (per share), but decrease the value of the old debt (shareholders increase equity due to repurchase)

60 stocks at \$1 each.

Major stockholders has 30 stocks.

Outsider stock holder has 30 stocks.

So the equity is split 50/50 between major and outsider.

If you purchase all outside stocks you have 100% equity.

100% major stockholder = 30 stocks, sum is \$45 (?)

Equity holders will ultimately bear the cost so they want to solve. Bond holders will only pay \$45 for the bond because they expect this kind of behavior. Equity holders were promised \$60 but get only \$45. They get a very low price for the \$60. **So the equity holders are keen to promise all bondholders that they will not issue new debt because they (the equity holders) will ultimately bear the cost.** This is more of a financing policy then investing policy but is the same notion. Conflict of interest between bondholders and shareholders.

-The problem is usually solved by restrictive **BOND COVENANTS** concerning future financing

-For example, the firm is not allowed to issue new debt unless the **interest expense/earnings ratio, or the debt/assets ratio**, is lower than a certain value

Expense-to-earnings ratio describes the probability of bankruptcy.

Debt-to-assets ratio is saying leverage must be below a certain point before there can be a new bond issue. Debt-to-asset and interest expense-to-earnings ratios represents probability of bankruptcy, leverage.

④ Dividend payout problem

-When shareholders pay themselves dividends, the claims of the bondholders become less secure (lower asset coverage)

-Thus, **BONDHOLDERS HAVE A NATURAL AVERSION TO DIVIDENDS**

-In the extreme, a firm could cash out of all its investments and pay a terminating special dividend to stockholders (leaving bondholders with the empty shell)

Bondholders generally do not like when the firm pays dividends.

Example:

- You own a firm with assets in place generating a payoff of \$30 at date 1
- The firm also has \$100 in cash and a debt with face value of \$50 repayable at date 1
- At date 0, the firm may distribute cash as dividends, or invest it in a project generating a payoff of \$110 at date 1 (assume $r=0$, firm should take positive cash flow project).

• What would the all-equity firm do? All equity firm would take the project.

But what if the firm has debt? Does debt cause a change in investment policy?

	Date 0	Date 1	Total
Invest	0	140	140
Debt	0	50	50
Equity	0 <i>(bankruptcy)</i>	90	90
			<i>Face Value</i>
Pay Dividend	100	30	130
Debt	0	30	30
Equity	100	0 <i>(bankruptcy)</i>	100

110 + 30 (arrow pointing to Date 1 Invest)

110 + 30 (arrow pointing to Date 1 Debt)

-By paying an early dividend, the stockholders increase the equity value, but decrease the value of the firm, and thereby, the value of the debt (who bears this cost?)

-What if the dividend were restricted?

Equity holder will not want to take the good project. Debt holders get only \$30. The equity holders will only get \$30 for the \$50 bond in the efficient market. For this reason the equity holders want to solve. Debt contract can specify an equity-to-debt ratio only above which is the firm allowed to pay a dividend or increase a dividend. The solution is contractual within the bond covenant.

Optimal capital structure

-Debt financing has advantages (i.e., tax-shields) and disadvantages (i.e., bankruptcy costs, bondholders-stockholders conflicts)

-THEREFORE, THE FIRM'S CAPITAL STRUCTURE SHOULD REFLECT THE TRADE-OFF BETWEEN THOSE ADVANTAGES AND DISADVANTAGES

-This notion is also called the **Trade-Off Theory of Capital Structure**

What is the likelihood of these issues arising among firms? These issues come up when there are investment opportunities to consider. So the greater the number of investment opportunities a firm has the greater the likelihood that the firm will face these conflicts of interest.

The price of debt will be much higher in firms with many investment opportunities.

Firms with fewer investment opportunities will carry more debt because their cost of debt is cheaper.

Leverage and investment opportunities

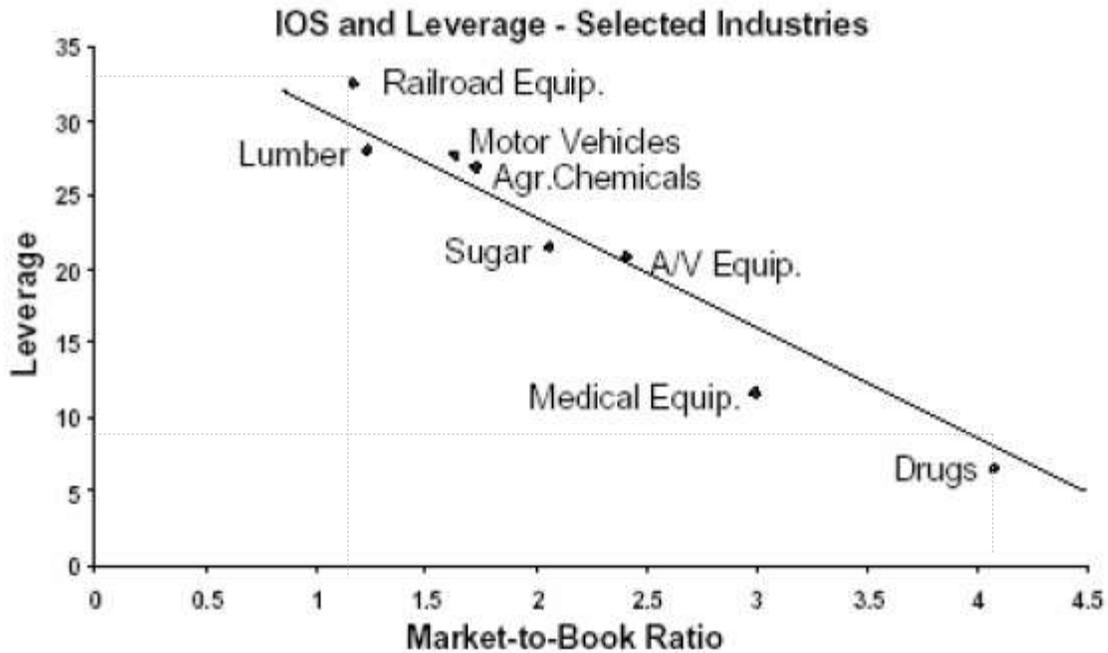
-Investment-related agency costs are expected to be higher within firms with more investment opportunities

-Thus, the price of debt for growth firms is relatively high

-ACCORDING TO THE TRADE-OFF THEORY, GROWTH FIRMS SHOULD ISSUE LESS DEBT

Empirical evidence

-Barclay, Smith and Watts (1995): A negative relation between investment opportunities (measured by the market-to-book ratio) and leverage



Market-to-book ratio represents the growth opportunities.

This result strongly supports the Trade-Off theory.

Example, lumber and railroad companies have few growth opportunities so their leverage is high (cheap debt). Whereas drug and medical equipment companies have many growth opportunities driving their affordable debt way down.

Alternative theories of capital structure

Signaling

- Managers have better information about the value of their companies than outside investors
- Would like to communicate this information to the market
- Can use capital structure as a signal. Why?

Managers taking on large debt means they will have to repay in the near future which means they expect to have significant cash in the near future.

- Debt contracts oblige the firm to make a fixed set of cash payments over the life of the loan
- If these payments are not made, there are serious consequences, including bankruptcy
- **Adding debt serves as a credible signal of high future cash flows**
- Empirical evidence: in reaction to large debt-for-stock exchanges, stock prices go up by 14% on average
- Stock-for-debt exchanges lead to a 9.9% decline in stock prices on average

Alternative theories of capital structure

Pecking Order Theory

- Managers are better informed about the quality of the firm than outside investors
- When issuing securities, this information asymmetry imposes costs on the stockholders
- The theory suggest, therefore, that the firm's project should be financed in an order that reflects the costs of information asymmetry
 - Use internal financing first (cash) – non-risky option
 - Then issue safe securities (debt) – low costs of asymmetric information
Pay less when not aware of what is going on in the firm. Bonds are less risky.
 - Then issue risky securities (equity) – high costs of asymmetric information

Practice questions

16.1

16.2

16.6