Masters in FINANCE

CAPITAL STRUCTURE – II

Personal Taxes, Financial Distress Costs, Agency Problems, Asymmetric Information

Corporate Investment Appraisal

Fall 2017

ISEG 100 1911-2011 ANOS

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OUTLINE

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Other factors that influence choice of capital structure:

1. Personal Taxes

   Investors also pay taxes on income received from firms.

2. Financial Distress and Bankruptcy:

   Excess leverage can increase the probability of default, and bankruptcy, which is costly.

3. Agency Problems:

   The existence of debt can create conflicts of interest between shareholders and debt-holders, which reduce the value of the firm (Agency Costs of Debt).

   On the other hand, debt can help disciplining managers when there is a conflict of interest between management and shareholders (Agency Benefits of Debt);

4. Asymmetric Information:

   In the presence of asymmetric information, the choice of capital structure can be used as a signal to the market, to try to get a fair valuation of the firm.

PERSONAL TAXES

The cash flows to investors are typically taxed twice. Once at the corporate level and then investors are taxed again when they receive their interest or dividend payment or realize their capital gain.

For individuals:

- Interest payments received from debt are taxed as income.
- Equity investors also must pay taxes on dividends and capital gains.

Personal taxes reduce the cash flows to investors and can offset some of the corporate tax benefits of leverage.

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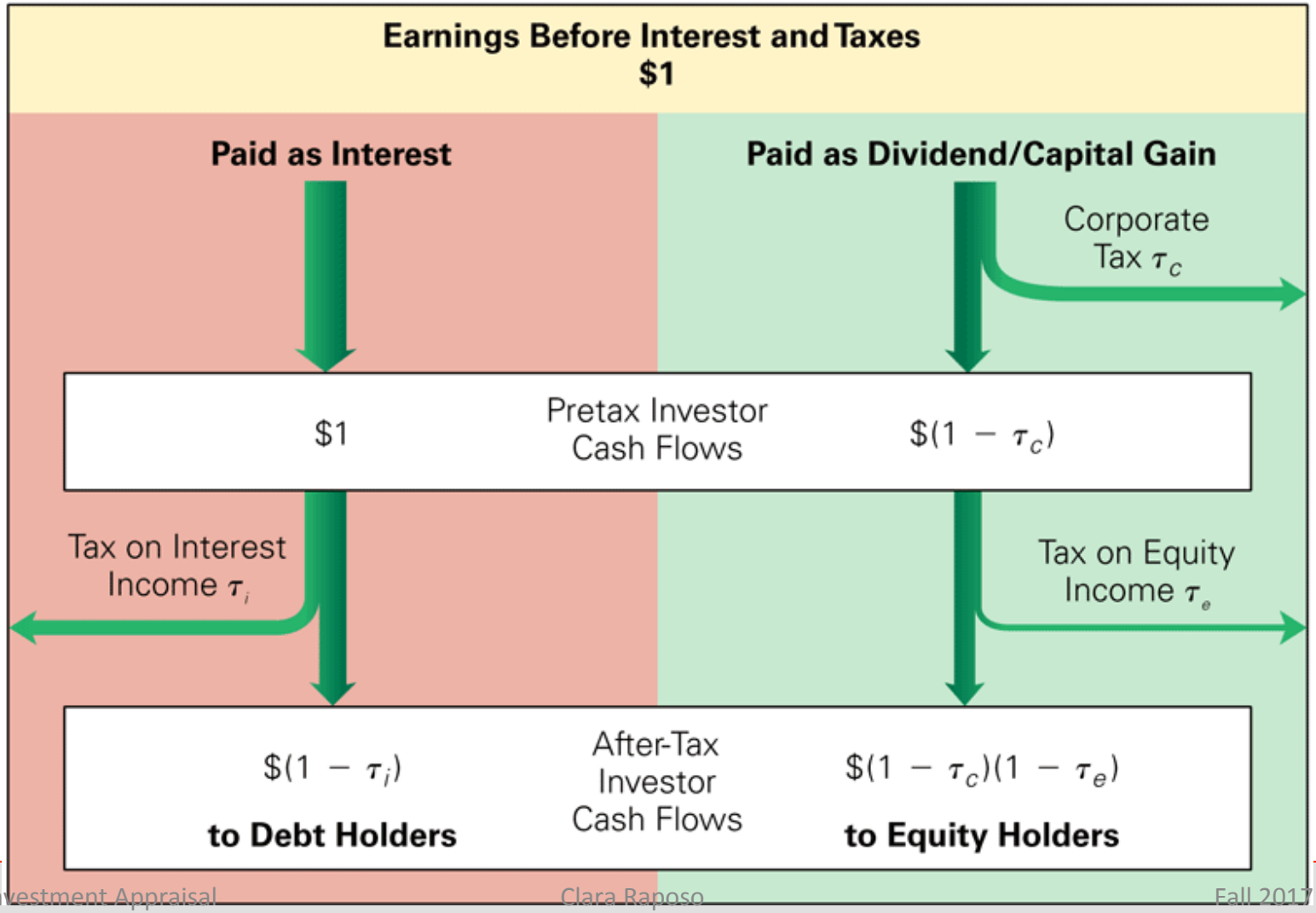
After-Tax Investor Cash Flows from a $1 EBIT



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Including Personal Taxes in the Interest Tax Shield

Therefore, in terms of after-tax cash flows, debt is more favorable than equity as long as:

$$\$1\times(1-\tau_i) > \$1\times(1-\tau_C)(1-\tau_E)$$

We could think of an annual tax shield from paying some amount of Interest, after corporate and personal taxes as:

$$\left[(1-\tau_i)-(1-\tau_C)(1-\tau_E)\right]\times \text{Interest}$$

If we are to consider a perpetual level of Debt and a fixed annual interest payment, we would get the present value of the Interest Tax Shield as:

$$PV(\text{Interest Tax Shield}) = \frac{\left[(1-\tau_i)-(1-\tau_C)(1-\tau_E)\right]\times r_D D}{r_D(1-\tau_i)}$$

Finally, the Effective Tax Advantage of Debt can be seen as:

$$\tau^* = 1-\frac{(1-\tau_C)(1-\tau_E)}{(1-\tau_i)}$$

Valuing the Interest Tax Shield with Permanent Debt

To keep things simple we will consider only the case of Permanent Debt in the capital structure.

Following MM's analysis and incorporating this additional imperfection – personal taxes – we would adapt proposition I to state:

$$V^L = V^U + \tau^* D$$

Note: If we were to use the WACC method the r_{WACC} rate would look the same, but r_E and r_D would be adjusted to compensate investors for their personal taxes.

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Effective Tax Advantage of Debt: US

Consider the tax rates (for the highest income tax brackets) in the US in different periods:

Year	Corporate Tax Rate†	Personal Tax Rates*			
		Interest Income	Average Rate on Equity Income	Dividends	Capital Gains
1971–1978	48%	70%	53%	70%	35%
1979–1981	46%	70%	49%	70%	28%
1982–1986	46%	50%	35%	50%	20%
1987	40%	39%	33%	39%	28%
1988–1990	34%	28%	28%	28%	28%
1991–1992	34%	31%	30%	31%	28%
1993–1996	35%	40%	34%	40%	28%
1997–2000	35%	40%	30%	40%	20%
2001–2002	35%	39%	30%	39%	20%
2003–2009	35%	35%	15%	15%	15%

- Compare the Effective Tax advantage of Debt in 1980 and 1990:

$$\tau^*_{1980} = 1 - \frac{(1-0.46)(1-0.49)}{1-0.7} = 0.082$$

$$\tau^*_{1990} = 1 - \frac{(1-0.34)(1-0.28)}{1-0.28} = 0.34$$

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Tax Disadvantage from Excessive Interest Payment

•The effective personal tax rate on equity income, T_E (especially for capital gains) is hard to determine, because the rate is only applied when the investor sells the share.

•Some investors are exempt from paying personal taxes (e.g., some retirement savings accounts or pension funds.)

•All we've seen so far applies only to firms that are paying corporate taxes. If a firm's EBIT is already negative, paying interest will not make the firm pay less taxes… (it's *as if Tc=0*). In this case there is actually a tax disadvantage from excess interest payments:

$$\tau^{ex} = 1 - \frac{(1-0)(1-\tau_E)}{(1-\tau_i)} = \frac{\tau_E - \tau_i}{1-\tau_i} < 0$$

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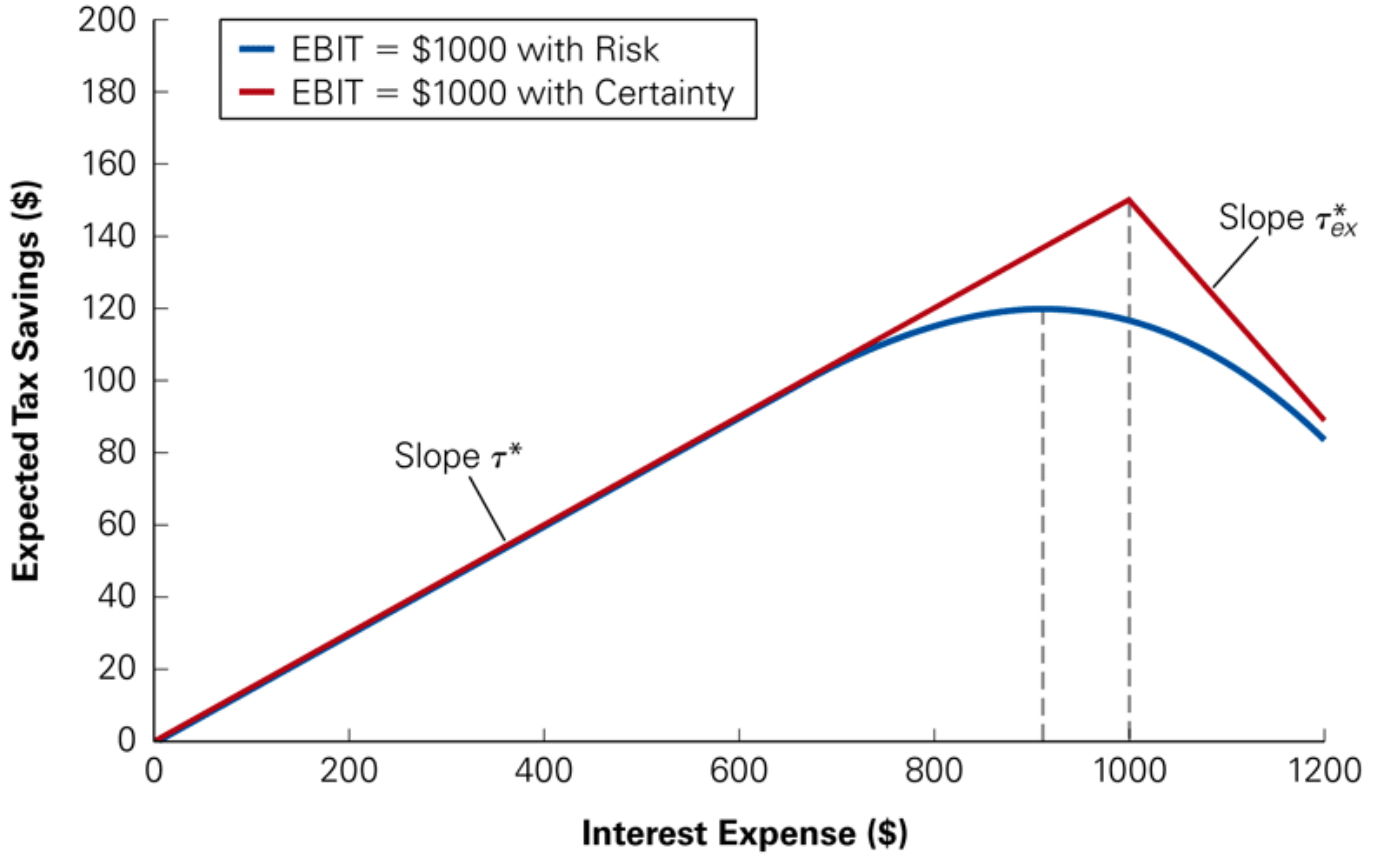
Example: Optimal Limited Leverage in the presence of Taxes



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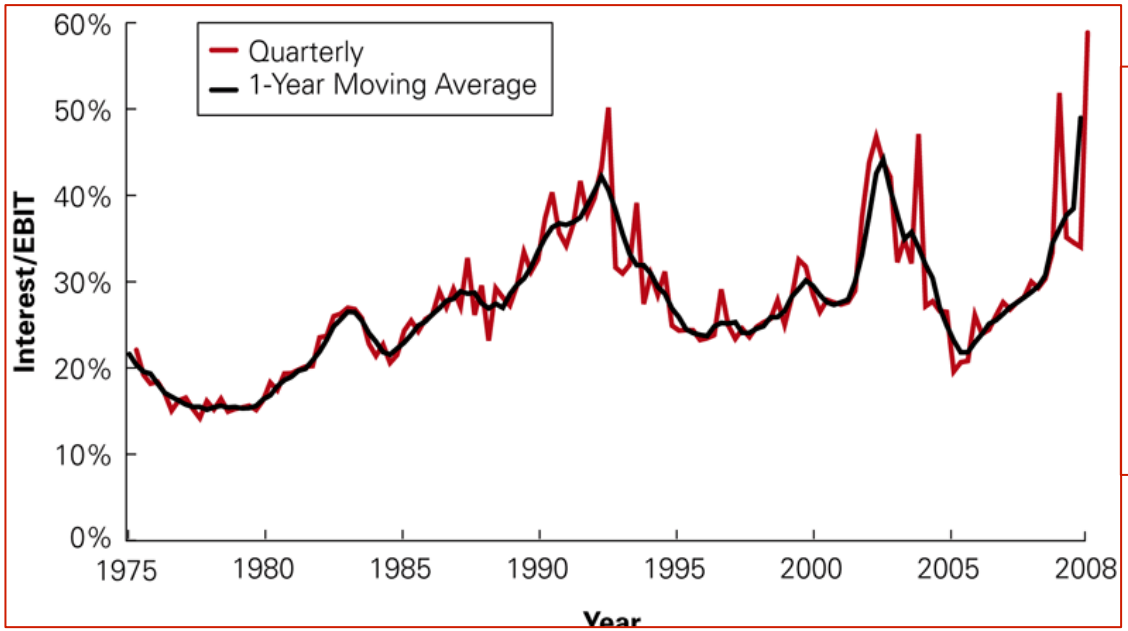
Capital Structure and EBIT

The optimal level of leverage from a tax saving perspective is the level such that interest equals EBIT. Of course, EBIT is not fully predictable. Still, US firms use lower leverage than what we could expect from a tax savings perspective



Interest Payments as a Percentage of EBIT for S&P 500 Firms, 1975–2008
Source: Compustat

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Capital Structure in Different Countries

The, perhaps low (from a tax perspective), levels of leverage are found in different parts of the world.

Country	$D/(E+D)$	Net of Cash $D/(E+D)$	Interest/EBIT	τ_c	τ^*
United States	28%	23%	41%	34.0%	34.0%
Japan	29%	17%	41%	37.5%	31.5%
Germany	23%	15%	31%	50.0%	3.3%
France	41%	28%	38%	37.0%	7.8%
Italy	46%	36%	55%	36.0%	18.6%
United Kingdom	19%	11%	21%	35.0%	24.2%
Canada	35%	32%	65%	38.0%	28.9%

Source: R. Rajan and L. Zingales, "What Do We Know About Capital Structure? Some Evidence from International Data," *Journal of Finance* 50 (1995): 1421–1460. Data is for median firms and top marginal tax rates.

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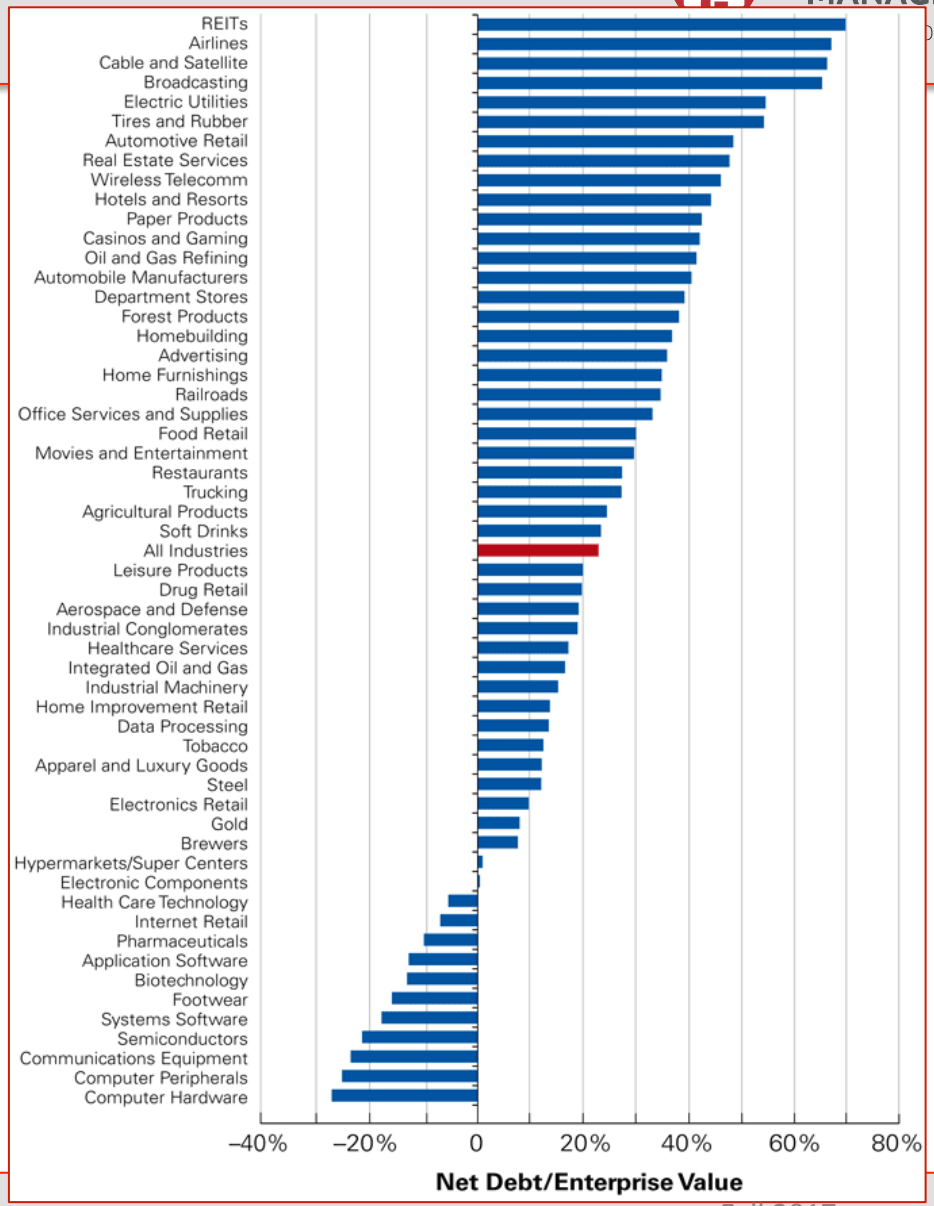
Capital Structure in Different Industries

Debt-to-Value Ratio [D / (E + D)] for Select Industries

Source: IQ Capital



COSTS OF FINANCIAL DISTRESS

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Unlike MM's world, in real life the bankruptcy process and even the suspicion of financial distress do produce a loss in the value of the firm. What are these costs?

We can split these costs into:

Direct Costs of Bankruptcy: costs borne by the firm **during the bankruptcy process**, reducing firm value.

Indirect Costs of Financial Distress: costs borne by the firm due to high leverage and the **anticipation of future problems** of default – also reduce firm value.

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DIRECT COSTS OF BANKRUPTCY

The bankruptcy process is time-consuming, complex, and costly.

Outside experts are expensive:

- Legal and accounting experts;
- Consultants;
- Appraisers;
- Auctioneers;
- Investment bankers.

E.g., Enron paid $30 million per month on legal and accounting fees in bankruptcy (total $750m)

Depending on the complexity and size of the business, direct costs of bankruptcy can amount to 10% of the value of the assets (on average 3-4%).

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INDIRECT COSTS OF BANKRUTCY

Even if the firm hasn't filed for bankruptcy, if the debt levels seem to be too high, losses do happen:

- Loss of Customers;
- Loss of Suppliers;
- Loss of Employees;
- Loss of Receivables;
- Fire Sale of Assets;
- Inefficient Liquidation;
- Costs to Creditors.

These costs should not exceed the cost of renegotiating with the creditors.

But many of these costs are incurred even prior to bankruptcy.

Indirect financial distress costs are hard to measure, and vary from industry to industry, from firm to firm.

There is evidence that they can amount to 10%-20% of firm value.

- Optimal Capital Structure in the presence of taxes and costs of financial distress

An adaptation of MMI would tell us:

$$V^L = V^U + PV(\text{Interest Tax Shield}) - PV(\text{Financial Distress Costs})$$

Firms should choose more

Debt as long as the incremental

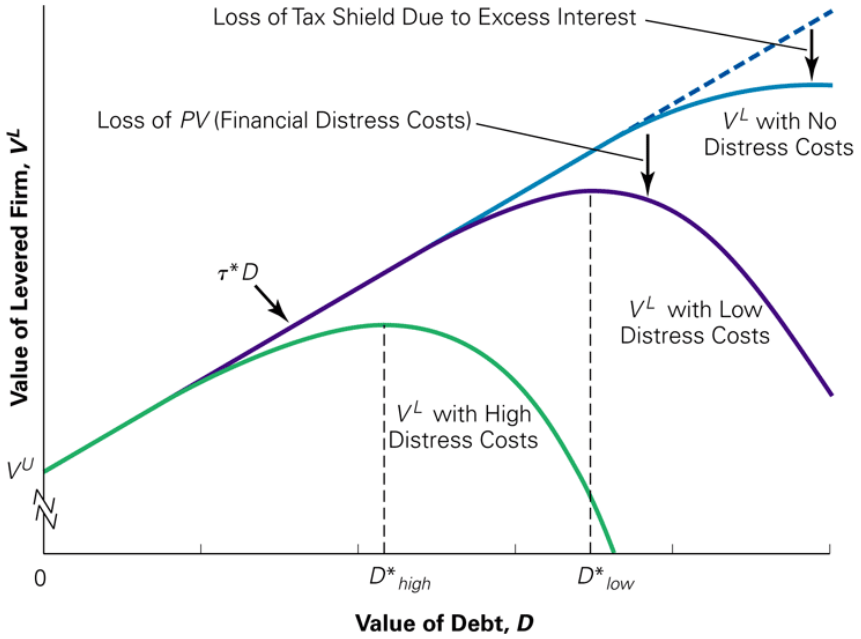
Tax shield is higher than the

additional costs of financial distress.

The size of the Distress Costs varies

from industry to industry and from firm

to firm.



AGENCY PROBLEMS

Conflicts of interest between different stake-holders in the firm are another factor that may influence the choice of capital structure.

We will see two different types of agency problems:

- Conflicts between shareholders and debt holders, which lower the value of the firm when debt is high (Agency Costs of Debt);
- Conflicts between managers and shareholders, in which case debt may be used to discipline management (Agency Benefits of Debt).

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AGENCY COSTS OF DEBT

When a firm has leverage, a conflict of interest exists if investment decisions have different consequences for the value of equity and for the value of debt.

These conflicts are more likely to occur when the risk of financial distress is high (there is high debt).

We will look at two types of investment strategies that represent agency costs of debt:

- Excessive Risk-Taking and Asset Substitution;
- Debt Overhang and Under-investment.
  - Firms may also try to Cash Out…

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AGENCY COSTS OF DEBT: EXCESSIVE RISK TAKING

When the firm is highly levered and financial distress is very likely, managers (shareholders) prefer risky investments, in which they gamble the total value of the firm, and hurt debt holders.

Example: Baxter has a loan of 1000 due at the end of the year. If it follows its old strategy, the value at the end of the year is 900 with certainty. A new strategy comes up: with a 50% chance the value can be either $1300 or $300.

	Old Strategy	New Risky Strategy		
		Success	Failure	Expected
Value of assets	**900**	1300	300	**800**
Debt	**900**	1000	300	**650**
Equity	**0**	300	0	**150**

However, ex ante, debt holders may anticipate this type of behavior, and ask for higher rates and protection. So, shareholders pay the price of these strategies when they get high levels of debt.

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AGENCY COSTS OF DEBT: UNDERINVESTMENT

When a firm faces financial distress, managers may choose not to finance new, positive-NPV projects. This reduces the total value of the firm.

Example: Suppose Baxter could try to raise 100 by issuing new equity in order to invest in a new riskless project generating an end of year cash flow of 150. This positive-NPV project will not be chosen.

	Without New Project	With New Project
Existing assets	900	900
New project		150
Total firm value	900	1050
Debt	900	1000
Equity	0	50

From the equity-holders' point of view, NPV=-100+50<0

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AGENCY BENEFITS OF DEBT

Due to the separation of ownership and control, managers may be entrenched in their positions.

We can find the Agency Benefits of Debt in the following cases:

Concentration of Ownership

When a firm starts dispersing its equity, the incentives of the owner-manager change. Using debt financing avoids this dilution of equity.

Reduction of Wasteful Investment

If the firm is levered, there is more pressure on its management to perform, and less opportunities for empire building, and overspending on personal perks.

Commitment

A firm at the risk of entering financial distress may require stronger vigor and commitment from the management. May also become a fiercer competitor.

TRADE-OFF THEORY

Optimal Capital Structure in the presence of taxes, costs of financial distress and agency problems

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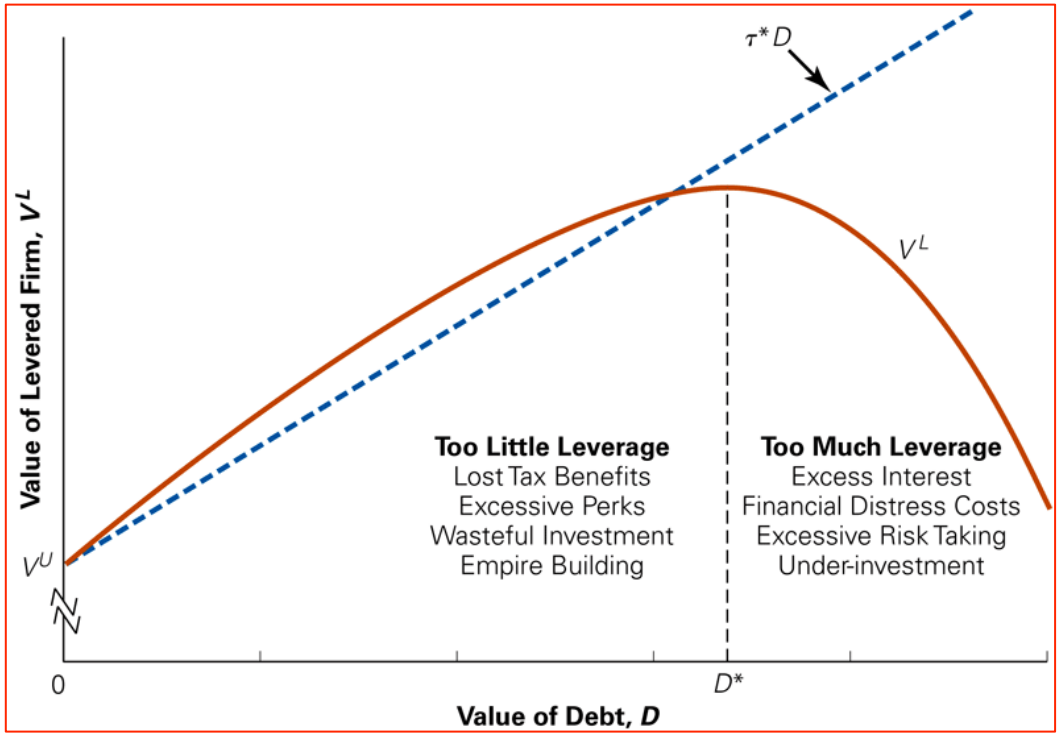
The value of the levered firm can now be shown to be:

$$V^L = V^U + PV(\text{Interest Tax Shield}) - PV(\text{Financial Distress Costs}) - PV(\text{Agency Costs of Debt}) + PV(\text{Agency Benefits of Debt})$$

Firms need to balance each of the relevant factors: taxes, financial distress costs, agency costs and benefits.

Low-growth, mature firms often fall into the high-debt category.

R&D-intensive firms typically maintain low levels of debt.



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ADVERSE SELECTION when issuing equity

Managers' information about the firm and its future cash flows is likely to be superior to that of outside investors – there is asymmetric information between managers and investors.

Managers don't want to issue new securities if they are undervalued by outside investors!

When a firm sells new equity, asymmetric information is present much in the same way as when someone sells a second hand car. There is adverse selection and the lemons principle:

> When a seller has private information about the value of a good, buyers will discount the price they are willing to pay due to adverse selection.

When a firm announces a new equity issue, investors wonder whether it is really because of new valuable investment opportunities or because of bad news…

> The market is skeptical, and managers who really have good news, may refrain from issuing new equity.

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EXAMPLE OF THE "PECKING ORDER THEORY"

Consider a firm with two equally likely scenarios for the value of its equity at the end of the year:

Scenario	Low	High
Value of Equity	50	150

To simplify, assuming a discount rate of 0%, the current market capitalization of the firm is: 100

Now suppose a new positive-NPV project appears:

The project requires investment of 100;

And has positive NPV in both scenarios:

Scenario	Low	High
NPV of new project	10	20

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EXAMPLE OF THE "PECKING ORDER THEORY"

Now suppose there is asymmetric information:

The Manager already knows the true scenario, whereas outside investors are in the dark.

What would happen if the manager went ahead with the equity offering in order to raise 100 (in both scenarios)?

Investors would value the firm according to:

Scenario	Low	High
Total Value of Assets	160	270

With an expected value of: $\frac{160+270}{2}=215$

And the percentage x of the equity demanded by new investors would be (npv=0):

$$100 = 215x$$

$$x = {}^{100}\!/_{215}$$

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EXAMPLE OF THE "PECKING ORDER THEORY"

Let's look at the final outcome:

	Market Value	Scenario Low	Scenario High
Old Shares	115	85.58	144.42
New Shares	100	74.42	125.58
Total	215	160	270

The manager in the High Scenario should not raise new equity!

Therefore the final solution would be different.

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EXAMPLE OF THE "PECKING ORDER THEORY"

The Equilibrium Solution would be for the "High" scenario manager to forego the positive-NPV project, in order to avoid pooling.

Only the "Low" scenario manager would be interested in investing, revealing its type to (unfooled) investors.

	Scenario High	Scenario Low
Old Shares	150	60
New Shares	-	100
Total	150	160

For this reason some researchers talk of a pecking order theory of financing, according to which firms that are exposed to serious asymmetric information (for example, due to high percentage of intangibles) avoid outside financing, especially equity.

Managers who perceive the firm's equity is underpriced, will prefer to fund investment using retained earnings, or debt, rather than equity. (Pecking order theory).

CAPITAL STRUCTURE: THE BOTTOM LINE

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Many factors influence the choice of capital structure:

Taxes tend to favor using Debt financing, but

Financial Distress Costs limit the use of Debt, as well as the Agency Costs of Debt.

But there other advantages to using Debt, in terms of motivating managers (Agency Benefits of Debt).

Finally, Asymmetric Information in the form of Adverse Selection makes it costly for current shareholders to issue new equity, giving a preference to retained earnings or debt as sources of funding.