

# Corporate Financial Management

## Lecture 3: Other explanations of capital structure

As we discussed in previous lectures, two extreme results, namely the irrelevance of capital structure and 100 percent debt financing, of the MM analyses are based on several strong assumptions including no bankruptcy and agency costs; no signalling opportunities; and no costly asymmetric information. In what follows, we will relax these assumptions to show that a firm's capital structure decision may be relevant when not only the benefits but also the costs are taken into account. In doing so, we will focus on the role of expected bankruptcy and agency costs in determining the firm's capital structure.

### 1. Trade-off theory: bankruptcy costs vs tax savings

As we know debt payments are different from dividend payments. Interest and principal payments on debt are a firm's obligations whereas dividend payments are not. That is, shareholders are not legally entitled to dividends in the way bondholders are legally entitled to interest and principal payments. If these debt obligations are not met the creditors of the firm can force it into a formal bankruptcy. Moreover, and more importantly, bankruptcy procedures - and, of course, the initial stage of financial distress - are costly. Costs associated with bankruptcy may take different forms. First, there are **direct** costs which include legal, administrative, and advisory fees paid by the firm. Second, there are **indirect** bankruptcy costs which arise because financial distress affects the company's ability to conduct its business. These costs result in the value of the firm in financial distress being less than the expected cash flows from operations. That is, bankruptcy costs, or more generally financial distress costs, tend to offset the advantages to debt financing.

It has long been realized that sufficiently large costs of bankruptcy reduce the incentive for firms to use debt financing, even in a world of otherwise perfect capital markets. However, as long as bankruptcies are costless, the mere possibility of bankruptcy or financial distress cannot significantly have an impact on capital structures of firms. Bankruptcy is a legal process to reorganize financial claims and the transfer of corporate ownership. In fact, bankruptcy means shareholders are exercising their option to default on the company's debt, which is a key benefit of having limited liability. The conditions under which costs associated with financial distress and bankruptcy will reduce the advantage of using financial leverage. Costs of bankruptcy will have a significant impact on capital structure if (1) being in financial distress reduces market demand for a firm's product; (2) financial distress would lead to costly incentives such as underinvestment - i.e. passing up some valuable investment opportunities - or asset substitution - i.e. shifting from low-risk to high-risk investment - that are likely to reduce overall firm value; and (3) legal bankruptcy procedures would impose deadweight costs on a firm that would not be borne by an identical, non-bankrupt firm.

The value of the firm in the presence of bankruptcy costs can be written as

$$V_L = V_U + T_c D - BC$$

where  $BC$  is the PV of the costs of financial distress which **depends on** the probability of distress and the magnitude of these costs if financial distress occurs.  $BC$  could affect a firm's cost of capital in alternative ways. Recall that the return to the firm's equityholders is  $Max[0, V-D]$  and the return to the debtholders is  $Min[V, D]$ . However, the outcome for the debtholders with  $BC$  becomes  $Min[V-\delta V, D]$  where  $\delta$  represents the magnitude of bankruptcy costs as some proportion of the value of the firm. Thus, the outcome for debtholders is diminished. The required rate return to debtholders will, therefore, increase as the probability of bankruptcy increases with increased leverage. Shareholders will also require compensation in the form of higher required returns to compensate them for the increased probability of bankruptcy.

It is argued that an optimal leverage ratio can exist resulting from a trade-off between the expected value of bankruptcy costs and the tax savings arising from the deductibility of interest payments. This optimal ratio maximises the value of the firm and equates the marginal gain from leverage to the marginal expected loss from bankruptcy costs. Essentially, the optimal debt-equity ratio is reached when the present value of the tax subsidy is just offset by the present value of the expected bankruptcy costs.

That is, any change in the level of debt,  $D$ , has both a positive and a negative effect on the value of the firm. On the one hand, an increase in debt leads to tax savings which decrease as the amount of debt increases since it raises the probability of bankruptcy which is, in turn, endogenously determined by the choice of  $D$ , ceteris paribus. On the other hand, an increase in  $D$  leads to an increase in the expected bankruptcy costs. For low levels of debt an increase in debt causes a greater increase in tax savings than in bankruptcy costs, and hence the value of the firm increases. However, as  $D$  increases the probability of bankruptcy also increases, which lowers tax savings and raises the expected bankruptcy costs. Although the change in the firm value is positive it decreases with increasing debt. More formally speaking, there must be a certain amount of debt **at which**  $dV/dD$  equals zero and  $V$  attains a maximum, say  $V^*$ . Therefore a shareholder-wealth maximizing firm, instead of maximizing its borrowing, will search for its optimal capital structure to attain  $V^*$ . **See Figure 1.**

Capital structure theories which are based on the trade-off between the tax advantage of debt financing and the costs of bankruptcy assume that the magnitude of bankruptcy costs are significant enough to be effective in the determination of an optimal capital structure. However, there has been a great deal of discussion about their magnitude. Lubben (2000) estimates the average cost of legal fees to be about 1.5 percent of total assets for bankrupt firms. Warner (1977) finds that the direct administrative costs of bankruptcy averaged only 5.3 percent of the value of the firm. Another empirical study is given by Altman (1984) who explores indirect bankruptcy costs. He based the measure of indirect bankruptcy costs on the foregone sales and profit. According to his analysis, the average indirect bankruptcy costs were 8.1 percent of the firm value three years prior to

bankruptcy and 10.5 percent in the year of bankruptcy. Despite the difficulty associated with measuring indirect bankruptcy costs his analysis suggests that bankruptcy costs are sufficiently large to lend support to the theory of optimal capital structure based on bankruptcy costs.

## **Empirical evidence**

Some of the findings (related to bankruptcy and/or financial distress) in the empirical literature can be summarised as follows:

1. Firms going through bankruptcy have lower sales;
2. Managers of bankrupt firms are more likely to lose their jobs than those of non-bankrupt firms, and their chances of being rehired for similar positions are virtually nil;
3. The likelihood of deviating from absolute priority rules increase the incentives for some parties to engage in "strategic behaviour";
4. Liquidation costs seem to be related to the asset structure of bankrupt firms (for example, it is less costly to liquidate tangible assets than intangible assets);
5. There is strong evidence that firms with higher growth opportunities in their investment opportunity sets have lower levels of debt in their capital structures;
6. Larger firms are less likely to be liquidated in financial distress and hence can afford to hold more debt;
7. Firms with more volatile earnings use less debt;
8. Costs of bankruptcy change from one country to another (e.g. bankruptcy costs are higher in the U.S. than in other developed countries).

## **2. Agency costs, information asymmetry, signalling explanations of leverage**

An agency relationship is defined as “a contract under which one or more persons engage another person to perform some service on their behalf which involves delegating some decision making authority to the agent”. The key to understanding the agency problem is recognition that the parties to a contract bear the agency costs of the relationship. Therefore, for any scale of activity, self-interested maximising agents minimize the agency costs in any contracting relationship. Incentives exist to write contracts that provide monitoring and bonding activities to the point where their marginal cost equals the marginal gains from reducing the residual loss.

### **The basic elements**

The following should give you an overall view of a basic agency model. Agency models have been used heavily in social sciences, particularly in economics and finance. Assume a relationship in which one party (contractor) contracts another (contractee) to carry out some type of action or to take some type of decision. Take, as an example, the relationship between the shareholders of a firm (**principal**) and the firm’s manager (**agent**). The objective of the contract is for the manager to carry out actions on behalf of the principal, which will specify the payments that the principal will pass on to the agent. The situation we consider has the following features: 1. The principal designs the contract that she will offer to the agent; 2. The agent accepts the contract if he so desires, that is if

the contract guarantees him greater expected utility than the other opportunities available to him; and 3. The agent carries out an action or effort on behalf of the principal.

It can be seen that *the agent's objectives are in conflict with those of the principal*. Examples in finance theory includes conflicts between shareholders and managers; conflicts between shareholders and debt holders (bondholders, banks and other creditors); and conflicts between creditors.

**Contract** is a reliable promise by both parties, in which the obligations of each, for all possible contingencies, are specified. A contract can only be based on **verifiable variables**. **Information** is related to the set of variables that are verifiable in a contractual relationship. The shareholders do not have perfect information regarding the characteristics of the manager hired. Hence it is also difficult to establish contractual terms that depend on certain competence or quality measures of the manager. **Such informational advantages give the manager a certain leeway in order to enhance their own utility instead of that of the shareholders**. So, the objective of agency-related theories is to analyse situation in which a contract is contemplated under conditions of **asymmetric information**, that is, one party knows certain relevant things of which the other party is ignorant. In other words, one of the participants has an **informational advantage** over the other, and the **individual objectives** are in conflict.

### **The Agency costs of outside equity**

Two different circumstances to consider:

1. (s)he owns 100 percent of the residual claims; 2. (s)he owns less than 100 percent of the residual claims (sells of a portion of these claims to outsiders).

Under case 1 the manager will make maximizing operating decision. The benefits include a. pecuniary returns; b. non-pecuniary benefits. The optimal mix is achieved when the marginal utility derived from an additional dollar of expenditure is equal for each non-pecuniary item and equal to the marginal utility derived from an additional dollar of after tax purchasing power (wealth). Under case 2 agency costs will be generated by the divergence between the interests of the manager and outside shareholders, since the manager will then bear only a fraction of the costs of any non-pecuniary benefits he takes out in maximising his own utility. This is related to well-known problem of *free cash flow*. Unless free cash flow is given back to investors, management has an incentive to destroy firm value, for example, through empire building and perks etc.

### **Can Using Debt Overcome the Agency Costs of Outside Equity?**

Yes. It is argued that using debt financing can help overcome the problem because it reduces the scope of excessive managerial consumption. This happens because debt payments are compulsory to make and failing to do so forces the firm into bankruptcy. This possibility in turn disciplines managers. That is, the burden of having to make regular debt-service payments serves as a very effective tool for disciplining managers.

The other benefit of debt in this sense is that it subjects managers to direct monitoring by the capital markets. To sum up, being aware of the disciplining and monitoring roles of debt financing, by choosing to issue debt, managers voluntarily accept the risk of losing their jobs, which help to reduce agency costs of the manager/shareholder relationship.

### **The Agency costs of debt**

The question is if debt financing is an effective disciplining device, why then don't firms use "maximum debt financing" to eliminate the agency costs of outside equity? The answer is simple: it is because there are also agency costs of debt. There are two main types of agency costs of debt we consider in this respect.

**Asset substitution effect:** As the level of debt in the capital structure increases, managers are more likely to have incentives to undertake risky (even negative NPV) projects. This is because, under certain circumstances such as financial distress, if the investment project is a success, shareholders will get all the upside benefits, whereas if it is a failure, debtholders will get all the downside risk. If the projects are undertaken, there is a chance of firm value decreasing and a wealth transfer from debt holders to share holders. This problem is sometimes called a *risk-shifting* problem as managers shift risk on to debtholders by choosing high-risk rather than low-risk projects. This is normally a problem associated with financial distress. Put differently, it means when firms face financial distress, shareholders gain by making sufficiently risky investments, even if they have negative NPV. Your textbook - and some others - prefers to call this **overinvestment**.

**Underinvestment problem:** If debt is risky (eg in a growth company), the gain from the project will accrue to debtholders rather than shareholders. Thus, management - acting in this case in the best interest of shareholders - have an incentive to reject positive NPV projects, even though they have the potential to increase firm value. Again, this is a problem generally associated with financial distress and it simply says: when firms face financial distress, it may choose not to finance positive NPV projects.

### **The Agency Cost/Tax Shield Trade-off Model of Leverage**

We can now put together all the aspects of bankruptcy and agency arguments together to come up with a trade-off model which combines the expected costs and benefits of debt financing.

$$V_L = V_U + T_C D - BC - AC$$

Where  $AC = PV$  (agency costs of outside equity – agency costs of outside debt).

This model expresses the value of a levered firm in terms of the value of an unlevered firm, adjusted for three present values: 1. PV of tax shield; 2. PV of bankruptcy costs;

and 3. PV of the agency costs of debt and equity. It gives a realistic illustration as to how companies should determine their capital structures. However, in practice there may be difficulties in quantifying the individual bits. **See Figure 2.**

### **Asymmetric Information and Signalling Approach**

Asymmetric information models are based on the idea that insiders of the firm have private information about the certain characteristics of the firm which outside investors do not have. Under the assumption that market prices do not really reflect full information, changes in capital structure of firms can be used as a signalling device to convey information to the market (investors).

**Ross (1977)** first applied signalling to finance theory by emphasizing managerial incentives in the presence of informational asymmetries. He argues that the implicit assumption of the M-M irrelevance proposition that the market knows the random return stream of the firm raises the possibility that changes in the financial market can alter the market's perception. That is, by changing its financial structure the firm alters its *perceived* risk class, even though its actual risk class remains unchanged. In the model, managers have the true information about the firm's expected cash flows. It is assumed that investors take larger debt levels as a signal of higher quality. Ross's model suggests that managers might use financial leverage to send unambiguous signals to the investors about the true performance of the firm. That is, leverage may signal target levels of earnings which firms expect to attain. Issuing debt in his model is a signal of high quality because the firm exposes itself to the costs of bankruptcy and financial decision.

**Myers and Majiluf (1984)** also present a signalling model in which a firm must issue common stock to raise cash to undertake a valuable investment opportunity. It is assumed that managers have better knowledge about the future value of the firm and the projects and act in the interests of the existing shareholders. Issuing new shares is seen as bad news by the market because shareholders have incentive to do so when the firm is overvalued. The implication of this argument is that original shareholders cannot take advantage of their superior information since issuing new shares will reveal their information to the market. Since investors are perfectly informed about the quality of firms, high-quality firms might suffer in value of their existing shares when they issue new equity. If this loss is sufficiently high, they might pass-up the valuable investment opportunity. Their analysis suggests that internally generated funds are preferred to external funds. They point out that when the firm uses its internal sources to finance the projects with positive NPVs, then all projects are undertaken since there will be no new equity issued to finance these projects and hence the problem arising from asymmetric information is resolved.

The above argument suggests a "**pecking order**" of corporate finance explored by **Myers (1984)** in detail. Myers argues that if finance is required firms prefer internal finance (retention finance) to external finance. This is because firms try to avoid facing the dilemma of either passing valuable investment opportunities or issuing equity at a price they think is too low. If external finance is required, however, firms issue the safest

security **first**. That is, debt comes first as the safest security, **then** hybrid securities such as convertible bonds, and **then** equity as a last resort. In his model, there is no optimal debt-equity ratio, since there are two different kinds of equity, internal and external. Whereas the former is at the top of the pecking order, the latter is at the bottom. He argues that each firm's observed debt ratio is the cumulative requirement for external finance, where this requirement accumulates over an extended period.

## The Pecking Order Hypothesis

Myers (1984) points out three aspects of corporate financial behaviour. First, managers tend to maintain stable dividend payouts even in the presence of fluctuations over time in earnings, stock price and investment opportunities. Second, managers seem to prefer internal financing (equity financing via retained earnings) to external financing (funds raised via the issuance of debt or equity). Third, if the firm needs to raise external financing, managers prefer to issue the least risky security that is feasible under circumstances. That is, they are, listed in increasing order of riskiness, straight debt, convertible debt, preferred stock, and, finally, common stock. In his model, there is no optimal debt-equity ratio, since there are two different kinds of equity, internal and external. Whereas the former is at the top of the pecking order, the latter is at the bottom. In a subsequent path-breaking article, Myers and Majiluf (1984) formulated these observations with a theoretical model and explained them as consequences of information asymmetry. Myers and Majiluf (1984) also present a signalling model in which a firm must issue common stock to raise cash to undertake a valuable investment opportunity. It is assumed that managers have better knowledge about the future value of the firm and the projects which might be undertaken and they act in the interests of the existing shareholders. In the model, issuing new shares is seen as bad news by the market because shareholders have incentive to do so when the firm is overvalued. The implication of this argument is that original shareholders cannot take advantage of their superior information since issuing new shares will reveal their information to the market. Since investors are perfectly informed about the quality of firms, high-quality firms might suffer in value of their existing shares when they issue new equity. If this loss is sufficiently high, they might pass-up the valuable investment opportunity. Myers and Majiluf's analysis suggests that internally generated funds are preferred to external funds. They point out that when the firm uses its internal sources to finance the projects with positive NPVs, then all projects are undertaken since there will be no new equity issued to finance these projects and hence the problem arising from asymmetric information is resolved. They also argue that external debt finance will be preferred to external equity since debt, at modest levels of borrowing, has payoffs which have less correlated with future states of the world than equity. An important exception to the above is the case in which management, based on their inside information, believes that their firm is overvalued in the market. In this case, managers have incentives to issue equity. However, the market is aware of this adverse selection problem; consequently, a firm's announcement of their intention to issue equity conveys management's inside information to the market, and the firm's stock price falls.

To review how this model works, consider a firm that has assets in place with value  $A$ , which is known only to insiders, and a growth opportunity with value  $B$ , which is known

to all. An equity issue of  $E$  is required to finance the growth opportunity. Let  $B > E$  so that the project has a strictly positive  $NPV$ . The firm's only decision is whether to issue equity and invest or to pass up the growth opportunity, and this decision is made to maximise the value of the existing shareholders' claim. There are two states of nature, where  $A$  can have either a high value ( $A_H$ ) or low value ( $A_L$ ). The firm knows the true state, but the market knows only that each state is equally likely. Let  $P$  be the market value of the firm if it issues and invests, and thus,  $P$  is the value of the growth opportunity plus the expected value of  $A$ . The proportion of firm value that the old shareholders retain is  $P/(P+E)$ , and the value of the old shareholders' claim in each of the two states is:

$$\frac{P}{P+E}(A+B)$$

where  $A$  is either  $A_H$  or  $A_L$ . Under asymmetric information, the firm is better off passing up the growth opportunity in the high state because the equity is undervalued; the old shareholders would have to give up (to the new shareholders) a substantial proportion of the value of the assets in place. In fact, they give up more than the share of the  $NPV$  they gain by investing in the growth opportunity. The condition that determines whether or not the firm will issue and invest compares the value of the old shareholders claim if the firm does not invest, which is the value of assets in place,  $A$ , to the value of the old shareholders' claim if the firm does invest,  $(P/(P+E))(A+B)$ .

Thus the firm will invest if and only if

$$\frac{P}{P+E}(A+B) > A$$

Rearranging this expression gives us the following intuitive condition:

$$\frac{P}{P+E}B > \frac{E}{P+E}A$$

The LHS is the value of the growth opportunity that is captured by the existing shareholders and the RHS is the value of the assets in place that the existing shareholders give up to the new shareholders. The firm will invest if and only if the value of the growth opportunity captured by the old shareholders is greater than the value of the assets in place that they must give up. We note that this inequality will hold for low values of  $A$  but not for high values of  $A$ . This model illustrates that if equity is the only financing choice, a firm's optimal strategy differs across states: firms will issue and invest if equity is overvalued, but they may pass up a growth opportunity if equity is undervalued. Thus, the decision to issue equity and invest conveys negative information to the market about the value of the firm's assets in place. They show that this same underinvestment problem is avoided entirely if the firm finances with internal funds or riskless debt.



Financing with risky debt can lead to the same type of underinvestment problem as financing with equity, but it is less severe because the value of debt is less sensitive to information and will suffer less from underpricing.

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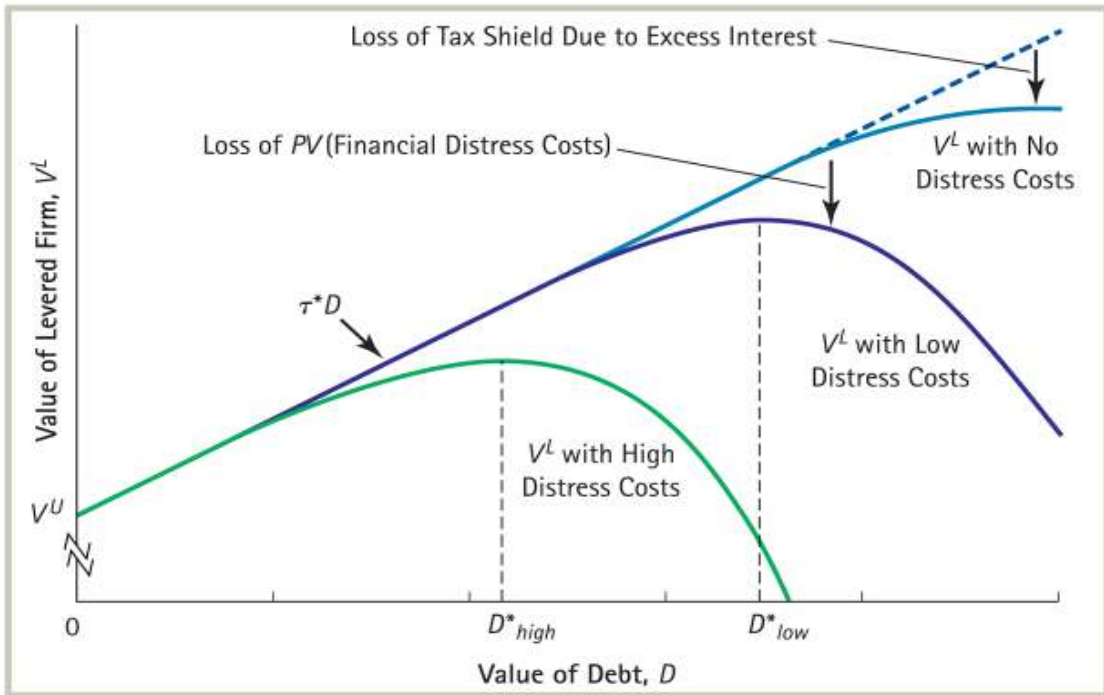
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**Figure 1. Optimal Leverage with taxes and financial distress costs.**



**Figure 2. Optimal Leverage with taxes and financial distress and agency costs.**

