CHAPTER 16: LIMITS TO THE USE OF DEBT POLICY

Assigned problems are 3, 4, 6, 7, and 8. Skip section 16.9.

"Think not only of the probability of whether financial distress will come. Think also of the value that will be lost if financial distress does come."

In the Chapter 15 Modigliani-Miller (M&M) model with corporate taxes, there is no *theoretical* limit to the increase in a firm's value from the use of financial leverage. In Chapter 15, financing a larger proportion of the firm with debt results in increasing the Present Value of the tax shield. Common sense tells us that companies are not financed 100% by debt. We now address factors that restrain financial managers from using financial leverage. This chapter extends the Chapter 15 M&M world to a world with (1) **financial distress costs** and (2) **information asymmetry**.

I. COSTS OF FINANCIAL DISTRESS (direct and indirect costs)

Direct Costs: quantifiable costs such as legal and administrative costs associated with distress and/or bankruptcy.

Indirect Costs: mainly the (1) *agency* costs of financial distress and also (2) impaired ability to conduct business (e.g., lost sales, customers are scared away, suppliers are scared away, employees begin leaving, managers are distracted away from the firm's business operations, etc.)

Examples of the **agency costs** associated with financial distress are listed below:

1. Selfish Investment Strategy 1: Incentive to take large risks

2. Selfish Investment Strategy 2: Incentive toward *underinvestment*

3. Selfish Investment Strategy 3: Milking the property

These *selfish strategies* represent agency costs between bondholders and stockholders. They exist because stockholders have limited liability and payoffs to bondholders are limited. During *financial distress*, investment strategies that maximize firm value may no longer maximize the value of stockholders. These strategies are demonstrated with the following example.

We assume that there is only one stockholder, who is also the manager. He will always act in the best interests of the stockholders (himself). An important characteristic of this example is that the company is already in financial distress. However, the firm is not bankrupt yet because the bonds are due *tomorrow*. The owner-manager can make one last investment today.

Balance Sheet for Against-the-Wall Corp. (BV is Book Value and MV is Market Value)

Assets	BV	MV	Liabilities	BV	MV
Cash	$200	$200	LT bonds	$300	200
Fixed Asset	$400	$0	Equity	$300	0
Total	$600	$200	Total	$600	$200

The bonds mature tomorrow and bondholders would expect to receive $300. However, under the current conditions, the firm only has $200. Therefore, tomorrow the company will be bankrupt and bondholders will receive $200 and stockholders will receive nothing.

Selfish Investment Strategy 1: Incentive to Take Large Risks

Since the bonds are not due today, the owner-manager has the chance to make one last investment. He can gamble with the bondholders' money because management still has control over the assets of the firm.

Suppose there is an investment that costs $200 with a 90% probability of a $0 payoff and a 10% probability of an immediate payoff of $1,000. The NPV of the proposed investment is:

NPV = E(CF) – Initial investment; (I don't discount the expected cash flow since it occurs **immediately**)

= [(.9)($0) + (.1)($1000)] – $200 = **–$100** (value of firm would fall by $100)

After investment in the project, the market value of the firm will **fall** from $200 to $100. Under normal circumstances, this project should never be accepted because it reduces the value of the firm. However, in the current situation the owner/manager will receive nothing when the bonds mature tomorrow. He has an incentive to gamble with this remaining value, since the value doesn't belong to him, it belongs to the bondholders instead. If he accepts this project, there is a 10% chance of receiving $1000 – $300 = $700, rather than a 100% chance of receiving nothing.

Expected CF from the Gamble: (it has a 10% chance of a payoff)

To **Bondholders** = (0.1)($300) + (0.9)($0) = **$30**

To **Stockholders** = (0.1)($1000 – $300) + (0.9)($0) = **$70**

If this project (gamble) is NOT accepted:
PV of **Bonds** Without the Gamble = **$200** (firm gets liquidated tomorrow and bondholders take the $200 in remaining cash)

PV of **Stocks** Without the Gamble = **$0** (nothing remains for equity after liquidation)

If this project (gamble) is accepted:
PV of **Bonds** With the Gamble = **$30**

PV of **Stocks** With the Gamble = **$70** (which is $70 higher than without the gamble)

Conclusion: the presence of **risky** debt can create an incentive to accept large risks and provides the rationale behind the use of **restrictive covenants** in bond indenture agreement. Here, the *risk shifting* only damages the bondholders, while benefiting shareholders.

Selfish Investment Strategy 2: Incentive toward Underinvestment

Suppose the Against-the-Wall Corp. is presented with a government sponsored investment costing $300 and with an *immediate* and *riskless* payoff of $350. The NPV of this investment is $350 – $300 = $50. This is a positive NPV project that should be accepted under normal circumstances (and also for any Unlevered corporation). However, this project costs $300 and the firm only has $200. Should **stockholders** actually provide the additional $100 investment needed to take on the project?

Expected CF from the government sponsored project:

To **Bondholder** = **$300** (they get paid the full $300 par value from the $350 payoff)

To **Stockholder** = ($350 – $300) = **$50**

PV of **Bonds** Without the Project = **$200**

PV of **Stocks** Without the Project = **$0**

PV of **Bonds** With the Project = **$300**

PV of **Stocks** With the Project = **$50** (why pay in $100 now and receive $50 tomorrow?)

If stockholders invest the additional $100 required to undertake this project, bondholders will actually receive the promised payment of $300 and stockholders will receive the remaining $50. Therefore, from the stockholders' perspective, the NPV on their $100 investment is –$50. Rational stockholders will always choose to forego this positive NPV project.

Conclusion: when confronted with financial distress, **risky** debt creates an incentive to reject new investments where the NPV to shareholders is negative, i.e., risky debt can create an *underinvestment* incentive. The increase in wealth (+NPV) goes to the debtholders.

Selfish Investment Strategy 3: Milking the Property

Shareholders may attempt to capture some of the firm's value by paying out extra dividends or higher salaries to management in times of financial distress. This is another instance in which the protective covenants written into bond indentures or contracts can be important to the bondholders. Some tactics, e.g., liquidating dividends, are illegal in many states.

II. CAPITAL STRUCTURE WITH CORPORATE TAXES AND FINANCIAL DISTRESS

The direct costs of financial distress represent quantifiable transaction costs. The indirect costs result from agency costs and also the impaired ability to conduct business. Both are certainly violations of the Chapter 15 MM perfect market assumptions. This section illustrates that when financial distress costs exist, the optimal capital structure is no longer 100% debt. The MM model for the value of a levered firm in Chapter 15 is augmented here:

$$V_L = V_U + \text{PV(tax savings)} - \textbf{PV(costs of financial distress)}$$

While the equation above and following figures are intuitively appealing, they cannot tell us the exact method or formula for computing the optimal D/E ratio. The actual amount of the PV of the costs of financial distress is difficult to ascertain.

To understand the above equation and following **Figures 1** and **2**, V_U represents the Unlevered value of the firm. As leverage is added in **Figure 1** (D/E increases), the value of the firm initially increases, due to the **PV(tax shield)** that is created. The firm reaches its Maximum Value at the **Optimal Debt/Equity ratio** for this firm. **Figure 2** then shows how **WACC** varies with the D/E ratio for this firm. The WACC is **minimized** when the firm's value is **maximized**.

In **Figure 1**, if the D/E ratio increases beyond the optimal D/E ratio, the firm's value begins to **fall**. The firm's value falls due to the increasing PV of financial distress costs. Too much leverage simply makes the firm too risky, as it always increases the probability of default.

The ideal capital structure will be found when the tax shield created by the next dollar of debt is exactly offset by the PV of financial distress that is created by that dollar of debt. This concept is known as the ***Static Tradeoff model***.

Figure 1:

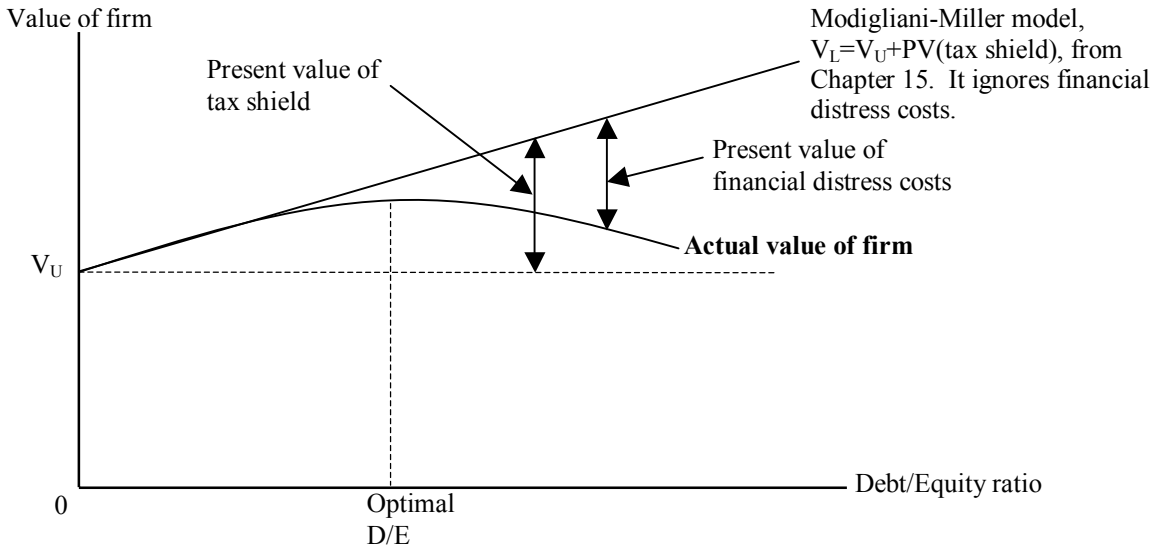


Figure 2 below shows the WACC and the components of WACC (r_D and r_E) for the firm shown in Figure 1. Also note that the firm will reach its maximum value when the firm's Weighted Average Cost of Capital (WACC) is minimized. At the **Optimal D/E ratio**, the firm's value (and stock price) is maximized and the WACC is minimized. The Present Value of any stream of future cash flow will be *maximized* when you *minimize* the discount rate or cost of capital.

Figure 2:

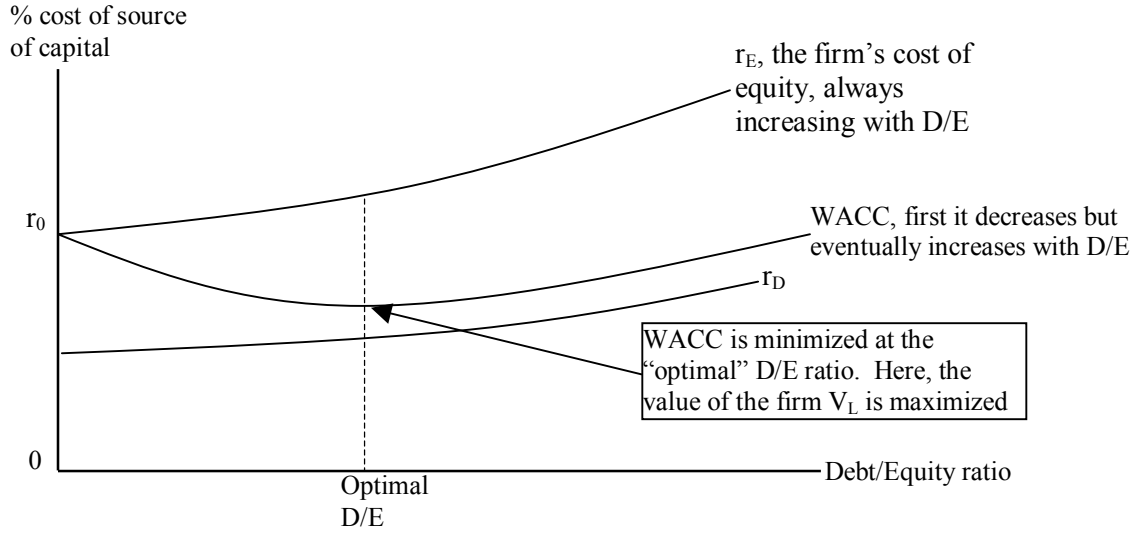
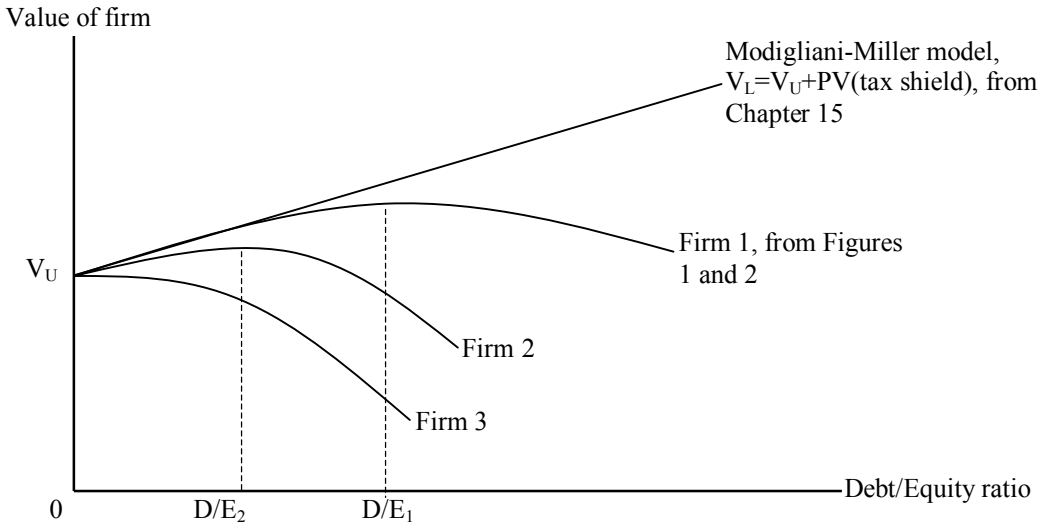


Figure 3 below illustrates the Value versus D/E ratio for **three hypothetical corporations**. Firm 1 is the firm from Figures 1 and 2. Firms 2 and 3 are new.

Each firm simply has a different target or optimal D/E ratio. **Firm 1** maximizes its value at **D/E_1**, and **Firm 2** maximizes its value at **D/E_2**. Firm 1 can support a larger proportion of debt than can Firm 2. Firm 3 should have zero debt!

Figure 3:



Firm 3 maximizes its value and minimizes its WACC when it is *unlevered* or all equity financed. For Firm 3, any debt makes the firm too risky and thus destroys value. Any tax shield of debt appears to be *immediately* overwhelmed or dominated by the increase in the Present Value of the costs of financial distress.

Also, remember the following from Chapter 5:

Firm value = PV(cash flow from Assets in Place) + PV(NPV of future growth opportunities)

More mature firms will derive a substantial amount of their value from **Assets in Place**, and can typically support moderate to high levels of debt. Firms whose value largely comes from future growth opportunities typically have no or low levels of debt.

Characteristics of high leverage firms and industries:

1. Most of value comes from assets already in place.
2. Assets are easily transferred or redeployed to another use with little loss in value.
3. Stable earnings
4. Assets are physical in nature (not intangible).

Characteristics of unlevered or low leverage firms and industries:

1. Value comes largely from future growth opportunities, i.e., large amounts of future investment in assets are necessary. High debt levels can actually create an **underinvestment** incentive (an agency problem associated with risky debt) when facing financial distress. For example, projects that would otherwise be positive NPV for shareholders in a healthy firm are rejected in the presence of leverage and financial distress since the NPV would often go to the owners of the risky debt, rather than shareholders.
2. Assets are intangible in nature, such as R&D skills, human capital, and organizational skills
3. Assets are not easily transferred or redeployed to another use or firm.
4. Earnings are nonexistent, low, or unstable (too much debt or perhaps any debt makes the firm too risky due to a high likelihood of default on the debt).

III PECKING ORDER THEORY OF CORP. FINANCING:

Most firms are observed to operate at Debt to Equity ratios that are **lower** than what would be thought of as optimal. Raising capital (especially from external sources) to invest can raise questions about the firm's value. A strong preference exists for firms to use internal sources of financing such as retained cash flow from operations.

We assume that managers work in the best interest of existing shareholders and that **Asymmetric Information** exists. With Asymmetric Information, the insiders of the firm have superior knowledge about the firm's true value or future prospects. The behavior and actions of managers (especially financing decisions) constitute important **signals** to the outsiders concerning management beliefs. In this environment, cash for new investments would be raised as follows, beginning with the most preferred source of financing:

1. Retained cash flow: most preferred source of cash. Most business investment is expected to come from internal financing. No negative information is conveyed, since no external cash is used. There is no need for the market to reassess or reevaluate the firm.

2. Debt issue: announcements of debt issues typically result in an insignificant decrease in the existing stock price. Some, but clearly not all, of these announcements disappoint the market when investors discover that external financing is needed. Managers also know that if the firm is overvalued they would be able to sell new overvalued debt, and thus many debt issuances cause the market to reassess the firm.

3. Convertible debt issue: stock prices significantly drop when firm's announce the issue of convertible debt. Often it is felt that managers believe that the stock is *overvalued* since the firm is selling a bond that includes a Call option on its stock.

4. Stock issue: the least preferred source of financing. The announcement of a new stock issue leads to a sizeable decrease in the existing stock price. It often suggests that managers feel they can issue new stock at an overvalued price (who would ever want to sell new *undervalued* stock?). It can further signal that the managers know *bad news*, i.e., the future is expected to be more risky, and, therefore, any additional debt would be too risky.

   As a result, announcements of new external equity, known as **Seasoned Equity Offerings** or **SEOs**, are relatively rare and are the last resort for new financing. Since managers generally know more about the true value of a firm's risky equity, investors are only willing to buy the new equity if it is sold at a discount to the existing stock price.

Financial slack is also another important consideration. Firms want to have the ability to borrow in a time of need, so they usually maintain a Debt to Equity ratio that is **lower** than what would otherwise be thought of as optimal.

The Pecking Order effect is regularly observed *within* industries — **within an industry**, the most (least) profitable firms tend to have the lowest (highest) Debt to Equity ratios. All firms must invest in order to keep up with growth in the industry. The most profitable firms have the most internal financing available and thus become the *least* levered firms in the industry. The less profitable firms are forced to issue some debt to finance their investments and thus become the more highly levered firms in the industry. Any equity issuance is unlikely to occur given the high information cost — investors would assume that managers probably know bad news.

If managers perceive that the firm's future is bright, why would they want to sell new stock and thus bring in new owners to the firm? Managers would typically only sell new equity when they feel the price is overvalued and/or they know bad news about the future of the firm.

In a nutshell, asymmetric information is assumed to exist. When firms make public disclosures or announcements of financing or capital structure decisions (also other major corporate events such as dividend changes) these decisions are assumed to originate from the superior knowledge that the managers possess. Thus we certainly expect the market price of the firm's stock (and bonds) to respond to such events as participants in the marketplace process this new and material information concerning the firm's fundamental value.

Obviously, one can also extend the SEO case from above to announcements of a firm to "go public" in an Initial Public Offering or IPO. The existing owners of the private and closely held firm are certainly assumed to have better information than the public investors in the market. Thus, outsiders would want to know why the owners really want to sell part of their stake. Is it simply their wish to cash out and diversify, or do they want to cash out because they feel they can receive an overvalued price in the IPO and/or they know bad news.

IV. HOW FIRMS ESTABLISH CAPITAL STRUCTURE

Lessons from the Data

1. Debt ratios are low in the United States. Less than 50% of long-term financing is in the form of debt. Many firms thus have low debt ratios and pay large tax bills. Industry is a major factor in understanding capital structure, and, within an industry, firms should have roughly the same asset Beta. There is often a tendency to want to stay close to the average D/E ratio for the industry.

2. Changes in capital structure affect firm value. Typically, announcements of increases in financial leverage increase value and vice versa due to asymmetric information. This is true despite difficulty in identifying and measuring financial distress costs.

3. Debt ratios vary among industry groups. Remember that the value of any firm can be expressed as:

Value = PV of existing operations in place + NPV of future growth opportunities

Financial distress is typically more costly for firms whose value primarily comes from future growth opportunities. Firms with a lot of assets or operations in place are typically not as risky and can generally support some moderate level of debt, especially since they are likely to have more stable earnings. Also, if the assets can be transferred elsewhere without much of a loss in value, then the costs of financial distress will be lower, e.g., airlines.

Drug companies have low debt ratios. Airlines have high debt ratios. Obvious patterns emerge, including the fact that firms with high proportions of intangible assets, organizational skills, firm-specific assets (e.g. drug companies) and growth opportunities use less debt.

Given the firm's business risk (Asset Beta from Chapter 12) and the financial risk added by each financing alternative, what is the financing mix that maximizes shareholder wealth? To answer this question, we need to estimate the NPV of each financing alternative, which is the topic of Chapter 17.

CHAPTER 16: ADDENDUM 1

Chapter 16 presents the limitations to the use of debt. Here, I briefly summarize and compare the *Static Tradeoff model* with the *Pecking Order theory*.

Static Tradeoff Theory: a firm should lever up to the point where the PV(tax shield) created by the next dollar of debt is **exactly offset** by the PV(costs of financial distress) that is created by that dollar of debt. Here the value of the firm, $V_L = D + E$, is maximized and WACC is minimized. At this point the firm is levered at the optimal D/E ratio. The equation given is:

$$\mathbf{V_L = V_U + PV(tax\ shield) - PV(costs\ of\ financial\ distress)}$$

A firm will also achieve its **maximum stock price** when it levers up to the optimal D/E ratio. Of course, the levered firm will have fewer shares of common stock existing than the unlevered version of the firm.

Any firm can, of course, be unlevered if it so chooses. You should ask the critical question of whether the unlevered strategy is in the best interest of the shareholders.

This static tradeoff theory assumes that the market has the roughly the same information set as the firm's insiders, i.e., we all know the agency costs of distress, the tax benefits, and future prospects for the firm. This **symmetric** information scenario is **unlikely** to exist for most firms.

However, the static tradeoff theory contains much intuition. Most *mature* industries, having more tangible assets in place, stable earnings, fewer growth opportunities, etc., are more highly levered than industries where most of the value derives from future growth opportunities (especially where the assets are often difficult to transfer without a large loss in value). Corporate debt is always risky, and the presence of risky debt can often lead to an **Underinvestment** incentive, i.e., some investments that otherwise would be positive NPV are rejected with a firm is faced with financial distress.

Pecking Order Theory: we assume that the managers or insiders will work in the best interest of shareholders. Also, **Asymmetric Information** exists, since the insiders are likely to know more than the outsiders about the true value and future prospects or opportunities of the firm. The Pecking Order Theory is **dynamic** in nature and states that corporate financing sources are raised with the following preferences:

1. Retained earnings (most preferred), referred to as "internal equity"

2. Debt issuance; this is the "safest" security to issue and price

3. Convertible debt

4. Equity (least preferred source of financing), the most difficult security to price

Corporate debt is risky, but is always less risky than the equity. As a result, new debt is easier for the market to understand, analyze, and price than new equity. However, a corporation has an

incentive to issue securities when managers perceive that they can receive an overvalued price, whether the new security is debt or equity. Assuming that **asymmetric information** exists, the insiders have a better idea of the firm's true risk and value than the outsiders. The market or outsiders know that there is no incentive to issue either debt or equity if the firm will receive *less* than a fair price.

The financing decisions made by insiders are likely to tell us something about that they believe about the firm's true future prospects and risk!

Issuing new equity is rare, since it usually causes the market to seriously reevaluate the firm. Why would any firm want to issue new ownership claims?

This is not to say that issuing equity is always negative; however, most of the time the existing stock price drops when a firm announces that it will sell new common stock to the market (an SEO or Seasoned Equity Offering).

The total existing market value of a firm's equity usually drops by about one-third of the amount of the new equity issue, e.g., a firm will lose about $100 million in existing equity value if it announces that it will attempt to sell $300 million in new common stock.

Evidence from event studies consistently report the following:

(1) Actions that *decrease* leverage, such as issuing equity to repurchase debt (an equity for debt swap), are interpreted by the market as negative signals (the stock price drops)

(2) Actions that *increase* leverage, such as issuing debt to repurchase some stock (a "leveraged recapitalization", or debt for equity swap), are interpreted as positive signals (the stock price usually increases). Asymmetric Information can explain observations 1 and 2.

If these firms are merely moving to the optimal Debt/Equity ratio, then each action (1) and (2) above should increase stock prices, according to the static tradeoff theory. However, actual evidence is consistent with asymmetric information and the Pecking Order theory. When a firm issues equity in order to retire debt, the managers are typically signaling that the existing debt load needs to be reduced – they believe that the future is of *higher* risk.

In contrast, when a firm issues debt in order to repurchase stock, it is seen as positive news about the future. The managers are signaling that the firm can handle the increased debt (the tax shield that is created is a benefit as well).

Free Cash Flow Hypothesis (page 437): this is also important for understanding capital structure and debt policy. In a mature firm having sizable operating cash flow and limited need for new investment, debt can be a valuable mechanism for controlling inefficient or wasteful managerial behavior. This topic will be addressed in the Chapter 18 lecture.

CHAPTER 16: ADDENDUM 2

Introduction to asymmetric information, pecking order theory, and managerial signaling in the context of capital structure

The **static tradeoff model** of Chapter 16 is presented as follows:

$$V_L = V_U + PV(\text{tax savings}) - PV(\text{costs of financial distress})$$

The asset risk (Beta) and future expected cash flows, along with firm and industry characteristics will produce the firm total value (D+E) versus D/E ratio curves below that constitute the static tradeoff model of Chapter 16 (lecture notes figure 1). However, now we introduce the issue of **asymmetric information** where managers (insiders) have superior information concerning the future prospects and/or risk of the firm than do the investors (outsiders).

Three static tradeoff curves are shown below. The middle curve (heavier line) represents both the **insider** and **outsider** valuation forecast for the firm at time t=0. At a later time t=1, insiders believe that the firm's future is different than their prior perception. In scenarios 1 and 2 below, insiders are now more **optimistic** (*good news*) or **pessimistic** (*bad news*) about the firm's future, respectively. However, the outsider's perception of the firm's value has not yet changed since the insiders, having superior information, are the first to realize that the firm's future prospects are believed to be either better or worse. Scenarios 1 and 3 each imply that a new optimal debt/equity ratio exists; however, the firm is currently largely stuck at the original D/E ratio.

Future financing decisions and other managerial decisions will provide important signals or information releases to outsiders about what managers believe about the firm's future. In scenarios 1 and 2 above, managers inevitability need to increase or decrease leverage, respectively. Decisions that increase or decrease leverage are typically interpreted by the market as positive or negative news, respectively.