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More Imperfect-Market Capital Structure

Bankruptcy, information and agency costs, and biases

As a corporate manager, when you think about your structure, you should pay attention not only to taxes, but also to other considerations. This chapter will show that you can increase firm value and lower the firm's cost of capital if you also optimize your firm's capital structure with respect to such factors as financial distress, agency considerations, liquidity considerations, and so on.

The chapter ends with an overall perspective of capital structure, which also takes into account the role of taxes that were discussed in the previous chapter.

19.1 What Really Matters?

You are the entrepreneur who owns the whole firm and wants to sell it now. You want to set up a corporate charter that maximizes your value. If your design makes it possible that your firm will be inclined to take the wrong projects in the future, then smart buyers will lower their offers today by the expected losses from these projects. If your charter makes it possible for you to "steal" money from the firm later on, any potential buyers will take this prospect into account and lower what they will pay you today. (Usually, this means that it is better for you to bond yourself so that you cannot steal money later on.) If you set up your firm so that your tax obligations in the future will be higher, it is *you* who is harmed by it, not your future owners. You **internalize** all the good and bad aspects that you design into your setup. In sum, you will want to set up a structure ex-ante that minimizes your firm's problems ex-post. Your capital structure is part of this initial setup.

> Investors should care only about value today.

Let's start with a hypothetical firm in a Modigliani-Miller world without any market imperfections. It has $100 in value, must earn 10%, and indeed earns exactly this $10 in its first year. Consider two capital structures:

> What is really value-relevant? (P/E ratios, for instance, are not.)

All-equity: The firm's price/earnings ratio is $100/$10 = 10.

$80 in 6% debt: With $80 in safer debt (which therefore has a lower interest rate), $6\% \cdot \$80 = \$4.80$ will go to the creditors, and $5.20 will go to the equity. With $20 in equity and $5.20 in earnings, this firm's price/earnings ratio is 3.8.

Should the maintenance of a high price/earnings ratio therefore push the firm away from having debt? Obviously not. In an M&M world, structure does not matter. Therefore, whether the price/earnings ratio is 10 or 3.8 is not important. All that should matter to firm owners is value, and it is unchanged by the price/earnings ratio. Other factors that should be irrelevant to firm value include, for example, whether the debt or the equity is riskier or safer. In fact, you already

know that with more debt, both debt and equity become riskier, but this need not be of any value consequence.

Look for real value-relevant causes, not incidental by-products.

If there were no distortions other than corporate income taxes, your firms should be 100% debt-financed. To lead to a non-extreme solution, this benefit of debt would have to be offset by some other value-relevant influences when debt gets to be too much. For example, if the firm were to get extra cash only if (and because) it is equity-financed, then this equity-linked cash subsidy could create an optimal capital structure that is not 100% debt. Any resulting changes, e.g., to equity risk, earnings dilution, and all sorts of other financial ratios, would be coincidental only. Such changes would not in themselves influence what ultimately matters: the change in the overall value of the firm.

Owners are smart enough to care about value, not P/E.

Fortunately, the capital markets are smart enough to understand what really matters—money to them. There is good empirical evidence that financial markets indeed appreciate money—such as money that comes from lower corporate or personal income taxes. Investors reward such managerial tax-reduction schemes with higher market values. (The cost of capital, being a measure of future cash flows relative to the value today, is often a one-to-one alternative measure of value. If a managerial action lowers the cost of capital, it usually means that it raises the firm's present value.) They also like schemes that induce you to take better projects later on.

IMPORTANT

> Ultimately, specific capital structures have only two types of value consequences:
>
> 1. A financial structure may create more real costs than others.
>
> 2. A financial structure may lead managers not to take all positive-NPV projects and reject all negative-NPV projects.
>
> Value consequences today also arise if such costs occur probabilistically in the future.

Value today is influenced by future payments and implied future decision making.

An example of the first type of value consequence is an equity-heavy capital structure that increases the corporate income tax obligations in the future. An example of the second type is a capital structure that is so debt-heavy and underwater that the manager would simply give up trying. Your goal is to find the optimal structure that balances all pros and cons.

Q 19.1. Is the high debt risk and equity risk when the firm has too much debt a force away from debt and toward equity? Can this higher risk counterbalance the corporate income tax benefits of debt?

19.2   Operating Policy in Bad Times (Distress)

Too much debt can make it more likely that a firm will not be able to meet its repayment obligations and go bankrupt—creating a whole new can of worms. This usually means that firms may want to limit the amount of debt that they take on.

The Trade-off in the Presence of Financial Distress Costs

Start with the perfect-market example from Exhibit 17.1 on Page 453.

A firm that has debt in its capital structure is more likely to experience financial distress or even go bankrupt. Exhibit 19.1 shows how such financial distress can matter. If the firm has less debt, as in capital structure LD with its face value of $55, the firm can always fully meet its debt obligations. Consequently, we assume that it will not experience financial distress, and our LD scenario still matches our perfect world from Exhibit 17.1. However, if the firm has more debt, as in capital structure MD with its face value of $94, the firm may not pay creditors all it has

		Bad Luck **Prob** $=1/2$	Good Luck **Prob** $=1/2$	Expected Value	Present Value $r = 10\%$
Project	Firm	$60	$160	$110	$100
Capital Structure LD: Bond with Face Value $55					
Bond	Debt	$55	$55	$55	$50
Equity	Equity	$5	$105	$55	$50
Capital Structure MD: Bond with Face Value $94 and $10 Deadweight Costs When in Distress					
		Distressed State			
Bond	Debt	$60 −$10 = $50	$94	$77 −$5 = $72	$70 −$4.55 = $65.45
Equity	Equity	$0	$66	$33	$30

Exhibit 19.1: *Illustration of Deadweight Costs in Financial Distress.* The cost of capital in this example is 10% for all securities, which is equivalent to assuming risk neutrality. Capital structure MD faces $10 financial distress costs in the bad luck state. The opposite of deadweight costs (where the money simply escapes the system altogether) are transfer costs (where one party gains from the loss of the other.

promised. If the world were perfect, as it had been in Exhibit 17.1, this bankruptcy condition would merely change the payoff pattern. Everyone (including bondholders) would have known that the firm would be transferred to bondholders, who would liquidate a full $60. The firm value would not be impacted by the financial distress and would therefore still be $100.

However, bankruptcy matters if we introduce deadweight losses—such as legal fees that do not benefit the parties themselves—that are triggered in financial distress. In the lower part of Exhibit 19.1, we assume that these deadweight bankruptcy costs amount to $10. How does this matter?

Deadweight distress costs can make low-debt structures better.

- If you choose LD, you would borrow $50 and promise $55. Your cost of capital would be 10%. Your firm value would be $100 today.

- If you choose MD, you would borrow $65.45 and promise $94, for an interest rate of 43.6%. The expected rate of return to creditors would not change—it would still be 10%. (Every investment has to offer 10% in our risk-neutral world.) However, the deadweight bankruptcy cost increases *your* cost of capital. You are giving up what *should have been* $60 or $94 (because it is now only an expected value of $77) in exchange for a payment of $65.45. Thus, you could sell your firm only for $65.45 + $30 = $95.45, not for $50 + $50 = $100. Relative to its potential of $110, your cost of capital would have increased from $110/$100 − 1 = 10% to $110/$95.45 − 1 ≈ 15.2%!

From your perspective, capital structure MD is worse than capital structure LD, in which the firm could never go bankrupt. The important insight with respect to bankruptcy is that it is not bankruptcy per se that is the problem, but only the deadweight losses in and around financial distress that matter.

Owners may trade off debt's expected tax savings against its deadweight bankruptcy cost increases.

Who ultimately bears the cost of bankruptcy—you as the entrepreneur selling the firm, or the creditors providing capital? It would be you, because creditors demand fair compensation upfront. How would you want to structure your firm if you face both taxes and bankruptcy losses? You should now try to reduce not only the deadweight loss from taxes but also the deadweight losses from financial distress:

- Too little debt, and you lose too much in taxes.
- Too much debt, and you lose too much in bankruptcy costs.

Therefore, an amount of debt not too high and not too low maximizes the value of your firm today.

Deadweight distress costs can come in various forms.

Deadweight losses in financial distress can be direct or indirect. **Indirect bankruptcy costs** that do not involve direct cash outlays can sometimes be more important than any legal fees in formal bankruptcy. For example:

1. The firm may have to spend money to avoid formal bankruptcy.
2. Fear of bankruptcy may prevent the firm from taking a positive-NPV project. If the firm does not take otherwise optimal NPV projects, this omission would count as a deadweight loss.
3. Concern about bankruptcy may lead customers and suppliers to demand different terms.

In any case, it does not matter whether the deadweight costs are direct or indirect. They all have the same effect in the end—they increase the firm's cost of capital and decrease the firm's value today, and more so if the current structure makes future distress more likely. Note that the financial distress itself never needs to actually occur—the possibility that it may occur in the future is enough to reduce the firm value today. The higher the probability of financial distress, the higher the costs.

IMPORTANT

> Financial distress costs usually favor equity over debt as a cheaper financing vehicle.

Q 19.2. What deadweight bankruptcy that favor debt or equity financing?

Direct Losses of Firm Value

The Bankruptcy Process

Chapter 7 liquidation and Chapter 11 reorganization. Firm owners internalize creditor costs.

Although the process and history of bankruptcy are fascinating, both in the United States and worldwide, the full legal details are beyond the scope of this book. In the United States, there are two legal forms of corporate bankruptcy: **Chapter 7 liquidation** and **Chapter 11 reorganization**. Larger firms almost always petition to enter Chapter 11 (not Chapter 7), which gives them a stay from creditors trying to seize their vital assets. If the court determines that the business is still viable, the firm can reorganize its financial claims and emerge from bankruptcy if its creditors vote to agree to the reorganization. Otherwise, the case is converted into Chapter 7 and the firm is liquidated. Both forms are supervised by a federal judge (and/or a federal bankruptcy trustee) and last on average about 2-3 years. In real life, creditors in Chapter 11 sometimes agree to modest violations from the absolute priority rule —which we have always used to construct our state-contingent tables—in order to reduce bankruptcy costs. The firm typically has to pay for most of the legal fees of all creditor classes—but even if it does not, creditors will ask for compensation for their expected legal fees upfront. In one way or another, the firm's owners today have to carry the expected costs of bankruptcy in the future.

➤ Absolute priority rule, Sect. 16.2, Pg.428.

Direct and Indirect Costs

The direct fees—the legal fees that the bankruptcy process consumes—are the most obvious costs. There are hours spent by management, employees, and experts to deal with the running bankruptcy process. For small and mid-size firms, these costs are usually enough to overwhelm the firm. Roughly speaking, for firms that are smaller than, say, $100 million in assets and sales, the lawyers for the debtor-in-possession, the creditors, and the bankruptcy process will most likely end up with everything. (This is also why it is so essential for a startup firm not to be in danger of running out of money. In your mind, imagine a picture of circling sharks.) This does not mean that the assets are destroyed. Buildings, for example, are often easy to sell in bankruptcy. (The tenants may not even notice the change.) But the original non-mortgage owners rarely end up receiving anything. For firms of, say, $1 billion and up, these direct costs are manageable and firms have a chance to emerge from bankruptcy with some value intact.

Direct legal and administrative bankruptcy costs are easily visible. But bankruptcy also has non-cash-outlay costs.

But much of the cost of financial distress can be pre-bankruptcy, indirect, and on the real business side. For example, it may become more expensive to produce (e.g., because suppliers may charge more, fearing delayed or no payment), more difficult to focus (e.g., management may become distracted with bankruptcy and talented employees may leave), more expensive to sell products (e.g., customers may flee due to loss of confidence), and more expensive to sell assets (e.g., liquidation sales may mean low fire-auction prices). All these costs reduce the value of the firm, and they are real welfare losses caused by financial distress. These costs can also arise even before formal bankruptcy. Many of these costs originate from the fact that firms can shed promised claims in bankruptcy, even if they would like to commit themselves today (ex ante) to not shedding them in the future. This inability to commit causes a loss of value when future distress is possible. Consider the following examples:

Pre-bankruptcy costs are large, too.

- **When products require customer investments, customers may be reluctant to buy the products and invest, knowing that their investments could turn out to be wasted if the firm were to disappear.** For example, the value of a computer is determined not only by its hardware but also by the manufacturer's continued provision of hardware and software support and development. End-of-life hardware or software, no matter how good, is often close to worthless. Even if the firm promises to continue development of faster hardware to preserve its customers' software investments, if the firm is liquidated, it would not be able to keep such a promise. The inability of the firm to commit to honoring its promises in the future hurts its sales to customers today—and may even cause the bankruptcy itself. For example, consumers worried when U.S. car companies were about to go bankrupt in 2009. These worries were such an important consideration that the government itself took the unusual step to guarantee all car warranties. (Of course, the government did not guarantee car resale value, and thus addressed consumer fears only partly.)

If a computer firm could disappear, customers would be less willing to buy its computers—making this a self-fulfilling prophecy.

- **When product sales require promises of future contact, customers may be reluctant to buy the product, given that the future promised rebate may fail to materialize.** For example, airlines depend on frequent flier plans to attract business travelers. When the promise of future free flights loses its credibility, an airline becomes severely handicapped. In effect, any firm whose products require warranties should weigh whether issuing debt might not alarm its customers. Such products may require future service, and customers may be reluctant to buy the product, knowing that the service may become unobtainable in the future.

- **When product quality is difficult to judge, customers fear that companies may cut corners in order to avoid financial distress.** Have you ever wondered whether an airline in financial distress cuts corners on airplane maintenance? (You should next time you are booking a ticket!) The capital structure influence here is not that maintenance would be cheaper but rather customers' fears that the firm may cut corners. Consequently, the price

Without trustworthy warranty programs, competing in some businesses is very difficult.

at which such an airline can sell tickets may be below that of a financially solid airline. Similarly, wholesalers will not deliver their goods to near-bankrupt retailers unless they are assured of payment. Because bankrupt retailers may no longer be able to buy on credit, the costs of their merchandise may increase—and their competitive advantage may erode.

- **If suppliers fear that the retailer can go bankrupt, they may not extend trade credit.** Some businesses rely on **trade credit**, in which suppliers sell their goods to buyers in an open credit arrangement. (In effect, it is a credit line that is limited to the specific goods the supplier sells.) In some cases, not having access to trade credit can hamper business operations to the point where it can itself cause the onset of bankruptcy.

- **If buyers fear that the seller cannot provide service once bankrupt, they may not buy any goods to begin with.** When Aloha and ATA Airlines went bankrupt in early 2008, customers who believed they had bought flights instead ended up owning only worthless pieces of paper. Even passengers who had already flown to their destination found themselves stranded without a return ticket. Although this may not have been bad for Aloha and ATA (essentially confiscating passenger money without having had to provide service), many other airlines now face far more skeptical customers. Smaller airlines with more debt that are more likely to go bankrupt now may find customers hard to come by—and therefore go bankrupt.

Fear and Relief

Here are some real-world examples of how companies in financial distress lose customers because they are in financial distress. This worsens their financial distress and can become a self-fulfilling prophecy. A capital structure with more equity and less debt would often have avoided such problems in the first place.

First, an example in which actual financial distress reduced the value of the underlying operations: On March 3, 2008, the *Associated Press* reported how gift cards had become worthless when *The Sharper Image* filed for bankruptcy. The gift card business was among its most profitable operations, constituting about $32 million of outstanding credit. How many customers do you believe will buy gift cards from *The Sharper Image* in the future? One customer noted, "With the uncertainty today, I didn't want my aunt's gift to be only a card."

Second, an example in which merely the *fear* of financial distress led an important firm to collapse: On Thursday, March 13, 2008, the 85-year-old Bear Stearns investment bank closed at $57.07 per share, a market value of about $8 billion. Half an hour after Friday's stock market opening, rumors emerged that some of Bear Stearns' sources of short-term capital were drying up. (These are the equivalent of suppliers in the financial services industry.) As a consequence, Bear Stearns had trouble not only finding other short-term capital suppliers but also in executing financial trades with counterparties (the equivalent of customers). Both suppliers and customers feared that Bear Stearns could go bankrupt. Bear Stearns' stock price fell to $31.54—a level that it maintained for the rest of Friday. However, these developments caused even more short-term capital providers and trading counterparties to jump ship. Over the weekend, the same withdrawal dynamic continued, and on Saturday morning, the Federal Reserve coopted JP Morgan for a bailout of Bear Stearns. JP Morgan announced that it had agreed to acquire Bear Stearns for—hold on to your hat—$2 per share. In September 2008, Lehman Bros, another heavily over-levered major investment bank, followed Bear Stearns into bankruptcy, and existing shareholders received nothing. Barclays later bought its best assets for a song. The Fed and U.S. Treasury henceforth decided to save other financial services firms (such as Citibank) from the same fate. These are extreme examples of how a "run on the bank" can become self-fulfilling. Chances are that both suppliers and customers would not have bailed if they had not feared other suppliers and customers bailing, too. Capital structures with less debt, more equity, and more cash would have reduced the likelihood of such (systemic) meltdowns.

Financial Distress Costs as Transaction Costs?

But there is a limit to the importance of bankruptcy costs. We can muster an argument similar in spirit to the M&M proof: If financial distress costs are too high, you could buy all debt and equity—an action that would immediately eliminate any financial distress costs caused by too much debt. You would own an entire firm that suffers no more debt-caused distress costs. In the real world, if the transaction costs to buy all securities are an extra $100, it must be that the value reduction caused by the financial distress costs is less than $100. Otherwise, you and every other arbitrageur around would clamor to take over the firm.

> One upper limit to the importance of financial distress costs is the cost of turning debt back into equity.

So, how much extra (above the true value) could it possibly cost an arbitrageur to buy all securities? Remarkably, this could be more than just the normal financial transaction costs. The reason is a **holdout** problem. Put yourself in the shoes of a single bondholder. Let's assume your bond promised to pay $100, but the firm is now worth so little that your bond is worth only $50. Some arbitrageur has just offered you and every other bondholder a buyout for $55. Would you take this offer? You would if you held all the bonds. But if you are just a small bondholder among many, you could refuse to sell, hoping that the arbitrageur will be so exasperated that he will offer you the $100 just to get rid of you. The extra $45 won't make or break the offer, and your continued presence as a creditor (e.g., in the courts) could make the arbitrageur's life a nightmare. Unfortunately, every other little creditor would realize this, too, and would prefer to hold out and be bought off. Given such bargaining complications, the transaction costs of acquiring all the debt could be very high, which means the firm may end up running down the rest of its true economic value rather than being efficiently reorganized. (One justification for the U.S. Chapter 11 reorganization procedure is that it allows a judge to force all creditors to participate and thus eliminates the holdout problem.)

> Buying back debt and issuing equity should be cheap, but creditor holdout problems could imply that they are not.

One attempt to reduce the transaction cost is for firms to bundle their financial claims into **units** (unit securities) of debt and equity. Each creditor would also be a shareholder. If the firm fails to pay interest in the future, creditors would be more inclined to compromise in order to avoid financial distress—after all, there is little reason to force bankruptcy in order to collect assets from oneself.

> If all creditors are in the same creditor class and own equity, too, they would not hold out.
>
> ➤ Unit securities, Pg.433.

Assessing the Magnitude of Direct Bankruptcy Costs

In small firms, future financial distress is always a possibility, and legal fees can quickly consume their assets. Managers of such firms need to be careful not to take on too many liabilities. But what about the average Fortune 500 company? What would be a good estimate for its expected direct bankruptcy costs? We can do some back-of-the-envelope calculations. Say you run a typical healthy Fortune 500 company today, worth $10 billion. Fewer than five Fortune 500 companies enter financial distress (either formal or informal) in a given year. Quadruple this number to get an estimate of 4% probability of bankruptcy at the outset of the year. To be among them, your company would have to drop by, say, about 70% of its market value. In other words, it is unlikely for you to run into real distress unless your firm value dropped to about $3 billion. (Year-to-year changes of plus or minus 30% [$3 billion] are common occurrences.) Finally, let's estimate the deadweight financial distress losses if you run into trouble. Assume that your bankruptcy costs would be 5% of the value of your distressed Fortune 500 company *when you enter bankruptcy*. Again quadruple this number to assume a 20% distress cost. For example, say you run a $10 billion company today. Say it has a 4% chance to drop to $3 billion in value, setting off financial distress and legal costs amounting to $20\% \cdot \$3\text{billion} = \$600$ million in distress costs. (Yes, $600 million in distress costs is a lot of money for bankruptcy lawyers to fight over *if* your firm goes bankrupt.) Yet, in expectation today, for your $10 billion firm this is only

> For most Fortune 500 companies, expected financial distress costs are small.

$$4\% \quad \cdot \quad 30\% \quad \cdot \quad 20\% \quad = \quad 24 \text{ basis points}$$

Distress Probability	·	Value if Distressed	·	Deadweight Loss	=	*High Expected Distress Costs Estimate*

or \$24 million. This is not a whole lot when compared to the potential tax savings of debt if you are currently a healthy \$10 billion firm in the 35% tax bracket and you are thinking about taking another loan. In sum, for the average healthy Fortune 500 firm today, bankruptcy costs do not seem large enough to prevent them from taking on more debt.

The fact that some firms used to go bankrupt "regularly" suggests that they had relatively low bankruptcy costs.

This argument does not, of course, apply to each and every firm. Which firms are likely to suffer high deadweight losses in bankruptcy? We know that many U.S. railroads have declared bankruptcy dozens of times, without interruption in service. Even large retailers, like Federated Department Stores (Macy's and Bloomingdales), have been in and out of bankruptcy several times. Airlines have some easily transferable and collateralizable assets (airplanes) and thus may have fewer deadweight losses—many airlines have ceased operations with their planes sold, repainted, and turned around for another carrier. Airlines' bankruptcy deadweight losses may be bearable. In contrast, firms with mostly intangible assets (such as reputation or name recognition) need to be more concerned with reducing the probability of future bankruptcy. For example, if Chanel were to go bankrupt, Chanel No. 5 might acquire the odor of death, rather than the odor of high style, and the entire business might disappear. Chanel should therefore choose a capital structure that is not too liability-heavy in order to avoid the loss of prestige that a bankruptcy could bring about.

In sum, expected bankruptcy costs are probably small for healthy, large companies.

We can investigate the importance of bankruptcy costs as a determinant of capital structure in the data. The academic consensus is that bankruptcy costs matter a lot for some firms and some industries, particularly during recessions and when these firms are very heavily levered. However, for most healthy Fortune 500 firms, the expected deadweight costs from too much debt are probably small—some exceptions notwithstanding.

PS: The Fortune-500 firms Enron and Arthur Andersen did go bankrupt, but not because they had too much debt.

Q 19.3. What do U.S. managers usually mean by Chapter 11 and Chapter 7?

Q 19.4. Give examples of bankruptcy costs. Distinguish between direct and indirect costs.

Operational Distortions of Incentives

A second set of financial distress costs arises from the fact that shareholders' incentives diverge from bondholders' incentives if the firm gets close to financial distress. These are also our first examples of situations in which (debt-heavy) capital structures harm a firm ex ante, because they may lead it to pass up positive NPV projects. This distortion in its incentives can make such a firm worth less today.

➤ Two types of value sources of capital structures.,
Pg.516.

Underinvestment

The **underinvestment** problem is the bondholder concern that managers will not make necessary investments if the promised debt payments end up being too large. That is, owners may prefer to pay out cash to shareholders rather than spend their money on maintenance and repair (or other projects). This may be in their interest if the project proceeds would more than likely go to bondholders than to themselves. Ex ante, underinvestment reduces the payoffs bondholders expect to receive—a fact that increases the price at which bond buyers would be willing to lend money to the firm today.

When there is more debt than assets, equity holders may not take proper care of the assets.

Initial condition: The firm has $50 in cash, no projects, but has an outstanding bond with a $100 face value. It pays out $50 in cash to shareholders and waits.

		Bad Luck Prob $=1/2$	Good Luck Prob $=1/2$	Expected Value	Present Value r = 10%
Project	Firm	$0	$0	$0	$0
Bond	Debt	$0	$0	$0	$0
Equity	After $50 dividend payout today	$0	$0	$0	$0

News Flash: Positive-NPV Project Appears

New development: A positive-NPV project comes along that costs $50 and pays either $60 or $160.

Managerial choice #1: Pay $50 to shareholders today. Default on the debt that comes due in the future.

Managerial choice #2: Use the firm's $50 to take the project today. When the project finishes, the debt obligation with $100 face value is due, which the firm must then honor.

		Bad Luck Prob $=1/2$	Good Luck Prob $=1/2$	Expected Value	Present Value r = 10%
Project	Firm	$60	$160	$110	$100
Bond	Debt	$60	$100	$80	$72.73
Equity	Equity	$0	$60	$30	$27.27

Exhibit 19.2: *Illustration of Underinvestment Distortions.* This firm is considering a positive-NPV project, which it should take. The management is assumed to act on behalf of shareholders, not on behalf of the overall firm. The cost of capital in this example is 10% for all securities. Will the managers take this project?

For example, assume a firm has only $50 in cash and no projects. Worse, it owes creditors a promised $100 in a couple of years. Fortunately for the shareholders, in our simple example, the firm can pay $50 in dividends and leave the bondholders with nothing. Yet, suddenly, managers find an unexpected opportunity. They can pay the $50 to start a project that will yield either $60 or $160 by the time the debt is due. The firm should undertake this project, because it is a positive-NPV project. But would managers acting in the interest of shareholders be willing to do so?

Would "underwater" shareholders want to take all profitable projects?

Exhibit 19.2 shows that the answer is no. Managers would prefer to pay out $50 to shareholders rather than to take this positive-NPV project. Most of the project's benefits would go to cover the "debt overhang," which is something that managers who act on behalf of shareholders would not care much about. Again, this "underinvestment problem" is a cost of debt to the firm.

Ex ante, entrepreneurs "internalize" the cost of future inefficient behavior.

If the firm had chosen a zero-debt capital structure ex ante, such profitable future investments would not be ignored. In turn, the future higher cash flows would increase the value at which our hypothetical owner can sell the firm today. In finance jargon, the current owners "internalize" the cost and benefits of their future behavior.

IMPORTANT

> Ex-post reluctance to take the right projects (such as making additional maintenance investments) can favor equity over debt as the cheaper financing vehicle.

Reluctance to Liquidate

Managers may not want to liquidate the firm, even if they should. If the firm is underwater, this can even hurt creditors.

A similar problem is **reluctance to liquidate**. Managers acting on behalf of equity holders may not always wish to liquidate the firm when it has fallen onto hard times, even if doing so would maximize firm value. Equity holders tend to prefer riskier payoffs because equity is essentially like an option. If there is even a small chance of improvement and even if deterioration is more likely, equity holders are better off to take their chances than to give up their options and liquidate. For example, return to Exhibit 19.1. Assume that the $60 represents the liquidation value of the factory and that the MD debt is due in two years rather than in one. Further, assume that managers can continue running the factory, in which case the factory will be worth either $100 or $0 with equal probability. The optimal unconflicted behavior would be to liquidate the factory. Unfortunately, shareholders prefer to continue operating—they would get nothing in liquidation, but perhaps $6 if the factory were to be worth $100. In effect, equity holders have an option on the firm. They would often even make running interest and principal payments in order to keep their option alive! This inefficient behavior, caused by the presence of debt in the capital structure, reduces the value of a firm with both debt and equity *today*.

IMPORTANT

> Ex-post reluctance to liquidate *by managers not acting on behalf of the overall firm but on behalf of equity* can favor equity over debt as the cheaper financing vehicle.

However, reluctance to liquidate can also hurt equity.

So far, we have assumed that management acts on behalf of shareholders. They indeed typically care more about equity than about debt—a fact that, as you just saw, may induce them to exploit the debt on behalf of equity. However, managers can also act on behalf of themselves, especially if shareholders would be best served by corporate liquidation, too. Managers may run down the firm's equity substance in order to keep their jobs instead of returning the money to the owners. To reduce the incidence of such behavior, firms may add debt to the capital structure. Debt can limit the ability of managers to run down the entire firm and force them to liquidate and disgorge some of the remaining assets. This move can benefit both debt and equity.

IMPORTANT

> Ex-post reluctance to liquidate *by managers not acting on behalf of the overall firm but on behalf of themselves* can favor debt over equity as the cheaper financing vehicle. Debt can force them to liquidate—which can be a good move ex-ante.

Agency problems preview.

We discuss agency problems between managers and owners in the next section (and in a companion chapter on corporate governance). Such problems tend to be more dramatic in good times. But you should realize that conflicts of interest can occur in financial distress, too—in which case the presence of more debt could be a good remedy to discipline unwilling managers, just as it often is in good times.

Q 19.5. Give an example of an underinvestment problem.

Q 19.6. What kinds of firms are most likely to be influenced by underinvestment costs when choosing a capital structure?

Q 19.7. Give an example of a reluctance-to-liquidate problem. Is this an issue that could hurt only the creditors, or only the shareholders?

Q 19.8. What kinds of firms are most likely to be influenced by possible reluctance-to-liquidate costs when choosing a capital structure?

Strategic Considerations

Finally, there are some theories in which debt is a strategic commitment device. This argument is perhaps easiest to understand by analogy. Consider playing a game of chicken (two cars driving toward one another; the first to "chicken out" and get out of the way loses). How can you make sure you win? If you can tie down your steering controls, remove the steering wheel, and throw it visibly out the window, any smart opponent would surely chicken out! The trick is to commit yourself visibly to not giving way. (Some people have suggested that driving an old, large, and apparently unstable Oldsmobile is the equivalent of throwing out the wheel; other cars will be in a hurry to get out of the way.)

> Debt can change the nature of the competition in the product market.

The same argument has been made for debt—that by having debt, firms can commit to squash potential entrant competitors in their product markets. Assume for a moment that a monopolist has borrowed a lot of money. Consider the decision of a potential market entrant who knows this. The market entrant also knows that it is in the interest of the shareholders to increase risk—they will gain more of the upside than the downside. A price war is riskier than accommodation—so the monopolist's managers (acting on behalf of equity holders) may prefer the riskier strategy of a price war over accommodation. Consequently, the potential entrant may chicken out, and the monopolist may never have to start the price war. (Of course, if the market entrant is too stupid to understand the message, both players—the monopolist and the entrant—will be hurt badly. The two cars will end up crashing head-on.)

> This is an argument that debt can make firms more aggressive (commit to fight entrants), thereby making the firm itself better off.

> ➤ Risk shifting, Sect. 19.4, Pg.529.

This argument is clever, but it may not be a first-order factor in the real world. We do know that peers, competitors, and industry influence capital structure. For example, financial services companies tend to rely on a lot of debt. However, it is not clear whether managers have strategic product market consequences in mind when they target their capital structures. There is not much evidence that managers of companies with more debt have relatively more of a tendency to act in a more risk-seeking fashion in the product market. There is not much evidence that they choose a price war strategy. And there is even less evidence that they consciously increase their debt ex ante *in order to* commit themselves to a price war. Some empirical research has actually found that more debt tends to hurt firms in the product market. Owners tend to take on more debt when they are severely cash-constrained, and this situation may prevent them from competing effectively. Indeed, there is some evidence that supermarkets that dramatically increased their leverage were systematically attacked by their competitors with price wars and failed to compete as effectively. In the aforementioned *The Sharper Image* bankruptcy in 2008, the *Associated Press* wrote, "Bankrupt businesses also face the risk that card holders left in the cold could defect to other stores just when struggling merchants need their customers the most...Sharper Image's rival, Brookstone, is capitalizing on the situation. It announced last week that it would exchange Sharper Image gift cards for 25 percent off any purchase, no matter the amount of the gift card or the cost of the item." To the extent that high leverage can cause weakness in the product markets, it will count as a direct cost of debt. The subject of

> Empirically, the argument of intentional value-enhancing self-commitment seems not too important. On the contrary: Debt may make firms less competitive and worse off.

> ➤ The Sharper Image, Pg.520.

product-market-related strategic capital structure choice is still under active investigation, and
the final word has not been spoken.

IMPORTANT

> Competitive product-market environments could favor either equity or debt.

Q 19.9. Is debt always a strategic advantage? Describe the arguments on both sides.

Assessment

Sudden Distress Syndrome.

Financial distress has one somewhat unusual feature: it accelerates. When a firm has a low
debt ratio, not much happens. Whether it has 20% debt or 30% debt is really quite irrelevant.
However, when a firm gets to a high debt ratio, all the distress concerns "suddenly" appear and
feed on one another. These non-tax distress effects of debt matter greatly for financial-services
firms (which always operate with high leverage ratios) and for firms that get into trouble. This
can create many run-away self-fulfilling prophecies—which economists like to call by the fancy
name of "**equilibria**." If people think a firm will go bankrupt, it may go bankrupt simply because
people think it will. If people think a firm will not go bankrupt, it may not go bankrupt simply
because people think it will not. And in both cases, the expectations will be borne out.

Distress can be good or bad, both individually and socially.

But just because firms can get into financial distress does not mean debt is all bad. Ex-ante,
financial distress can be a good thing, e.g., to force managers who will want to hang on at all
cost to let go and be replaced by better management. Moreover, even liquidation is not all bad.
Assets are often better used elsewhere. Allowing alternative use of assets can increase firm value
ex ante. Even socially, it can make sense. Bankruptcy can be the process by which capitalist
economies allocate resources to better uses. However, in an imperfect market, liquidation can
also waste resources. It depends.

Lessons from the recent crisis

Interestingly, we also have good recent experience. We just recovered from the Great Recession
of 2008—the deepest crisis since the Great Depression of the 1930s. Credit dried up for all but a
few large firms. Yet, remarkably few firms actually liquidated. Almost all large, publicly traded
firms survived and prospered. A few were bailed out by the government—and the government
actually ended up earning profits from some of them! The average Fortune-500 company may
have experienced some scare but not much harm. Ex-ante, corporate debt and financial distress
probabilities seem relatively low.

19.3   Operating Policy in Good Times (Agency)

Too much money can lead firms to take bad projects.

In most of the previous section, debt was usually worse than equity, because it made it more
likely that the firm would enter financial distress. Just as too much debt can cause the firm to
make poor operating decisions when financial distress looms, too little debt can also cause the
firm to make poor operating decisions when the business is going well. Again, it is the fact that
a particular capital structure—now one with too much equity—can make firms take projects that
they really should not take. Such distorted investment choices can reduce their values today.
However, some agency costs are even more direct, with managers simply taking too much for
themselves and giving too little to the owners. But I am getting ahead of myself.

Moral hazard is a gorilla in the room.

You already met agency conflicts in Chapter 13. (And there is more in the companion chapter
on corporate governance.) A less academic name for an agency conflict is a **conflict of interest**.
A more academic name is **moral hazard**, although this term is also common in the insurance
industry. Agency conflicts play important roles in capital-structure theory:

Free cash flow: Managers usually prefer spending money internally on their pet projects instead of returning money to shareholders. For example, in the 1980s, many large oil companies continued exploring for oil even though it was well known that oil companies could be bought on the stock exchange for significantly less than the expected cost of finding equivalent oil reserves. Free cash flow issues are especially problematic in declining industries—faced with shrinking markets, managers often desperately search for alternative investing ventures that are not their competitive advantage, rather than returning the money to the rightful owners. How can capital structure counterweigh this tendency? Debt requires coupon payments, which force managers to perform. Managers who fail to generate enough income to pay the coupons are subject to bankruptcy and (as has been shown empirically) almost always lose their jobs. Therefore, managers who have more debt will spend less wastefully, which makes such firms worth more *today*.

> Managers like building empires and receiving perks; debt restrains them.

Theft (and verification): Another important problem of too much equity instead of debt is implicit or explicit **theft**. If you are a passive partner, you are dependent on true and accurate reporting of what profits really are. The active partners or the managers, however, might try to avoid reporting large profits: They might rather use corporate cash to build more of an empire, to compensate themselves better, or just to outright steal it! Debt has the advantage that the creditor may not even need to know what the profits are: If the agreed-upon payments are not made, the creditor can force bankruptcy.

> Managers might steal: Debt restrains their ability to do so without being discovered.

Stakeholder holdup: Higher potential hold-up costs are another important drawback of equity. When a company, especially a public company, rolls in cash, anyone who has the power to hold up the business will try to extort some of these profits. (This is called **rent seeking**.) For example, a supplier who delivers an important input, a wholesaler who is an important distributor, or any key employees who can bring production to a stop may want to pressure the firm to renegotiate their deals and gain more of the riches. Airlines, for example, suffer greatly from this problem. A strike by any one of its unions can render billions of dollars in airplanes useless and destroy much of the customer goodwill (though airlines have almost none these days). If the airline has the cash to afford it, it will have no choice but to give in. Yet if such a company is financed more via debt than equity, these third parties will recognize that there is less cash to expropriate. After all, if the company does not pay the debt, it can go bankrupt. Thus, in a company with more debt, the equity earnings (which parties can renegotiate) are smaller.

> Employees or other critical stakeholders may hold up the firm's shareholders for more of its money. Creditors are much less forgiving.

> United seemed more intent on beating its customers than its competitors.

Higher effective managerial stake: More debt amplifies the effects of managerial equity holdings. For example, if managers have enough wealth to own $5 of a $100 firm, it would mean that they owned 5% of the firm. A decline in the value of projects from $100 to $80 would cost them $1. In contrast, if the firm were financed with $60 in debt, managers' $5 in shares would be a $5/$40 = 12.5% stake in the firm, and a drop from $100 to $80 would wipe out half of the value of their equity. Thus, managers would lose not $1 but $2.50. Chances are that with more debt, managers would be much less inclined to take bad projects that reduced firm value from $100 to $80.

> When management owns more of the levered equity, possible only with a lot of debt, then management may be less conflicted.

> > The need to control free cash flow and agency problems favors debt over equity as the cheaper financing vehicle.

IMPORTANT

Agency conflicts are very important, especially in large, stalwart firms. But be careful: Just because these agency conflicts are important, and although it is true that the presence of debt helps control agency conflicts, it is not automatically true that real-world companies will have more debt. If managers have already taken effective control of the corporate board (by stacking it with insiders and friends), they become the "agents in charge." They will then act in their own interests and structure the firm to carry more equity and *not* more debt.

> A more sinister view of the corporation: Firms have equity not because it is value-enhancing, but because managers in charge like it.

Airlines, Unions, and Shareholders

In the first edition of my book (in 2008), I wrote that American Airlines (AMR) operated over 1,000 airplanes and owned about half of them in 2002. It had assets valued at about $30 billion and debt valued at around $15 billion. Still, its equity market value was only $800 million—about the price of 3 of its 40 top-of-the-line Boeing 777 airplanes. And it was not clear if AMR was worth even this $800 million: Bankruptcy was imminent for all major U.S. carriers (except Southwest).

I predicted that its unions would capture the lion's share of any profits AMR would ever make. After all, it takes only one of its three unions (pilots, flight attendants, and mechanics) to ground a fleet worth $30 billion and wreck any residual customer loyalty. If there was only one union, it would probably leave shareholders just enough as to not kill the golden goose. Three unions, all trying to get the most for their members, would probably end up killing the goose.

In 2011, AMR indeed went bankrupt. In April 2013, its shareholders received about $0.4 billion in the reorganization. In July 2013, the successor company AAMRQ had shares trading for $1.9 billion. Let me write again: I do not understand shareholders who believe that they will see most of their money again—except if they photograph it. In my opinion, airlines should not exist as public corporations but be owned by their unions. For AMR's owners, corporate debt is the only chance to resist union demands.

Lucky me, I can repeat my point. As of this writing in mid-2017, American Airlines (now AAL) trades at $25 billion. Say what?

IMPORTANT

> Uncontrolled free cash flow and agency concerns can mean that firms end up having more equity than debt financing, even if this is not value-maximizing.

Corporate governance breakdown in many large Fortune 500 companies could explain excessive equity in their financing.

In the real world, it comes down to how good the corporate governance of the firm is. A good independent board, a large external equity owner, or a set of potential external acquirers can sometimes exert enough pressure on management to issue more debt when it is optimal to do so. (Many economists argue that this is the role that **private equity** firms are playing—they take on more leverage that leads managers to cut wasteful projects and focus on creating value.) Unfortunately, strong corporate governance by shareholders over managers is the exception and not the rule in Fortune 500 firms. Thus, you should not be surprised that there are also many large blue-chip firms that could benefit substantially from exchanging their equity for more debt, but their management has chosen to keep the firm fairly unlevered.

Q 19.10. Give some examples of perks that management might have to give up if they work at a firm with more debt.

Q 19.11. Do managerial agency concerns induce firms to be more debt- or equity-financed?

19.4 Bondholder Expropriation

You already know that entrepreneurs should structure the firm *at the outset* (ex ante) so as to make it in their interest to optimize firm value in the future. To raise debt at an attractive interest rate, managers must also take into account that bondholders know that managers might later want to weasel out of their obligations (expropriating bondholders to transfer resources to shareholders). After all, creditors realize that it is shareholders who vote managers into office, not bondholders. This section shows that managers can expropriate bondholders on behalf of shareholders in two ways:

If there is debt, equity shareholders may want management to expropriate these debtors. This has bad ex-ante value consequences.

1. They can increase the risk of the firm's projects (a change in operating policies).
2. They can issue more bonds of equal or higher priority. (Bonds that pay cash earlier are de facto higher priority.)

If potential bondholders believe they could be expropriated, they will demand a higher cost of capital today. Let me explain this in more detail.

Project Risk Changes

The first expropriation risk that creditors face is called **risk-shifting**. Exhibit 19.3 returns to our firm with an LD capital structure from Exhibit 19.1 but allows managers to add project "New" after the original debt has been raised. The new project is independent of the old project and pays either +$50 or –$60 with equal probability. It is a negative-NPV project, so it would not be too hard for managers to find such projects—any Las Vegas casino provides better investment opportunities. Why would a negative-NPV project matter? Would the managers not reject this negative-NPV project?

Risk-shifting: Adding a risky, but negative, NPV project changes the state-contingent payoffs.

➤ Deadweight Costs, Exhibit 19.1, Pg.517.

The lower half of the table shows that if the new negative-NPV project is taken, the value of the equity would increase from $50 to $57.95. If shareholders are in firm control of their managers and vote them into and out of office, managers would indeed take this project *despite the bad consequences for the firm overall*! In essence, the new project would eliminate $50 – $37.50 = $12.50 of bondholder value, waste $4.55, and hand $7.95 extra value to shareholders. The intuition is that this risky project gives existing shareholders relatively more of the upside and existing bondholders relatively more of the downside.

If the shareholders can gamble with the bondholders' money, they may be better off.

Everyone—managers, shareholders, and bondholders—recognizes that taking the project will be in the interest of the managers if a bond with a face value of $55 was originally sold. Although this is good for equity holders ex post, ex ante it is bad for them (and the firm). Skeptical creditors will assume that the debt payoff is only $41.25 (not $55) and thus pay no more than $37.50. The firm would have to pay a cost of capital of $55/$37.50 – 1 ≈ 46.7%, even if it wanted to finance itself with debt.

Ex ante, entrepreneurs should prevent it to reduce their cost of debt capital.

Note that the real problem is not that creditors receive less but that managers would have the incentive to destroy firm value in the process of reducing their liabilities in the future. If they did not destroy any value—if it were just reallocation of the payoffs in different states—both equity and creditors could simply recompute and pay the appropriate fair value of their contingent claims upfront, and the overall firm value today would be unaffected. As before, an ex-post problem has consequences ex ante.

Ex ante, the real problem is value reduction (taking negative-NPV projects)—not the state reallocation.

If you now conclude that it is good for the corporation to commit itself not to take other projects, you would be wrong. This could backfire, too. If a new zero-cost project were to come along that pays off either –$60 or +$500, it would have a highly positive NPV. If creditors had negotiated a commitment at bond issue, they would insist that the project not be taken, because their wealth would still decline. But their ability to block would prevent the firm from taking great projects. Therefore, a wholesale ex-ante commitment not to take any more projects is not necessarily a good thing for the value of the overall firm.

Unfortunately, committing not to shift risk could prevent positive-NPV projects—also costly.

		Bad Luck **Prob** $=\frac{1}{2}$	Good Luck **Prob** $=\frac{1}{2}$	Expected Value	Present Value $r = 10\%$
Project	Firm	$60	$160	$110	$100

Capital Structure LD: Bond with Promised Payoff $55

Bond	Debt	$55	$55	$55	$50
Equity	Equity	$5	$105	$55	$50

News Flash: Negative-NPV Project Appears

Adding Risky Project "New"

		Probability				Expected Value	Present Value $r = 10\%$
		$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$		
Project	Old Firm	$60	$60	$160	$160	$110	$100.00
Project	New	$50	–$60	$50	–$60	–$5	–$4.55
Total Projects		$110	$0	$210	$100	$105	$95.45

Capital Structure LD: Bond with Face Value $55

Bond	Debt	$55	$0	$55	$55	$41.25	$37.50
Equity	Equity	$55	$0	$155	$45	$63.75	$57.95

Exhibit 19.3: *The Effect of Risk-Shifting on Debt and Equity Value.* The cost of capital in this example is 10% for all securities, which is equivalent to assuming risk neutrality.

We have emphasized the overall-company risk-shifting incentives caused by corporate debt. It is especially bad for financial-services firms (and especially investment funds!), which operate with a lot of leverage to begin with and which can easily triple their risk overnight. But the problem is really more widespread. It is not just the firms that suffer from severe risk-shifting incentives, but also the traders within these firms. Traders who are underwater know that they are likely to be fired. And they receive larger bonuses and promotions if they win. Not surprisingly, they will want to gamble—and convince themselves and others what great opportunities they uncovered. The problem becomes worse when every link in the chain, from trader to CEO, is better off gambling. Over time, the more successful traders and managers in these firms will gravitate towards opportunities that have more risk in reality than what the internal risk-management systems indicate. And the winners who have climbed up the ladder will be convinced that it was their talent to uncover edges and good bets that was responsible. Similarly, most traders and managers who go "rogue" start with being a little underwater. Then they gamble more. If they win, no one ever hears about it. If they lose, they will gamble more and, if discovered, their employers will fire them but try to cover it up. If they lose big enough, the firms can't hide the problem—and you will probably read about it in the *Wall Street Journal*.

Where is the problem worst?

Issuance of Bonds of Similar Priority

There are also other expropriation risks that creditors face. The first is the issuance of more bonds of equal or higher priority. (Paying out some cash before the original bond comes due is in effect higher priority.) Exhibit 19.4 shows an example, in which the firm issues another bond with a face value of $20 that has equal priority. In bankruptcy (the bad state), the old bond would have to share proceeds with the new bond of equal priority. Being equal, the "spoils" would often be allocated according to face value within bonds of the same priority. Because the $20 bond represents $20/($20 + $55) \approx 27\%$ of the debt claim, it would receive $27\% \cdot \$60 \approx \$16$; and the $55 bond would receive the remaining $73\% \cdot \$60 \approx \$44$. This means that when the firm announces the issuance of the new bond, the old bond would immediately drop by $\$50 - \$45 = \$5$ in value. Would this consequence be in the interest of the equity? It now receives nothing in the bad state and $85 in the good state—plus the one-time dividend of $16.36. In total, by issuing new debt of equal priority, equity holders would have increased their wealth from $50 to $\$38.64 + \$16.36 = \$55$.

Managers can also exploit bondholders by issuing more debt of equal or higher priority.

This expropriation is not as bad as our risk-shifting example, in that managers need not destroy firm value. But it can force a certain capital-structure dynamic on the firm. The first creditors will again assume that they will be expropriated, and therefore they will demand a higher interest rate today. They would demand a quoted interest rate of $\$55/\$45 - 1 \approx 22.2\%$. To recoup this higher interest rate, the managers will have no choice but to indeed issue more bonds that expropriate these first bond buyers later. In effect, before deciding on any capital structure, the firm has two choices: Either issue no bonds or be dragged into a capital structure that will require expropriating existing debt more and more (by issuing more and more new debt).

Again, fearing expropriation, the entrepreneur has to pay a higher interest upfront to potential bondholders.

A similar but even more benign form of creditor expropriation could unfold as follows: If creditors were always to receive x% of what they were promised, they would simply incorporate this number into the interest rate they demand. The overall firm value would not change. This scenario is actually quite relevant in the real world. In bankruptcy, the agreed-upon absolute priority rule (in which bondholders are supposed to be paid in full before equity holders receive anything) is often not followed. Fortunately, such deviations from promised absolute priority are expected and simply change the contingent payoffs and thus the effective values of the securities. They do not reduce the total value of the firm. Relative to a strict Absolute Priority Rule (APR), the equity value is higher by exactly the amount that the debt value is lower.

Again, the problem is that it requires contortion by the firm (negative-NPV projects) to expropriate creditors after the fact.

		Bad Luck Prob $=1/2$	Good Luck Prob $=1/2$	Expected Value	Present Value r = 10%
Project	Firm	$60	$160	$110	$100
Capital Structure LD: One Bond with Face Value $55					
Old Bond	Debt	$55	$55	$55	$50
Equity	Equity	$5	$105	$55	$50

News Flash: New Bond Issue, Equal Priority, $20 Face Value

		Bad Luck Prob $=1/2$	Good Luck Prob $=1/2$	Expected Value	Present Value r = 10%
Project	Firm	$60	$160	$110	$100
Capital Structure LD+: LS plus an equal-priority Bond					
Old Bond(Face Value $55)	Debt	73% · $60 ≈ $44	$55	$49.50	$45.00
New Bond(Face Value $20)	Debt	27% · $60 ≈ $16	$20	$18.00	$16.36
Equity	Equity	$0	$85	$42.50	$38.64
				plus extra payout of equity dividend	+$16.36 = $55

Exhibit 19.4: *The Effect of Issuance of Equal-Seniority or Shorter-Term Bonds on Debt and Equity Values.* The cost of capital in this example is 10% for all securities, which is equivalent to assuming risk neutrality. 73% is the proportional allocation of the old debt, $55/($55 + $20) ≈ 73%.

Q 19.12. Describe the two basic mechanisms whereby unprotected bondholders can be expropriated by shareholders. Can you illustrate your arguments with numerical examples?

Counteracting Forces against Expropriation

Bondholders demand a premium ex ante that they would not demand if the firm could commit to not expropriating them ex post. The premium may prevent the firm from raising debt at fair interest rates and thus tilt the optimal capital structure more toward equity. Even managers with the best intentions not to act against bondholders may not be able to shield themselves from the pressures of expropriating creditors later. Who ultimately loses? To the extent that smart bond investors anticipate their fate, they will demand and receive fair compensation. Ultimately, it is the firm that suffers. Its inability to commit to not expropriating creditors may prevent it from issuing debt at fair prices—which would mean it might have to forgo debt's other advantages (such as tax savings).

> If entrepreneurs can commit not to expropriate creditors later, they can enjoy lower interest rates.

In the real world, there are a number of mechanisms that can help to alleviate the fears of bondholders, thereby allowing the firm to issue debt at higher interest rates and thereby lower the firm's overall cost of capital.

> Mechanisms that help align managerial interests with those of prospective bondholders.

Managerial risk aversion: We noted earlier that shareholders like increases in project risk, because they help them at the expense of bondholders. However, it is not clear if managers really act on behalf of shareholders and thus like higher risk, too. After all, if the project fails and the firm enters financial distress, they might get fired themselves. Thus, managerial risk aversion is a natural counterbalance to the shareholders' incentives to increase risk.

> Managers dislike going bankrupt, so they are probably not inclined to gamble unless the firm is already in terrible distress.

Bond covenants: A variety of bond covenants have developed to mitigate bondholder skepticism.

- Many bonds prohibit excessive dividend payouts.
- Many bonds prohibit large new debt issues, especially of shorter term and of equal priority.
- Many bonds require the maintenance of certain financial ratios. For example, covenants may mandate maximum debt-equity ratios, maximum payout ratios, minimum earnings retention ratios, minimum liquidity ratios, and so on. These ratio restrictions can all help prevent the firm from taking on riskier projects.

> Bond covenants reduce exploitational opportunities in the future—but at a cost in flexibility.

If the covenant is broken, creditors can sue or demand their money back. Covenants are never perfect. It is just impossible to enumerate all the things managers can do. In addition, if the firm enters Chapter 11 bankruptcy, the law says that any new debt issued will automatically receive higher priority, no matter what the covenants of the original bond stated.

Bonds with strong covenants often have a "call" feature that allows the firm to retire the bond before maturity at an agreed-upon price—and thereby free itself of the covenant requirements.

Corporate reputation: Covenants are inflexible, so they impose costs, too. For example, if the firm happens to come across a project with +$1 billion in NPV, the covenants could prevent the firm from taking it. Again, a firm that fails to take all profitable projects in the future is worth less today. One alternative to formal covenants is for firms to build a less formal "reputation." This is not easy to do, but firms may realize that it is in their interest not to exploit current bondholders because any future bondholders would henceforth definitely assume the worst behavior. Put differently, if managers were to take advantage of creditors today, then future financing costs would be so much higher that managers would rather

> And, again, covenants reduce the flexibility of the firm to take advantage of other opportunities. Sometimes, reputation can substitute for covenants.

not do so. Reputation is not perfect, though, especially if the advantage that can be taken of creditors today becomes very large. The most prominent example of broken creditor reputation was possibly RJR Nabisco. In the 1980s, RJR was generally believed to be a safe investment for bondholders. However, when it was bought out in 1988 (in the largest leveraged buyout of its time), RJR tripled its debt overnight, its outstanding bonds went from investment grade to speculative grade, and bondholders experienced a loss of 15% at the announcement. Since then, bondholders have either assumed worse or protected themselves better.

Convertible bonds or strip financing: Another mechanism is to try to allow creditors to partake in the upside of equity. The most common such financing vehicles are **convertible bonds**. Again, they can limit the ex-post expropriation of bondholders while still preserving the firm's option to accept new projects. Instead of straight bonds with strong covenants, "convertible bonds" with weak covenants allow creditors to participate if a great new project were to come along. This reduces the risk expropriation problem. **Strip financing**, in which individuals buy debt and equity in equal units, is a similar idea—it eliminates the incentives of shareholders to exploit each other (i.e., themselves).

> Convertible bonds allow bondholders to participate in the upside, and reduce exploitational incentives in the future.

Units: The same idea is behind the use of units. A unit is a combination of securities. It can consist of a debt security and an equity security. Thus, there is no difference in identity between shareholders and bondholders. However, if the firm pays interest, it shifts its tax burden to the unit owners. If the firm pays dividends, it shifts this tax burden to itself. More importantly, unless the buyers unbundle the units, it does not matter to them if the firm expropriates bondholders at the expense of shareholders. Every bondholder is a shareholder! Note that this also puts a stark limit on the amount that bondholder expropriation may possibly destroy. After all, if it were that important, someone could just purchase the securities and resell them as inseparable units. This cannot be too expensive, so ex-ante bondholder expropriation costs cannot be too much in equilibrium.

> If shareholders are also the creditors, there would be little use for them to expropriate themselves.

> ➤ Units of debt and equity, Sect. 19.2, Pg.518.

In the real world, firms have to undertake a delicate balancing act. When they issue debt, it can only be issued at favorable terms when the firm can promise not to exploit bondholders after the bonds are issued. Even if such promises can be credibly made, they cause a loss of flexibility, which can be expensive. This can mean that the firm cannot issue debt—and thus that it has to forego some other beneficial effects of debt (such as tax advantages).

> Recap: Entrepreneurs internalize the cost of future inefficient behavior.

IMPORTANT

- Bondholders and other creditors can lose value if either of the following occurs:
    - The firm later undertakes riskier projects.
    - The firm adds more debt of equal or higher priority.
- Creditors demand higher interest rates if they fear such expropriation. Thus, it is in the interest of the owners to assure creditors that they will not do so. The prime mechanisms to allay bondholder fears are
    - Loan covenants
    - Reputation
    - Bond convertibility

Q 19.13. Does managerial risk aversion mitigate or exacerbate the fear of creditors to be expropriated in favor of shareholders?

Q 19.14. In a market in which bond covenants are priced at what they are worth, can their presence still increase firm value? When could covenants reduce firm value?

Q 19.15. What is an advantage of adding a convertibility feature to a bond?

Q 19.16. Consider a project similar to the firm in Exhibit 19.3, but change the risk-neutral required interest rate to 0%. The firm is worth either $100 or $120. The bond promises $90. We shall consider two cases: one in which the bond is convertible into 75% of the firm's equity, and one in which it is not.

1. Work out the value of the firm. For the bond, create three rows for each state:

    a) If bondholders never convert (which is also the value for the nonconvertible bond);

    b) If bondholders always convert;

    c) If bondholders convert only if it is optimal for them (which is also the value for the convertible bond).

    Does the convertibility feature have any value?

2. Now a new and independent project "BAD" becomes available. It will pay off either +$50 or –$60 with equal probabilities.

    a) If the bond is not convertible, is it in the interest of shareholders to undertake "BAD"?

    b) If the bond is convertible (into 75% equity), is it in the interest of shareholders to undertake "BAD"? Would you expect to see many conversions if this were the case? How does frequency of actual conversion empirically relate to the value of convertibility?

19.5 Private Information and Adverse Selection

Our next important determinant of capital structure is inside information. Typically, current firm managers (acting on behalf of the old owners) have better information than new investors. If current managers are acting on behalf of their old investors, new investors need to be doubly careful. As the old adage says, "Never bet with someone better informed than yourself." Again, to the extent that inside information concerns can prevent managers from taking the optimal set of projects, e.g., because they make it difficult to raise the necessary funding, some capital structures can create more value than others.

New potential partners (shareholders) have less information than current managers and owners.

Consider this scenario: You are a potential investor in an oil well, and you suspect that the current owner/manager (who has to raise new capital) already knows whether or not there is oil. Not knowing whether there is oil, you have to ask yourself the following questions:

➤ Two types of value sources of capital structures, Pg.516.

- What will you believe about the oil well if the present owner offers to make you a full partner who shares in all future profits?

If owners want partners rather than lenders, the project may not be as good.

- What will you believe about the oil well if the present owner asks you for a loan to be paid back that she is willing to collateralize with her present assets?

If you are offered partnership, you should be reluctant to believe that it has oil. If, however, you are asked for a loan, so that the present owner can keep the profits, she probably knows that it has oil. This is sometimes called the **winner's curse**, **adverse selection**, or simply the **lemon problem**:

- If you receive the offer to become an investment partner, you are better off if you decline. This is because you can infer that there won't be oil in the ground.

- If you do not receive the offer to become an investment partner, you are better off if you could become one. This is because you can infer that there will be oil in the ground.

This analogy is directly transferable to capital structure. Sharing in the firm's equity is the equivalent of becoming an investment partner.

The basic scenario assumptions.

Let's assume that the firm still needs to raise $25 to buy the rig, and if no money can be raised, there is no business. The firm's value is $50 if the outcome is bad and $150 if it is good. Let's say the effective time discount rate is zero. (We make this assumption because we are lazy. It works the same way if the interest rate is positive.) Finally, we will assume that half of all firms that want to raise money are con artists, while the other half are "for real." Thus, for the average firm,

		Bad Luck $\text{Prob} = 1/2$	Good Luck $\text{Prob} = 1/2$	Expected Value
Project	Firm	$50	$150	$100

No financing other than equity.

Now let's say that firms can only be equity financed, and that there is no possibility whatsoever for any firm to get funds by borrowing. In this case, both types of firms must raise equity financing if they want to operate. The fraction of the firm that you will demand in exchange for your $25 must depend on your assessment of whether the firm is good or bad. If you believe it is bad, and worth only $50, you would demand $25/$50 = 50\% of the firm. On the other hand, if you believe it is good, and worth $150, you would demand only $25/$150 = 1/6 of the firm. If you believe it's 50-50, you would demand $25/$100 = 1/4 of the firm. Let's work out how much each type of firm will end up with, depending on what you believe.

Outside Investors Believe Firm is		% Equity Sold To Raise $25	Bad Firm Keeps	Good Firm Keeps
Bad	$\Rightarrow E = \$50$	$1/2$	$25 + 1/2 \cdot \$50 = \$50.00$	$25 + 1/2 \cdot \$150 = \$100.00$
50-50	$\Rightarrow E = \$100$	$1/4$	$25 + 3/4 \cdot \$50 = \$62.50$	$25 + 3/4 \cdot \$150 = \$137.50$
Good	$\Rightarrow E = \$150$	$1/6$	$25 + 5/6 \cdot \$50 = \$67.00$	$25 + 5/6 \cdot \$150 = \$150.00$

With both types of firms raising money, and with our assumption that half of the firms are really good, outside investors can believe that there is a 50-50 chance that a firm is good or bad. The firm's expected value is therefore $100. To raise $25 in equity, the entrepreneurs must promise outside investors 25% of their $100 firm. They keep the rest. The con artists end up with $62.50, and the good guys end up with $137.50. Note that the bad firm is better off claiming that it is a good firm, too, and the good firm suffers for it. Every dollar that the con artists skim off investors is in effect paid by the good guys.

The "only equity" equilibrium: You demand 25% of the firm.

Now debt financing becomes available.

Now assume that debt financing has suddenly become available. In this case, depending on your beliefs, a firm that sells debt will receive the following:

Outside Investors Believe Firm is		$ Debt Sold To Raise $25	Bad Firm Keeps	Good Firm Keeps
Bad	$\Rightarrow E = \$50$	$25	$25 + (\$50 - \$25) = \$50$	$25 + (\$150 - \$25) = \$150$
50-50	$\Rightarrow E = \$100$	$25	$25 + (\$50 - \$25) = \$50$	$25 + (\$150 - \$25) = \$150$
Good	$\Rightarrow E = \$150$	$25	$25 + (\$50 - \$25) = \$50$	$25 + (\$150 - \$25) = \$150$

Pretty boring—you would always demand $25 and receive $25. But good firms are better off. If good firms can raise the $25 funding with debt, they end up with $150 in total. They simply pay back the loan after the oil comes out of the hole.

The "only debt" equilibrium: You demand $25 in debt.

However, the important insight of this example is altogether different. If debt financing is available, your outside investors' inference for a firm that asks you for an equity investment changes altogether. The reason is that it becomes irrational for you to believe that such a firm is not a con. Even if half of all firms in the pool are for real, not a single one of these good firms would want to ask you for equity financing. Every single good firm is better off going with debt financing instead. As a result, there is only one possible inference for you: anyone who wants to raise equity financing must be a con artist!

The presence of debt financing renders equity financing a bad signal.

The "choose debt or equity" equilibrium: You demand either $25 in debt or 50% of the firm. (25% is no longer enough!)

You should now be convinced that unless entrepreneurs can credibly convince outside investors that they have raised as much funding from debt (and from themselves) as possible, outside investors will assume that entrepreneurial requests for equity financing signal that there is something wrong with the firm that they don't know. Thus, when existing owners announce a new equity offering, it releases information that the firm's projects are worse than generally believed, and the new equity can only be sold for a very low price. This is again an example of adverse selection—only companies fearing the future would want to share their prospects. In real life, we indeed observe that firms public equity value declines by about 10 cents when they announce that they plan to raise $1 in new equity.

Issuing more equity-like (partner-like) shares reveals bad news. Thus, new equity shares can only be sold at low prices.

But this argument extends not only to equity but to other claims as well. The riskier the securities are that insiders want to sell rather than keep, the worse are their beliefs in their projects. Sharing in more junior (risky) bonds is the equivalent of the present owners making you a "little partner," when they are not willing to collateralize their loans. Consequently, the announcement of a risky junior security releases information that the firm's projects are not too great, but not too bad, either. In contrast, the new issue of a collateralized loan (or a risk-free senior bond) will indicate that the firm's projects are better than expected. The outcome is that the better the firm's projects are, the more senior the security the managers will offer for sale. This leads to a **pecking order** view of capital structure: The best projects are financed by the most senior debt, worse projects by junior debt, and the worst projects by equity. (Note however that inside information is a sufficient but not a necessary condition. A pecking order can also arise in the absence of inside information.)

This argument applies to all claims that are more junior, and leads to a "pecking order" of financing.

What does this imply about the optimal capital structure? Consider a firm that cannot issue debt easily because it has little collateral or because additional debt would unduly increase expected bankruptcy costs. If it cannot issue equity because of these insider concerns, such a firm may have to pass up on some good (but perhaps not stellar) projects, simply because owners do not want to sell their projects at the price of the worst possible scenario. A publicly traded firm thus may take on too much debt (incurring financial distress costs) or ration its projects, failing to take at least some of its positive-NPV projects. And to the extent that adverse selection distorts the firm's otherwise optimal project choice, it lowers the firm value.

Firms may want to avoid issuing equity to avoid signaling bad news.

➤ *Two types of value sources of capital structures, Pg.516.*

> The presence of inside information concerns (investors fearing the worst) favors debt over equity as the cheaper financing vehicle.

IMPORTANT

When could a firm issue equity without an insider penalty?

If managers can convey all they know, the adverse selection penalty would disappear.

- If there is a mechanism—for example, a detailed audit—by which insiders with good projects can credibly convey the true quality of the project, it would be in their interest to do so. Indeed, if such a mechanism is known to exist and owners do not undertake it, potential investors should immediately assume that current owners are not doing so because they know that the outcome will be bad.

- If current owners can convince potential investors that they have invested all of their own money, have maxed out their personal credit cards, and just cannot put any more personal capital at risk than they already have, then there is no bad inside information in the fact that they are trying to raise equity capital. In this case, external investors can assume that the project is not necessarily bad. Indeed, no venture capitalist will ever invest in a start-up in which the current owners do not have most of their personal wealth at stake.

The inside information and the free cash flow (agency) theories have a very close family relationship. The former says that when firms issue equity, managers signal a belief that the future will be worse. The latter says that when firms issue equity, managers will make the future worse—they will waste the money. In both cases, issuing equity sends signals to investors about bad futures. Therefore, both create pecking orders in which appropriate skepticism of investors should induce the ordinary manager to prefer issuing debt to equity. The main difference between the two theories is that the agency explanation is more causal than the inside information explanation.

Agency costs and inside information are closely related—both create a pecking order.

Q 19.17. You are a research scientist with a new drug idea. Only you can know how good it is. It costs $100 million to create a lab and test it. If it pans out, you get $500 million. If it does not, you can resell the lab. Alas, you do not have $100 million in cash. Assume the discount rate is 0.

- What is the expected NPV of your project?
- If you did not know any better than your outside investors whether the drug will be successful, and you borrowed $100 million, how much would you expect to keep in each state? How much would your creditors get in each state?
- If you did not know any better than your outside investors whether the drug will be successful, and you sold equity at a fair price, how much equity would you have to sell and how much would you expect to keep in each state?
- If you did not know whether the drug will be successful, and you borrowed $100 million, how much would you expect to keep in each state? How much would your creditors get in each state?
- If you did not know whether the drug will be successful, and you wanted to finance the upfront cost with equity, how much equity would you have to sell? How much would you expect to keep in each state? If it was good, but your creditors assume you act in your self-interest and sell debt instead, how much would you lose by financing with equity instead of debt?

Q 19.18. A house up for auction can be worth either $500,000 or $1,000,000 with 50-50 probability. The other bidders know the true value; you do not. If you bid for the house in an auction, what should you bid? If you bid $750,000, what is *your* expected rate of return?

Q 19.19. What is the pecking order? (Thinking question: In a real-world firm, will a pecking order lead to a **financing pyramid**, in which firms tend to be financed mostly by debt [the bottom of the pyramid] and by very little equity [the top of the pyramid]?)

Q 19.20. Does concern with inside information suggest that firms should issue debt or equity? Why?

Q 19.21. Go back to the oil rig example, which is worth either $50 or $150 with 50-50 probability. But now assume that there is an additional cost to issuing debt—perhaps because these types of firms are more likely to go bankrupt and incur the wrath (fees) of the legal profession.

1. If these fees are expected to be $10, how much will the good firms, the bad firms, and the lawyers get to keep?
2. If these fees are expected to be $15, how much will the good firms, the bad firms, and the lawyers get to keep? (You are not expected to get the answer right, but give it a stab.)

19.6   Other Important Concerns

Liquidity

Prior to the Great Recession, many firms "minted" money by switching from higher-yield long-term debt to lower-yield short-term debt or even overnight REPO financing. Rolling over this financing again and again, firms earned 2-4% per annum more than they had before (when they were financed with long-term debt). This was the case especially for financial-services firms like Bear Stearns or Lehman Bros, which had leverage ratios exceeding 98% just before the crisis. Low borrowing costs created record profits and many happy executive bonuses.

Short-term financing was really cheap and worked really well until 2008, when the financial markets suddenly froze up. Overnight loans that had been rolled over for many years suddenly were no longer extended, as the lenders were themselves afraid of going bankrupt and began to hoard their own liquidity. At this point, only extremely expensive methods of financing were still available. Borrowing firms tried to liquidate whatever they could on short notice and suddenly had to pay rates as high as 20-40% per annum—if they could find it. The short overnight borrowing was not the free corporate lunch that it had been claimed to be, at least from the perspective of the shareholders. (Executive bonuses were never clawed back, so from their perspectives, it was one.)

After the Great Recession, the liquidity tradeoff had become clearer. In the mid-2010s, most large, publicly traded firms have more time-balanced capital structures, often combined with record cash holdings in foreign countries. This strategy avoids paying U.S. taxes while being available at the same time as insurance against sudden dry spells in liquidity. Firms like Apple and Intel continue to raise large amounts of mid-term U.S. debt financing at rates of about 100 basis points above Treasury, while holding hundreds of billion of dollars in cash in foreign domiciles. Meanwhile, smaller and publicly traded firms continue to pay fairly high spreads, with interest rates often in the teens. We will see what the future brings.

Transaction Costs

Transaction costs have played an important role in all capital structure examples above: If transaction costs had been zero, external pressures would force management to choose the best capital structure. But if transaction costs are high, managerial mistakes are difficult or impossible to correct for outsiders. It is not just enough for an outsider to buy and sell shares. The appropriate corrective action requires accumulating enough shares to be able to influence management. Without external discipline, managers can act badly. They may take too much debt or too much equity, and the market may not be able to correct their actions.

Transaction costs can also play a direct role. For example, the reporting requirements and liabilities imposed by the *Securities Act of 1933* and the *Sarbanes-Oxley Act* (SOX) of 2002 raise the cost of publicly traded equity securities relative to those for private borrowing. Empirical evidence further shows that issuing new equity has direct transaction costs of around 5-15% of the issue, depending on firm and issue size. For many small companies, these costs of equity may be large enough to warrant a capital structure consisting not of public equity but exclusively of private securities and bank debt.

Another example of how marketwide transaction costs may affect individual capital structures depends on the absence of certain markets. For example, many institutions are not allowed by law to hold securities with too low of a credit rating. Roughly speaking, firms with below-investment-grade credit ratings cannot tap the large commercial paper market. This could create a situation in which the cost of capital of debt is low only for low debt ratios (where the corporation can issue high-rated debt), but it rises dramatically if the firm takes on a lot of debt. On a more basic level, it is not cheap for retail investors to trade a specific company's corporate

debt. If mutual funds cannot facilitate investor access, it could further raise the cost of issuing debt.

IMPORTANT

> Transaction cost considerations could favor either debt or equity.

Behavioral Issues

Transaction costs "cause" behavioral finance concerns.

➤ Behavioral finance,
Sect. 12.2, Pg.283.

Unfortunately, behavioral theory is often hard to use, perhaps because we are just getting started on it.

Specific behavioral errors can have specific implications.

➤ Behavioral biases,
Sect. 13.7, Pg.339.

Section 12.2 has already explained the link between high transaction costs and behavioral finance. When transaction costs are high—which means that one cannot easily correct mistakes—then behavioral finance considerations are likely to play important roles. Such conditions are indeed common in corporate finance. It is simply too expensive to take over a firm in order to correct a capital structure that has, say, 10% too much or too little debt.

Behavioral considerations can explain a lot of managerial behavior, which is otherwise difficult to explain. For example, we know that managers like to imitate their peers, perhaps too much so. Unfortunately, on a vague level, without a further description of what the specific behavioral mistakes are, behavioral finance is less prescriptive than the earlier theories of capital structure optimality. That is, we do not yet fully understand the guidance that behavioral finance theory gives managers about the optimal capital structure in a world in which they, and others, can make all sorts of mistakes.

Behavioral finance is the most promising new direction in corporate finance. But it is probably still too early to tell where and how it will help us better understand the world. Some early insights suggest that certain behavioral mistakes are more common than others. For example, we now believe that **overconfidence** and **overoptimism** are common traits among both managers and investors. If managers are overoptimistic, it may aggravate agency concerns (they may take some negative-NPV projects) and reluctance-to-liquidate concerns, but alleviate underinvestment problems. If investors are overoptimistic, issuing equity may not be as disadvantageous as the inside information argument suggests. Investors may not necessarily believe the worst—and there is some evidence that such was the case during the Internet bubble at the turn of the millennium. Although it is less likely that markets rather than managers are committing mistakes, there is good evidence that financial markets may be imperfect, too. If markets indeed misvalue securities—either because they are irrational or imperfect—it would be rational for managers to try to find the best time to issue equity.

IMPORTANT

> Behavioral considerations could favor either debt or equity.

Q 19.22. Give an example of transaction costs that favor more equity in the capital structure. Give an example of transaction costs that favor more debt.

19.7 Static Capital Structure Summary

Exhibit 19.5 gives a summary of all capital structure effects discussed so far. The four major forces that pull the firm toward equity are uncontrolled agency problems (managers like equity, because it makes their lives easier and allows them to buy other firms more easily), financial distress costs, personal income taxes, and debt expropriation—ordered by my assessment of their relative importance in many large firms. The three major forces that pull the firm toward debt are corporate income taxes, mitigating agency conflicts, and inside information issues—in my view, all very important and difficult to rank. Tugging against one another, these forces pull firms toward their capital structures. From a value maximization perspective:

The static forces are summarized in Exhibit 19.5.

- Too much debt, and the firm would expect to lose too much in financial distress handling, impose too much in personal taxes on its owners, and suffer too many creditor trust issues.

- Too little debt, and the firm would pay too much in corporate income taxes, suffer from too much rent-seeking by management, employees, and possibly others, and not signal enough confidence about the future.

As noted, unmitigated agency conflicts can instead pull the firm toward having too much equity and too little debt, because managers in charge prefer it that way.

Q 19.23. List the main effects pulling capital structures toward equity. List the main effects pulling capital structures toward debt. Are all these forces working through the desire of entrepreneurs and managers to maximize firm value?

19.8 The Effect of Leverage on the Cost of Capital and Value

This chapter has described the effect of many forces on firm value and on optimal debt-equity financing. But how do these forces influence the firm's effective WACC? You already know that the firm value and the cost of capital are mirrors of one another, so higher costs of capital mean lower firm values, and vice-versa. Just think of the value of the firm today as the expected future cash flows of given projects, divided by one plus the cost of capital. Holding expected cash flows (projects) constant, when the firm's cost of capital increases, its present value decreases, and vice-versa.

WACC Minimizing = Value Maximizing.

What does the firm's cost of capital look like as a function of its debt ratio? You have already seen it in a perfect world (Exhibit 17.2) and in a world with corporate taxes (Exhibit 18.2). Exhibit 19.6 shows how such a figure could look when there are multiple capital market imperfections. The cost of equity capital and the cost of debt capital are now both influenced by many forces. As drawn in the graph, the resulting WACC function has a minimum at a debt ratio around 50%. It is also quite flat, so in this case the firm would not make a big mistake being off by, say, 10% in its ratio. Of course, this is not always the case. There are firms in which the effective cost of capital is considerably more curved, in which case a suboptimal capital structure would destroy a lot more value. So, make sure you focus on what the important first-order effects are for the specific company that you are involved with, not those minor effects that do not cause much curvature in the firm's cost of capital.

With more forces than just corporate income taxes, there could be an interior optimal debt ratio now.

➤ Cost of capital in a perfect world, Exhibit 17.2, Pg.464.

➤ Cost of capital with corporate tax, Exhibit 18.2, Pg.485.

IMPORTANT

- Capital structure can have dramatic value influences for firms that are (a) considering drastic changes in their capital structure (e.g., as in a private buyout); (b) close to financial distress; and (c) very highly levered. (For example, many banks routinely operate with liabilities-to-assets ratios above 90%. Any mishap can be catastrophic.)

Managers Maximizing Their Own Welfare Pull the Firm Toward...

Unmitigated Agency Conflicts   Equity
    Managers like shareholders' equity and the flexibility it provides, and they
dislike debt and the discipline it imposes. Here, the presence of equity *reduces* the
value of the firm.

Entrepreneurs Maximizing the Firm Value Pull the Firm Toward...

Financial Distress Costs   Equity (usually)
    Include inefficient operations, underinvestment problems, supplier and cus-
tomer incentives, failure to liquidate or sell at appropriate prices, predatory policies
by competitors, and so on.

Personal Income Taxes   Equity
    Interest receipts are tax-disadvantaged from investors' points of view.

Debt Expropriation   Equity
    Includes costs arising from the interaction of borrower credibility and borrower
flexibility. Includes complete contract specification costs. Possibly less important
than other forces in this table.

Liquidity   Equity / LT Debt
    Availability in Sudden Tough Times

Corporate Income Taxes   Debt
    Interest payments are tax-deductible by the corporation.

Too Much Cash Flow (Mitigating Agency Conflicts)   Debt
    Sometimes called moral hazard. Includes empire building, free cash flow,
excessive managerial perks, verification, and so on.

Inside Information   Debt
    Sometimes called adverse selection or even the lemon problem. (Sometimes,
adverse selection is mistakenly called "pecking order"—inside information issues
indeed create a pecking order, but so can other forces.)

Behavioral Finance   Situation-Dependent
Transaction Costs   Situation-Dependent

Exhibit 19.5: *Summary of Important Capital Structure Forces and Effects.* With the exception of the first effect, it is overall
value maximization that should push firms toward financing themselves with the security that is described in the right
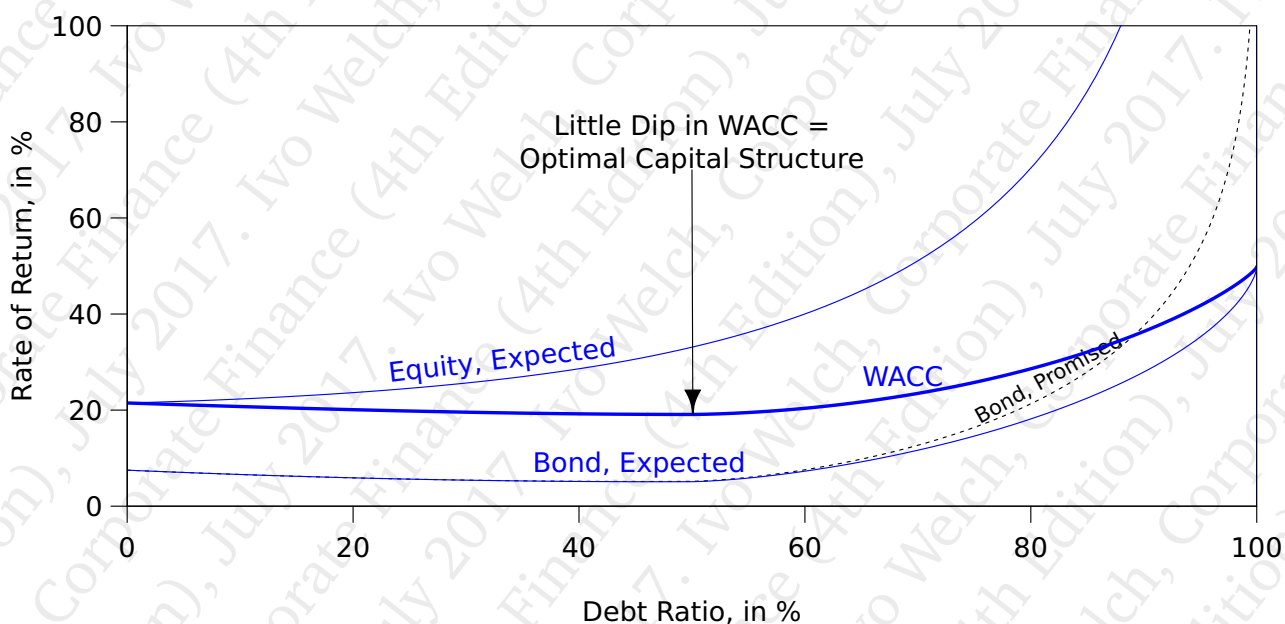column.

Exhibit 19.6: *The Cost of Capital in an Imperfect World.*   This figure is the equivalent of Exhibits 17.2 and 18.2, except that both types of claims now have some drawbacks and some advantages. This results in an optimal leverage ratio for the firm (marked by the arrow).

- For many other *large* publicly traded firms, the capital-structure value function seems to be quite flat. That is, small deviations in their debt ratios from the optimum, one way or the other, do not seem to have large influences on firm value. (This does not mean that managers do not care; it means that even if they do, changes will not have much effect on firm value.)

- When the value function is flat, and if there are high transaction costs to change debt into equity, or vice-versa, taking no action may be the best choice, even when the firm is not at its otherwise best debt-equity ratio.

Q 19.24. If the firm is not in an M&M perfect-market situation, how will this be reflected in the relation between its cost of capital and its leverage?

19.9   Valuation Formulas with Many Market Imperfections

You now know that, as a corporate manager, you should care about your own corporate income taxes (and you have nice APV and WACC formulas to work with them), your investors' personal income taxes, how corporate debt can raise your expected cost of bankruptcy, how equity can lead managers to waste money on pet projects, and other issues related to your firm's capital structure. So how do you work out the net present value of your firm in the presence of these issues and in the presence of your ability to use capital structure to change them?   How do all the capital market imperfections work together to determine the value of the firm and its capital structure? And do you need more complex APV or WACC formulas than those in Chapter 18?

First, recall that in an imperfect market the average cost of capital is not the marginal cost of capital that you would want to compare to your next project's internal rate of return. The cost of raising or retiring one more dollar in external financing can be substantially different from your cost of raising or retiring a billion dollars. The existing cost of capital that you can read from your balance sheet is just a historical number, and not what you need. Nevertheless, the average cost of capital can often be very useful to learn, if only because the same forces that influenced the average cost of capital in the past likely also influence the marginal cost of capital today. For many large firms, the average cost of capital may not be too far from the marginal cost of capital.

Exhibit 19.7 illustrates how you can think about valuing your firm (or just your next project) from different perspectives. The firm's value would be $100 in a perfect market, but it is only $80 because of market imperfections. (The flow-to-equity approach works directly with cash flows and costs of capital that are reduced by the $20 worth of imperfections.) Although the tax shelter created by the tax deductibility of interest plays a special role in the algebraic formulation of APV (and WACC), the other factors can be just as important. This is shown in the last row, where $5 worth of corporate income tax mitigation is broken out. Yet this is not because corporate income taxes were the only, or even the most important, factor. Only $5 of the $20 reduction is due to corporate income taxes. The remaining $15 of market imperfections is more important, but it enters value by flowing directly into the $75 present value of cash flows. Alternatively, you could think of an APV-type approach to other imperfections, too: You would work with $70 of value under extreme market imperfections if they remained totally unmitigated, and then you would add back the $10 in value that your clever capital structure has mitigated. This is rarely a useful method. Let me explain why.

Do You Need Other Valuation (APV or WACC) Formulas?

Think back. In the previous chapter, you learned that you could handle corporate income taxes in one of the following ways:

1. You could work with expected cash flows and costs of capital "as if fully taxed" and then add back the debt-shelter-created remedy that reduces the corporate income tax. This was the principle behind the first two methods, WACC and APV.

2. You could work with expected cash flows that already reflect the actual corporate income taxes. This was the flow-to-equity method.

For corporate income taxes, any of these three methods work. The APV and WACC methods are especially useful because they make it easy to think about how a change in capital structure changes the firm's value. Moreover, as manager, you know the inputs (primarily your own corporate income tax rate), so you can compute the exact dollar value of both the as-if-fully-corporate-taxed value and the exact dollar value of the debt-induced tax shelter remedy.

$80

Project Value in Imperfect Markets   (Flow-To-Equity Method)

=   **$100**

Perfect Market's Project Value

−   **$20**

All Existing Distortions, Problems, Costs
e.g., taxes, distress costs, transaction costs, skepticism, etc., that could not be eliminated by clever managing and financial markets.

=   **$70**

Project Value Under All Distortions, *as if totally unmitigated*

+   **$10**

The Net Of All Remedies To Mitigate Distortions

$2

Good Equity Effects
e.g., its reduction in expected distress costs

$3   **$5**

Good Debt Effects

e.g., signals higher quality, lower issuing costs, etc.   the corporate income tax deduction

$5

$80

APV   =   **$75**

PV of Cash Flows
- ignoring corporate income tax mitigation due to debt (cash flows are computed as if interest payments are not tax-deductible),
- but taking into account all other mitigating factors.

+   PV of Corporate Income Tax Shelter arising from the presence of debt
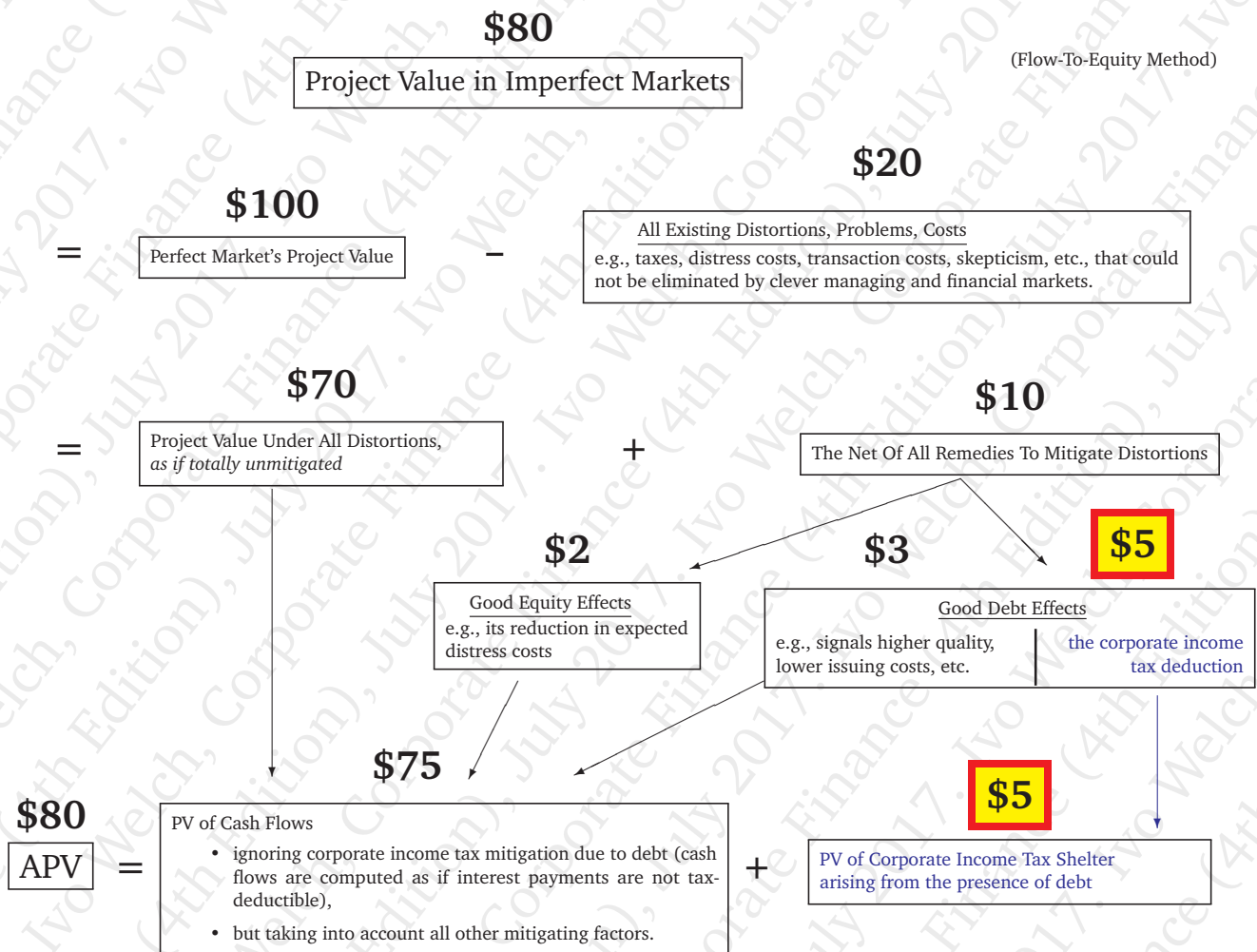
Exhibit 19.7: *Conceptual Framework for Capital Structure Effects and Formulas.* This figure provides a conceptual basis for thinking about capital structure in imperfect markets. All figures are made up to facilitate this explanation.

- Consider a project worth $100 in a perfect world. Market imperfections, such as corporate income taxes and financial distress costs that cannot be avoided, reduce this value to $80. This is the true imperfect-market value.

- You can think of this firm in another way, though. For example, consider a firm that has a capital structure that gets the worst of all worlds—it suffers market imperfections left and right, and does nothing to remedy them. This firm might be worth only $70. It follows that all imperfect market remedies together must save this firm $10.

- Now think about the potential remedies to market imperfections. There may be corporate taxes that can be avoided (e.g., by having debt and taking advantage of other tax loopholes). There may be ways to signal that the firm is worth more (e.g., by having more debt). There may be ways to reduce distress costs or to reduce personal income taxes (e.g., by having more equity). These increase the value of the firm relative to the $70 value.

- APV breaks out just one part of these remedies. It works with the value of the firm as if all noncorporate tax parts have been remedied as much as they can be remedied (here, $75), and then adds back the corporate tax shelter (here, $5).

- Note how in the real world, you still have to come up with the $75 number—the value of the firm assuming all other remedies. This includes all other net effects, such as personal income tax effects, financial distress costs, and so on. You must think about how debt and equity change this number.

Unfortunately, this is not the case for other capital structure influences. As the manager, you rarely have (or care about) this knowledge:

- It would be difficult for you to determine first the value of the firm if your investors received all payouts as interest and thus were fully taxed at the personal level, and then to adjust how equity financing would remedy their personal taxes. (In fact, you do not even know with great accuracy what the correct marginal tax rates of your investors are.)

- It would be difficult for you to determine first the expected losses in bankruptcy if your firm were financed only with debt and then to adjust how equity financing would reduce these bankruptcy costs.

- It would be difficult for you to determine first how much money would be wasted on pet projects if the firm were financed only with equity and then to adjust how debt financing would reduce this pet-project waste.

Could you design new cost-of-capital formulas to handle each of these effects? In principle, you could. (In fact, there is a Miller formula that specifically incorporates personal income taxes.) In practice, without knowing the exact inputs to such novel formulas, they would be mostly useless.

The cost-of-capital inputs
for debt and equity in the
valuation formulas reflect
the
non-corporate-income-tax
effects, not a new remedy
term.

But if these capital structure effects matter, then how should you value the firm under a given capital structure? The answer is that you are better off using the more direct equivalent that a flow-to-equity-like method provides. You would have to reflect all other capital structure influences in your inputs (expected cash flows and costs of capital).

- If you can reduce your investors' personal income taxes on certain types of claims, then your own corporate cost of capital on these claims would be lower. The reason is that your investors would want to give you their money at lower expected rates of return. (You may want to ask your investment banker by how much.)

- If you can reduce your probability of bankruptcy, your expected cash flows could go up (and your cost of capital might go down).

- If you can reduce inefficient pet projects by adding more debt, again your expected cash flows could go up (and your cost of capital could go down).

And so on. In sum, all the non-corporate-income-tax factors enter your cost-of-capital formula, but they do so through their influence on your inputs in the existing formulas, not through a new term in a new formula. (In Exhibit 19.7, they flow into determining the $75.)

No formula does not mean
less important or "no
thinking required."

It is important for you to understand that just because you have no new formulas does not mean you can think less about other factors. On the contrary, personal income taxes, bankruptcy costs, and so on, are not any less important than corporate income taxes just because they do not have their own formulas. (Exhibit 19.7 gives you such an example.) As the CFO, you can create value for your investors and reduce your cost of capital not only by reducing your corporate income taxes but also by taking into account all the other effects. You must think about how your actions and your capital structure maximize firm value. More than likely, because you can rarely easily compute exact magnitudes of these market imperfections, you may have to spend more time to understand them, not less. In the end, as you learned in Section 18.5, if you can reduce market imperfections, your firm will ultimately enjoy lower costs of capital. From a managerial perspective, you can turn this around, too: If your capital structure is minimizing your expected costs of capital, you are choosing the best real-world tradeoffs, given the myriad of market imperfections in the background.

- Corporate income taxes are just one factor influencing firm value.

- Corporate income taxes are often handled through the specialized WACC and APV formulas presented in Chapter 18, because managers usually have the quantitative inputs readily available. (These two inputs are the value of the firm *as if it were fully taxed* and the value of the corporate tax shelter due to debt.)

- Corporate income taxes could also be handled through a flow-to-equity approach, which relies on actual estimated costs of capital—not tax-adjusted costs of capital.

- Other capital structure influences are better handled through a direct cost-of-capital estimate. This is analogous to the flow-to-equity method. Market imperfections enter the valuation through their influence on the expected cash flows and/or costs of capital. Deriving formula extensions, where these factors would receive their own formula terms, would rarely, if ever, be useful.

- The fact that only corporate income tax has its own valuation formula and that other factors do not, does not mean that corporate income taxes are more important than other factors.

- Good managers think about the value effects of other capital structures! They often use market intelligence to obtain good estimates of their after-all-effects expected cash flows and their after-all-effects costs of capital.

  And don't forget—most large firms in non-finance industries have modest leverage ratios. Good project choice is much more value-relevant than good leverage choice (although this advice is not an excuse to get capital structure wrong).

Practitioners often make another mistake: APV only considers the tax benefits as you ramp up debt. But it remains *your* task to take into account how a higher debt level would impact your cost of capital on both debt and equity. For example, if you increase leverage, you may also increase bankruptcy costs, which would manifest itself in a higher cost of capital on the two terms. In general, there are no formulas to calculate the economic effects of non-tax related influences. You need to assess holistically how they change your cost of capital.

Naïve APV or WACC use can give the distorted impression that the firm's cost of capital always decreases with leverage. It is important that you adjust the cost-of-capital terms in the formula to take into account all the other capital-structure benefits and costs, too.

Q 19.25. Does the lack of a personal income tax rate in the APV and WACC formulas mean that the personal tax rate does not matter to the valuation of the firm?

19.10   Capital Structure Dynamics

Of course, we have not covered *everything* about capital structure, but you now have a very good grasp of the most important factors to think about. Still, the real world is considerably more complex. First of all, the many forces are not as surgically isolated as they were presented above. Usually, many forces are pulling at the same time and in different directions. Second, the world is not static. In the description you have read, management looks at its projects and the forces determining the optimal capital structure, sets the capital structure once, and then everything goes its course. Alas, this is not realistic. Instead, managers are usually confronted with many issues, and not just this year but every year. The complexities can raise altogether novel issues. The presence of one problem—or attempts to reduce it—often worsens others.

For example, there are often significant costs to move from a suboptimal to an optimal capital structure. Let us start with the simplest capital structure trade-off scenario: You own a firm in which you need to balance financial distress costs against the tax benefit of corporate debt. In a static scenario, you would choose an intermediate level of debt.

But why could you not optimize the capital structure dynamically? That is, instead of a medium debt-equity ratio, could you not keep a high debt ratio while the firm is healthy and lower it if and when bad news arrives? This way, your firm could take advantage of the tax deductions if it earns high profits, and avoid the financial distress costs if it does not. It would be the best of both worlds!

In reality, this may not be so easy. It is true that if a firm is close to bankruptcy, issuing equity could avoid or reduce bankruptcy costs, which in turn would increase firm value. But the infusion of more equity may mostly benefit bondholders, so equity holders may not agree to put in more equity. Individual creditors might hold up a reorganization, too. Thus, even when a new start could install a better capital structure, you would still have to solve many problems to get there, given the current capital structure.

IMPORTANT

> Interaction effects can make it difficult to adjust capital structure optimally in the future. Future adjustment costs can favor a more flexible capital structure (more equity and financial slack) today.

But what prevents the firm from arranging contracts ex ante, so that the optimal rearrangements happen automatically ex post? For example, an ex-ante bond covenant could force the firm to issue equity automatically, so there could be no reluctance by equity holders ex post. Or the firm could execute a simple tax arbitrage. It could give a major equity owner a bond in exchange for shares and simultaneously execute a forward contract that will reexchange the bond into the same number of shares in one year. The payments during the year to this equity (now bond) owner would now be called interest payments, and thus they would be tax-deductible from the corporation's point of view. Nothing other than extra corporate tax savings (during the most likely healthy next year) would have occurred. Under both mechanisms, shareholders and bondholders would pay a fair price for their securities—but the sum total of these security values would be higher, because the firm has increased its tax savings without raising its financial distress costs. Yet few firms seem to engage in such practices.

Perhaps the reason is that our setup is not applicable to most firms. One premise was that we wanted to stave off financial distress, but equity infusions to stave off bankruptcy may not always be value maximizing. For example, equity infusions could allow the firm to continue burning its remaining assets instead of optimally liquidating them. Financial distress could also be the best or only mechanism for firing bad managers; and if managers could avoid financial distress at will, then debt would lose its function in the control of agency problems. Raising more equity to eliminate financial distress costs might thus facilitate the *wrong* managerial behavior.

Another important issue that can come up in a repeated, multiperiod setting is reputation. It can lower financing costs, improve certain incentives, and increase firm value. Do you remember our earlier example in which the presence of an ex-post ability of managers to expropriate bondholders hurt the firm today? If managers had a reputation for not taking such bad projects, perhaps overly restrictive covenants could be avoided, in effect lowering financing costs ex ante. More importantly, the example assumed that everyone knew exactly what expropriation opportunities existed and what their probabilities were. But despite restrictive covenants, bondholders will always have the nagging suspicion that they may be expropriated, after all, when unforeseen opportunities appear. Thus, firms are often well-advised to build trust and reputation to mitigate such suspicions.

> Sometimes, owners are best off building a corporate reputation, which can help alleviate investor worries.

Do investors trust managers? *Can* investors trust managers? *Should* investors trust managers? When is it worthwhile for a manager/firm to build such a reputation? How can this effectively be accomplished? These are difficult questions to answer empirically, but they are important in the real world.

> To trust or not to trust!

Ultimately, the trick to being a good manager is to judge and weigh the plethora of marginal costs and marginal benefits of projects, of debt, and of equity, and to have sound judgment in deciding on a good combination thereof. Choosing a good capital structure is as much an "art" as a "science." This is good news for today's business students: Capital structure choices are unlikely to be taken over by a computer program anytime soon.

> Choosing the best capital structure is a combination of art and science.

In the companion, there is another chapter that explains the dynamic process that determines corporate capital structures (including the role of investment bankers and the role of mergers and acquisitions).

> More background info is in the companion.

Q 19.26. A cash-cow firm, susceptible to agency problems, might hit short-term financial difficulties in a recession. What kind of financial security would maximize the firm's value?

Summary

This chapter covered the following major points:

- Capital structure can influence managerial behavior in good and in bad times. It can pull towards debt or equity.

- A specific capital structure can influence firm value today because it can potentially impact firm value in the future. It can do so by creating direct costs, or by inducing the firm to take suboptimal projects.

- Equity has an advantage in that it reduces the likelihood of financial distress, and with it deadweight bankruptcy costs in bad times. Such costs include both direct costs (such as legal fees) and indirect costs (such as underinvestment, reluctance to liquidate, and excessive risk-taking).

- Debt has an advantage in that it imposes discipline on managers and thus reduces money-wasting in good times. Managers and employees tend to work harder if poor performance can lead to bankruptcy.

- Equity has an advantage of not tempting managers to expropriate creditors. If bondholders fear expropriation from subsequent increases in corporate risk or from the issuance of more debt with earlier payments or payments that are equal or higher in priority, they demand a higher cost of capital.

- Debt has an advantage of signaling confidence. If owners—or managers acting on behalf of owners—prefer to sell partnership shares rather than debt, they probably believe that the project's true quality is worse. Thus, the cost of raising equity is high, because new partners will assume the worst.

- If agency conflicts are unmitigated, managers may not choose an optimal capital structure, but rather a relatively equity-heavy one.

- Section 19.7 summarizes the effects of different forces on firm value and cost of capital. It also summarizes how you should think of cost-of-capital for-

mulas.

- Exhibit 19.7 illustrates how different forces enter valuation formulas.

- You do not need a more complex formula than WACC or APV from Chapter 18. The reason is that all market imperfections are better addressed with a flow-to-equity-like approach. That is, these factors should de-

termine your expected cash flows and cost-of-capital inputs into the formula.

- Not needing a formula for other forces does not mean that these forces are any less important. You must think about (and often effectively estimate) how these forces influence your expected cash flows and costs of capital on both debt and equity.

Keywords

Adverse selection, 535.   Chapter 11 reorganization, 518.   Chapter 7 liquidation, 518.   Conflict of interest, 526. Convertible bond, 534.   Equilibria, 526.   Financing pyramid, 538.   Holdout, 521.   Indirect bankruptcy cost, 518. Internalize, 515.   Lemon problem, 535.   Moral hazard, 526.   Overconfidence, 540.   Overoptimism, 540.   Pecking order, 537.   Private equity, 528.   Reluctance to liquidate, 524.   Rent seeking, 527.   Risk-shifting, 529.   Strip financing, 534.   Theft, 527.   Trade credit, 520.   Underinvestment, 522.   Unit, 521.   Winner's curse, 535.

Answers

Q 19.1 Higher debt and equity risk when the firm is more levered is not necessarily a force against leverage. Even in an M&M world with unchanging firm value, debt and equity have higher risk when the firm takes on more risk. See Section 17.3 on Page 463. Consequently, higher risk in itself is usually not a counteracting force to the beneficial corporate income tax consequences of debt.

Q 19.2 Deadweight bankruptcy costs, both direct and indirect, favor equity: In the extreme, with no debt, the firm would never incur them.

Q 19.3 U.S. managers usually mean the chapters of the bankruptcy code: Reorganization is Chapter 11; liquidation is Chapter 7.

Q 19.4 Direct bankruptcy costs are legal fees and management time. Indirect costs are, for example, reluctance of customers to buy goods from firms that could go bankrupt (e.g., if the good requires future contact or offers a warranty) and reluctance of suppliers to extend trade credit.

Q 19.5 As an example of an underinvestment problem, think of neglected maintenance that reduces the value of assets relative to the first-best behavior.

Q 19.6 To be influenced by underinvestment issues, assets must be very maintenance-intensive (such as boats), and the firm must be reasonably likely to go bankrupt so that underinvestment considerations could come into play.

Q 19.7 Here are two examples of reluctance-to-liquidate problems:

- Entrenched managers may not want to sell off the remaining assets, because they would rather run down the firm and keep their jobs. This can hurt shareholders.

- Shareholders may not want to liquidate and sell the firm if it is "underwater," even if the offer is more than the firm is worth. The reason is that the benefits would go primarily to the creditors. The shareholders may prefer to gamble with the creditors' money on high-risk ventures instead. Note that this problem now helps shareholders, whereas in the previous case it hurt them.

Thus, this reluctance-to-liquidate issue is never good for creditors, but it can either hurt or help shareholders depending on the situation.

Q 19.8 Firms in declining industries are more likely to suffer reluctance-to-liquidate problems, especially if their managers are well entrenched.

Q 19.9 Debt is not always a strategic advantage. It could commit the firm to undertake riskier projects. In some cases, this could deter competitive entry into the firm's markets. However, debt could also make it more difficult for the management of a company to respond effectively.

Q 19.10 Management in firms with a lot of debt to service may have to forgo corporate airplanes, large headquarters, and/or large staff.

Q 19.11 It depends. If the firm is not yet under the firm control of management—for example, if it is under the control of a

large value-maximizing shareholder-entrepreneur—then this entrepreneur would want the firm to be more debt-financed to keep management in check. However, if the firm is already under the firm control of conflicted management, then these managers will likely push to move away from debt and toward equity.

Q 19.12 First, shareholders can expropriate bondholders by issuing other claims that have an earlier or equal priority on the firm's cash flows in distress. This could be other bonds of equal or higher priority, or a straight-out dividend payment. Second, shareholders could induce the firm to take on riskier projects. Numerical examples illustrating these two mechanisms are in the text. You should be able to make up your own example on the spot.

Q 19.13 Managerial risk aversion usually mitigates the fear of creditors that they will be expropriated by risk shifting because managers dislike the same kind of risk. After all, if the firm were to go bankrupt, these managers would lose their jobs.

Q 19.14 Bond covenants can help reduce the incentives of equity shareholders to expropriate bondholders. This can increase the firm value if it prevents managers from taking negative-NPV projects whose main purpose is to shift value from bondholders to shareholders. However, covenants can also decrease the firm value if they prevent managers from taking positive-NPV projects that would trigger the bond covenant.

Q 19.15 The convertibility feature can reduce the need for some bond covenants and thus give the firm more flexibility in case a great project were to appear suddenly. Bondholders would be happy because they would benefit, too. (Of course, bondholders get more if the firm does well, and shareholders get a lower interest rate, but this is just state reallocation. The important aspect here is that the net effect of the alignment of interests would be a reduction in the firm's overall cost of capital.)

Q 19.16 1. For the firm worth $100 or $120 with debt promising $90:

Project		Firm
Convertible Bond with Face Value $90		
(a) Bond is Never Converted		Debt···
(b) Always Converted (to 75% Equity)		Debt···
(c) If Optimal Conversion Choice		Debt···
		Equity···

	Prob		**Exp**
	¹/₂	¹/₂	**Value**
Firm	$100	$120	$110
Convertible Bond with Face Value $90			
(a) ··· Debt	$90	$90	
(b) ··· Debt	75% · $100 = $75	75% · $120 = $90	
(c) ··· Debt	$90	$90	$90
··· Equity	$10	$30	$20

With these project payoffs, it is optimal for bondholders never to convert. Therefore, the conversion feature has no value.

2. With the new project "BAD" (which pays +$50 or –$60 with equal probabilities, independent of the original project), the payoffs are:

Adding Risky Project "New"						
		Prob				**Exp**
		¹/₄	¹/₄	¹/₄	¹/₄	**Value**
Project	Firm	$100	$100	$120	$120	$110
Project	BAD	$50	–$60	$50	–$60	–$5
Total Projects		$150	$40	$170	$60	$105

We can now consider the two scenarios:

a) In this case, the bond is nonconvertible.

Straight Bond with Face Value $90						
		Prob				**Exp**
		¹/₄	¹/₄	¹/₄	¹/₄	**Value**
Total Projects		$150	$40	$170	$60	$105
Bond	Debt	$90	$40	$90	$60	$70
Equity	Equity	$60	$0	$80	$0	$35

Yes, in this case, the shareholders want this project to be undertaken, because $35 is more than $20.

b) In this case, the bond with $90 face value is convertible into 75% of the firm's equity.

(a) Firm	$150
(b) Bond	Debt
(c) If Conv. (75% Eq)	Debt
(d) If Optimal Conv	Debt
(e) Equity	Equity

| | **Prob** | | | | **Exp** |
	$1/4$	$1/4$	$1/4$	$1/4$	**Value**
(a) Firm	$150	$40	$170	$60	$105
(b) Bond	$90	$40	$90	$60	$70
(c) If Conv (75%)	$112.5	$30	$127.5	$45	$78.8
(d) Optimal	Yes	No	Yes	No	
Then	$112.5	$40	$127.5	$60	$85
(e) Equity	$37.5	$0	$42.5	$0	$20

The shareholders are now no longer better off if project "BAD" is undertaken, because they now receive $18.18 either way. (If we made the debt convertible into 75.1% of the firm's equity, then the shareholders would be outright worse off.) Therefore, the convertibility adds value, even though we would never observe an actual conversion taking place. The convertibility would have deterred shareholders from taking bad projects in the first place.

Q 19.17   • The expected NPV is $200 million

- The creditors' repayment is assured. You would either keep $0 or $400.

- You would have to sell 1/3 of the firm. Your $100 million investors would get back $100/3 million half the time, $500/3 million half the time. You would keep $100·2/3 ≈ $67 million half the time, $500 · 2/3 ≈ $333 half the time.

- The creditors' repayment is assured. You would either keep $0 if you knew the drug would fail, or $400 million if you knew it would succeed.

- If you could sell just 1/3 of the firm, you would get $333 million. Alas, this is worse than $400 million. Thus, you wouldn't sell equity, and your potential investors would know this. You could only sell them the drug for 100% of the firm. This is because they would assume the drug is bad, and this is the only way they will get their money back. It also means that you would not keep anything!

Q 19.18 You should not bid anything above $500,000 for this house. If you bid $750,000, then you would get the house only if it is worth $500,000, and you would therefore earn $500,000/$750,000 − 1 = −33%. The other half of the time, you would not be the highest bidder so your rate of return would be 0%. Thus, your expected rate of return would be 50% · (−33%) + 50% · 0% = −16.7%.

Q 19.19 The "pecking order" refers to a scenario in which firms first issue as many senior securities (debt) as they can, before they issue more junior securities (equity). As to the thinking question, in a real-world firm, a pecking order may or may not lead to the firm being more debt-financed over time. The reason is that the projects of many firms are profitable, which increases the value of the equity of the firm over time, too.

Q 19.20 Firms that are concerned about inside information issues (i.e., that investors infer the quality of the projects from their behavior) should issue debt, because issuing equity would send a bad signal about the value of their projects.

Q 19.21   1. Good firms are still better off going with debt. Thus, they will still get to keep $140, the bad firms will go with equity and get to keep $50, and the lawyers expect to get $10 from half the firms (which you can count as $5).

2. It turns out that there are two equilibria now.

   • The first equilibrium has investors still assuming that all equity issuers are con artists. The good firms prefer $150-$15 (equity) to $100 (debt), and therefore all stick to debt. The bad firms prefer to raise funding with $50 equity. The outside investors are exactly correct—all equity issuers are scum, and all debt issuers are good. Lawyers expect to get $15 from half the firms (which you can count as $7.50).

   • The second equilibrium has investors assuming that all good firms prefer equity to debt, too. In this case, with both good and bad firms in the equity pool, outside investors can be satisfied with $1/4$ of the firm's equity. Good firms prefer the $137.50 from issuing equity to the $150–$15 from issuing debt. Thus, the outside investors are exactly correct, too—equity issuers can be either good or bad with equal probability. The lawyers get nothing.

   (Economists often have elaborate arguments about which of these equilibria is more likely to be selected in the real world. They have a vague resemblance to arguments about how many angels can dance on the top of a pin.)

Q 19.22 An example of transaction costs favoring equity is market segmentation in the corporate debt market that might prevent selling corporate debt cheaply to many institutions and retail investors. An example of transaction costs favoring debt are high regulatory costs and exchange fees for listing the company's shares in the public market.

Q 19.23 See Exhibit 19.5 for these forces. Not all are value-optimizing for the overall firm (e.g., unmitigated agency conflicts).

Q 19.24 In an imperfect market, the costs of debt and equity capital (and thus of the firm's capital) can be affected by the firm's leverage ratio. Thus, the WACC function is no longer a horizontal line.

Q 19.25 No, the personal income tax rate is still value-relevant. However, it works through its influence on the cost of capital that enters the WACC formula, not through its own term.

Q 19.26 A cash-cow firm would best be financed by something that looks like a bond until a recession comes around. You could design a novel kind of bond that has the ability to cancel or delay bond payments *if, and only if,* the official GDP or unemployment numbers state that there is a recession. The presence of agency problems makes it better if the contract does not allow managers to delay payments at their own discretion under normal circumstances.

End of Chapter Problems

Q 19.27. When is financial distress neutral, with regard to capital structure? When is it not neutral?

Q 19.28. In what types of firms would you imagine financial distress costs to be high?

Q 19.29. Does it appear as if financial distress costs should be a significant determinant of Fortune 100 firms' capital structures? What about for small growth firms?

Q 19.30. A firm has debt with a face value of $100. Its projects will pay a safe $80 tomorrow. Managers care only about shareholders. A new quickie project comes along that costs $20, earns either $10 or $40 with equal probabilities, and does so by tomorrow. Assume that the time value of money is 0.

1. Is this a positive-NPV project?

2. If the new project can only be financed with a new equity issue, would the shareholders vote for this? Would the creditors?

3. Assume the existing bond contract was written in a way that allows the new projects to be financed with first collateral (superseniority with respect to the existing creditors). New creditors can collect $20 from what the existing projects will surely pay. Would the existing creditors be better off?

4. What is the better arrangement from a firm-value perspective?

Q 19.31. Rent and watch the movie *Other People's Money*. Pay close attention to Danny DeVito's speech at the shareholders' meeting. What capital structure-related issue is he talking about? What kind of security would have reduced this problem?

Q 19.32. What kind of firms are most likely to be influenced by free cash flow issues when choosing a capital structure?

Q 19.33. A firm has debt with a face value of $100. Its projects will pay a safe $80 tomorrow. Managers care only about shareholders. A new quickie project comes along that costs $30, earns either $0 or $70 with equal probabilities, and does so by tomorrow. Assume that the time value of money is 0.

1. Is this a positive-NPV project?

2. If the new project can only be financed with a new equity issue, would the shareholders vote for this? Would the creditors?

3. Assume the existing bond contract was written in a way that allows the new projects to be financed with first collateral (superseniority with respect to the existing creditors). New creditors can collect $30 from what the existing projects will surely pay. Would the existing creditors be better off?

4. What is the better arrangement from a firm-value perspective if the old bondholders have veto power?

Q 19.34. What are the advantages and disadvantages of unit-offering bundles?

Q 19.35. Are shareholders better off if they can expropriate bondholders?

Q 19.36. (Advanced) A firm has $100 in cash and debt of $80. Assume that the time value of money is zero. A novel project comes along that costs $60 and that will either deliver $0 or x with equal probabilities.

1. What is the value of debt and equity without the project?

2. What is the x value above which the project would be positive NPV? Call this xh.

3. What is the x value above which the shareholders want the firm to take the project? Call this xl.

4. Divide the possible regions into those below xl, those between xl and xh, and those above xh. More specifically, pick xl − $10, (xl + xh)/2, and xh + 10 as your returns in the good state. In these three cases:

   a) If the debt can convert into 80% of the post-conversion equity, what would the debt and equity be worth? Would existing equity want to take the project?

   b) If the debt can convert into 0% of the post-conversion equity (i.e., if it is not convertible), what would the debt and equity be worth? Would existing equity want to take the project?

c) If the debt can convert into 40% of the post-conversion equity, what would the debt and equity be worth? Would existing equity want to take the project?

5. Do you have all the information needed to recommend a conversion rate to maximize the value of the firm today?

Q 19.37. A stake in an oil field is for sale. It can be worth either \$500 or \$1,000 with equal probabilities. It costs \$250 to develop. The seller knows the true value; you do not. The seller has no personal sources of funds. In an otherwise perfect market with no time value of money, what can the seller expect to raise and at what price?

Q 19.38. Repeat the last question but now assume that this seller has personal savings of \$200. With this extra capital and bargaining power, what can the seller expect to raise and at what price?

Q 19.39. If investors are rational and managers are overoptimistic, how would the value of the firm change if management were to raise more money for new projects? Would it be worse if the firm raised equity?

Q 19.40. When private equity firms take over publicly traded firms, they usually increase the leverage tremendously. Discuss what effect this capital structure policy should have on the firm's value and why.

Q 19.41. Explain three forces that can make debt cheaper than equity for corporate financing.

Q 19.42. Explain three forces that can make equity cheaper than debt for corporate financing.

Q 19.43. If the firm maximizes its *value* in an imperfect financial market, how would this change its *cost of capital*?

Q 19.44. What forces can change the shape of the graph of cost of capital versus leverage?

Q 19.45. Where do agency considerations appear in the WACC formula? Do agency costs influence the firm's WACC?

Q 19.46. If you could design a novel security at the inception of a growth firm that you expect to turn into a cash-generating value firm in 5 years, what would it look like?

Q 19.47. Is the ability of a firm to stave off financial distress always optimal from the firm-value perspective?