CHAPTER 7

CAPITAL STRUCTURE: OVERVIEW OF THE FINANCING DECISION

In the past few chapters, we examined the investment principle and argued that projects that earn a return greater than the minimum acceptable hurdle rate are good projects. In coming up with the cost of capital, which we defined to be the minimum acceptable hurdle rate, however, we used the existing mix of debt and equity used by the firm.

In this chapter, we examine the choices that a firm has in terms of both debt and equity and how these choices change over a firm's life cycle. In particular, we look at how the choices change as a firm goes from being a small, private business to a large publicly traded corporation. We then evaluate the basic trade-off between using debt and equity by weighing the benefits of borrowing against its costs. We close the chapter by examining when the costs of borrowing exactly offset its benefits, which essentially makes debt irrelevant, and the implications for corporate finance.

The Choices: Types of Financing

There are only two ways in which any business can raise money—debt or equity. This may seem simplistic, given the array of choices firms have in terms of financing vehicles. We will begin this section with a discussion of the characteristics of debt and equity and then look at a range of financing vehicles available within each of these categories. We will then examine of a range of securities that share some characteristics with debt and some with equity and are therefore called **hybrid securities**.

Hybrid Security: Any security that shares some of the characteristics of debt and some characteristics of equity.

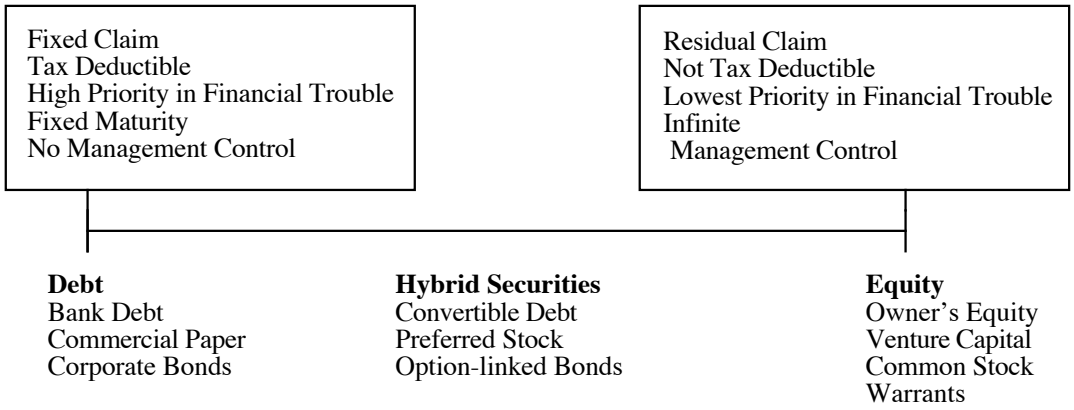
The Continuum between Debt and Equity

Although the distinction between debt and equity is often made in terms of bonds and stocks, its roots lie in the nature of the cash flow claims of each type of financing. The first distinction is that a *debt claim* entitles the holder to a contractual set of cash

flows (usually interest and principal payments), whereas an *equity claim* entitles the holder to any residual cash flows after meeting all other promised claims. This remains the fundamental difference, but other distinctions have arisen, partly as a result of the tax code and partly as a consequence of legal developments.

The second distinction, which is a logical outgrowth of the nature of cash flow claims (contractual versus residual), is that debt has a prior claim on both cash flows on a period-to-period basis (for interest and principal payments) and on the assets of the firm (in the case of liquidation). Third, the tax laws have generally treated interest expenses, which accrue to debt holders, very differently and often much more advantageously than dividends or other cash flows that accrue to equity. In the United States, for instance, interest expenses are tax-deductible to the entity paying them, and thus create tax savings, whereas dividend payments have to be made out of after-tax cash flows. Fourth, debt usually has a fixed maturity date, at which point the principal is due, whereas equity generally has an infinite life. Finally, equity investors, by virtue of their claim on the residual cash flows of the firm, are generally given the bulk of or all of the control of the management of the firm. Debt investors, on the other hand, play a much more passive role in management, exercising at most veto power over significant financial decisions.[1] These differences are summarized in Figure 7.1.

Figure 7.1: Debt versus Equity



To summarize, debt is defined as any financing vehicle that is a contractual claim on the firm (and not a function of its operating performance), creates tax-deductible

[1]Veto power is usually exercised through covenants or restrictions written into bond agreements.

payments, has a fixed life, and has a priority claim on cash flows in both operating periods and in bankruptcy. Conversely, equity is defined as any financing vehicle that is a residual claim on the firm, does not create a tax advantage from its payments, has an infinite life, does not have priority in bankruptcy, and provides management control to the owner. Any security that shares characteristics with both is a hybrid security.

In Practice: A Financing Checklist for Classifying Securities

Some new securities at first sight are difficult to categorize as either debt or equity. To check where on the spectrum between straight debt and straight equity these securities fall, answer the following questions:

1. Are the payments on the securities contractual or residual?

- If contractually set, it is closer to debt.
- If residual, it is closer to equity.

2. Are the payments tax-deductible?

- If yes, it is closer to debt.
- If no, if is closer to equity.

3. Do the cash flows on the security have a high priority or a low priority if the firm is in financial trouble?

- If it has high priority, it is closer to debt.
- If it has low priority, it is closer to equity.

4. Does the security have a fixed life?

- If yes, it is closer to debt.
- If no, it is closer to equity.

5. Does the owner of the security get a share of the control of management of the firm?

- If no, it is closer to debt.
- If yes, if is closer to equity



7.1. **Is This Debt or Is It Equity?**

You have been asked to classify a security as debt or equity and have been provided the following characteristics for the security: It requires fixed monthly payments that are tax-deductible and it has an infinite life. Its claims on the cash flows of the firm, during

operation, and on the assets, if the firm goes bankrupt, come after all debt holders' claims (including unsecured debt) are met.

a. It is debt.

b. It is equity.

c. It is a hybrid security.

A. Equity

Although most people think of equity in terms of common stock, the equity claim on a business can take a variety of forms, depending partly on whether the firm is privately owned or publicly traded and partly on the firm's growth and risk characteristics. Private firms have fewer choices available than do publicly traded firms, because they cannot issue securities to raise equity. Consequently, they have to depend either on the owner or a private entity, usually a venture capitalist, to bring in the equity needed to keep the business operating and expanding. Publicly traded firms have access to capital markets, giving them a wider array of choices.

1. Owner's Equity

Most businesses, including the most successful companies of our time, such as Microsoft and Wal-Mart, started off as small businesses with one or a few individuals providing the seed money and plowing back the earnings of the firm into the businesses. These funds, brought in by the owners of the company, are referred to as the *owner's equity* and provide the basis for the growth and eventual success of the business.

2. Venture Capital and Private Equity

Venture Capital: Equity capital provided to a private firm by an investor(s), in exchange for a share of the ownership of the firm.

As small businesses succeed and grow, they typically run into is a funding constraint, where the funds that they have access to are insufficient to cover their investment and growth needs. A **venture capitalist** or private equity investor provides equity financing to small and often risky businesses in return for a share of the ownership of the firm.

Generally speaking, the capacity to raise funds from alternative sources and/or to go public will increase with the size of the firm and decrease with the uncertainty about its future prospects. Thus, smaller and riskier businesses are more likely to seek venture capital and are also more likely to be asked to give up a greater share of the value of the firm when receiving the venture capital.



7.2. **The Effects of Diversification on Venture Capitalists**

You are comparing the required returns of two venture capitalists who are interested in investing in the same software firm. One venture capitalist has all of his capital invested in only software firms, whereas the other has invested her capital in small companies in a variety of businesses. Which of these two will demand the higher required rate of return?

a. The venture capitalist who is invested only in software companies.
b. The venture capitalist who is invested in a variety of businesses.
c. Cannot answer without more information.

If both venture capitalists had the same expected cash flow estimates for the business, which one would demand a larger share of the ownership for the same capital investment?

a. The venture capitalist with the higher required rate of return.
b. The venture capitalist with the lower required rate of return.

3. Common Stock

The conventional way for a publicly traded firm to raise equity is to issue common stock at a price the market is willing to pay. For a newly listed company, this price is estimated by the issuing entity (such as an investment banker) and is called the offering price. For an existing publicly traded company, the price at which additional equity is issued is usually based on the current market price. In some cases, the common stock issued by a company is uniform; that is, each share receives a proportional share of both the cash flows (such as dividends) and the voting rights. In other cases, different classes of common stock will provide different dividends and voting rights.

Common stock is a simple security, and it is relatively easy to understand and value. In fact, it can be argued that common stock makes feasible all other security

choices for a publicly traded firm, because a firm without equity cannot issue debt or hybrid securities. The accounting treatment of common stock follows well-established precedent and can be presented easily within the conventional format of financial statements.

4. Warrants

In recent years, firms have started looking at equity alternatives to common stock. One alternative used successfully by Japanese companies in the late 1980s involved **warrants**, where the holders received the right to buy shares in the company at a fixed price sometime in the future in return for paying for the warrants up front. Because their value is derived from the price of the underlying common stock, warrants have to be treated as another form of equity.

> ***Warrant:*** A security issued by a company that provides the holder with the right to buy a share of stock in the company at a fixed price during the life of the warrant.

Why might a firm use warrants rather than common stock to raise equity? We can think of several reasons. First, warrants are priced based on the implied volatility assigned to the underlying stock; the greater the volatility, the greater the value. To the degree that the market overestimates how risky a firm is, the firm may gain by using warrants and option-like securities. Second, warrants by themselves create no financial obligations at the time of the issue. Consequently, issuing warrants is a good way for a high-growth firm to raise funds, especially when current cash flows are low or negative. Third, for financial officers who are sensitive to the dilution created by issuing common stock, warrants seem to provide the best of both worlds—they do not create any new additional shares currently while they raise equity investment funds for current use.



7.3. **Stock Price Variance and the Use of Warrants**

Companies with high variance in their stock prices should use warrants more than companies with low variance in their stock prices, because warrant prices increase with variance.

a. True

b. False

Explain.

In Practice: Valuing Warrants

Warrants are long-term call options, but standard option pricing models are based on the assumption that exercising an option does not affect the value of the underlying asset. This may be true for listed options on stocks, but it is not true for warrants, because their exercise increases the number of shares outstanding and brings fresh cash into the firm, both of which will affect the stock price. The expected negative impact (dilution) of their exercise will make warrants less valuable than otherwise similar call options. There are two significant differences between the inputs we use to value conventional options (see appendix 4 for more on option pricing models) and the inputs used to value a dilution-adjusted option.

- The stock price is adjusted for the expected dilution from warrant exercise.

$$\text{Dilution-Adjusted } S = (Sn_S + Wn_w)/(n_s + n_w)$$

where

S = current value of the stock;

n_w = number of warrants outstanding;

W = market value of warrants outstanding;

n_s = number of shares outstanding.

When the warrants are exercised, the number of shares outstanding will increase, reducing the stock price. The numerator reflects the market value of equity, including both stocks and warrants outstanding. Making this adjustment will lower the stock price used in the model and hence the value of the warrant.

5. Contingent Value Rights

Contingent value rights provide investors with the right to sell stocks for a fixed price and thus derive their value from the volatility of the stock and the desire on the part of investors to hedge away their losses. *Put options*, which are traded on the option exchanges, give their holders a similar right to sell the underlying stock at a fixed price. There are two primary differences between contingent value rights and put options. First, the proceeds from the contingent value rights sales go to the firm, whereas those from the

Contingent Value Rights: A contingent value right provides the holder with the right to sell a share of stock in the underlying company at a fixed price during the life of the right.

sale of listed put options go to private parties. Second, contingent value rights tend to be much more long-term than typical listed put options.

There are several reasons why a firm may choose to issue contingent value rights. The most obvious is that the firm believes it is significantly undervalued by the market. In such a scenario, the firm may offer contingent value rights to take advantage of its belief and to provide a signal to the market of the undervaluation. Contingent value rights are also useful if the market is overestimating volatility and the put price reflects this misestimated volatility. Finally, the presence of contingent value rights as insurance may attract new investors to the market for the common stock.

B. Debt

The clear alternative to using equity, which is a residual claim, is to borrow money. This option both creates a fixed obligation to make cash flow payments and provides the lender with prior claims if the firm is in financial trouble.

1. Bank Debt

Historically, the primary source of borrowed money for all private firms and many publicly traded firms have been banks, with the interest rates on the debt based on the perceived risk of the borrower. Bank debt provides the borrower with several advantages. First, it can be used for borrowing relatively small amounts of money; in contrast, bond issues thrive on economies of scale, with larger issues having lower costs. Second, if the company is neither well known nor widely followed, bank debt provides a convenient mechanism to convey information to the lender that will help in both pricing and evaluating the loan; in other words, a borrower can provide internal information about projects and the firm to the lending bank. The presence of hundreds of investors in bond issues makes this both costly and not feasible if bonds are issued as the primary vehicle for debt. Finally, to issue bonds, firms have to submit to being rated by ratings agencies and provide sufficient information to make this rating Dealing with a rating

agency might be much more difficult and costly for many firms, especially smaller firms, than dealing with a lending bank.

Besides being a source of both long-term and short-term borrowing for firms, banks also often offer them a flexible option to meet unanticipated or seasonal financing needs. This option is a *line of credit*, which the firm can draw on only if it needs financing. In most cases, a line of credit specifies an amount the firm can borrow and links the interest rate on the borrowing to a market rate, such as the prime rate or Treasury rates. The advantage of having a line of credit is that it provides the firm with access to the funds without having to pay interest costs if the funds remain unused. Thus, it is a useful type of financing for firms with volatile working capital needs. In many cases, however, the firm is required to maintain a compensating balance on which it earns either no interest or below-market rates. For instance, a firm that wants a $20 million line of credit from a bank might need to maintain a compensating balance of $2 million, on which it earns no interest. The opportunity cost of having this compensating balance must be weighed against the higher interest costs that will be incurred by taking on a more conventional loan to cover working capital needs.



7.5. **Corporate Bonds and Bank Debt**

If a company can issue corporate bonds, it should not use bank debt.

a. True

b. False

Explain.

2. Bonds

For larger, publicly traded firms, an alternative to bank debt is to issue bonds. Generally speaking, bond issues have several advantages for these firms. The first is that bonds usually carry more favorable financing terms than equivalent bank debt, largely because risk is shared by a larger number of financial market investors. The second is that bond issues might provide a chance for the issuer to add on special features that could not be added on to bank debt. For instance, bonds can be convertible into common stock or be tied to commodity prices (commodity bonds). When borrowing money, firms have to

make a variety of choices, including the maturity of the borrowing (short-term or long-term), whether the debt should have fixed interest payments or an interest rate tied to market rates (fixed and floating rates), the nature of the security offered to those buying the bonds (secured versus unsecured) and how the debt will be repaid over time. In Chapter 9, we will examine how best to make these choices.

3. Leases

A firm often borrows money to finance the acquisition of an asset needed for its operations. An alternative approach that might accomplish the same goal is to lease the asset. In a lease, the firm commits to making fixed payments to the owner of the asset for the rights to use the asset. These fixed payments are either fully or partially tax-deductible, depending on how the lease is categorized for accounting purposes. Failure to make lease payments initially results in the loss of the leased asset but can also result in bankruptcy, though the claims of the lessors (owners of the leased assets) may sometimes be subordinated to the claims of other lenders to the firm.

A lease agreement is usually categorized as either an operating lease or a capital lease. For *operating leases*, the term of the lease agreement is shorter than the life of the asset, and the present value of lease payments is generally much lower than the actual price of the asset. At the end of the life of the lease, the asset reverts back to the lessor, who will either offer to sell it to the lessee or lease it to somebody else. The lessee usually has the right to cancel the lease and return the asset to the lessor. Thus, the ownership of the asset in an operating lease clearly resides with the lessor, with the lessee bearing little or no risk if the asset becomes obsolete. Operating leases cover the store spaces leased out by specialty retailing firms like The Gap and Ann Taylor, for instance.

A *capital lease* generally lasts for the life of the asset, with the present value of lease payments covering the price of the asset. A capital lease generally cannot be canceled, and the lease can be renewed at the end of its life at a reduced rate or the asset acquired by the lessee at a favorable price. In many cases, the lessor is not obligated to pay insurance and taxes on the asset, leaving these obligations up to the lessee; the lessee consequently reduces the lease payments, leading to what are called *net leases*. A capital lease places substantial risk on the shoulders of the lessee if the asset loses value or

becomes obsolete. Although the differences between operating and financial leases are obvious, some lease arrangements do not fit neatly into one or another of these extremes; rather, they share some features of both types of leases. These leases are called *combination leases*.



7.6. **Debt Maturity and Interest Rates**

Assume that long-term interest rates are much higher than short-term rates (a steeply upward-sloping yield curve) and that your investment banker advises you to issue short-term debt because it is cheaper than long-term debt. Is this statement true?

a. Yes

b. False

Why or why not?

In Practice: Leasing versus Borrowing

If borrowing money to buy an asset and leasing the asset are both variations on debt, why might a firm choose one over the other? We can think of several factors that may sway firms in this choice:

1. ***Service Reasons***: In some cases, the lessor of an asset will bundle service agreements with the lease agreement and offer to provide the lessee with service support during the life of the lease. If this service is unique—either because of the lessor's reputation or because the lessor is also the manufacturer of the asset—and if the cost of obtaining this service separately is high, the firm may choose to lease rather than buy the asset. IBM, for instance, has traditionally leased computers to users, with an offer to service them when needed.

2. ***Flexibility***: Some lease agreements provide the lessee with the option to exchange the asset for a different or upgraded version during the life of the lease. This flexibility is particularly valuable when the firm is unsure of its needs and when technology changes rapidly. Flexibility is also useful when the asset is required for a period much shorter than the life of the asset, because buying the asset and selling it again is expensive in terms of transaction time and cost.

3. ***Tax Reasons***: The classic reason provided for leasing is that different entities face different tax rates. An entity with a high tax rate buys an asset and leases it to one with no or a low tax rate. By doing so, the lessor obtains the tax benefits, which are greater because of its higher tax rate. The lessee, in turn, gets the use of the asset and also gains by sharing in some of the tax benefits.

In addition, if a lease qualifies as an operating lease, it essentially operates as off-balance-sheet debt and may make firms that use it look safer to a careless analyst. If firms consider leasing as an alternative to borrowing, the choice becomes primarily financial. Operating leases create lease obligations to the firm, and these obligations are tax-deductible. The present value of these after-tax lease obligations has to be weighed against the present value of the after-tax cash flows that would have been generated if the firm had borrowed the money and bought the asset instead. The after-tax cash flows from borrowing and buying the asset have to include not only the interest and principal payments on the debt but also the tax benefits accruing from depreciation from owning the asset and the expected value of the asset at the end of operations.

C. Hybrid Securities

Convertible Debt: Debt that can be converted into equity at a rate that is specified as part of the debt agreement (conversion rate).

Summarizing our analysis thus far, equity represents a residual claim on the cash flows and assets of the firm and is generally associated with management control. Debt, on the other hand, represents a fixed claim on the cash flows and assets of the firm and is usually not associated with management control. There are a number of securities that do not fall neatly into either of these two categories; rather, they share some characteristics with equity and some with debt. These securities are called hybrid securities.

1. Convertible Debt

A **convertible bond** is a bond that can be converted into a predetermined number of shares, at the discretion of the bondholder. Although it generally does not pay to convert at the time of the bond issue, conversion becomes a more attractive option as

stock prices increase. Firms generally add conversions options to bonds to lower the interest rate paid on the bonds.

In a typical convertible bond, the bondholder is given the option to convert the bond into a specified number of shares of stock. The *conversion ratio* measures the number of shares of stock for which each bond may be exchanged. Stated differently, the *market conversion value* is the current value of the shares for which the bonds can be exchanged. The *conversion premium* is the excess of the bond value over the conversion value of the bond.

Thus, a convertible bond with a par value of $1,000, which is convertible into fifty shares of stock, has a conversion ratio of 50. The conversion ratio can also be used to compute a conversion price—the par value divided by the conversion ratio—yielding a conversion price of $20. If the current stock price is $25, the market conversion value is $1,250 (50 * $25). If the convertible bond is trading at $1,300, the conversion premium is $50.

In Practice: A Simple Approach to Decomposing Debt and Equity

The value of a convertible debt can be decomposed into straight debt and equity components using a simple approach. Because the price of a convertible bond is the sum of the straight debt and the conversion option components, the value of the straight bond component in conjunction with the market price of the convertible bond should be sufficient to estimate the conversion option component, which is also the equity component:

Value of Equity Component = Price of Convertible Bond – Value of Straight Bond Component

The value of the straight bond component can be estimated using the coupon payments on the convertible bond, the maturity of the bond, and the market interest rate the company would have to pay on a straight debt issue. This last input can be estimated directly if the company also trades straight bonds in the market place, or it can be based on the bond rating, if any, assigned to the company.

For instance, assume that you have a ten-year convertible bond, with a 5 percent coupon rate trading at $1,050, and that the company has a debt rating of BBB (with a

market interest rate of 8 percent). The value of the straight bond and equity components can be estimated as follows:

$$\text{Straight Bond Component} = \$50\ (\text{PVA, 10 years, 8\%}) + 1000/1.08^{10} = \$799$$

$$\text{Equity Component} = \$1{,}050 - \$799 = \$251$$



7.7. **Convertible Debt and Yields**

The yields on convertible bonds are much lower than the yields on straight bonds issued by a company. Therefore, convertible debt is cheaper than straight debt.

a. True

b. False

Why or why not?

2. Preferred Stock

Preferred stock is another security that shares some characteristics with debt and some with equity. Like debt, preferred stock has a fixed dollar dividend; if the firm does not have the cash to pay the dividend, it is accumulated and paid in a period when there are sufficient earnings. Like debt, preferred stockholders do not have a share of control in the firm, and their voting privileges are strictly restricted to issues that might affect their claims on the firm's cash flows or assets. Like equity, payments to preferred stockholders are not tax-deductible and come out of after-tax cash. Also like equity, preferred stock does not have a maturity date when the face value is due. In terms of priority, in the case of bankruptcy, preferred stockholders have to wait until the debt holders' claims have been met before receiving any portion of the assets of the firm.

Preferred Stock: A hybrid security. Like debt, it has a promised payment (the preferred dividend) in each period. Like equity, its cash flows are not tax-deductible, and it has an infinite life.

Although accountants and ratings agencies continue to treat preferred stock as equity, it can be argued that the fixed commitments that preferred stock create are like debt obligations and have to be dealt with likewise. The obligations created by preferred stock are generally less onerous than those created by debt; however, because they are

generally cumulated, cannot cause default, and do not have priority over debt claims in the case of bankruptcy.

Unlike convertible debt, which can be decomposed into equity and debt components, preferred stock cannot really be treated as debt because preferred dividends are not tax-deductible and certainly cannot be viewed as the equivalent of equity because of the differences in cash flow claims and control. Consequently, preferred stock is treated as a third component of capital, in addition to debt and equity, for purposes of capital structure analysis and for estimating the cost of capital.



7.8. **Preferred Stock and Equity**

Many ratings agencies and regulators treat preferred stock as equity in computing debt ratios, because it does not have a finite maturity and firms cannot be forced into bankruptcy if they fail to pay preferred dividends. Do you agree with this categorization?

a. Yes

b. No

Why or why not?

3. Option-Linked Bonds

In recent years, firms have recognized the value of combining options with straight bonds to create bonds that more closely match the firm's specific needs. We considered one when with convertble bonds. Consider two other examples. In the first, commodity companies issued bonds linking the principal and even interest payments to the price of the commodity. Thus interest payments would rise if the price of the commodity increased and vice versa. The benefit for the company was that it tailored the cash flows on the bond to the cash flows of the firm and reduced the likelihood of default. These **commodity-linked bonds** can be viewed as a combination of a straight security and a call option on the underlying commodity. In the second example, consider insurance companies that have recently issued bonds whereby the principal on the bond is reduced in the case of a specified

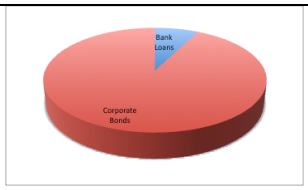
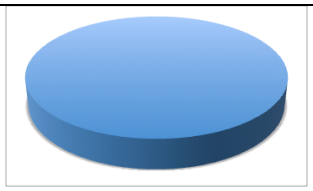
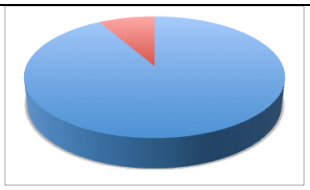
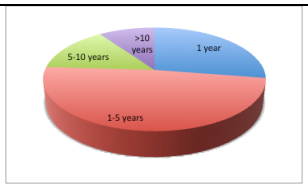
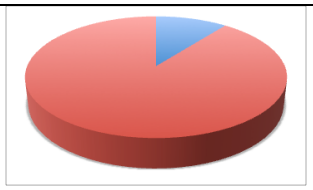
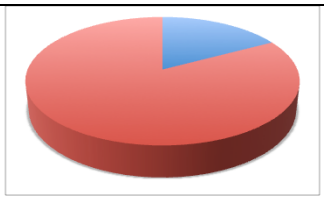
Commodity-Linked Bonds: Bonds where the interest and/or the principal payments are linked to the price of the commodity. In most cases, the payments will increase with the price of the commodity and decrease if it drops.

catastrophe and remains unaffected in its absence. For instance, an insurance firm that has the bulk of its revenues coming from homeowners' insurance in California might attach a provision that reduces principal and/or interest in the case of a major earthquake. Again, the rationale is to provide the firm with some breathing room when it needs it the most—when a catastrophe creates huge cash outflows for the firm.

Illustration 7.1: Financing Choices in 2008- Disney, Aracruz and Tata Chemicals

Disney, Aracruz and Tata Chemicals all have debt on their books in 2008. We well begin by taking a look at both the amount of the debt and the composition of this debt in table 7.1:

Table 7.1: Debt Breakdown for Disney, Aracruz and Tata Chemicals

	Disney	*Aracruz*	*Tata Chemicals*
Debt due	*$13.27 billion*	*R$ 24.20 billion*	*Rs 42.22 billion*
Loans vs Bonds			
Maturity			
Leases	Has operating leases with a debt value of $1.46 billion (see chapter 4)	No stated lease commitments	Small lease commitments.
Fixed vs Floating	76% Fixed Rate 24% Floating Rate	100% Fixed Rate	100% Fixed Rate
Currency	90% US dollar 10% Japanese Yen	100% R$	97% Rupees 3% US dollar
Other	43% of bonds are callable 10% of bonds are putable	Small portion of debt is convertible Bank debt is term loans	Bank debt is term loans

Looking at the breakdown of the debt, we can draw some preliminary conclusions:

a. Disney used the corporate bond market much more extensively than Aracruz and Tata Chemicals in 2008, with 92% of its debt taking the form of bonds, reflecting both its standing as a large market capitalization company and its access to capital markets as a US-based company.

b. While Disney has the higher proportion of short term debt of the three companies, it is the only one of the three companies with debt maturing in more than 10 years. That may also be a reflection of its use of the bond market, since banks, especially in emerging markets, may be unwilling to commit to long term loans.

c. Disney is the only one of the three companies with a significant portion of floating rate debt, where the interest will vary across time, as a function of index rates (LIBOR, in the case of Disney).

d. All three companies borrow predominantly in their domestic currencies. Disney does have some Japanese debt and Tata Chemicals has two small US dollar bond issues.

e. Disney's corporate bonds follow the conventional form and have only coupon payments during their lifetime, with the face value due at the end (bullet payments). In contrast, the bank loans used by Aracruz and Tata Chemicals require that the principal be repaid over the course of the debt (term loans).

f. A large portion of Disney's bonds can be called back by the firm, if it chooses to do so, an option that will probably be exercised if interest rates drop significantly. A small portion of the bonds can be put back by the bondholders to the firm, a protection against actions that Disney may take that reduce the value of the bonds.

While we did not break out Bookscape's debt in table 7.1, the only debt it has takes the form of an operating lease on its premises. As we noted in chapter 4, the present value of the lease commitments (of $750,000 each year for the next 25 years) is $9.6 million.

Financing Behavior

We spent the last section looking at the different financing choices available to a firm. They all represent external financing, that is, funds raised from outside the firm.

Many firms meet the bulk of their funding needs internally with cash flows from existing assets. In this section, we begin by presenting the distinction between internal and external financing and the factors that may affect how much firms draw on each source. We then turn our attention again to external financing. We consider how and why the financing choices may change as a firm goes through different stages of its life cycle, from start-up to expansion to high growth to stable growth and on to decline. We will follow up by looking why some choices dominate in some stages and do not play a role in others.

Internal versus External Financing

Cash flows generated by the existing assets of a firm can be categorized as internal financing. Because these cash flows belong to the equity owners of the business, they are called *internal equity*. Cash flows raised outside the firm, whether from private sources or from financial markets, can be categorized as *external financing*. External financing can, of course, take the form of new debt, new equity, or hybrids.

A firm may prefer internal to external financing for several reasons. For private firms, external financing is typically difficult to raise, and even when it is available (from a venture capitalist, for instance) it is accompanied by a loss of control (the venture capitalist wants a share of control). For publicly traded firms, external financing may be easier to raise, but it is still expensive in terms of issuance costs (especially in the case of new equity). Internally generated cash flows, on the other hand, can be used to finance operations without incurring large transaction costs or losing control.

Despite these advantages, there are limits to the use of internal financing to fund projects. First, firms have to recognize that internal equity has the same cost as external equity, before the transaction cost differences are factored in. The cost of equity, computed using a risk and return model, such as the CAPM or APM, applies as much to internal as to external equity. Thus, Disney has a cost of equity of 10.00 percent for internal equity (or retained earnings) and external equity (new stock or equity option issues). This equivalence implies that a project financed with internal equity should pass the same test as a project financed with external equity; Disney has to earn a return on equity for investors that is greater than 10 percent on projects funded with either external

equity or retained earnings. Second, internal equity is clearly limited to the cash flows generated by the firm for its stockholders. Even if the firm does not pay dividends, these cash flows may not be sufficient to finance the firm's projects. Depending entirely on internal equity can therefore result in project delays or the possible loss of these projects to competitors. Third, managers should not make the mistake of thinking that the stock price does not matter just because they use only internal equity for financing projects. In reality, stockholders in firms whose stock prices have dropped are much less likely to trust their managers to reinvest their cash flows for them than are stockholders in firms with rising stock prices.

Growth, Risk, and Financing

As firms grow and mature, their cash flows and risk exposure follow fairly predictable patterns. Cash flows become larger, relative to firm value, and risk approaches the average risk for all firms. The financing choices that a firm makes will reflect these changes. To understand these choices, let us consider five stages in a firm's life cycle:

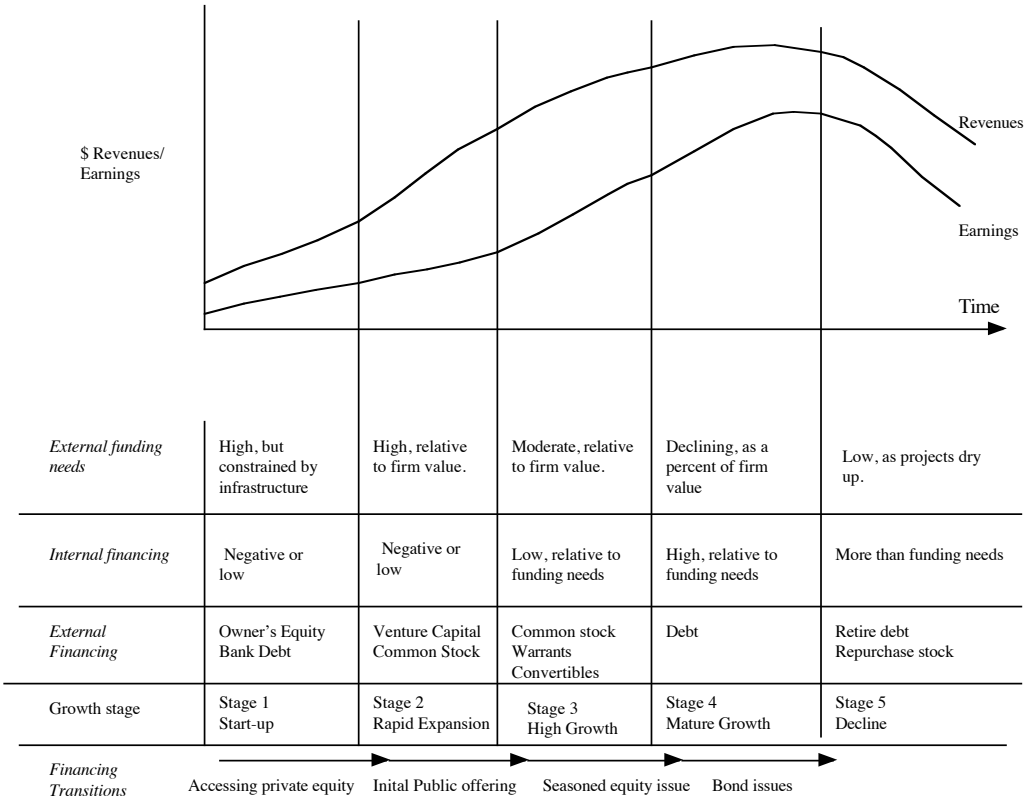
1. ***Start-Up***: This represents the initial stage after a business has been formed. Generally, this business will be a private business, funded by owner's equity and perhaps bank debt. It will also be restricted in its funding needs, as it attempts to gain customers and get established.
2. ***Expansion***: Once a firm succeeds in attracting customers and establishing a presence in the market, its funding needs increase as it looks to expand. Because this firm is unlikely to be generating high cash flows internally at this stage and investment needs will be high, the owners will generally look to private equity or venture capital initially to fill the gap. Some firms in this position will make the transition to publicly traded firms and raise the funds they need by issuing common stock.
3. ***High Growth***: With the transition to a publicly traded firm, financing choices increase. Although the firm's revenues are growing rapidly, earnings are likely to lag behind revenues and internal cash flows lag behind reinvestment needs. Generally, publicly traded firms at this stage will look to more equity issues, in the form of

common stock, warrants, and other equity options. If they are using debt, convertible debt is most likely to be used to raise capital.

4. ***Mature Growth***: As growth starts leveling off, firms will generally find two phenomena occurring. The earnings and cash flows will continue to increase rapidly, reflecting past investments, and the need to invest in new projects will decline. The net effect will be an increase in the proportion of funding needs covered by internal financing and a change in the type of external financing used. These firms will be more likely to use debt in the form of bank debt or corporate bonds to finance their investment needs.
5. ***Decline***: The last stage in this corporate life cycle is decline. Firms in this stage will find both revenues and earnings starting to decline as their businesses mature and new competitors overtake them. Existing investments are likely to continue to produce cash flows, albeit at a declining pace, and the firm has little need for new investments. Thus, internal financing is likely to exceed reinvestment needs. Firms are unlikely to be making fresh stock or bond issues but are more likely to be retiring existing debt and buying back stock. In a sense, the firm is gradually liquidating itself.

Figure 7.2 summarizes both the internal financing capabilities and external financing choices of firms at different stages in the growth life cycle.

Figure 7.2: Life Cycle Analysis of Financing



Not all firms go through these five phases, and the choices are not the same for all of them. First, many firms never make it past the start-up stage in this process. Of the tens of thousands of businesses that are started each year by entrepreneurs, many fail to survive, and even those that survive often continue as small businesses with little expansion potential. Second, not all successful private firms become publicly traded corporations. Some firms, like Cargill and Koch Industries, remain private and manage to raise enough capital to continue growing at healthy rates over long periods. Third, there are firms like Microsoft that are in high growth and seem to have no need for external financing, because internal funds prove more than sufficient to finance this growth. There are high-growth firms that issue debt, and low-growth firms that raise equity capital. In short, there are numerous exceptions, but the life cycle framework still provides a useful device to explain why different kinds of firms do what they do and what causes them to deviate from the prescribed financing choices.

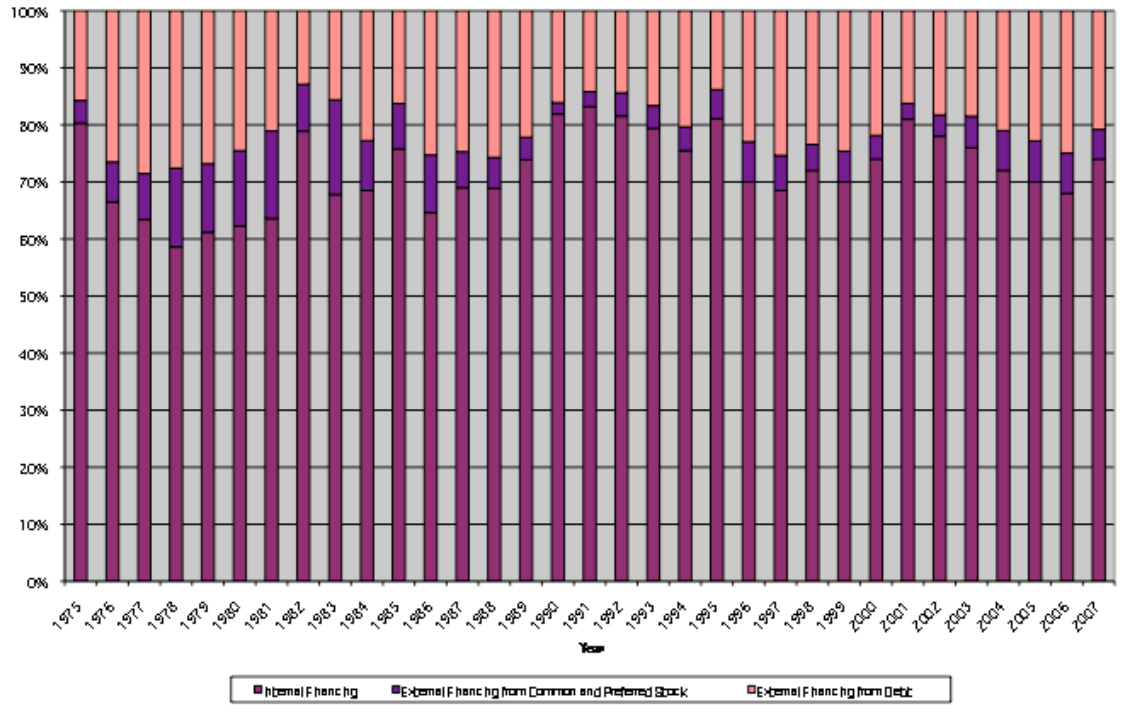
Note that when we look at a firm's choices in terms of debt and equity at different stages in the growth life cycle, there are two things we do not do in this analysis. First,

we do not explain in any detail why firms at each stage in the growth life cycle pick the types of financing that they do. Second, we do not consider what kind of debt is best for a firm—short-term or long-term, dollar or foreign currency, fixed rate or floating rate. The reason is that this choice has more to do with the types of assets the firm owns and the nature of the cash flows from these assets than with where in its life cycle a firm is in. We will return to examine this issue in more detail in Chapter 9.

How Firms Have Actually Raised Funds

In the first part of this chapter, we noted the range of choices in terms of both debt and equity that are available to firms to raise funds. Before we look at which of these choices should be used, it is worth noting how firms have historically raised funds for operations. Firms have used debt, equity, and hybrids to raise funds, but their dependence on each source has varied across time. In the United States, for instance, firms collectively have generally raised external financing through debt issues rather than equity issues, and have primarily raised equity funds internally from operations. Figure 7.3 illustrates the proportion of funds from new debt and equity issues, as well as from internal funds, for U.S. corporations between 1975 and 2007.

Figure 7.3: External and Internal Financing at US Firms



In every year, firms have relied more heavily on internal financing to meet capital needs than on external financing. Furthermore, when external financing is used, it is more likely to be new debt rather than new equity or preferred stock.

There are wide differences across firms in the United States in how much and what type of external financing is used. The evidence is largely consistent with the conclusions that emerge from looking at a firm's place in the growth cycle in Figure 7.2. Fluck, Holtz-Eakin, and Rosen looked at several thousand firms that were incorporated in Wisconsin; most of these firms were small, private businesses.[2] The authors find that these firms depend almost entirely on internal financing, owner's equity, and bank debt to cover capital needs. The proportion of funds provided by internal financing increases as the firms became older and more established. A small proportion of private businesses manage to raise capital from venture capitalists and private equity investors. Many of these firms ultimately plan on going public, and the returns to the private equity investors come at the time of the public offering. Bradford and Smith looked at sixty computer-related firms prior to their initial public offerings (IPOs) and noted that forty-one of these firms had private equity infusions before the public offering.[3] The median number of private equity investors in these firms was between two and three, and the median proportion of the firm owned by these investors was 43.8 percent; an average of 3.2 years elapsed between the private equity investment and the IPO at these firms. Although this is a small sample of firms in one sector, it does suggest that private equity plays a substantial role in allowing firms to bridge the gap between private businesses and publicly traded firms.

When we compare the financing patterns of U.S. companies to companies in other countries, we find some evidence that U.S. companies are much more heavily dependent

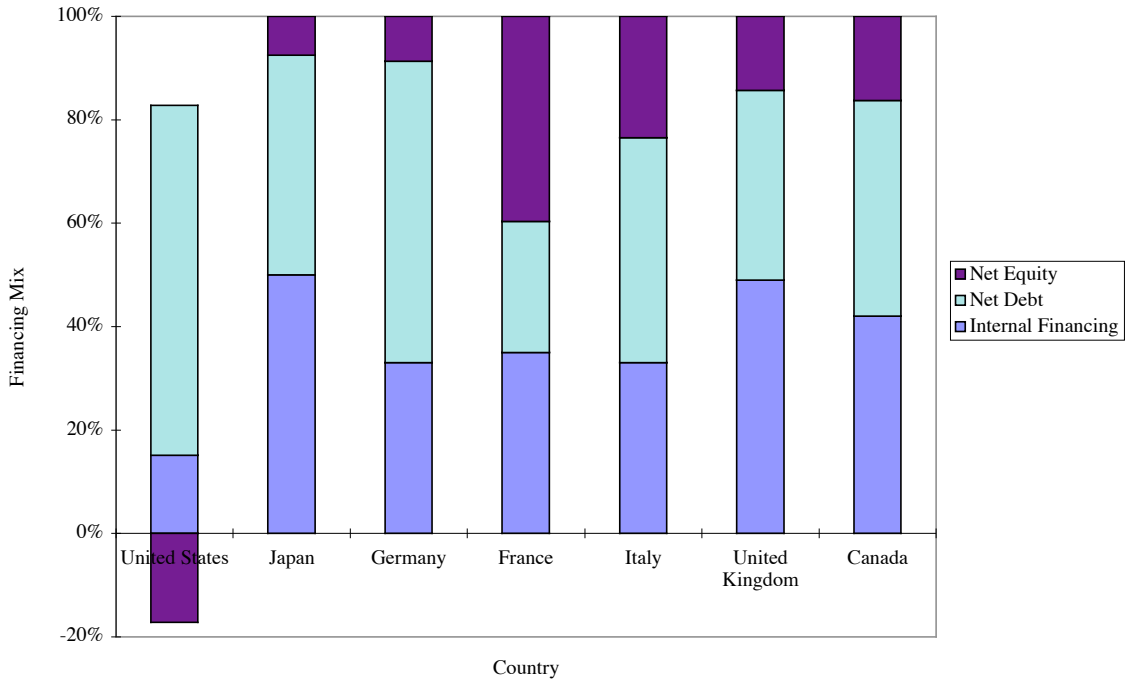
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[2]Fluck, Z., D. Holtz-Eakin and H.S. Rosen, 1998, *Where does the money come from? The Financing of Small Entrepreneurial Enterprises?*, Working Paper, NYU Salomon Center. This is a unique data set, because this information is usually either not collected or not available to researchers.

[3] Bradford, T. and R.C. Smith, 1997, *Private Equity: Sources and Uses*, Journal of Applied Corporate Finance, v10(1), 89-97.

on debt than equity for external financing than their counterparts in other countries. Figure 7.4 summarizes new security issues in the G-7 countries between 1984 to 1991.[4]

Figure 7.4: Financing Patterns for G-7 Countries – 1984-91



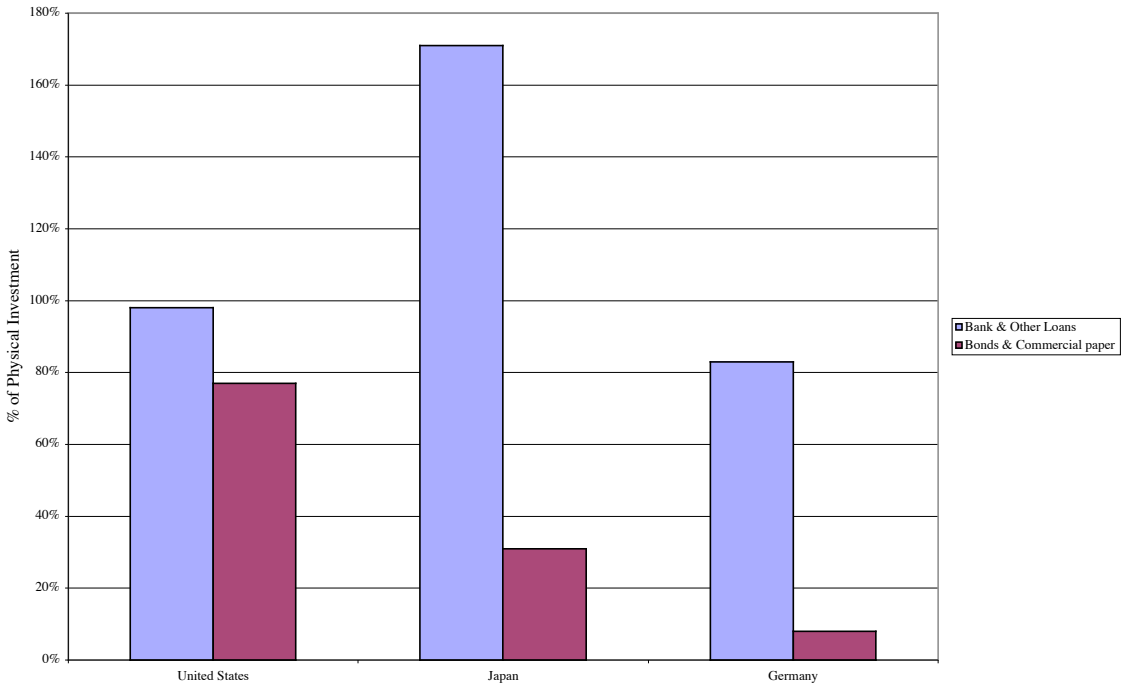
Net equity in Figure 7.4 refers to the difference between new equity issues and stock buybacks. Firms in the United States, during the period of this comparison, bought back more stock than they issued, leading to negative net equity. In addition, a comparison of financing patterns in the United States, Germany, and Japan reveals that German and Japanese firms are much more dependent on bank debt than firms in the United States, which are much likely to issue bonds.[5] Figure 7.5 provides a comparison of bank loans

[4]See Rajan, Raghuram G. and Luigi Zingales. *What Do We Know About Capital Structure? Some Evidence From International Data*, Journal of Finance, 1995, v50(5), 1421-1460. This is based on OECD data, summarized in the OECD publication " Financial Statements of Non-Financial Enterprises." The G7 countries represent seven of the largest economies in the world. The leaders of these countries meet every year to discuss economic policy.

[5]Hackethal, A. and R.H. Schmidt, 1999, *Financing Patterns: Measurement Concepts and Empirical Results*, Working Paper, University of Frankfurt.. They compare financing patterns in the three countries.

and bonds as sources of debt for firms in the three countries, as reported in Hackethal and Schmidt .[6]

Figure 7.5: Bonds versus Bank Loans - 1990-96



There is also some evidence that firms in some emerging markets, such as Brazil and India, use equity (internal and equity) much more than debt to finance their operations. Some of this dependence can be attributed to government regulation that discourages the use of debt, either directly by requiring the debt ratios of firms to be below specified limits or indirectly by limiting the deductibility of interest expenses for tax purposes. One of the explanations for the greater dependence of U.S. corporations on debt issues relies on where they are in their growth life cycle. Firms in the United States, in contrast to firms in emerging markets, are much more likely to be in the mature growth stage of the life cycle. Consequently, firms in the United States should be less dependent on external equity. Another factor is that firms in the United States have far more access to corporate bond markets than do firms in other markets. Firms in Europe, for instance, often have to

[6] Hackethal, A. and R.H. Schmidt, 1999*, Financing Patterns: Measurement Concepts and Empirical Results*, Working Paper, University of Frankfurt.

raise new debt from banks, rather than bond markets. This may constrain them in the use of new debt.

7.9. **Corporate Bond Markets and the Use of debt**

Companies in Europe and emerging markets have historically depended on bank debt to borrow and have had limited access to corporate bond markets. In recent years, their access to corporate bond markets, both domestically and internationally, has increased. As a result, which of the following would you expect to happen to debt ratios in these countries?

a. Debt ratios should go up.
b. Debt ratios should go down.
c. Debt ratios should not change much.

*Why firms are reluctant to raise new equity: A Behavioral Perspective*

If there is a common theme to the financing choices that publicly traded firms make, at least in the United States, it is that they are reluctant to issue new shares to raise funds, which manifests itself in the low proportion of new funding that comes from equity (see figure 7.3) and an unwillingness to use rights issues, even though it is less expensive way of raising equity than issuing new shares at the current stock price. Since the same firms are willing to use internal equity (retained earnings) to fund projects, we can attribute this behavior to an aversion to equity or a preference for debt. There are two behavioral explanations:

a. Anchoring/ Framing: A common theme in behavioral finance is that how individuals make decisions is a function of how they frame the outcomes and their choices of anchors. For better or worse, the number that equity research analysts seem to pay the most attention to, when looking at corporate earnings, is earnings per share. Any new equity issue, no matter what its justification, increases the number of shares outstanding and by doing so, will reduce earnings per share, at least in the near term. When firms do decide to raise external equity, rights issues, widely used by European

companies to raise equity, are used infrequently by US companies, primarily because it results in more shares being issued to raise the same funds.

b. Over confidence: Malmendier and Tate (2004) note that the same over confidence that leads managers to over estimate cash flows on investments also can lead them to believe that their stock is under priced by the market, and this perception makes it less likely that they will issue shares at the price.

It is interesting to note that the aversion to reducing earnings per share and issuing new equity is selective. The same firms that are reluctant to make rights issues are more than willing to split their stock and seem to put aside the unwillingness to issue new common stock, when issuing convertible debt and preferred stock. Put another way, managers seem to averse to actions that increase the number of shares today but not to actions that potentially could increase the number of shares in the future.

The Process of Raising Capital

Looking back at Figure 7.2, we note four financing transitions, where the source of funding for a firm is changed by the introduction of a new financing choice. The first occurs when a private firm approaches a private equity investor or venture capitalist for new financing. The second occurs when a private firm decides to offer its equity to financial markets and become a publicly traded firm. The third takes place when a publicly traded firm decides to revisit equity markets to raise more equity. The fourth occurs when a publicly traded firms decides to raise debt from financial markets by issuing bonds. In this section, we examine the process of making each of these transitions. Because the processes for making seasoned equity and bond issues are very similar, we will consider them together.

Private Firm Expansion: Raising Funds from Private Equity

Private firms that need more equity capital than can be provided by their owners can approach venture capitalists and private equity investors. Venture capital can prove useful at different stages of a private firm's existence. *Seed-money venture capital*, for instance, is provided to start-up firms that want to test a concept or develop a new product, whereas *start-up venture capital* allows firms that have established products and

concepts to develop and market them. Additional rounds of venture capital allow private firms that have more established products and markets to expand. There are five steps associated with how venture capital gets to be provided to firms and how venture capitalists ultimately profit from these investments.

- ***Provoke Equity Investor's Interest***: The first step that a private firm wanting to raise private equity has to take is to get private equity investors interested in investing in it. There are a number of factors that help the private firm at this stage. One is the *type of business* that the private firm is in and how attractive this business is to private equity investors. The second factor is the track record of the top manager(s) of the firm. Top managers, who have a track record of converting private businesses into publicly traded firms, have an easier time raising private equity capital.
- ***Valuation and Return Assessment***: Once private equity investors become interested in investing in a firm, the value of the private firm has to be assessed by looking at both its current and expected prospects. This is usually done using the *venture capital method*, whereby the earnings of the private firm are forecast in a future year, when the company can be expected to go public. These earnings, in conjunction with a price-earnings multiple, estimated by looking at publicly traded firms in the same business, is used to assess the value of the firm at the time of the IPO; this is called the *exit or terminal value*.
- For instance, assume that Bookscape is expected to have an IPO in three years and that the net income in three years for the firm is expected to be $4 million. If the price-earnings ratio of publicly traded retail firms is 25, this would yield an estimated exit value of $100 million. This value is discounted back to the present at what venture capitalists call a *target rate of return*, which measures what venture capitalists believe is a justifiable return, given the risk to which they are exposed. This target rate of return is usually set at a much higher level than the traditional cost of equity for the firm.[7]
    - Discounted Terminal Value = Estimated exit value /(1 + Target return)^n

[7]For instance, the target rate of return for private equity investors is in excess of 30 percent.

- Using the Bookscape example again, if the venture capitalist requires a target return on 30 percent on his or her investment, the discounted terminal value for Bookscape would be
  - Discounted Terminal Value for Bookscape = \$100 million/1.30^3 = \$45.52 million
- ***Structuring the Deal***: In structuring the deal to bring private equity into the firm, the private equity investor and the firm have to negotiate two factors. First, the investor has to determine what proportion of the value of the firm he or she will demand in return for the private equity investment. The owners of the firm, on the other hand, have to determine how much of the firm they are willing to give up in return for the capital. In these assessments, the amount of new capital being brought into the firm has to be measured against the estimated firm value. In the Bookscape example, assuming that the venture capitalist is considering investing \$12 million, he or she would want to own at least 26.36 percent of the firm.[8]
  - Ownership Proportion = Capital Provided/Estimated Value
    - = \$12/\$45.52 = 26.36%
- Second, the private equity investor will impose constraints on new investments and fresh financing on the managers of the firm in which the investment is being made. This is to ensure that the private equity investors are protected and that they have a say in how the firm is run.
- ***Post-deal Management***: Once the private equity investment has been made in a firm, the investor will often take an active role in the management of the firm. Private equity investors and venture capitalists bring not only a wealth of management experience to the process but also contacts that can be used to raise more capital and get fresh business for the firm.
- ***Exit***: Private equity investors and venture capitalists invest in private businesses because they are interested in earning a high return on these investments. How will these returns be manifested? There are three ways a private equity investor can profit from an investment in a business. The first and usually the most lucrative alternative

[8]Many private equity investors draw a distinction between premoney valuation, or the value of the company without the cash inflow from the private equity investor, and postmoney valuation, which is the

is an IPO made by the private firm. Although venture capitalists do not usually liquidate their investments at the time of the IPO, they can sell at least a portion of their holdings once they are traded.[9] The second alternative is to sell the private business to another firm; the acquiring firm might have strategic or financial reasons for the acquisition. The third alternative is to withdraw cash flows from the firm and liquidate the firm over time. This strategy would not be appropriate for a high-growth firm, but it may make sense if investments made by the firm no longer earn excess returns.

While there are well known and publicized success stories of private businesses making it to prosperity, the reality is more sobering. Most private businesses do not make it. There are several studies that back up this statement, though they vary in the failure rates that they find. A study of 5196 start-ups in Australia found that the annual failure rate was in excess of 9% and that 64% of the businesses failed in a 10-year period.[10] Knaup and Piazza (2005,2008) used data from the Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW) to compute survival statistics across firms.[11] This census contains information on more than 8.9 million U.S. businesses in both the public and private sector. Using a seven-year database from 1998 to 2005, the authors concluded that only 44% of all businesses that were founded in 1998 survived at least 4 years and only 31% made it through all seven years.

From Private to Publicly Traded Firm: The IPO

A private firm is restricted in its access to external financing, both for debt and equity. In our earlier discussion of equity choices, we pointed out the hard bargain venture capitalists extract for investing equity in a private business. As firms become

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value of the company with the cash influx from the private equity investors. They argue that their ownership of the firm should be based on the former (lower) value.

[9]Black, B.S and R.J. Gilson, 1998, *Venture Capital and the Structure of Capital Markets: Banks versus Stock Markets*, Journal of Financial Economics, v47, 243-277. They argue that one of the reasons why venture capital is much more active in the United States than in Japan or Germany is because the option to go public is much more easily exercised in the United States.

[10] John Watson and Jim Everett, 1996, "Do Small Businesses Have High Failure Rates?" *Journal of Small Business Management, v*34, pg 45-63.

[11] Knaup, Amy E., May 2005,, "Survival and longevity in the Business Employment Dynamics data," *Monthly Labor Review*, pp. 50–56; Knaup, Amy E. and MC. Piazza, September 2007, Business Employment Dynamics Data: Survival and Longevity, Monthly Labor Review, pp 3-10.

larger and their capital needs increase, some of them decide to become publicly traded and to raise capital by issuing shares of their equity to financial markets.

Staying Private versus Going Public

When a private firm becomes publicly traded, the primary benefit is increased access to financial markets and capital for projects. This access to new capital is a significant gain for high-growth businesses with large and lucrative investment opportunities. A secondary benefit is that the owners of the private firm are able to cash in on their success by attaching a market value to their holdings. These benefits have to be weighed against the potential costs of being publicly traded. The most significant of these costs is the loss of control that may ensue from being a publicly traded firm. As firms get larger and the owners are tempted to sell some of their holdings over time, the owner's share of the outstanding shares will generally decline. If the stockholders in the firm come to believe that the owner's association with the firm is hurting rather than helping it, they may decide to put pressure for the owner's removal.

Other costs associated with being a publicly traded firm are the information disclosure requirements and the legal requirements.[12] A private firm experiencing challenging market conditions (declining sales, higher costs) may be able to hide its problems from competitors, whereas a publicly traded firm has no choice but to reveal the information. Yet another cost is that the firm has to spend a significant portion of its time on investor relations, a process in which equity research analysts following the firm are cultivated and provided with information about the firm's prospects.[13]

Overall, the net trade-off to going public will generally be positive for firms with large growth opportunities and funding needs. It will be smaller for firms that have smaller growth opportunities, substantial internal cash flows, and owners who value the complete control they have over the firm.

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[12]The costs are twofold. One is the cost of producing and publicizing the information itself. The other is the loss of control over how much and when to reveal information about the firm to others.

[13]"Cultivated" may sound like an odd word choice, but it is accurate. Buy recommendations from equity research analysts following the firm provoke investor interest and can have a significant impact on the stock price; sell recommendations, on the other, can cause the stock price to drop. This is especially true for small, lightly followed firms.

Steps in an IPO

Assuming that the benefits outweigh the costs, there are five steps involved in an IPO.

Step 1: Choose an investment banker based on reputation and marketing skills. In most IPOs, this investment banker underwrites the issue and guarantees a specified price for the stock. This investment banker then puts together a group of several banks (called a syndicate) to spread the risk of the offering and to increase marketing reach. [14] Private firms tend to pick investment bankers based on reputation and expertise, rather than price. A good reputation provides the credibility and the comfort level needed for investors to buy the stock of the firm; expertise applies not only to the pricing of the issue and the process of going public but also to other financing decisions that might be made in the aftermath of a public issue. The investment banking agreement is then negotiated, rather than opened up for competition.

Step 2: Assess the value of the company and set issue details. This valuation is generally done by the lead investment bank, with substantial information provided by the issuing firm. The value is sometimes estimated using discounted cash flow models. More often, though, the value is estimated by using a multiple, like a price-earnings ratio, and by looking at the pricing of comparable firms that are already publicly traded. Whichever approach is used, the absence of substantial historical information, in conjunction with the fact that these are small companies with high growth prospects, makes the estimation of value an uncertain one at best. Once the value for the company has been estimated, the value per share is obtained by dividing by the number of shares, which is determined by the price range the issuer would like to have on the issue. If the equity in the firm is valued at $50 million, for example, the number of shares would be set at 5 million to get a target price range of $10, or at 1 million shares to get a target price range of $50 per share. The final step in this process is to set the offering price per share. Most investment banks set the offering price below the estimated value per share for two reasons. First, it reduces the bank's risk exposure. If the offering price is set too high and the investment

[14] In 2004, Google broke with precedent and decided to go public without an investment banking syndicate backing it. Using an auction process to set the stock price, it saved itself the normal costs associated with issuance fees. It remains to be seen whether Google is unique or at the vanguard of a new trend.

bank is unable to sell all of the shares offered, it has to use its own funds to buy the shares at the offering price. Second, investors and investment banks view it as a good sign if the stock increases in price in the immediate aftermath of the issue. For the clients of the investment banker who get the shares at the offering price, there is an immediate payoff; for the issuing company, the ground has been prepared for future issues.

Step 3: Gauge investor demand at the offering price. In setting the offering price, investment bankers have the advantage of first checking investor demand. This process, which is called *building the book*, involves polling institutional investors prior to pricing an offering to gauge the extent of the demand for an issue. It is also at this stage in the process that the investment banker and issuing firm will present information to prospective investors in a series of presentations called *road shows*. In this process, if the demand seems very strong, the offering price will be increased; in contrast, if the demand seems weak, the offering price will be lowered. In some cases, a firm will withdraw an IPO at this stage if investors are not enthusiastic about it.[15]

Step 4: Meet SEC filing requirements and issue a prospectus. To make a public offering in the United States, a firm has to meet several requirements. First, it has to file a registration statement and prospectus with the SEC, providing information about it's financial history, its forecasts for the future, and how it plans for the funds it raises from the IPO. The prospectus provides information about the riskiness and prospects of the firm for prospective investors in its stock. The SEC reviews this information and either approves the registration or sends out a deficiency memorandum asking for more information. While the registration is being reviewed, the firm may not sell any securities, though it can issue a preliminary prospectus, called a *red herring*, for informational purposes only. Once the registration has been approved by the SEC, the firm can place a *tombstone advertisement* in newspapers and other publications.

Step 5: Allocate stock to those who apply to buy it at offering price. If the demand for the stock exceeds the supply (which will happen if the offering price is set too low), you will have to ration the stock. If the supply exceeds the demand, the investment banker will

[15]One study of IPOs between 1979 and 1982 found that 29 percent of firms terminated their IPOs at this stage in the process.

have to fulfill the underwriting guarantee and buy the remaining stock at the offering price.

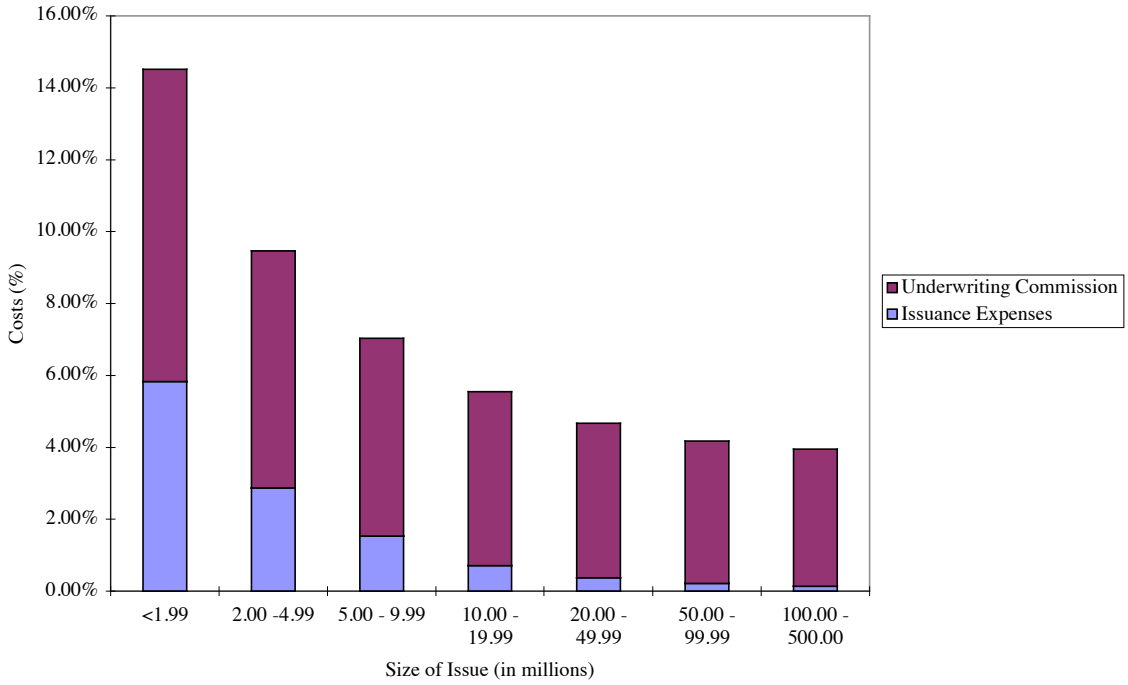
On the offering date—the first date the shares can be traded—the market price is determined by supply and demand. If the offering price has been set too high, as is sometimes the case, the investment bankers will have to discount the offering to sell it and make up the difference to the issuer because of the underwriting agreement. If the offering price is set too low, as is often the case, the traded price on the offering date will be much higher than the offereing price, thus enriching those who were allocated shares in the IPO.

The Costs of Going Public

There are three costs associated with an IPO. First, the firm must consider the legal and administrative cost of making a new issue, including the cost of preparing registration statements and filing fees. Second, the firm should examine the underwriting commission—the gross spread between the offering price and what the firm receives per share, which goes to cover the underwriting, management, and selling fees on the issue. This commission can be substantial and decreases as the size of the issue increases. Figure 7.6 summarizes the average issuance and underwriting costs for issues of different sizes, reported by Ritter (1998).[16]

[16] Ritter, J., 1998, *Initial Public Offerings*, Contemporary Finance Digest, v2, 5-30.

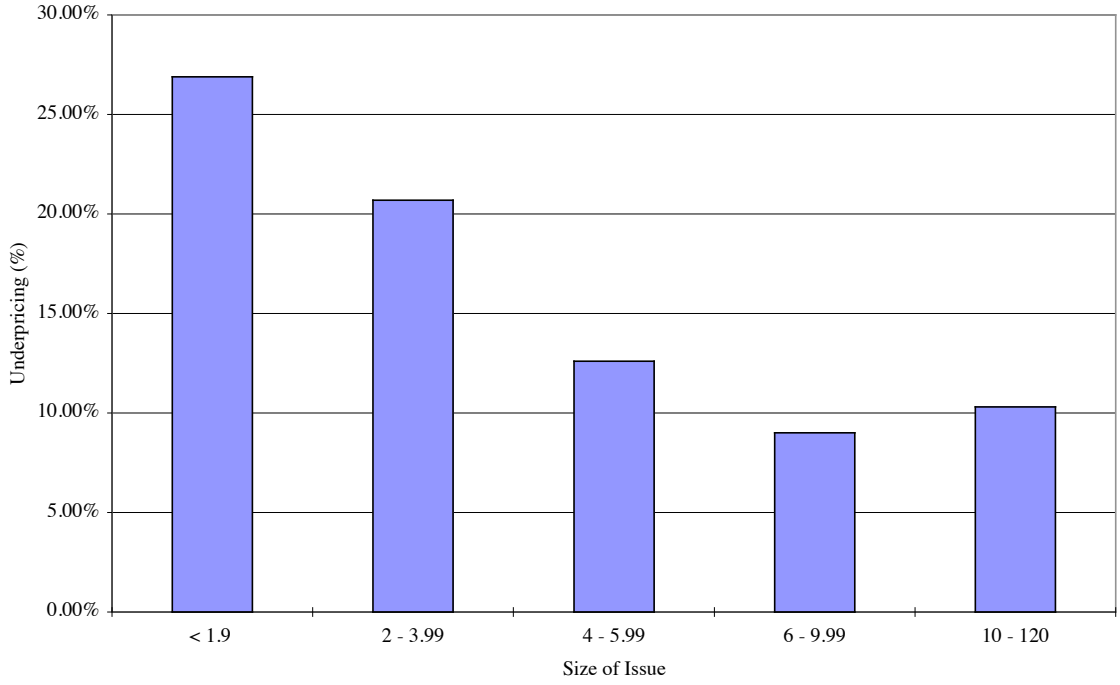
Figure7.6: Issuance Costs by Size of Issue



The third cost is any underpricing on the issue**,** which provides a windfall to the investors who get the stock at the offering price and sell it at the much higher market price. Although precise estimates vary from year to year, the average IPO seems to be underpriced by 10 to 15 percent. Ibbotson, Sindelar, and Ritter in a study of the determinants of underpricing, estimate its extent as a function of the size of the issue. [17] Figure 7.7 summarizes the underpricing as a percent of the price by size of issue.

[17] Ibbotson, Roger G., Jody L. Sindelar and Jay R. Ritter. 1994, *The Market's Problems With The Pricing Of Initial Public Offerings*, Journal of Applied Corporate Finance4, v7(1), 66-74.

Figure 7.7: Underpricing as percent of Price - By Issue Size



Source: Ibbotson, Sindelar, and Ritter (1994).

Investment banks are fairly open about the fact that they under price IPOs. This gives rise to two questions. First, why don't the offering firms express more outrage about the value left on the table by the underpricing? Second, can investors take advantage of the underpricing by subscribing to dozens of IPOs? There are answers to both questions. First, it is true that an underpriced IPO results in less proceeds going to the issuing firms. However, the loss of wealth is a function of how much of the equity of the firm is offered in the initial offering. If only 10 percent of the stock is being offered at the initial offering, we can see why many issuing firms go along with the underpricing. The favorable publicity associated with a strong opening day of trading may act as promotion for subsequent offerings that the firm plans to make in future months or even years. Second, it is not easy constructing an investment strategy that takes advantage of IPO mispricing. If an investor applies for shares in a number of offerings, he or she is likely to get all the shares requested in the offerings that are overpriced and only a fraction of the shares requested in the offerings that are underpriced (where there will be rationing because of excess demand). The resulting portfolio will be over weighted in overpriced

public offerings and underweighted with the underpriced offerings, and the returns will not match up to those reported in IPO studies.



The under pricing of IPOs: A Behavioral Perspective

While conventional finance has viewed the under pricing of initial public offerings as a puzzle, there are two explanations that have their basis in behavioral finance.

a. Stable buyers: The investors who subscribe to an initial public offering provide a home and a stable price for the stock, and by doing so, allay the fears that other investors may have about investing in a young company. The initial discount is the price that investment banks pay to the initial investors for voluntarily restricting their selling.[18]

b. The impresario hypothesis: The high initial return to investors in a public offering helps to create or sustain enthusiasm for initial offerings in general. Since IPOs occur in waves and often are concentrated on specific sectors at any time (technology stocks in the late 1990s), investment bankers pricing offerings have to work at keeping the enthusiasm going by under pricing them. Implicit here is the assumption that waves of new offerings are in essence taking advantage of an underlying bubble in a sector or the market, and that the under pricing feeds that illusion.

Finally, there are two other characteristics that feed the under pricing. The first is that investment bankers who are "averse to losses" will under price initial public offerings. The other is that the under pricing is compensation for the winner's curse in initial public offerings, i.e., that less informed investors over subscribe to over priced offerings and that the winners therefore have to offer their shares at a discount to keep these investors from dropping out of the game. Thus, informed investors in the IPO game will walk away with excess returns.

[18] Since the restriction is voluntary, those investors who violate this implicit agreement will not be allocated stock in future initial public offerings.

Illustration 7.2: The IPO for United Parcel Service (UPS)

On July 21, 1999, UPS, the world's largest private package company, announced plans to sell its shares to the public. The company, which was wholly owned by its managers and employees, announced that it was going public to raise capital to make acquisitions in the future. UPS reported revenues of $24.8 billion and net income of $1.7 billion in 1998 and at that time employed about 330,000 people.

UPS followed the initial announcement by filing a prospectus with the SEC on the same day, announcing its intention of creating two classes of shares. Class A shares, with ten votes per share, would be held by the existing owners of UPS, and class B shares, having one vote per share, would be offered to the public.

The firm chose Morgan Stanley as its lead investment banker, and Morgan Stanley put together a syndicate that included Goldman Sachs and Merrill Lynch as senior comanagers. Other comanagers included Credit Suisse, Salomon Smith Barney, and Warburg Dillon Read. On October 20, 1999, UPS filed a statement with the SEC (called an S-1 registration statement) announcing that it planned to issue 109.4 million shares (about 10 percent of the 1.1 billion outstanding shares) at a price range of $36 to $42,[19] and that the IPO would occur sometime in early November.

Based on the strong demand from institutional investors, gauged in the process of building the book, the investment banking syndicate increased the offering price to $50 per share on November 8, 1999, and set the offering date at November 10, 1999. At that time, it was the largest IPO ever by a U.S. company.

On November 10, 1999, the stock went public. The stock price jumped to $70.1325 from the offering price of $50. At the end of the trading day, UPS shares were trading at $67.25. Based on this price and the total number of shares outstanding, the market value of UPS was assessed at $80.9 billion.

7.10. **The Cost of Underpricing**

[19]The process by which this price range was set was not made public. We would assume that it was partially based on how the market was pricing two other publicly traded rivals—FedEx and Airborne Freight.

Assume that the market is correct in its assessment of UPS value and that the investment bankers underpriced the issue. How much did the underpricing cost the owners of UPS?

a. About $22 billion
b. About $50 billion
c. About $2.2 billion
d. None of the above

The Choices for a Publicly Traded Firm

Once a firm is publicly traded, it can raise new financing by issuing more common stock, equity options, or corporate bonds. Additional equity offerings made by firms that are already publicly traded are called seasoned equity issues. In making stock and bond offerings, a publicly traded firm has several choices. It can sell these securities with underwritten general subscriptions, where stocks and bonds are offered to the public at an offering price guaranteed by the investment banker. It can also privately place both bonds and stocks with institutional investors or issue stocks and bonds directly to investors without any middlemen.

General Subscriptions

In a *general subscription*, the issue is open to any member of the general public to subscribe. In that sense, it is very similar to an IPO, though there are some basic differences:

- *Underwriting Agreement*: The underwriting agreement of an IPO almost always involves a firm guarantee and is generally negotiated with the investment banker, whereas the underwriting agreements for seasoned issues take on a wider variety of forms. First, there is the potential for competitive bids to arise on seasoned issues, because investment bankers have the information to promise a fixed price.[20] There is evidence that competitive bids reduce the spread, though even seasoned firms continue to prefer negotiated offerings. Second, seasoned issues also offer a wider range of underwriting guarantees; some issues are backed up by a *best efforts*

guarantee, which does not guarantee a fixed price; other issues come with *standby guarantees*, where the investment banker provides back-up support, in case the actual price falls below the offering price. The payoff from relaxing the guarantee comes as lower underwriting commissions.

- *Pricing of Issue*: The issuer of an IPO has to estimate the value of the firm and then the per-share value before pricing the issue, whereas the pricing of a seasoned issue starts with the current market price, simplifying the process. Often, the price of a seasoned issue will be set just below the current market price.

The overall evidence on the cost of public offerings indicates that it is still clearly much more expensive to issue stock rather than bonds, and the cost of the issue is a decreases with the size of the issue.

Private Placements

An alternative to a general subscription is a *private placement*, in which securities are sold directly to one or a few investors. The terms for the securities are negotiated between the two parties. The primary advantage of private placements over general subscriptions is the lower cost, because there are fewer intermediaries and no need for underwriting guarantees or marketing. There are also substantial savings in time and administrative costs because the SEC registration requirements are bypassed. The other advantages are that the terms of the bond can be tailored to meet the specific needs of the buyer, and the firm can convey proprietary information (presumably positive) to the potential investors.

The primary disadvantage of private placements is that there are relatively few potential investors, because large private placements may expose the investor to firm-specific risks. This is why private placements of corporate bonds are much more common than private placement of equity. In a typical private placement, the buyer tends to be a long-term institutional investor, such as a life insurance company or a pension fund. These investors tend to invest in these bonds and hold them until maturity. Private

[20]The information takes two forms. The first are the filings that every publicly traded firm has to make with the SEC. The other, and more important, is the current stock price.

placements generally range from $25 million to $250 million in size and have more restrictions associated with them than typical corporate bond issues.

Rights Offerings

The third option available to seasoned issuers is a *rights offering*. In this case, instead of trying to sell new stock at the current market price to all investors, the existing investors in the firm are given the right to buy additional shares, in proportion to their current holdings, at a price much lower than the current market price.

A company that uses a rights offering generally issues one right for each outstanding common share, allowing each stockholder to use those rights to buy additional shares in the company at a *subscription price*, generally much lower than the market price. Rational stockholders will either exercise the right or sell it. Those investors who let a right expire without doing either will find that the market value of their remaining holding shrinks—the market price will almost certainly drop when the rights are exercised because the subscription price is set much lower than the market price. In general, the value of a right should be equal to the difference between the stock price with the rights attached—the *rights-on price*—and the stock price without the rights attached—the *ex-rights price*. The reasoning is simple. If this were not true, there would be opportunities for easy profits on the part of investors and the resulting price would not be stable. To illustrate, if the price of the right were greater than the difference between the rights-on price and the ex-rights price, every stockholder would be better off selling the right rather than exercising it. This, in turn, would push the price down toward the equilibrium price. If the price of the right were lower than the difference between the rights-on and the ex-right price, there would be an equally frenzied rush to buy the right and exercise it, which in turn would push the price up toward the equilibrium price. The value of a right can be estimated using the following equation:

$$\text{Price of a Right} = (\text{Rights-On Price} - \text{Subscription Price})/(n + 1)$$

where n is the number of rights required for each new share.

Rights offerings are a much less expensive way of raising capital than public issues, for two reasons. First, the underwriting commissions are much lower, because a rights offering has little risk of not receiving subscriptions if the subscription price is set

well below the market price. Second, the other transaction and administrative costs should also be lower because there is a far smaller need for marketing and distribution.

What is the drawback of making a rights issue? The primary reservation seems to be that it increases the number of shares outstanding far more than a general subscription at the existing stock price. To illustrate, a firm that makes a rights issue at $5 per share when the stock price is $10 will have to issue 10 million shares to raise $50 million. In contrast, the same firm would have had to issue only 5 million shares if the issue had been at the existing stock price of $10. Some financial managers argue that this dilutes the share holding and lowers the market price. Although this is true in a technical sense, the existing stockholders should not object because they are the only ones who receive the rights. In other words, the stock price will drop, but everyone will own proportionately more shares in the firm. In general, firms in the United States have been much more reluctant to use rights issues than European firms, in spite of the significant cost savings that could accrue from them. Part of this reluctance can be attributed to the fear of dilution.

Illustration 7.3: Valuing a Rights Offering: Tech Temp

Tech Temp has 10 million shares outstanding trading at $25 per share. It needs to raise $25 million in new equity and decides to make a rights offering. Each stockholder is provided with one right for every share owned, and five rights can be used to buy an additional share in the company at $12.50 per share. The value of a right can be calculated as follows:

	Before Rights Exercised	*After Rights Exercised*
Number of shares	10 million	12 million
Value of equity	$250 million	$275 million
Price per share	$25.00	$22.92

The rights-on price is $25.00 per share, and the ex-rights price is $22.92, leading to a per-right value of $2.08. This can be confirmed by using the equation:

$$\text{Value per Right} = (\text{Rights-On Price} - \text{Subscription Price})/(n + 1)$$
$$= (\$25 - \$12.50)/(5 + 1)$$
$$= \$12.50/6 = \$2.08$$

If the rights price were greater than this value, investors would want to sell their rights. Alternatively, if the rights could be acquired for less than $2.08, there would be an opportunity to gain by acquiring the rights at the lower price and exercising them.


rights.xls: This spreadsheet allows you to estimate the ex-rights price and the value per right in a rights issue.


7.11. **Rights Issues and Existing stockholders**

Assume that you own 1,000 shares in Tech Temp, trading at $25 a share, and that you receive the rights described in the last illustration. Assume also that due to an oversight, you neither exercise the right nor sell it. How much would you expect to lose as a result of the oversight?

a. Nothing; you still own the shares
b. $416
c. $2,080
d. $12,500

Shelf Registrations

Firms that want to raise external financing have to disclose information and file the required statements with the SEC before they can issue securities. This registration process is costly and time-consuming and is one reason why some firms rely on internal financing. In response to this criticism, the SEC simplified its rules and allowed firms more flexibility in external financing. Rule 415, which was issued in 1982, allows firms to make a *shelf registration*, in which they can file a single prospectus for a series of issues they expect to make over the next two years.

Besides making the process less cumbersome, shelf registration also gives firms more flexibility in terms of timing, because stock and bond issues can be made when windows of opportunity open up. Thus, a firm might make a shelf registration for $200 million in bonds and make the bond issue when interest rates are at a low point. This flexibility in timing also allows firms to open up the process to aggressive bidding from

investment banks, reducing transaction costs substantially. Some firms make the issues themselves rather than use investment bankers because the process is simpler and faster.

Overall, the spreads on new issues, especially for bonds, have been under pressure since the passage of shelf registration. In spite of its benefits, however, shelf registration is more likely to be used by large firms making bond issues and less likely to be used by small firms making equity issues.

The Trade-Off of Debt

Now that we have defined debt and considered how financing choices change as a function of where a firm is in its life cycle, we can tackle a fundamental question. Why use debt instead of equity? In this section, we will first examine the benefits of using debt instead of equity and then follow up by looking at the costs.

The Benefits of Debt

In the broadest terms, debt provides two differential benefits over equity. The first is the *tax benefit*: Interest payments on debt are tax-deductible, whereas cash flows on equity are not. The second is the *added discipline imposed on management* by having to make payments on debt. Both benefits can and should be quantified if firms want to make reasonable judgments on debt capacity.

Double Taxation: There is double taxation when the same income gets taxed twice, once at the entity level and once at the individual level. Thus, dividends, which are paid out of after-tax corporate profits, are double-taxed when individuals have to pay taxes on them as well.

1. Debt Has a Tax Advantage

The primary benefit of debt relative to equity is the tax advantage it confers on the borrower. In the United States, interest paid on debt is tax-deductible, whereas cash flows on equity (such as dividends) have to be paid out of after-tax cash flows. For the most part, this is true in other countries as well, though some countries try to provide partial protection against the **double taxation** of dividends by providing a tax credit to investors who receive the dividends for the corporate taxes paid (Britain) or by taxing retained earnings at a rate higher than dividends (Germany).

The tax benefits from debt can be presented in three ways. The first two measure the benefit in absolute terms, whereas the third measures it as a percentage cost.

- In the first approach, the dollar tax savings in any financial year created by interest expenses can be computed by multiplying the interest expenses by the marginal tax rate of the firm. Consider a firm that borrows $\$B$ to finance it operations, on which it faces an interest rate of r percent, and assume that it faces a marginal tax rate of t on income. The annual tax savings from the interest tax deduction can be calculated as follows:

$$\text{Annual Interest Expense Arising from the Debt} = rB$$

$$\text{Annual Tax Savings Arising from the Interest Payment} = trB$$

- In the second approach, we can compute the present value of tax savings arising from interest payments over time. The present value of the annual tax savings can be computed by making three other assumptions. The first is that the debt is perpetual, which also means that the dollar savings are a perpetuity. The second is that the appropriate discount rate for this cash flow is the interest rate on the debt, because it reflects the riskiness of the debt. The third is that the expected tax rate for the firm will remain unchanged over time and that the firm is in a tax-paying position. With these three assumptions, the present value of the savings can be computed as follows:

$$\text{Present Value of Tax Savings from Debt} = trB/r = tB$$

$$= \text{Marginal Tax Rate} * \text{Debt}$$

Although the conventional view is to look at the tax savings as a perpetuity, the approach is general enough to be used to compute the tax savings over a shorter period (say, ten years.) Thus, a firm that borrows $100 million at 8 percent for ten years and has a tax rate of 40 percent, can compute the present value of its tax savings as follows:

Present Value of Interest Tax Savings = Annual Tax Savings (PV of Annuity)

= (0.08 * 0.4 * $100 million) (PV of Annuity, 8%, 10 years) = $21.47 million

When asked to analyze the effect of adding debt on value, some analysts use a shortcut and simply add the tax benefit from debt to the value of the firm with no debt:

$$\text{Value of Levered Firm with Debt } B = \text{Value of Unlevered Firm} + tB$$

The limitation of this approach is that it considers only the tax benefit from borrowing and none of the additional costs. It also yields the unrealistic conclusion that firm value always increases as you borrow more money.

- In the third approach, the tax benefit from debt is expressed in terms of the difference between the pretax and after-tax cost of debt. To illustrate, if r is the interest rate on debt, and t is the marginal tax rate, the after-tax cost of borrowing (k_d) can be written as follows:

$$\text{After-Tax Cost of Debt } (k_d) = r(1 - t)$$

This is the familiar formula used for calculating the cost of debt in the cost of capital calculation. In this formula, the after-tax cost of debt is a decreasing function of the tax rate. A firm with a tax rate of 40 percent, which borrows at 8 percent, has an after-tax cost of debt of 4.8 percent. Another firm with a tax rate of 70 percent, which borrows at 8 percent, has an after-tax cost of debt of 2.4 percent.

Other things remaining equal, the benefits of debt are much greater when tax rates are higher. Consequently, there are three predictions that can be made about debt ratios across companies and across time.

- The debt ratios of entities facing higher tax rates should be higher than the debt ratios of comparable entities facing lower tax rates. Other things remaining equal, you would expect German companies that face a 38.5 percent marginal corporate tax rate to borrow more money than Irish companies that face a 12.5 percent marginal corporate tax rate.
- If tax rates increase over time, we would expect debt ratios to go up over time as well, reflecting the higher tax benefits of debt.
- Companies with large net operating losses carried forward should get far less in tax benefits from debt than firms without these net operating losses.

There is a data set online that summarizes by sector the effective tax rates of firms.

7.12. **Net Operating Loss Carryforward and Tax Benefits**

You have been asked to assess the after-tax cost of debt for a firm that has $2 billion in net operating losses to carry forward, and operating income of roughly $2 billion this year. If the company can borrow at 8 percent, and the marginal corporate tax rate is 40 percent, the after-tax cost of debt this year is

8 percent.

4.8 percent.

What would your after-tax cost of debt be next year?

2. Debt May Make Managers More Disciplined

In the 1980s, in the midst of the leveraged buyout boom, a group of practitioners and academics, led by Michael Jensen at Harvard, developed and expounded a new rationale for borrowing, based on improving firms' efficiency in the utilization of their free cash flows. **Free cash flows** represent cash flows made on operations over which managers have discretionary spending power—they may use them to take projects, pay them out to stockholders, or hold them as idle cash balances. The group argued that managers in firms that have substantial free cash flows and no or low debt have such a large cash cushion against mistakes that they have no incentive to be efficient in either project choice or project management. One way to introduce discipline into the process is to force these firms to borrow money, because borrowing creates the commitment to make interest and principal payments, increasing the risk of default on projects with substandard returns. It is this difference between the forgiving nature of the equity commitment and the inflexibility of the debt commitment that have led some to call equity a cushion and debt a sword.

Free Cash Flows (Jensen's): The free cash flows referred to here are the operating cash flows after taxes but before discretionary capital expenditures.

The underlying assumptions in this argument are that there is a conflict of interest between managers and stockholders and that managers will not maximize shareholder wealth without a prod (debt). From our discussion in Chapter 2, it is clear that this assumption is grounded in fact. Most large U.S. corporations employ managers who own only a very small portion of the outstanding stock in the firm; they receive most of their

income as managers rather than stockholders. Furthermore, evidence indicates that managers at least sometimes put their interests ahead those of stockholders.

The argument that debt adds discipline to the process also provides an interesting insight into management perspectives on debt. Based purely on managerial incentives, the optimal level of debt may be much lower than that estimated based on shareholder wealth maximization. Left to themselves, why would managers want to burden themselves with debt, knowing full well that they will have to become more efficient and pay a larger price for their mistakes? The corollary to this argument is that the debt ratios of firms in countries in which stockholder power to influence or remove managers is minimal will be much lower than optimal because managers enjoy a more comfortable existence by carrying less debt than they can afford to. Conversely, as stockholders acquire power, they will push these firms to borrow more money and, in the process, increase their stock prices.

Do increases in debt lead to improved efficiency and higher returns on investments? The answer to this question should provide some insight into whether the argument for added discipline has some basis. A number of studies have attempted to answer this question, though most have done so indirectly.

- Firms that are acquired in hostile takeovers are generally characterized by poor performance in both accounting profitability and stock returns. Bhide, for instance, noted that the return on equity of these firms is 2.2 percent below their peer group, whereas the stock returns are 4 percent below the peer group's returns.[21] Although this poor performance by itself does not constitute support for the free cash flow hypothesis, Palepu presented evidence that target firms in acquisitions carry less debt than similar firms that are not taken over.[22]

Leveraged Recapitalization: In a leveraged recapitalization, a firm borrows money and either buys back stock or pays a dividend, thus increasing its debt ratio substantially.

[21] Bhide, A., 1993, Reversing Corporate Diversification, in The New Corporate Finance- Where Theory meets Practice, ed. D.H. Chew Jr., McGraw Hill.

[22] Palepu, Krishna G., *1986, Predicting Takeover Targets: A Methodological And Empirical Analysis*, 1986, Journal of Accounting and Economics, v8(1), 3-35.

- There is evidence that increases in leverage are followed by improvements in operating efficiency, as measured by operating margins and returns on capital. Palepu presented evidence of modest improvements in operating efficiency at firms involved in leveraged buyouts.[23] Kaplan and Smith in separate studies, also found that firms earn higher returns on capital following leveraged buyouts.[24] Denis and Denis presented more direct evidence on improvements in operating performance after **leveraged recapitalizations**.[25] In their study of twenty-nine firms that increased debt substantially, they report a median increase in the return on assets of 21.5 percent. Much of this gain seems to arise out of cutbacks in unproductive capital investments, because the median reduction in capital expenditures of these firms is 35.5 percent.

Of course, we must consider that the evidence presented is consistent with a number of different hypotheses. For instance, it is possible that the management itself changes at these firms and that the change of management rather than the additional debt leads to higher investment returns.



7.13. **Debt as a Disciplining Mechanism**

Assume that you buy into the argument that debt adds discipline to management. Which of the following types of companies will most benefit from debt adding this discipline?

Conservatively financed, privately owned businesses

Conservatively financed, publicly traded companies with a wide and diverse stock holding

Conservatively financed, publicly traded companies, with an activist and primarily institutional holding.

(By "conservatively financed," we mean primarily with equity.)

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[23] Palepu, K. G., *1990, Consequences of Leveraged Buyouts*, Journal of Financial Economics, v26, 247-262.

[24] See Kaplan, S.N.,1989, Campeau's Acquisition of Federated: Value Destroyed or Value Added, Journal of Financial Economics, v25, 191-212; Smith, A.J., 1990, Corporate Ownership Structure and Performance: The Case of Management Buyouts, Journal of Financial Economics, v27, 143-164.

[25] Denis, David J. and Diane K. Denis. Leveraged Recaps In The Curbing Of Corporate Overinvestment, Journal of Applied Corporate Finance, 1993, v6(1), 60-71.

The Costs of Debt

As any borrower will attest, debt certainly has disadvantages. In particular, borrowing money can expose the firm to default and eventual liquidation, increase the agency problems arising from the conflict between the interests of equity investors and lenders, and reduce the flexibility of the firm to take actions now or in the future.

1. Debt Increases Expected Bankruptcy Costs

The primary concern when borrowing money is the increase in expected bankruptcy costs that typically follows. The expected bankruptcy cost can be written as a product of the probability of bankruptcy and the direct and indirect costs of bankruptcy.

The Probability of Bankruptcy

The *probability of bankruptcy* is the likelihood that a firm's cash flows will be insufficient to meet its promised debt obligations (interest or principal). Although such a failure does not automatically imply bankruptcy, it does trigger default, with all its negative consequences. Using this definition, the probability of bankruptcy should be a function of both the size of the operating cashflows of the firm – larger cashflows should reduce the likelihood of default – and the volatiltty in these cashflows – more votlatile cashflows should resulty in a higher probability of bankruptcy.

Accordingly, the probability of bankruptcy increases marginally for all firms as they borrow more money, irrespective of how large their cash flows might be, and the increase should be greater for firms in riskier businesses.

The Cost of Bankruptcy

The cost of going bankrupt is neither obvious nor easily quantified. It is true that bankruptcy is a disaster for all involved in the firm—lenders often get a fraction of what they are owed, and equity investors get nothing—but the overall cost of bankruptcy includes the indirect costs on operations of being perceived as having high default risk.

a. Direct Costs

The direct, or deadweight, cost of bankruptcy is that which is incurred in terms of cash outflows at the time of bankruptcy. These costs include the legal and administrative

costs of a bankruptcy, as well as the present value effects of delays in paying out the cash flows. In a widely quoted study of railroad bankruptcies in the 1970s, Warner estimated the legal and administrative costs of eleven railroads to be on average 5.3 percent of the value of the assets at the time of the bankruptcy. He also estimated that it took, on average, thirteen years before the railroads were reorganized and released from the bankruptcy costs.[26] These costs, although certainly not negligible, are not overwhelming, especially in light of two additional factors. First, the direct cost as a percentage of the value of the assets decreases to 1.4 percent if the asset value is computed five years before the bankruptcy. Second, railroads in general are likely to have higher bankruptcy costs than other companies because of the nature of their assets (real estate and fixed equipment).

b. Indirect Costs

If the only costs of bankruptcy were the direct costs, the low leverage maintained by many firms would be puzzling. There are, however, much larger costs associated with taking on debt and increasing default risk, which arise prior to the bankruptcy, largely as a consequence of the perception that a firm is in financial trouble. The first is the perception on the part of the customers that the firm is in trouble. When this happens, customers may stop buying the product or service because of the fear that the company will go out of business. In 1980, for example, when car buyers believed that Chrysler was on the verge of bankruptcy, they chose to buy from Ford and GM, largely because they were concerned about receiving service and parts for their cars after their purchases. Similarly, in the late 1980s, when Continental Airlines found itself in financial trouble, business travelers switched to other airlines because they were unsure about whether they would be able to accumulate and use their frequent-flier miles on the airline. The second indirect cost is the stricter terms suppliers start demanding to protect themselves against the possibility of default, leading to an increase in working capital and a decrease in cash flows. The third cost is the difficulty the firm may experience trying to raise fresh capital for its projects—both debt and equity investors are reluctant to take the risk, leading to capital rationing constraints and the rejection of good projects.

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[26] Warner, J.N., 1977, *Bankruptcy Costs: Some Evidence*, Journal of Finance, v32, 337-347.

Given this reasoning, the indirect costs of bankruptcy are likely to be higher for the following types of firms:[27]

- *Firms that sell durable products with long lives that require replacement parts and service*: Thus, a personal computer manufacturer would have higher indirect costs associated with bankruptcy than would a grocery store.
- *Firms that provide goods or services for which quality is an important attribute but is difficult to determine in advance*: Because the quality cannot be determined easily in advance, the reputation of the firm plays a significant role in whether the customer will buy the product in the first place. For instance, the perception that an airline is in financial trouble may scare away customers who worry that the planes belonging to the airline will not be maintained.
- *Firms producing products whose value to customers depends on the services and complementary products supplied by independent companies*: Returning to the example of personal computers, a computer system is valuable only insofar as there is software available to run on it. If the firm manufacturing the computers is perceived to be in trouble, it is entirely possible that the independent suppliers that produce the software might stop providing it. Thus, if Apple Computers gets into financial trouble, many software manufacturers might stop producing software for its machines, leading to an erosion in its potential market.
- *Firms that sell products that require continuous service and support from the manufacturer*: A manufacturer of copying machines, for which constant service seems to be a necessary operating characteristic, would be affected more adversely by the perception of default risk than would a furniture manufacturer, for example.

Implications for Optimal Capital Structure

If the expected bankruptcy cost is indeed the product of the probability of bankruptcy and the direct and indirect bankruptcy cost, interesting and testable implications emerge for capital structure decisions.

[27] See Shapiro, A., 1989, *Modern Corporate Finance*, Macmillan, New York; Titman, S., 1984, *The Effect of Capital Structure on a Firm's Liquidation Decision*, Journal of Financial Economics, v13, 1371-51.

- Firms operating in businesses with volatile earnings and cash flows should use debt less than otherwise similar firms with stable cash flows. For instance, regulated utilities in the United States have high leverage because the regulation and the monopolistic nature of their businesses result in stable earnings and cash flows. At the other extreme, toy-manufacturing firms, such as Mattel, can have large shifts in income from one year to another, based on the commercial success or failure of a single toy.[28] These firms should use leverage far less in meeting their funding needs.
- If firms can structure their debt in such a way that the cash flows on the debt increase and decrease with their operating cash flows, they can afford to borrow more. This is because the probability of default is greatest when operating cash flows decrease and the concurrent reduction in debt cash flows makes the default risk lower. Commodity companies, whose operating cash flows increase and decrease with commodity prices, may be able to use more debt if the debt payments are linked to commodity prices. Similarly, a company whose operating cash flows increase as interest rates (and inflation) go up and decrease when interest rates go down may be able to use more debt if the debt has a floating rate feature.
- If an external entity provides protection against bankruptcy, by providing either insurance or bailouts, firms will tend to borrow more. To illustrate, the deposit insurance offered by the FSLIC and the FDIC enables savings and loans and banks to maintain higher leverage than they otherwise could. Although one can argue for this insurance on the grounds of preserving the integrity of the financial system, undercharging for the insurance will accentuate this tendency and induce high-risk firms to take on too much debt, letting taxpayers bear the cost. Similarly, governments that step in and regularly bail out firms on social grounds (e.g., to save jobs) will encourage all firms to overuse debt.
- Because the direct bankruptcy costs are higher, when the assets of the firm are not easily divisible and marketable, firms with assets that can be easily divided and sold should be able to borrow more than firms with assets that do not share these features. Thus, a firm, such as Weyerhaeuser, whose value comes from its real estate holdings

[28]In years past, a single group of toys, such as the Teenage Mutant Ninja Turtles or the Power Rangers,

should be able to borrow more money than a firm such as Coca-Cola, which derives a great deal of its value from its brand name.

- Firms that produce products that require long-term servicing and support generally should have lower leverage than firms whose products do not share this feature, as discussed before.

7.14. **Debt and Bankruptcy**

Rank the following companies on the magnitude of bankruptcy costs from most to least, taking into account both explicit and implicit costs:

A grocery store

An airplane manufacturer

High-technology company

Explain.

There is a data set online that summarizes variances in operating earnings by sector.

2. Debt Creates Agency Costs

Equity investors, who receive a residual claim on the cash flows, tend to favor actions that increase the value of their holdings, even if that means increasing the risk that the bondholders (who have a fixed claim on the cash flows) will not receive their promised payments. Bondholders, on the other hand, want to preserve and increase the security of their claims. Because the equity investors generally control the firm's management and decision making, their interests will dominate bondholder interests unless bondholders take some protective action. By borrowing money, a firm exposes itself to this conflict and its negative consequences and it pays the price in terms of both higher interest rates and a loss of freedom in decision making.

The conflict between bondholder and stockholder interests appears in all three aspects of corporate finance: (1) deciding what projects to take (making investment decisions),

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could account for a substantial proportion of a major toy manufacturer's profits.

(2) choosing how to finance these projects, and (3) determining how much to pay out as dividends:

- *Risky Projects*: In the section on investment analysis, we argued that a project that earn a return that exceed the hurdle rate, adjusted to reflect the risk of the project, should be accepted and will increase firm value. The caveat, however, is that bondholders may be hurt if the firm accepts some of these projects. Bondholders lend money to the firm with the expectation that the projects accepted will have a certain risk level, and they set the interest rate on the bonds accordingly. If the firm chooses projects that are riskier than expected, however, bondholders will lose on their existing holdings because the price of the holdings will decrease to reflect the higher risk.
- *Subsequent Financing*: The conflict between stockholder and bondholder interests also arises when new projects have to be financed. The equity investors in a firm may favor new debt, using the assets of the firm as security and giving the new lenders prior claims over existing lenders. Such actions will reduce the interest rate on the new debt. The existing lenders in a firm obviously do not want to give new lenders priority over their claims, because it makes the existing debt riskier (and less valuable).
- *Dividends and Stock Repurchases*: Dividend payments and equity repurchases also divide stockholders and bondholders. Consider a firm that has built up a large cash reserve but has very few good projects available. The stockholders in this firm may benefit if the cash is paid out as a dividend or used to repurchase stock. The bondholders, on the other hand, will prefer that the firm retain the cash, because it can be used to make payments on the debt, reducing default risk. It should come as no surprise that stockholders, if not constrained, will pay the dividends or buy back stock, overriding bondholder concerns. In some cases, the payments are large and can increase the default risk of the firm dramatically.

The potential for disagreement between stockholders and bondholders can show up in as real costs in two ways:

a. If bondholders believe there is a significant chance that stockholder actions might make them worse off, they can build this expectation into bond prices by demanding much higher interest rates on debt.
b. If bondholders can protect themselves against such actions by writing in restrictive covenants, two costs follow:
    - the direct cost of monitoring the covenants, which increases as the covenants become more detailed and restrictive.
    - the indirect cost of lost investments, because the firm is not able to take certain projects, use certain types of financing, or change its payout; this cost will also increase as the covenants becomes more restrictive.

As firms borrow more and expose themselves to greater agency costs, these costs will also increase.

Because agency costs can be substantial, two implications relating to optimal capital structure follow. First, the agency cost arising from **risk shifting** is likely to be greatest in firms whose investments cannot be easily observed and monitored. For example, a lender to a firm that invests in real estate is less exposed to agency cost than is a lender to a firm that invests in people (consulting, for example) or intangible assets (as is the case with technology firms). Consequently, it is not surprising that manufacturing companies and railroads, which invest in substantial real assets, have much higher debt ratios than service companies. Second, the agency cost associated with monitoring management actions and second-guessing investment decisions is likely to be largest for firms whose projects are long term, follow unpredictable paths, and may take years to come to fruition. Pharmaceutical companies in the United States, for example, which often take on research projects that may take years to yield commercial products, have historically maintained low debt ratios, even though their cash flows would support more debt.



7.15. **Risk Shifting and Bondholders**

It is often argued that bondholders who plan to hold their bonds until maturity and collect the coupons and the face value are not affected by risk shifting that occurs after they buy the bonds, because the effect is only on market value. Do you agree?

Yes No Explain.

3. Using Up Excess Debt Capacity Reduces Financial Flexibility

> ***Financial Flexibility:*** The capacity of firms to meet any unforeseen contingencies that may arise (such as recessions and sales downturns) and take advantage of unanticipated opportunities (such as great projects), using the funds they have on hand and any excess debt capacity that they might have nurtured.

As noted earlier, one of the by-products of the conflict between stockholders and bondholders is the introduction of strict bond covenants that reduce the flexibility of firms to make investment, financing, or dividend decisions. It can be argued that this is part of a much greater loss of flexibility arising from taking on debt. One of the reasons firms do not use their available debt capacity is that they like to preserve it for a rainy day, when they might need the debt to meet funding needs or specific contingencies. Firms that borrow to capacity lose this flexibility and have no fallback funding if they get into trouble.

Firms value **financial flexibility** for two reasons. First, the value of the firm may be maximized by preserving some flexibility to take on future projects as they arise. Second, flexibility provides managers with more breathing room and more power, and it protects them from the monitoring that comes with debt. Thus, although the argument for maintaining flexibility in the interests of the firm is based on sound principles, it is sometimes used as camouflage by managers pursuing their own interests. There is also a trade-off between not maintaining enough flexibility (because a firm has too much debt) and having too much flexibility (by not borrowing enough).

So, how best can we value financial flexibility? If flexibility is needed to allow firms to take advantage of unforeseen investment opportunities, its value should ultimately be derived from two variables. The first is access to capital markets. After all, firms that have unlimited access to capital markets will not need to maintain excess debt capacity because they can raise funds as needed for new investments. Smaller firms and those in emerging markets, on the other hand, should value financial flexibility more. The second is the potential for excess returns on new investments. If a firm operates in a

mature business where new investments, unpredictable though they might be, earn the cost of capital, there is no value to maintaining flexibility. Alternatively, a firm that operates in a volatile business with high excess returns should attach a much higher value to financial flexibility.

7.16. **Value of Flexibility and Firm Characteristics**

Both Ford and Microsoft have huge cash balances (as a percent of firm value); assume that you are a stockholder in both firms. The management of both firms claims to hold the cash because they need the flexibility. Which of the two managements are you more likely to accept this argument from?

a. Microsoft's management

b. Ford's management

Explain.

The Trade-Off in a Balance Sheet Format

Bringing together the benefits and the costs of debt, we can present the trade-off in a balance sheet format in Table 7.2:

Table 7.2: Trade-Off on Debt versus Equity

Advantages of Borrowing	*Disadvantages of Borrowing*
1. Tax Benefit: Higher tax rates → Higher tax benefit	*1. Bankruptcy Cost*: Higher business risk and bankruptcy cost → Higher cost
2. Added Discipline: Greater the separation between managers and stockholders → Greater the benefit	*2. Agency Cost*: Greater the separation between stockholders and lenders → Higher cost
	3. Loss of Future Financing Flexibility: Greater the uncertainty about future financing needs → Higher cost

Overall, if the marginal benefits of borrowing exceed the marginal costs, the firm should borrow money. Otherwise, it should use equity.

What do firms consider when they make capital structure decisions? To answer this question, Pinegar and Wilbricht surveyed financial managers at 176 firms in the

United States.[29] They concluded that the financial principles listed in Table 7.3 determine capital structure decisions, in the order of importance in which they were given.

Table 7.3: Financial Principles Determining Capital Structure Decisions

Planning Principle by Order of Importance	Percentage of Responses Within Each Rank[a] Unimportant	2	3	4	Important	Not Ranked	Mean[b]
1. Maintaining financial flexibility	0.6	0.0	4.5	33.0	61.4	0.6	4.55
2. Ensuring long-term survivability	4.0	1.7	6.8	10.8	76.7	0.0	4.55
3. Maintaining a predictable source of funds	1.7	2.8	20.5	39.2	35.8	0.0	4.05
4. Maximizing security prices	3.4	4.5	19.3	33.5	37.5	1.7	3.99
5. Maintaining financial independence	3.4	4.5	22.2	27.3	40.9	1.7	3.99
6. Maintaining a high debt rating	2.3	9.1	32.4	43.2	13.1	0.0	3.56
7. Maintaining comparability with other firms in the industry	15.9	36.9	33.0	10.8	2.8	0.6	2.47

The foremost principles the survey participants identified were maintaining financial flexibility and ensuring long-term survivability (which can be construed as avoiding bankruptcy). Surprisingly few managers attached much importance to maintaining comparability with other firms in their industries or maintaining a high debt rating.

Illustration 7.4: Evaluating the Debt Trade-Off: Disney, Aracruz, Tata Chemicals and Bookscape

In Table 7.4, we summarize our views on the potential benefits and costs to using debt, instead of equity, at Disney, Aracruz, and Tata Chemicals.

Table 7.4: The Debt Equity Trade-Off: Disney, Aracruz. and Tata Chemicals

Item	*Disney*	*Aracruz*	*Tata Chemicals*
Tax benefits	Significant. The firm has a marginal tax rate of 38%. It does have large depreciation tax shields.	Significant. The firm has a marginal tax rate of 34%, as well. It does not have very much in noninterest tax shields.	Significant. The firm has a 33.99% tax rates It does have significant non-interest tax shields in the form of depreciation.
Added discipline	Benefits will be high, because managers are not large stockholders.	Benefits are smaller, because the voting shares are closely held by insiders.	Since the Tata family runs the firm, the benefits from added discipline are small.
Bankruptcy costs	Movie and broadcasting businesses have volatile earnings. Direct costs of bankruptcy are likely to be	Variability in paper prices makes earnings volatile. Direct and indirect costs of bankruptcy likely to be	Firm is mature, with fairly stable earnings and cash flows from its chemicals and fertilizer business.

[29] Pinegar, J. Michael and Lisa Wilbricht. 1989, *What Managers Think Of Capital Structure Theory: A Survey*, Financial Management, v18(4), 82-91

	small, but indirect costs can be significant.	moderate, since assets are marketable (timber, paper plants)	Indirect bankruptcy costs should be low, since physical assets are marketable.
Agency costs	High. Although theme park assets are tangible and fairly liquid, is much more difficult to monitor movie and broadcasting businesses.	Low. Assets are tangible and liquid.	Biggest concern is that debt may be utilized in other (riskier) Tata companies.
Flexibility needs	Low in theme park business but high in media businesses because technological change makes future investment uncertain.	Low. Business is mature and investment needs are well established.	Low. Tata Chemicals is a mature company with established reinvestment needs.

Based on this analysis, qualitative though it might be, we would argue that all three firms could benefit from borrowing, as long as the borrowing does not push it below an acceptable default risk threshold. For Aracruz and Tata Chemicals, the overlay of country risk (India and Brazil are both emerging markets, with substantial growth opportunities but significant risk) will be a factor that holds back additional debt, since a market shock can not only cause capital markets to shut down but also make earnings more volatile.

For Bookscape, the trade off is more personal, since the owner is fully invested in the company and is not diversified. Consequently, while the tax benefits of debt remain high, bankruptcy costs are likely to loom larger in the decision of whether to borrow money. If the firm defaults on its debt, the owner's entire wealth would be at risk, as would his reputation. While this will serve to keep debt in check, it has to be weighed off against the absence of alternative ways of raising financing. As a private business, Bookscape cannot easily raise fresh equity and may be entirely dependent on bank loans for external financing.

No Optimal Capital Structure

We have just argued that debt has advantages, relative to equity, as well as disadvantages. Will trading off the costs and benefits of debt yield an optimal mix of debt and equity for a firm? In this section, we will present arguments that it will not and the resulting conclusion that there is no such optimal mix. The seeds of this argument were

sown in one of the most influential papers ever written in corporate finance, containing one of corporate finance's best-known theorems, the *Modigliani-Miller theorem*. [30]

When they first looked at the question of whether there is an optimal capital structure, Miller and Modigliani drew their conclusions in a world void of taxes, transaction costs, and the possibility of default. Based on these assumptions, they concluded that the value of a firm was unaffected by its leverage and that investment and financing decisions could be separated. Their conclusion can be confirmed in several ways; we present two in this section. We will also present a more complex argument for why there should be no optimal capital structure even in a world with taxes, made by Miller almost two decades later.

The Irrelevance of Debt in a Tax-Free World

In their initial work, Modigliani and Miller made three significant assumptions about the markets in which their firms operated. First, they assumed there were no taxes. Second, they assumed firms could raise external financing from debt or equity, with no issuance costs. Third, they assumed there were no costs—direct or indirect—associated with bankruptcy. Finally, they operated in an environment in which there were no agency costs; managers acted to maximize stockholder wealth, and bondholders did not have to worry about stockholders expropriating wealth with investment, financing, or dividend decisions.

In such an environment, reverting back to the trade-off that we summarized in Table 7.2 it is quite clear that all the advantages and disadvantages disappear, leaving debt with no marginal benefits and no costs. In Table 7.5 we modify Table 7.2 to reflect the assumptions just listed

Table 7.5: The Trade-Off on Debt: No Taxes, Default Risk, and Agency Costs

Advantages of Debt	*Disadvantages of Debt*
1. Tax Benefit: Zero, because there are no taxes.	1. Bankruptcy Cost: Zero, because there are no bankruptcy costs.

[30] Modigliani, F. and M. Miller, 1958, *The Cost of Capital, Corporation Finance and the Theory of Investment*, American Economic Review, v48, 261-297.

2. Added Discipline: Zero, because managers already maximize stockholder wealth.	2. Agency Cost: Zero, because bondholders are fully protected from wealth transfer.
	3. Loss of Future Financing Flexibility: Not costly, because firms can raise external financing costlessly.

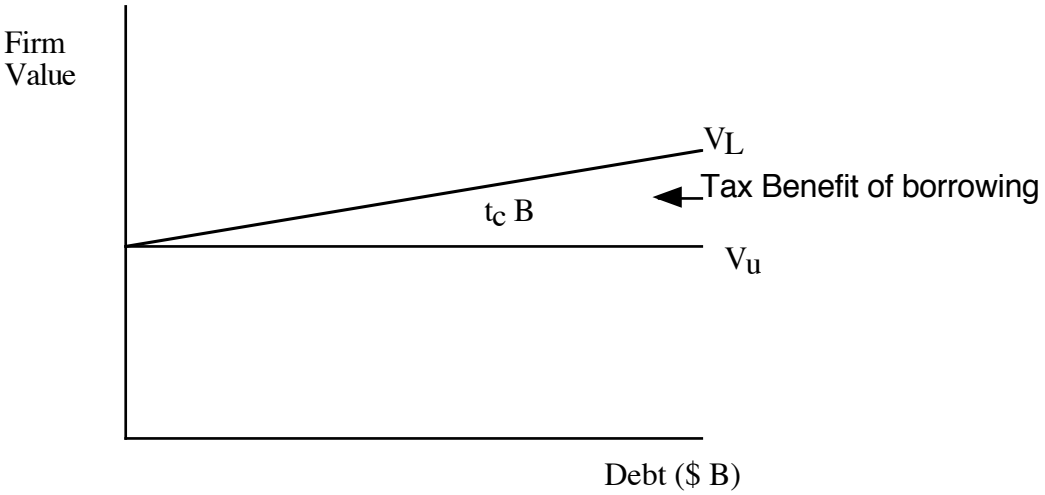
Debt creates neither benefits nor costs and thus has a neutral effect on value. In such an environment, the capital structure decision becomes irrelevant.

In a later study, Miller and Modigliani preserved this environment but made one change, allowing for a tax benefit for debt. In this scenario, where debt continues to have no costs, the optimal debt ratio for a firm is 100 percent debt. In fact, in such an environment the value of the firm increases by the present value of the tax savings for interest payments.

$$\text{Value of Levered Firm} = \text{Value of Unlevered Firm} + t_c B$$

where t_c is the corporate tax rate and B is the dollar borrowing. Note that the second term in this valuation is the present value of the interest tax savings from debt, treated as a perpetuity. Figure 7.8 graphs the value of a firm with just the tax benefit from debt.

Figure 7.8: Value of Levered Firm: MM with Taxes



Miller and Modigliani presented an alternative proof of the irrelevance of leverage, based on the idea that debt does not affect the underlying operating cash flows of the firm in the absence of taxes. Consider two firms that have the same cash flow (X) from operations.

Firm A is an all-equity firm, whereas firm B has both equity and debt. The interest rate on debt is r. Assume you are an investor and you buy a fraction (α) of the equity in firm A, and the same fraction of both the equity and debt of firm B. Table 7.6 summarizes the cash flows that you will receive in the next period.

Table 7.6: Cash Flows to Investor from Levered and All-Equity Firm

	Firm A	*Firm B*
Type of firm	All-equity firm ($V_u = E$)	Has some equity and debt
Actions now	Investor buys a fraction α of the firm (αV_u)	Investor buys a fraction a of both equity and debt of the firm; $\alpha E_L + \alpha D_L$
Next period	Investor receives a fraction α of the cash flow (αX)	Investor receives the following: $\alpha(X - rD_L) + \alpha rD_L = \alpha X$

Because you receive the same total cash flow in both firms, the price you will pay for either firm has to be the same. This equivalence in values of the two firms implies that leverage does not affect the value of a firm. Note that this proof works only if the firm does not receive a tax benefit from debt; a tax benefit would give firm B a higher cash flow than firm A.

The Irrelevance of Debt with Taxes

It is clear, in the Miller-Modigliani model, that when taxes are introduced into the model, debt does affect value. In fact, introducing both taxes and bankruptcy costs into the model creates a trade-off, where the financing mix of a firm affects value, and there is an optimal mix. In an address in 1979, however, Miller argued that the debt irrelevance theorem could apply even in the presence of corporate taxes if taxes on the equity and interest income individuals receive from firms were included in the analysis.[31]

To demonstrate the Miller proof of irrelevance, assume that investors face a tax rate of t_d on interest income and a tax rate of t_e on equity income. Assume also that the

[31] Miller, M., 1977, *Debt and Taxes*, Journal of Finance, v32, 261-275.

firm pays an interest rate of r on debt and faces a corporate tax rate of t_c. The after-tax return to the investor from owning debt can then be written as:

$$\text{After-Tax Return from Owning Debt} = r(1 - t_d)$$

The after-tax return to the investor from owning equity can also be estimated. Because cash flows to equity have to be paid out of after-tax cash flows, equity income is taxed twice—once at the corporate level and once at the equity level:

$$\text{After-Tax Return from Owning Equity} = k_e(1 - t_c)(1 - t_e)$$

The returns to equity can take two forms—dividends or capital gains; the equity tax rate is a blend of the tax rates on both. In such a scenario, Miller noted that the tax benefit of debt, relative to equity becomes smaller, because both debt and equity now get taxed, at least at the level of the individual investor.

$$\text{Tax Benefit of Debt, Relative to Equity} = \{1 - (1 - t_c)(1 - t_e)\}/(1 - t_d)$$

With this relative tax benefit, the value of the firm, with leverage, can be written as:

$$V_L = V_u + [1 - (1 - t_c)(1 - t_e)/(1 - t_d)]B$$

where

V_L is the value of the firm with leverage,

V_U is the value of the firm without leverage,

B is the dollar debt.

With this expanded equation, which includes both personal and corporate taxes, there are several possible scenarios:

a. *Personal tax rates on both equity and dividend income are zero*: if we ignore personal taxes, this equation compresses to the original equation for the value of a levered firm, in a world with taxes but no bankruptcy costs:

$$V_L = V_u + t_c B$$

b. *The personal tax rate on equity is the same as the tax rate on debt*: If this were the case, the result is the same as the original one—the value of the firm increases with more debt.

$$V_L = V_u + t_c B$$

c. *The tax rate on debt is higher than the tax rate on equity*: In such a case, the differences in the individual investor tax rates may more than compensate for the double taxation of equity cash flows. To illustrate, assume that the tax rate on ordinary income is 70 percent, the tax rate on capital gains on stock is 28 percent, and the tax rate on corporations is 35 percent. In such a case, the tax liabilities for debt and equity can be calculated for a firm that pays no dividend as follows:

$$\text{Tax Rate on Debt Income} = 70\%$$

$$\text{Tax Rate on Equity Income} = 1 - (1 - 0.35)\,(1 - 0.28) = 0.532 \text{ or } 53.2\%$$

This is a plausible scenario, especially considering tax law in the United States until the early 1980s. In this scenario, debt creates a tax disadvantage to investors.

d. *The tax rate on equity income is just low enough to compensate for the double taxation*: In this case, we are back to the original debt irrelevance theorem.

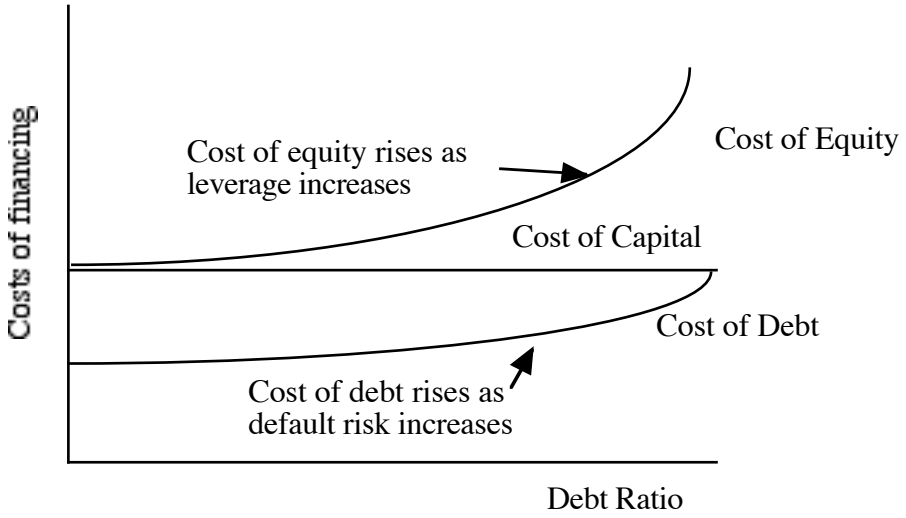
$$(1 - t_d) = (1 - t_c)(1 - t_e) \ldots \text{Debt is irrelevant}$$

Miller's analysis brought investor tax rates into the analysis for the first time and provided some insight into the role of investor tax preferences on a firm's capital structure. As Miller himself notes, however, this analysis does not reestablish the irrelevance of debt under all circumstances; rather, it opens up the possibility that debt could still be irrelevant despite its tax advantages.

The Consequences of Debt Irrelevance

If the financing decision is irrelevant, as proposed by Miller and Modigliani, corporate financial analysis is simplified in a number of ways. The cost of capital, which is the weighted average of the cost of debt and the cost of equity, is unaffected by changes in the proportions of debt and equity. This might seem unreasonable, especially because the cost of debt is much lower than the cost of equity. In the Miller-Modigliani world, however, any benefits incurred by substituting cheaper debt for more expensive equity are offset by increases in both their costs, as shown in Figure 7.9.

Figure 7.9: Cost of Capital in the MM World



The value of the firm is also unaffected by the amount of leverage it has. Thus, if the firm is valued as an all-equity entity, its value will remain unchanged if it is valued with any other debt ratio. (This actually follows from the implication that the cost of capital is unaffected by changes in leverage and from the assumption that the operating cash flows are determined by investment decisions rather than financing decisions.)

Finally, the investment decision can be made independently of the financing decision. In other words, if a project is a bad project when evaluated as an all-equity project, it will remain so using any other financing mix.

The Contribution of the Miller-Modigliani Theorem

It is unlikely that capital structure is irrelevant in the real world, given the tax preferences for debt and existence of default risk. In spite of this, Miller and Modigliani were pioneers in moving capital structure analysis from an environment in which firms picked their debt ratios based on comparable firms and management preferences, to one that recognized the trade-offs. They also drew attention to the impact of good investment decisions on firm value. To be more precise, a firm that invests in poor projects cannot hope to recoup the lost value by making better financing decisions; a firm that takes good projects will succeed in creating value, even if it uses the wrong financing mix. Finally, although the concept of a world with no taxes, default risk, or agency problems may seem a little far-fetched, there are some environments in which the description might hold.

Assume, for instance, that the U.S. government decides to encourage small businesses to invest in urban areas by relieving them of their tax burden and providing a back-up guarantee on loans (default protection). Firms that respond to these initiatives might find that their capital structure decisions do not affect their value.

Finally, surveys of financial managers indicate that in practice, they do not attach as much weight to the costs and benefits of debt as we do in theory. In the survey quoted earlier by Pinegar and Wilbricht, managers were asked to cite the most important inputs governing their financial decisions. Their responses are ranked in the order of the importance managers attached to them in Table 7.7.

Table 7.7: Inputs into Capital Structure Decisions

	Percentage of Responses within Each Rank						
	Least Important				Most Important		
Inputs/assumptions by order of importance	*1*	*2*	*3*	*4*	*5*	*Not Ranked*	*Mean*
1. Projected cash flow from asset to be financed	1.7%	1.1%	9.7%	29.5%	58.0%	0.0%	4.41
2. Avoiding dilution of common equity's claims	2.8%	6.3%	18.2%	39.8%	33.0%	0.0%	3.94
3. Risk of asset to be financed	2.8%	6.3%	20.5%	36.9%	33.0%	0.6%	3.91
4. Restrictive covenants on senior securities	9.1%	9.7%	18.7%	35.2%	27.3%	0.0%	3.62
5. Avoiding mispricing of securities to be issued.	3.4%	10.8%	27.3%	39.8%	18.7%	0.0%	3.60
6. Corporate tax rate	4.0%	9.7%	29.5%	42.6%	13.1%	1.1%	3.52
7. Voting control	17.6%	10.8%	21.0%	31.2%	19.3%	0.0%	3.24
8. Depreciation & other tax shields	8.5%	17.6%	40.9%	24.4%	7.4%	1.1%	3.05
9. Correcting mispricing of securities	14.8%	27.8%	36.4%	14.2%	5.1%	1.7%	2.66
10. Personal tax rates of debt and equity holders	31.2%	34.1%	25.6%	8.0%	1.1%	0.0%	2.14
11. Bankruptcy costs	69.3%	13.1%	6.8%	4.0%	4.5%	2.3%	1.58

Financial managers seem to weigh financial flexibility and potential dilution much more heavily than bankruptcy costs and taxes in their capital structure decisions.

In Practice: The Dilution Bogey

The dilution effect refers to the possible decrease in earnings per share from any action that might lead to an increase in the number of shares outstanding. As evidenced in Table 7.7, managers (especially in the United States) weigh these potential dilution effects heavily in decisions on what type of financing to use and how to fund projects. Consider, for instance, the choice between raising equity using a rights issue, where the stock is issued at a price below the current market price, and a public issue of stock at the market price. The latter is a much more expensive option, from the perspective of investment banking fees and other costs, but is chosen nevertheless because it results in fewer shares being issued (to raise the same amount of funds). The fear of dilution is misplaced for the following reasons:

1. Investors measure their returns in terms of total return and not just in terms of stock price. Although the stock price will go down more after a rights issue, each investor will be compensated adequately for the price drop (by either receiving more shares or by being able to sell their rights to other investors). In fact, if the transactions costs are considered, stockholders will be better off after a rights issue than after an equivalent public issue of stock.
2. Although the earnings per share will always drop in the immediate aftermath of a new stock issue, the stock price will not necessarily follow suit. In particular, if the stock issue is used to finance a good project (i.e., a project with a positive net present value), the increase in value should be greater than the increase in the number of shares, leading to a higher stock price.

Ultimately, the measure of whether a company should issue stock to finance a project should depend on the quality of the investment. Firms that dilute their stockholdings to take good investments are choosing the right course for their stockholders.

There Is an Optimal Capital Structure

The counter to the Miller-Modigliani proposition is that the trade-offs on debt may work in favor of the firm (at least initially) and that borrowing money may lower the

cost of capital and increase firm value. We will examine the mechanics of putting this argument into practice in the next chapter; here, we make a case for the existence of an optimal capital structure and look at some of the empirical evidence for and against it.

The Case for an Optimal Capital Structure

If the debt decision involves a trade-off between the benefits of debt (tax benefits and added discipline) and the costs of debt (bankruptcy costs, agency costs, and lost flexibility), it can be argued that the marginal benefits will be offset by the marginal costs *only in exceptional cases* and not always then (as argued by Miller and Modigliani). In fact, under most circumstances, the marginal benefits will either exceed the marginal costs (in which case debt is good and will increase firm value) or fall short of marginal costs (in which case equity is better). Accordingly, there is an optimal capital structure for most firms at which firm value is maximized.

Of course, it is always possible that managers may be operating under an illusion that capital structure decisions matter when the reality might be otherwise. Consequently, we examine some of the empirical evidence to see if it is consistent with the theory of an optimal mix of debt and equity.

Empirical Evidence

The question of whether there is an optimal capital structure can be answered in a number of ways. The first is to see if differences in capital structure across firms can be explained systematically by differences in the variables driving the trade-offs. Other things remaining equal, we would expect to see relationships listed in Table 7.8.

Table 7.8 Debt Ratios and Fundamentals

Variable	*Effect on Debt Ratios*
Marginal tax rate	As marginal tax rates increase, debt ratios increase.
Separation of ownership and management	The greater the separation of ownership and management, the higher the debt ratio.
Variability in operating cash Flows	As operating cash flows become more variable, the bankruptcy risk increases,

	resulting in lower debt ratios.
Debt holders' difficulty in monitoring firm actions, investments, and performance	The more difficult it is to monitor the actions taken by a firm, the lower the optimal debt ratio.
Need for flexibility	The greater the need for decision making flexibility in future periods, the lower the optimal debt ratio.

This may seem like a relatively simple test to run, but keeping all other things equal in the real world is often close to impossible. In spite of this limitation, attempts to see if the direction of the relationship is consistent with the theory have produced mixed results.

Bradley, Jarrell, and Kim analyzed whether differences in debt ratios can be explained by proxies for the variables involved in the capital structure trade-off.[32] They noted that the debt ratio is:

- *negatively correlated with the volatility in annual operating earnings*, as predicted by the bankruptcy cost component of the optimal capital structure trade-off.
- *positively related to the level of nondebt tax shields*, which is counter to the tax hypothesis, which argues that firms with large nondebt tax shields should be less inclined to use debt.
- *negatively related to advertising and R&D expenses used as a proxy for agency costs*; this is consistent with optimal capital structure theory.

Others who have attempted to examine whether cross-sectional differences in capital structure are consistent with the theory have come to contradictory conclusions.

An alternate test of the optimal capital structure hypothesis is to examine the stock price reaction to actions taken by firms either to increase or decrease leverage. In evaluating the price response, we have to make some assumptions about the motivation of the firms making these changes. If we assume that firms are rational and that they make these changes to get closer to their optimal, both leverage-increasing and -decreasing actions should be accompanied by positive excess returns, at least on average. Smith (1986) noted that the evidence is *not* consistent with an optimal capital structure

hypothesis, however, because leverage-increasing actions seem to be accompanied by positive excess returns whereas leverage-reducing actions seem to be followed by negative returns.[33] The only way to reconcile this tendency with an optimal capital structure argument is by assuming that managerial incentives (desire for stability and flexibility) keep leverage below optimal for most firms and that actions by firms to reduce leverage are seen as serving managerial interests rather than stockholder interests.



The Debt Equity Trade off: A Behavioral Perspective

The trade off between the benefits of debt – tax advantages and added discipline – and the costs of debt – expected bankruptcy costs and agency costs- is not always done rationally. Managers bring to this trade off all of the behavioral characteristics that influence other corporate finance decisions. Several papers note that managers who are over confident in their abilities to deliver cash flows (and thus take negative NPV investments) also tend to borrow too much. Put another, they under estimate the bankruptcy costs of debt and over estimate its benefits.[34] The same over confidence, though, can reduce agency costs since over confident managers are less likely to divert funds away from the stated investments.[35]

How do we counter the tendency of firms with optimistic, over confident managers to borrow too much? The first line of defense has to be lenders. Historically, banks have played the role of the realistic pessimist, who sees the potential downside to the management's upside, restraining borrowing. However, the shift to corporate bonds has weakened this constraint. The second line of defense are the bond ratings agencies, especially for firms that borrow through corporate bonds. It is the role of ratings agencies to look past the hype and the sales pitches made by managers and to assess default risk realistically.

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[32] Bradley, M., G. Jarrell and E.H. Kim, 1984, *On the Existence of an Optimal Capital Structure: Theory and Evidence*, Journal of Finance, v39, 857-878.

[33] Smith, C.W., 1986, *Investment Banking and the Capital Acquisition Process*, Journal of Financial Economics, v15, 3-29.

[34] Fairchild, R. (2005b), "The effect of managerial overconfidence, asymmetric information, and moral hazard on capital structure decisions." ICFAI Journal of Behavioral Finance, vol II, no 4, 46- 68.

[35] Hackbart, D., 2007, Managerial Trails and Capital Structure Decisions, Working paper, ssrn.com.

There are periods in history when both lines of defense crumble and lenders do not operate as restraints on managers. It is in these environments that we see firms collectively borrow too much at interest rates that do no adequately reflect the underlying default risk. Eventually, though, the bubble bursts, leaving bondholders, banks and the borrowing firms feeling the pain.

There is a data set online that summarizes debt ratios and averages by sector for the fundamental variables that should determine debt ratios.

How Firms Choose Their Capital Structures

We have argued that firms should choose the mix of debt and equity by trading off the benefit of borrowing against the costs. There are, however, three alternative views of how firms choose a financing mix. The first is that the choice between debt and equity is determined by where a firm is in the growth life cycle. High-growth firms will tend to use debt less than more mature firms. The second is that firms choose their financing mix by looking at other firms in their business. The third view is that firms have strong preferences in for the kinds of financing they prefer to use, that is, a financing hierarchy, and that they deviate from these preferences only when they have no choice. We will argue that in each of these approaches, firms still implicitly make the trade-off between costs and benefits, though the assumptions needed for each approach to work are different.

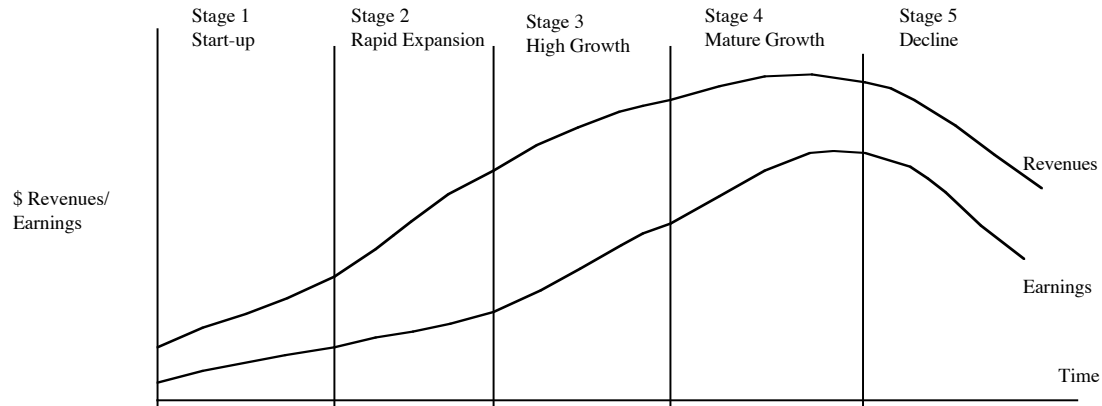
Financing Mix and a Firm's Life Cycle

Earlier in this chapter, we looked at how a firm's financing choices might change as it makes the transition from a start-up firm to a mature firm to final decline. We can also look at how a firm's financing mix changes over the same life cycle. Typically, start-up firms and firms in rapid expansion use debt sparingly; in some cases, they use no debt at all. As the growth eases and as cash flows from existing investments become larger and more predictable, we see firms beginning to use debt. Debt ratios typically peak when firms are in mature growth.

How does this empirical observation relate to our earlier discussion of the benefits and costs of debt? We argue that the behavior of firms at each stage in the life cycle is entirely consistent with making this trade-off. In the start-up and high-growth phases, the tax benefits to firms from using debt tend to be small or nonexistent because earnings from existing investments are low or negative. The owners of these firms are usually actively involved in the management of these firms, reducing the need for debt as a disciplinary mechanism.

On the other side of the ledger, the low and volatile earnings increase the expected bankruptcy costs. The absence of significant existing investments or assets and the magnitude of new investments makes lenders much more cautious about lending to the firm, increasing the agency costs; these costs show up as more stringent covenants or in higher interest rates on borrowing. As growth eases, the trade-off shifts in favor of debt. The tax benefits increase and expected bankruptcy costs decrease as earnings from existing investments become larger and more predictable. The firm develops both an asset base and a track record on earnings, which allows lenders to feel more protected when lending to the firm. As firms get larger, the separation between owners (stockholders) and managers tends to grow, and the benefits of using debt as a disciplinary mechanism increase. We have summarized the trade-off at each stage in the life cycle in Figure 7.10.

Figure 7.10: The Debt-Equity Trade off and Life Cycle



	Stage 1 Start-up	Stage 2 Rapid Expansion	Stage 3 High Growth	Stage 4 Mature Growth	Stage 5 Decline
Tax Benefits	Zero, if losing money	Low, as earnings are limited	Increase, with earnings	High	High, but declining
Added Disceipline of Debt	Low, as owners run the firm	Low. Even if public, firm is closely held.	Increasing, as managers own less of firm	High. Managers are separated from owners	Declining, as firm does not take many new investments
Bamkruptcy Cost	Very high. Firm has no or negative earnings.	Very high. Earnings are low and volatile	High. Earnings are increasing but still volatile	Declining, as earnings from existing assets increase.	Low, but increases as existing projects end.
Agency Costs	Very high, as firm has almost no assets	High. New investments are difficult to monitor	High. Lots of new investments and unstable risk.	Declining, as assets in place become a larger portion of firm.	Low. Firm takes few new investments
Need for Flexibility	Very high, as firm looks for ways to establish itself	High. Expansion needs are large and unpredicatble	High. Expansion needs remain unpredictable	Low. Firm has low and more predictable investment needs.	Non-existent. Firm has no new investment needs.
Net Trade Off	Costs exceed benefits Minimal debt	Costs still likely to exceed benefits. Mostly equity	Debt starts yielding net benefits to the firm	Debt becomes a more attractive option.	Debt will provide benefits.

As with our earlier discussion of financing choices, there will be variations between firms in different businesses at each stage in the life cycle. For instance, a mature steel company may use far more debt than a mature pharmaceutical company because lenders feel more comfortable lending on a steel company's assets (that are tangible and easy to liquidate) than on a pharmaceutical company's assets (which might be patents and other assets that are difficult to liquidate). Similarly, we would expect a company like IBM to have a higher debt ratio than a firm like Microsoft at the same stage in the life cycle because Microsoft has large insider holdings, making the benefit of discipline that comes from debt much smaller.

Financing Mix Based on Comparable Firms

Firms often try to use a financing mix similar to that used by other firms in their business. With this approach, Bookscape would use a low debt to capital ratio because

other book retailers have low debt ratios. Bell Atlantic, on the other hand, would use a high debt to capital ratio because other phone companies have high debt to capital ratios.

The empirical evidence about the way firms choose their debt ratios strongly supports the hypothesis that they tend not to stray too far from their sector averages. In fact, when we look at the determinants of the debt ratios of individual firms, the strongest determinant is the average debt ratio of the industries to which these firms belong. Some would view this approach to financing as contrary to the approach where we trade off the benefits of debt against the cost of debt, but we do not view it thus. If firms within a business or sector share common characteristics, it should not be surprising if they choose similar financing mixes. For instance, software firms have volatile earnings and high growth potential and choose low debt ratios. In contrast, phone companies have significant assets in place and high and stable earnings; they tend to use more debt in their financing. Thus, choosing a debt ratio similar to that of the industry in which you operate is appropriate, when firms in the industry are at the same stage in the life cycle and, on average, choose the right financing mix for that stage.

It can be dangerous to choose a debt ratio based on comparable firms under two scenarios. The first occurs when there are wide variations in growth potential and risk across companies within a sector. Then we would expect debt ratios to be different across firms. The second occurs when firms on average have too much or too little debt given their characteristics. This can happen when an entire sector changes. For instance, phone companies have historically had stable and large earnings because they have had monopoly power. As technology and deregulation breaks down this power, it is entirely possible that earnings will become more volatile and that these firms should carry a lot less debt than they do currently.

Following a Financing Hierarchy

There is evidence that firms follow a *financing hierarchy*: retained earnings are the most preferred choice for financing, followed by debt, new equity, common, and preferred; convertible preferred is the least preferred choice. Going back again to the survey by Pinegar and Wilbricht (Table 7.9), managers were asked to rank six different

sources of financing—internal equity, external equity, external debt, preferred stock, and hybrids (convertible debt and preferred stock)—from most preferred to least preferred.[36]

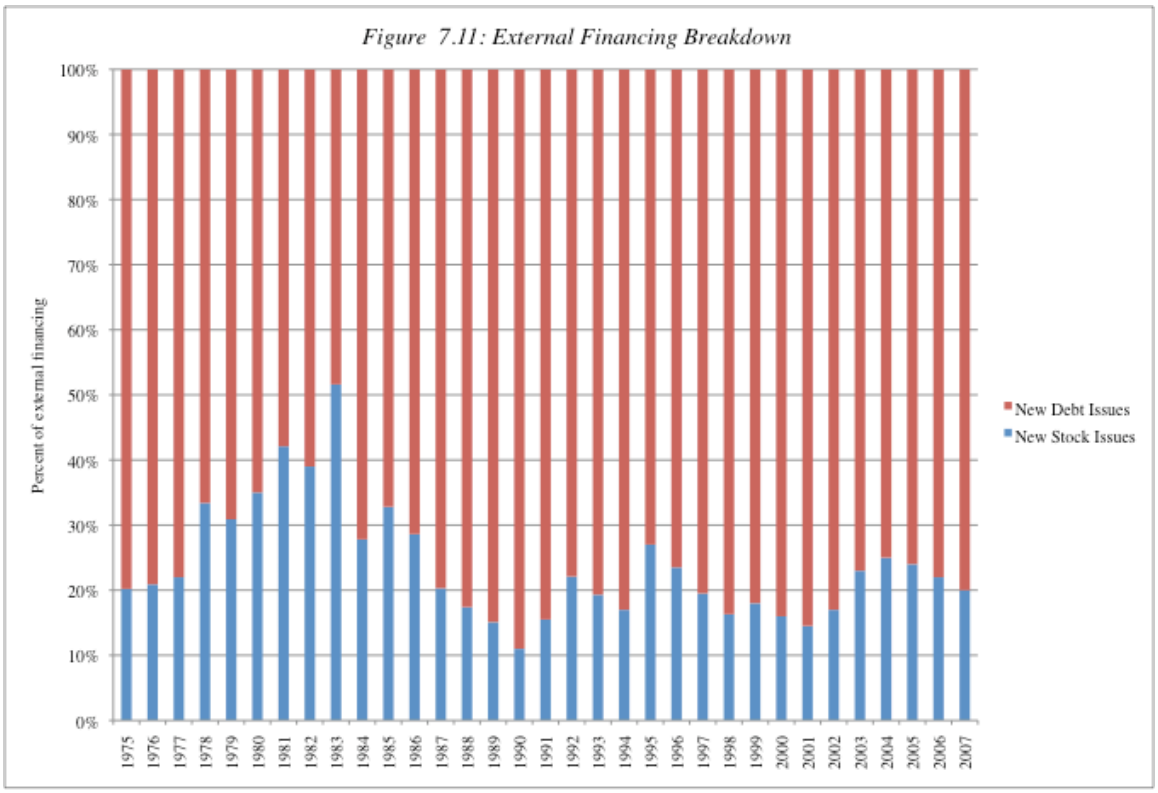
Table 7.9 Survey Results on Planning Principles

Ranking	*Source*	*Planning Principle Cited*
1	Retained earnings	None
2	Straight debt	Maximize security prices
3	Convertible debt	Cash flow and survivability
4	Common stock	Avoiding dilution
5	Straight preferred stock	Comparability
6	Convertible preferred stock	None

One reason for this hierarchy is that managers value *flexibility and control*. To the extent that external financing reduces flexibility for future financing (especially if it is debt) and control (bonds have covenants; new equity attracts new stockholders into the company and may reduce insider holdings as a percentage of total holding), managers prefer retained earnings as a source of capital. Another reason is it costs nothing in terms of issuance costs to use retained earnings, whereas *it costs more* to use external debt and even more to use external equity.

The survey yielded some other interesting conclusions as well. External debt is strongly preferred over external equity as a way of raising funds. The percentages of external financing from debt and external equity between 1975 and 2007, issued by U.S. corporations, are shown in Figure 7.11 and bear out this preference.

[36] Pinegar, J. Michael and Lisa Wilbricht. 1989, *What Managers Think Of Capital Structure Theory: A Survey*, Financial Management, v18(4), 82-91.



Source: Compustat.

Given a choice, firms would much rather use straight debt than convertible debt, even though the interest rate on convertible debt is much lower. Managers perhaps have a much better sense of the value of the conversion option than is recognized.

A firm's choices may say a great deal about its financial strength. Thus, the 1993 decisions by RJR Nabisco and GM to raise new funds through convertible preferred stock were seen by markets as an admission of their financial weakness. Not surprisingly, the financial market response to the issue of securities listed in Table 7.9 mirrors the preferences: The most negative responses are reserved for securities near the bottom of the list, the most positive (or at least the least negative) for those at the top of the list.

Why do firms have a financing hierarchy? In the discussion of financing choices so far, we have steered away from questions about how firms convey information to financial markets with their financing choices and how well the securities that the firms issue are priced. Firms know more about their future prospects than do the financial markets that they deal with; markets may under or overprice securities issued by firms. Myers and Majluf note that in the presence of this asymmetric information, firms that believe their securities are underpriced, given their future prospects, may be inclined to

reject good projects rather than raise external financing. Alternatively, firms that believe their securities are overpriced are more likely to issue these securities, even if they have no projects available.[37] In this environment, the following implications emerge:

- Managers prefer retained earnings to external financing, because it allows them to consider projects on their merits, rather than depending on whether markets are pricing their securities correctly. It follows then that firms will be more inclined to retain earnings over and above their current investment requirements to finance future projects.
- When firms issue securities, markets will consider the issue a signal that these securities are overvalued. This signal is likely to be more negative for securities, such as stocks, where the asymmetry of information is greater, and smaller for securities, such as straight bonds, where the asymmetry is smaller. This would explain both the rankings in the financial hierarchy and the market reaction to these security issues.



7.17. **Value of Flexibility and Firm Characteristics**

You are reading the *Wall Street Journal* and notice a tombstone ad for a company offering to sell convertible preferred stock. What would you hypothesize about the health of the company issuing these securities?

Nothing

Healthier than the average firm

In much more financial trouble than the average firm

Conclusion

In this chapter, we laid the groundwork for analyzing a firm's optimal mix of debt and equity by laying out the benefits and the costs of borrowing money. In particular, we made the following points:

- We differentiated between debt and equity at a generic level by pointing out that any financing approach that results in contractual cash flows and has prior claims in the case of default, fixed maturity, and no voting rights is debt, whereas a financing

[37] Myers, S.C. and N.S. Majluf, 1984, Corporate Financing and Investment Decisions when Firms have Information that Investors do not have, Journal of Financial Economics, v13, 187-221.

approach that provides for residual cash flows and has low or no priority in claims in the case of default, infinite life, and a lion's share of the control is equity.

- Although all firms, private as well as public, use both debt and equity, the choices in terms of financing and the type of financing used change as a firm progresses through the life cycle, with equity dominating at the earlier stages and debt as the firm matures.
- The primary benefit of debt is a tax benefit: Interest expenses are tax-deductible and cash flows to equity (dividends) are not. This benefit increases with the tax rate of the entity taking on the debt. A secondary benefit of debt is that it forces managers to be more disciplined in their choice of projects by increasing the costs of failure; a series of bad projects may create the possibility of defaulting on interest and principal payments.
- The primary cost of borrowing is an increase in the expected bankruptcy cost—the product of the probability of default and the cost of bankruptcy. The probability of default is greater for firms that have volatile cash flows. The cost of bankruptcy includes both the direct costs (legal and time value) of bankruptcy and the indirect costs (lost sales, tighter credit, and less access to capital). Borrowing money exposes the firm to the possibility of conflicts between stock and bondholders over investment, financing, and dividend decisions. The covenants that bondholders write into bond agreements to protect themselves against expropriation cost the firm in both monitoring costs and lost flexibility. The loss of financial flexibility that arises from borrowing money is more likely to be a problem for firms with substantial and unpredictable investment opportunities.
- In the special case where there are no tax benefits, default risk, or agency problems, the financing decision is irrelevant. This is known as the Miller-Modigliani theorem. In most cases, however, the trade-off between the benefits and costs of debt will result in an optimal capital structure whereby the value of the firm is maximized.
- Firms generally choose their financing mix in one of three ways—based on where they are in the life cycle, by looking at comparable firms, or by following a financing hierarchy where retained earnings is the most preferred option and convertible preferred stock the least.

Live Case Study

Analyzing a Firm's Current Financing Choices

Objective To examine a firm's current financing choices and to categorize them into debt (borrowings) and equity and to examine the trade-off between debt and equity for your firm.

Key Questions

- Where and how does the firm get its current financing?
- Would these financing choices be classified as debt, equity, or hybrid securities?
- How large, in qualitative or quantitative terms, are the advantages to this company from using debt?
- How large, in qualitative or quantitative terms, are the disadvantages to this company from using debt?
- From the qualitative trade-off, does this firm look like it has too much or too little debt?

Framework for Analysis

- *Assessing Current Financing*

  1.1. How does the firm raise equity?

  a. If it is a publicly traded firm, it can raise equity from common stock and warrants or options.
  b. If is a private firm, the equity can come from personal savings and venture capital.

  1.2. How (if at all) does the firm borrow money?

  a. Does it use bank loans or corporate bonds?
  b. What is the maturity structure for the debt?
  c. What type of debt does the firm have? (Currency mix, fixed versus floating)

  1.3. Does the firm use any hybrid approaches to raising financing that combine some of the features of debt and some of equity?

  - Examples would include preferred stock, convertible bonds, and bonds with warrants attached to them.

2. *Detailed Description of Current Financing*

2.1. If the firm raises equity from warrants or convertibles, what are the characteristics of the options (exercise price, maturity, etc.)?

2.2. If the firm has borrowed money, what are the characteristics of the debt (maturity, coupon or stated interest rate, call features, fixed or floating rate, secured or unsecured, and currency)?

2.3. If the firm has hybrid securities, what are the features of the hybrid securities?

3. *Breakdown into Debt and Equity*

3.1. If the firm has financing with debt and equity components (such as convertible bonds), how much of the value can be attributed to debt and how much to equity?

3.2. Given the coupon or stated interest rate and maturity of the nontraded debt, what is the current estimated market value of the debt?

3.3 What is the market value of equity that the firm has outstanding?

4. *Trade-Off on Debt versus Equity*

Benefits of Debt

- What marginal tax rate does this firm face, and how does this measure up to the marginal tax rates of other firms? Are there other tax deductions that this company has (like depreciation) to reduce the tax bite?
- Does this company have high free cash flows (for example, EBITDA/firm value)? Has it taken and does it continue to have good investment projects? How responsive are managers to stockholders? (Will there be an advantage to using debt in this firm as a way of keeping managers in line or do other [cheaper] mechanisms exist?)

Costs of Debt

- How high are the current cash flows of the firm (to service the debt) and how stable are these cash flows? (Look at the variability in the operating income over time.)
- How easy is it for bondholders to observe what equity investors are doing? Are the assets tangible or intangible? If not, what are the costs in terms of monitoring stockholders or in terms of bond covenants?
- How well can this firm forecast its future investment opportunities and needs?

Getting Information about Current Financing Choices

The information about current financing choices can almost all be extracted from the financial statements. The balance sheet should provide a summary of the book values of the various financing choices made by the firm, though hybrids are usually categorized into debt (if they are debt hybrids) and equity (if they are equity hybrids). The description of warrants outstanding as well as the details of the borrowing that the firm has should be available in the footnotes to the balance sheets. In particular, the maturity dates for different components of borrowing, the coupon rates and information on any other special features should be available in the notes.

Online sources of information: Review

www.stern.nyu.edu/~adamodar/cfin2E/project/data.htm.

Problems and Questions

1. An income bondholder receives interest payments only if the firm makes income. If the firm does not make interest payments in a year, the interest is cumulated and paid in the first year the firm makes income. A preferred stock receives preferred dividends only if the firm makes income. If a firm does not make preferred dividend payments in a year, the dividend is cumulated and paid in the first year the firm makes income. Are income bonds really preferred stock? What are the differences? For purposes of calculating debt. how would you differentiate between income bonds and regular bonds?

2. A commodity bond links interest and principal payments to the price of a commodity. Differentiate a commodity bond from a straight bond, and then from equity. How would you factor these differences into your analysis of the debt ratio of a company that has issued exclusively commodity bonds?

3. You are analyzing a new security that has been promoted as equity, with the following features:

- The dividend on the security is fixed in dollar terms for the life of the security, which is twenty years.
- The dividend is not tax-deductible.
- In the case of default, the holders of this security will receive cash only after all debt holders, secured as well as unsecured, are paid.
- The holders of this security will have no voting rights.

Based on the description of debt and equity in the chapter, how would you classify this security? If you were asked to calculate the debt ratio for this firm, how would you categorize this security?

4. You are analyzing a convertible preferred stock with the following characteristics for the security:

- There are 50,000 preferred shares outstanding, with a face value of $100 and a 6 percent preferred dividend rate.

- The firm has straight preferred stock outstanding, with a preferred dividend rate of 9 percent.
- The preferred stock is trading at $105.

Estimate the preferred stock and equity components of this preferred stock.

5. You have been asked to calculate the debt ratio for a firm that has the following components to its financing mix:

- The firm has 1 million shares outstanding, trading at $50 per share.
- The firm has $25 million in straight debt, carrying a market interest rate of 8 percent.
- The firm has 20,000 convertible bonds outstanding, with a face value of $1,000, a market value of $1,100, and a coupon rate of 5 percent.

Estimate the debt ratio for this firm.

6. You have been asked to estimate the debt ratio for a firm with the following financing details:

- The firm has two classes of shares outstanding: 50,000 shares of class A stock, with 2 voting rights per share, trading at $100 per share, and 100,000 shares of class B stock, with 1/2 voting right per share, trading at $90 per share.
- The firm has $5 million in bank debt, and the debt was taken on recently.

Estimate the debt ratio. Why does it matter when the bank debt was taken on?

7. Zycor Corporation obtains most of its funding internally. Assume that the stock has a beta of 1.2, the riskless rate is 6.5 percent, and the market risk premium is 6 percent.

    a. Estimate the cost of internal equity.

    b. Now assume that the cost of issuing new stock is 5 percent of the proceeds. Estimate the cost of external equity.

8. Office Helpers is a private firm that manufactures and sells office supplies. The firm has limited capital and is estimated to have a value of $80 million with the capital constraints. A venture capitalist is willing to contribute $20 million to the firm in exchange for 30 percent of the value of the firm. With this additional capital, the firm will be worth $120 million.

    a. Should the firm accept the venture capital?

b. At what percentage of firm value would you (as the owner of the private firm) break even on the venture capital financing?

9. Assume now that Office Helpers decides to go public and would like to have its shares trade at a target price of $10 per share. If the IPO is likely to be underpriced by 20 percent, how many shares should the firm have?

10. You are a venture capitalist and have been approached by Cirrus Electronics, a private firm. The firm has no debt outstanding and does not have earnings now but is expected to be earning $15 million in four years, when you also expect it to go public. The average price-earnings ratio of other firms in this business is 50.
    a. Estimate the exit value of Cirrus Electronics.
    b. If your target rate of return is 35 percent, estimate the discounted terminal value of Cirrus Electronics.
    c. If you are contributing $75 million of venture capital to Cirrus Electronics, at a minimum what percentage of the firm value would you demand in return?
11. The unlevered beta of electronics firms, on average, is 1.1. The riskless rate is 6.5 percent and the market risk premium is 6 percent.
    a. Estimate the expected return, using the CAPM.
    b. If you are a venture capitalist, why might you have a target rate of return much higher than this expected return?

12. Sunshine Media has just completed an IPO, where 50 million shares of the 125 million shares outstanding were issued to the public at an offering price of $22 per share. On the offering date, the stock price zoomed to $40 per share. Who gains from this increase in the price? Who loses, and how much?

13. IPOs are difficult to value because firms going public tend to be small and little information is available about them. Investment bankers have to underprice IPOs because they bear substantial pricing risk. Do you agree with this statement? How would you test it empirically?

14. You are the owner of a small and successful firm with an estimated market value of $50 million. You are considering going public.

    a. What are the considerations you would have in choosing an investment banker?

    b. You want to raise $20 million in new financing, which you plan to reinvest back in the firm. (The estimated market value of $50 million is based on the assumption that this $20 million is reinvested.) What proportion of the firm would you have to sell in the IPO to raise $20 million?

    c. How would your answer to **b** change if the investment banker plans to underprice your offering by 10 percent?

    d. If you wanted your stock to trade in the $20–25 range, how many shares would you have to create? How many shares would you have to issue?

15. You have been asked for advice on a rights offering by a firm with 10 million shares outstanding trading at $50 per share. The firm needs to raise $100 million in new equity. Assuming that the rights subscription price is $25, answer the following questions.

    a. How many rights would be needed to buy one share at the subscription price?

    b. Assuming that all rights are subscribed to, what will the ex-rights price be?

    c. Estimate the value per right.

    d. If the price of a right were different (higher or lower) than the value estimated in **c**, how would you exploit the difference?

16. You are stockholder in a SmallTech, a company that is planning to raise new equity. The stock is trading at $15 per share, and there are 1 million shares outstanding. The firm issues 500,000 rights to buy additional shares at $10 per share to its existing stockholders.

    a. What is the expected stock price after the rights are exercised?

    b. If the rights are traded, what is the price per right?

    c. As a stockholder, would you be concerned about the dilution effect lowering your stock price? Why or why not?

17. Assume that SmallTech has net income of $1 million and that the earnings will increase in proportion with the additional capital raised.
    a. Estimate the earning per share that SmallTech will have after the rights issue described in the last problem.
    b. Assume that SmallTech could have raised the capital by issuing 333,333 shares at the prevailing market price of $15 per share (thus raising the same amount of equity as was raised in the rights issue) to the public. Estimate the earnings per share that SmallTech would have had with this alternative.
    c. As a stockholder, are you concerned about the fact that the rights issue results in lower earnings per share than the general subscription offering (described in **b**).

18. MVP, a manufacturing firm with no debt outstanding and a market value of $100 million, is considering borrowing $40 million and buying back stock. Assuming that the interest rate on the debt is 9 percent and that the firm faces a tax rate of 35 percent, answer the following questions:

    a. Estimate the annual interest tax savings each year from the debt.

    b. Estimate the present value of interest tax savings, assuming that the debt change is permanent.

    c. Estimate the present value of interest tax savings, assuming that the debt will be taken on for ten years only.

    d. What will happen to the present value of interest tax savings if interest rates drop tomorrow to 7 percent but the debt itself is fixed rate debt?

19. A business in the 45 percent tax bracket is considering borrowing money at 10 percent.

    a. What is the after-tax interest rate on the debt?

    b. What is the after-tax interest rate if only half of the interest expense is allowed as a tax deduction?

    c. Would your answer change if the firm is losing money now and does not expect to have taxable income for three years?

20. WestingHome is a manufacturing company that has accumulated a net operating loss of $2 billion over time. It is considering borrowing $5 billion to acquire another company.

    a. Based on the corporate tax rate of 36 percent, estimate the present value of the tax savings that could accrue to the company.

    b. Does the existence of a net operating loss carryforward affect your analysis? (Will the tax benefits be diminished as a consequence?)

21. Answer true or false to the following questions relating to the free cash flow hypothesis (as developed by Jensen).

    a. Companies with high operating earnings have high free cash flows.

    b. Companies with large capital expenditures relative to earnings have low free cash flows.

    c. Companies that commit to paying a large portion of their free cash flow as dividends do not need debt to add discipline.

    d. The free cash flow hypothesis for borrowing money makes more sense for firms in which there is a separation of ownership and management.

    e. Firms with high free cash flows are inefficiently run.

22. Assess the likelihood that the following firms will be taken over, based on your understanding of the free cash flow hypothesis. You can assume that earnings and free cash flows are highly correlated.

    a. A firm with high growth prospects, good projects, low leverage, and high earnings.

    b. A firm with low growth prospects, poor projects, low leverage, and poor earnings.

    c. A firm with high growth prospects, good projects, high leverage, and low earnings.

    d. A firm with low growth prospects, poor projects, high leverage, and good earnings.

    e. A firm with low growth prospects, poor projects, low leverage, and good earnings.

23. Nadir, an unlevered firm, has expected earnings before interest and taxes of $2 million per year. Nadir's tax rate is 40 percent, and the market value is $V = E = \$12$ million. The stock

has a beta of 1, and the risk-free rate is 9 percent. [Assume that $E(R_m) - R_f = 6\%$] Management is considering the use of debt; debt would be issued and used to buy back stock, and the size of the firm would remain constant. The default free interest rate on debt is 12 percent. Because interest expense is tax-deductible, the value of the firm would tend to increase as debt is added to the capital structure, but there would be an offset in the form of the rising cost of bankruptcy. The firm's analysts have estimated approximately that the present value of any bankruptcy cost is $8 million and the probability of bankruptcy will increase with leverage according to the following schedule:

Value of Debt	*Probability of Failur*
$2,500,000	0.00%
$5,000,000	8.00%
$7,500,000	20.5%
$8,000,000	30.0%
$9,000,000	45.0%
$10,000,000	52.5%
$12,500,000	70.0%

a. What is the cost of equity and WACC at this time? <AQ: WACC has not been defined in this chapter, so it should be spelled out here.>

b. What is the optimal capital structure when bankruptcy costs are considered?

c. What will the value of the firm be at this optimal capital structure?

24. A firm that has no debt has a market value of $100 million and a cost of equity of 11 percent. In the Miller-Modigliani world,
    a. what happens to the value of the firm as the leverage is changed (assume no taxes)?
    b. what happens to the cost of capital as the leverage is changed (assume no taxes)?
    c. how would your answers to **a** and **b** change if there are taxes?

25. Assume that personal investors pay a 40 percent tax rate on interest income and only a 20 percent tax rate on equity income. If the corporate tax rate is 30 percent, estimate whether debt has a tax benefit, relative to equity. If a firm with no debt and $100 million in market value borrows money in this world, estimate what the value of the firm will be if the firm borrows $50 million.

26. In the illustration in Problem 25, what would the tax rate on equity income need to be for debt to not have an effect on value?

27. XYZ Pharma is a pharmaceutical company that traditionally has not used debt to finance its projects. Over the past ten years, it has also reported high returns on its projects and growth and made substantial research and development expenses over the time period. The health care business overall is growing much slower now, and the projects that the firm is considering have lower expected returns.
    a. How would you justify the firm's past policy of not using debt?
    b. Do you think the policy should be changed now? Why or why not?

28. Unitrode, which makes analog/linear integrated circuits for power management, is a firm that has not used debt in the financing of its projects. The managers of the firm contend that they do not borrow money because they want to maintain financial flexibility.
    a. How does not borrowing money increase financial flexibility?
    b. What is the trade-off you would be making if you have excess debt capacity and you choose not to use it because you want financial flexibility?

29. Consolidated Power is a regulated electric utility that has equity with a market value of $1.5 billion and debt outstanding of $3 billion. A consultant notes that this is a high debt ratio relative to the average across all firms, which is 27 percent, and suggests that the firm is overlevered.
    a. Why would you expect a electric utility to be able to maintain a higher debt ratio than the average company?
    b. Does the fact that the company is a regulated monopoly affect its capacity to carry debt?