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The study of capital structure attempts to explain the mix of securities and financing sources used by corporations to finance real investment. Most of the research on capital structure has focused on the proportions of debt vs. equity observed on the right-hand sides of corporations' balance sheets. This paper is an introduction to that research.

There is no universal theory of the debt-equity choice, and no reason to expect one. There are several useful conditional theories, however. For example, the *tradeoff theory* says that firms seek debt levels that balance the tax advantages of additional debt against the costs of possible financial distress. The tradeoff theory predicts moderate borrowing by tax-paying firms. The *pecking order theory* says that the firm will borrow, rather than issuing equity, when internal cash flow is not sufficient to fund capital expenditures. Thus the amount of debt will reflect the firm's cumulative need for external funds. The *free cash flow theory* says that dangerously high debt levels will increase value, despite the threat of financial distress, when a firm's operating cash flow significantly exceeds its profitable investment opportunities. The free cash flow theory is designed for mature firms that are prone to overinvest.

There is another possibility: perhaps financing doesn't matter. Modigliani and Miller (1958) proved that the choice between debt and equity financing has no material effects on the value of the firm or on the cost or availability of capital. They assumed perfect and frictionless capital markets, in which financial innovation would quickly extinguish any deviation from their predicted equilibrium.

The logic of the Modigliani and Miller (1958) results is now widely accepted. Nevertheless, financing clearly can matter. The chief reasons why it matters include

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taxes, differences in information and agency costs. Theories of optimal capital structure differ in their relative emphases on, or interpretations of, these factors. The tradeoff theory emphasizes taxes, the pecking order theory emphasizes differences in information, and the free cash flow theory emphasizes agency costs. I will review the theories in that order.

Most research on capital structure has focused on public, nonfinancial corporations with access to U.S. or international capital markets. This is the right place to start. These companies have the broadest menu of financing choices and can adjust their capital structures at relatively low cost. Yet even 40 years after the Modigliani and Miller research, our understanding of these firms' financing choices is limited. We know much more about financing tactics—for example the tax-efficient design or timing of a specific security issue—than about financing strategy, for example the firm's choice of a target overall debt level.

Research on financing tactics confirms the importance of taxes, information differences and agency costs. Whether these factors have first-order effects on the overall levels of debt vs. equity financing is still an open question. Debt ratios of established, public U.S. corporations vary within apparently homogenous industries. There is also variation over time, even when taxation, information differences and agency problems are apparently constant.

Some Facts about Financing

Most of the aggregate gross investment by U.S. nonfinancial corporations has been financed from internal cash flow (depreciation and retained earnings). External financing in most years covers less than 20 percent of real investment, and most of that financing is debt. Net stock issues are frequently *negative*: that is, more shares are extinguished in acquisitions and share repurchase programs than are created by new stock issues. For example, in 1999 internal cash flow financed about 85 percent of aggregate investment by U.S. nonfarm, nonfinancial corporations ($805 billion out of $944 billion). External financing was $139 billion. Corporations raised this sum by net additional borrowing of $283 billion; net share issues were negative at $144 billion (Federal Reserve System, 1999, *Flow of Funds Accounts*, Table F.102).

Of course, these are aggregate figures. Some companies rely heavily on stock issues. They tend to be the smaller, riskier and more rapidly growing firms.

Debt ratios vary across industries. For example, the large, integrated oil companies have relied mostly on debt for external financing. Many of these companies have simultaneously retired equity through share repurchases. Exxon spent $29 billion on share repurchases from the mid-1980s to its merger with Mobil in 1999. Other relatively heavy debt users include the utility, chemical, transportation, telecommunications, forest products and real estate development industries.

At the other extreme, the major pharmaceutical companies typically operate at *negative* debt ratios: their holdings of cash and marketable securities exceed their

Table 1
Median Debt-to-Capital Ratios, 1991

	Debt to Total Capital			
	Book	*Book, Adjusted*	*Market*	*Market, Adjusted*
Canada	39%	37%	35%	32%
France	48	34	41	28
Germany	38	18	23	15
Italy	47	39	46	36
Japan	53	37	29	17
United Kingdom	28	16	19	11
United States	37	33	28	23

Source: Rajan and Zingales (1995).

outstanding debt, so they are net lenders. Other net lenders include Ford Motor Co., which had roughly $25 billion of cash and marketable securities in 2000 vs. $10 billion of outstanding debt. Debt ratios are also low or negative for many prominent growth companies. At mid-year 2000, Microsoft had no long-term debt but held $24 billion in cash and marketable securities.

In general, industry debt ratios are low or negative when profitability and business risk are high. Intangible assets are also associated with low debt ratios. For example, marketing- and advertising-intensive companies such as Procter & Gamble have traditionally operated at low debt ratios. Their profits flow mainly from intangible assets. Firms with valuable growth opportunities also tend to have low debt ratios (Long and Malitz, 1985; Smith and Watts, 1992; Barclay, Smith and Watts, 1995; Barclay and Smith, 1999).

Reported debt ratios for U.S. corporations are generally lower than in other industrialized countries. This seems to be due to differences in accounting. Table 1 is drawn from Rajan and Zingales (1995), who calculated debt ratios for a large sample of publicly traded firms in several countries.[1] They compared the ratios for both reported and adjusted balance sheets. The adjustments removed the effects of the most important differences in accounting. For example, German firms report pension liabilities as a debt-equivalent liability, with no offset for pension assets. U.S. companies report a net liability only if the pension plan is underfunded. Also, German firms segregate "reserves" from equity. Under U.S. accounting, the reserves would be included in equity. The median adjusted debt ratio of the U.S.

[1] These are debt-to-capital ratios, that is, ratios of debt to the *sum* of debt and equity financing. Sometimes debt-to-equity ratios are reported instead. Debt and equity levels are usually taken from corporations' annual reports or filings with the Securities and Exchange Commission. In other words, they are based on accounting or "book" values. For some purposes, for example calculating weighted average costs of capital, debt ratios should be based on the market values of the firm's debt and equity securities. Where these distinctions are important, I point them out in the text. Otherwise, I just say "debt ratio."

sample is in the middle of the pack of the adjusted ratios for the other six countries. At the end of the day, Rajan and Zingales found no systematic differences between debt ratios in the United States and the other major industrialized countries.

Financial Innovation and the Modigliani-Miller Propositions

Surveys of the theory of optimal capital structure always start with the Modigliani and Miller (1958) proof that financing doesn't matter in perfect capital markets.[2] Consider the simple, market-value balance sheet in Figure 1. The market values of the firm's debt and equity, D and E, add up to total firm value V. Modigliani and Miller's (1958) Proposition 1 says that V is a constant, regardless of the proportions of D and E, provided that the assets and growth opportunities on the left-hand side of the balance sheet are held constant. "Financial leverage"—that is, the proportion of debt financing—is irrelevant. This leverage-irrelevance result generalizes to any mix of securities issued by the firm. For example, it doesn't matter whether the debt is short- or long-term, callable or call-protected, straight or convertible, in dollars or euros, or some mixture of all of these or other types.

Proposition 1 also says that each firm's cost of capital is a constant, regardless of the debt ratio. The cost of capital is a standard tool of practical finance, so it's worth writing out the formula. Let r_D and r_E be the cost of debt and the cost of equity—that is, the expected rates of return demanded by investors in the firm's debt and equity securities. The overall (weighted-average) cost of capital depends on these costs and the market-value ratios of debt and equity to overall firm value.

$$\text{Weighted Average Cost of Capital} = r_A = r_D D/V + r_E E/V$$

The weighted average cost of capital r_A is the expected return on a portfolio of all the firm's outstanding securities. It is also the discount or "hurdle rate" for capital investment.[3]

The weighted average cost of capital r_A is, according to Modigliani and Miller, a constant. Also, debt has a prior claim on the firm's assets and earnings, so the cost

[2] It took some time to sort out what "perfect" means in the Modigliani-Miller context. (Ezra Solomon once quipped: "A perfect capital market should be *defined* as one in which the MM theory holds.") Strictly speaking, the capital market must be not only competitive and frictionless, but also "complete," so that the risk characteristics of every security issued by the firm can be matched by purchase of another existing security or portfolio, or by a dynamic trading strategy. In complete markets, a change in capital structure does not change range of risk characteristics attainable in investors' portfolios. Fama (1978) summarizes the conditions required for Modigliani and Miller's (1958) Proposition 1.

[3] I am ignoring taxes. Corporations actually use the after-tax weighted average cost of capital (WACC):

$$\text{WACC} = r_D(1 - T_C)D/V + r_E E/V$$

Figure 1
A Market-value Balance Sheet

Assets-in-place and growth opportunities	Debt (D) Equity (E)
	Firm value (V)

of debt is always less than the cost of equity. Suppose we solve the equation for the cost of equity.

$$r_E = r_A + (r_A - r_D)D/E$$

In other words, the cost of equity—the expected rate of return demanded by equity investors—increases with the market-value debt-equity ratio D/E. The rate of increase depends on the spread between the overall cost of capital r_A and the cost of debt r_D. This equation is Modigliani and Miller's Proposition 2. It shows why "there is no magic in financial leverage." Any attempt to substitute "cheap" debt for "expensive" equity fails to reduce the overall cost of capital because it makes the remaining equity still more expensive—just enough more expensive to keep the overall cost of capital constant.

Modigliani and Miller's (1958) propositions are no longer controversial as a matter of theory. The economic intuition is simple, equivalent to asserting that in a perfect-market supermarket, the value of a pizza does not depend on how it is sliced.

The Modigliani-Miller theory may be intuitive, but is it credible? Are capital markets really sufficiently perfect? After all, the values of pizzas *do* depend on how they are sliced. Consumers are willing to pay more for the several slices than for the equivalent whole. Perhaps the value of the firm does depend on how its assets, cash flows and growth opportunities are sliced up and offered to investors as debt and equity claims.[4] We see constant innovation in the design of securities and in new financing schemes. Innovation proves that financing can matter. If new securities

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This incorporates the after-tax cost of debt, calculated at the marginal corporate rate T_C. WACC is the correct discount rate for after-tax cash flows from capital investments that do not change the firm's business risk. See Brealey and Myers (2000, Chapter 19).

[4] There are surely investors who would be willing to pay extra for particular types or mixes of corporate securities. For example, investors cannot easily borrow with limited liability, but corporations provide limited liability and can borrow on their stockholders' behalf.

or financing tactics never added value, then there would be no incentive to innovate.

The practical relevance and credibility of the Modigliani-Miller propositions therefore cannot rest on a lack of demand for financial leverage or for specialized securities. The support for the propositions must, in the end, come from the supply side. The key fact supporting the Modigliani-Miller propositions is that the cost of supply is very small relative to the market value of the firm. Suppose there is a clientele of investors who would be willing to pay extra for the debt and equity securities of a firm with a particular, "optimal" debt ratio. They will not have to pay extra, because public corporations' cost of manufacturing debt and equity securities, rather than equity only, is a small fraction of the securities' market values. (Underwriting and other issue costs are actually lower for debt than for equity.) Thus, the supply of debt adjusts until the value added for the marginal investor is essentially zero.

Modigliani and Miller's (1958) theory is exceptionally difficult to test directly, but financial innovation provides convincing circumstantial evidence. The costs of designing and creating new securities and financing schemes are low, and the costs of imitation are trivial. (Fortunately, securities and financing tactics cannot be patented.) Thus temporary departures from Modigliani and Miller's predicted equilibrium create opportunities for financial innovation, but successful innovations quickly become "commodities," that is, standard, low-margin financial products. The rapid response of supply to an innovative financial product restores the Modigliani and Miller equilibrium. Firms may find it convenient to use these new products, but only the first users will increase value, or lower the cost of capital, by doing so.

For regulators and policymakers, the Modigliani and Miller propositions are the ideal end result. If that result could be achieved in practice, then investors' diverse demands for specialized securities would be satisfied at negligible cost. All firms would have equal access to capital, and the cost of capital would not depend on financing, but only on business risk. Capital would flow directly to its most efficient use. Therefore public policy should accommodate financial innovation because it makes financing decisions unimportant.

But for students or practitioners of corporate finance, the Modigliani and Miller propositions are benchmarks, not end results. The propositions say that financing does not affect value *except for* specifically identified costs or imperfections. As Merton Miller (1989, p. 7) noted, " . . . showing what *doesn't* matter can also show, by implication, what *does*."

Debt and Taxes

The United States taxes corporate income, but interest is a tax-deductible expense. A taxpaying firm that pays an extra dollar of interest receives a partially offsetting "interest tax shield" in the form of lower taxes paid. Financing with debt

instead of equity increases the total after-tax dollar return to debt and equity investors, and should increase firm value.

This present value of interest tax shields could be a very big number. Suppose debt is fixed and permanent, as Modigliani and Miller (1963) assumed, and that corporate income is taxed at the current 35 percent statutory rate.[5] The firm borrows $1 million and repurchases and retires $1 million of equity. It commits to maintain this debt level and to make annual interest payments for the indefinite future. Absent taxes, this new debt does not increase or decrease firm value: the firm is borrowing on fair terms, so the money raised is exactly offset by the present value of the future interest payments. But for a taxpaying firm the net liability created by the $1 million debt issue is only $650,000, because the Internal Revenue Service effectively pays 35 percent of the interest payments. The after-tax net present value of this transaction would be NPV = + 1 − .65 = + $.35 million. The gains from borrowing $10 million or $500 million scale up proportionally.

Such calculations are now understood as remote upper bounds. First, the firm may not always be profitable, so the average effective future tax rate is less than the statutory rate. Second, debt is not permanent and fixed. Investors today cannot know the size and duration of future interest tax shields. "Debt capacity" depends on the future profitability and value of the firm; it may be able to increase borrowing if it does well, or be forced to pay down debt if it does poorly. The future interest tax shields flowing to investors are therefore risky.

Third, the corporate-level tax advantages of debt could be partly offset by the tax advantage of equity to individual investors, namely, the ability to defer capital gains and then to pay taxes at a lower capital gains rate. The tax rate on investors' interest and dividend income is higher than the effective tax rate on equity income, which comes as a mixture of dividends and capital gains. Corporations should see this relatively low effective rate as a reduction in the cost of equity relative to the cost of debt.

The tax advantages of equity to investors could, in some cases, offset the value of interest tax shields to the corporation. For example, suppose Firm X's shareholders are in the top individual tax bracket, paying about 40 percent on a marginal dollar of interest or dividends received. However, the firm pays no dividends, so equity income comes entirely as capital gains. Suppose the effective rate on capital gains is about 8 percent. (The top-bracket capital gains rate is now 20 percent, and payment can be deferred until shares are sold and the gains realized.) Then the total taxes paid on $100,000 of Firm X's income are: 1) $35,000 in corporate taxes, plus 2) about $5,000 of (deferred) capital gains taxes (about 8 percent of the after-tax corporate income of $65,000).

Now Firm X borrows $1 million at 10 percent and repurchases and retires $1 million of equity. It pays out $100,000 per year in interest but saves $35,000 in taxes. But investors receive $100,000 *more* in interest income and $65,000 *less* in

[5] This is the marginal federal rate for most large corporations. State income taxes could add two or three percentage points to this rate.

capital gains. Their taxes go up by \$40,000 − 5,000 = \$35,000. There is no net gain once both corporate and individual taxes are considered.

If these effective tax rates applied generally to the marginal investors in debt and equity securities, we would predict the equilibrium described by Miller (1977). The equilibrium is reached in the following way. As the supply of debt from all corporations expands, investors with higher and higher tax brackets have to be enticed to hold corporate debt, and to receive more of their income in the form of interest rather than capital gains. Interest rates rise as more and more debt is issued, so corporations face rising costs of debt relative to their costs of equity. Eventually the after-tax cost of debt becomes so high that there is no gain from further borrowing. The supply of debt increases until there is no further net tax advantage. At that point, the effects of personal and corporate taxes cancel out, and Modigliani and Miller's Proposition 1 holds despite the tax-deductibility of interest.

But actual tax rates do not appear to support this equilibrium. Graham (2000) examines the interest rate spread between corporate bonds and tax-exempt municipal bonds to estimate the tax rate paid by marginal investors in corporate debt. The rate is about 30 percent, well below the top bracket. He also estimates the effective tax rate on equity income at about 12 percent.[6] Assume again that Firm X borrows \$1 million and pays out \$100,000 of interest yearly. It saves \$35,000 in taxes. The marginal investor in debt pays an extra \$30,000 on interest income but saves about \$8,000 on equity income (about 12 percent of \$65,000). The net tax saving is \$35,000 − (30,000 − 8,000) = \$13,000. Thus the extra tax paid by investors offsets more than half of the corporate interest tax shield. Nevertheless, interest tax shields should still be extremely valuable.

Graham's (2000) estimates are not definitive. We are not sure who the relevant marginal investors are, much less their effective tax rates. Yet there is a near-consensus, among both practitioners and economists, that there is a significant tax incentive for corporate borrowing. Therefore we should observe corporations borrowing to exploit interest tax shields. If there were no offsetting costs, they would attempt to shield as much taxable income as possible, and in equilibrium there would be no corporations paying taxes! This prediction is clearly wrong. There must be some costs attached to aggressive borrowing. This leads to the tradeoff theory of capital structure.

Taxes and the Tradeoff Theory

The tradeoff theory justifies moderate debt ratios. It says that the firm will borrow up to the point where the marginal value of tax shields on additional debt is just offset by the increase in the present value of possible costs of financial

[6] Graham's (2000) estimate of the marginal rate on interest and dividends is an average from 1980 to 1994. The estimate for the effective rate on equity income varied over this sample period. I have quoted the rate for 1993 and 1994.

distress. Financial distress refers to the costs of bankruptcy or reorganization, and also to the agency costs that arise when the firm's creditworthiness is in doubt. I discuss some of these costs further below. For now, just assume that costs of financial distress exist, and that the prospect of financial distress can drag down the current market value of the firm.

The tradeoff theory is in immediate trouble on the tax front, because it seems to rule out conservative debt ratios by taxpaying firms. If the theory is right, a value-maximizing firm should never pass up interest tax shields when the probability of financial distress is remotely low. Yet there are many established, profitable companies with superior credit ratings operating for years at low debt ratios, including Microsoft and the major pharmaceutical companies.

These examples are not unusual. About half the firms in Graham's (2000) sample were paying taxes at the full statutory rate; the average firm in this subsample could have doubled its interest payments in confident expectation of doubled interest tax shields. Graham (pp. 1916, 1934) estimates that these companies could have added 7.5 percent on average to firm value by "levering up" to still-conservative debt ratios. This is not small change. A 7.5 percent deviation from Modigliani and Miller's (1958) leverage-irrelevance proposition should prompt a vigorous supply response from security issuers. One cannot accept Modigliani and Miller and at the same time ignore many mature corporations' evident lack of interest in the tax advantages of debt.

Studies of the determinants of actual debt ratios consistently find that the most profitable companies in a given industry tend to borrow the least.[7] For example, Wald (1999) found that profitability was "the single largest determinant of debt/asset ratios" in cross-sectional tests for the United States, United Kingdom, Germany, France and Japan.

High profits mean low debt, and vice versa. But if managers can exploit valuable interest tax shields, as the tradeoff theory predicts, we should observe exactly the opposite relationship. High profitability means that the firm has more taxable income to shield, and that the firm can service more debt without risking financial distress.

The tradeoff theory cannot account for the correlation between high profitability and low debt ratios. It does no good to say (without further explanation) that managers are "excessively conservative" or "not value-maximizing." That amounts to blaming managers, rather than economists, for the failure of the economists' theory. Also, an examination of financing tactics quickly dismisses the idea that managers don't pay attention to taxes.

Floating-rate preferred shares are creatures of the tax code, and a clear illustration of the importance of taxes in financing tactics. These preferreds'

[7] Myers (1984) stressed this point; see also Baskin (1989). Other studies are cited in Harris and Raviv's (1991) review article. Rajan and Zingales (1995) confirm the negative correlation between profitability and leverage for the United States, Japan and Canada, although no significant correlations were found for France, Germany, Italy and Britain.

dividend payments are tied to short-term interest rates. This stabilizes the preferreds' prices.[8] They are purchased by other corporations with excess cash available for short-term investment. The key tax advantage is that only 30 percent of intercorporate dividends are taxed. The effective corporate tax rate for preferred dividends is therefore $.3 \times .35 = .105$ or 10.5 percent. The financial innovators who first created floating-rate preferred shares thus created a partially tax-exempt security that acted like a safe, short-term, money-market instrument.[9]

Financial leases are also largely tax-driven. When the lessor's tax rate is higher than the lessee's, there is a net gain because the lessor's interest and depreciation tax shields are front-loaded—that is, mostly realized earlier—than the taxes paid on the lease payments. The tax advantage is due to the time value of money, and therefore increases in periods of high inflation and high nominal interest rates (Myers, Dill and Bautista, 1977).

There are many further examples of tax-driven financing tactics. Finding clear evidence that taxes have a systematic effect on financing *strategy*, as reflected in actual or target debt ratios, is much more difficult. In Myers (1984, p. 588), after a review of the then-available empirical work, I concluded that there was "no study clearly demonstrating that a firm's tax status has a predictable, material effect on its debt policy. I think that the wait for such a study will be protracted."

A few such studies have since appeared, although some relate in part to financing tactics, and none gives conclusive support for the tradeoff theory. For example, MacKie-Mason (1990) estimated a probit model for companies issuing debt or equity securities. He predicted that companies with low marginal tax rates—for example companies with tax loss carry-forwards—would be more likely to issue equity, compared to more profitable companies facing the full statutory tax rate. This was clearly true in his sample.

MacKie-Mason's (1990) result is consistent with the tradeoff theory, because it shows that taxpaying firms favor debt. But it is also consistent with a Miller (1977) equilibrium in which the value of corporate interest tax shields is entirely offset by the low effective tax rate on capital gains. In this case, a firm facing a low enough tax rate would also use equity, because investors pay more taxes on debt interest than on equity income. Thus, we cannot conclude from MacKie-Mason's results that interest tax shields make a significant contribution to the market value of the firm or that debt ratios are determined by the tradeoff theory.

Graham (1996) also finds evidence that changes in long-term debt are posi-

[8] The preferred dividend is set by a monthly or quarterly auction. Thus floating-rate preferreds are now called auction-rate preferreds.

[9] Corporations and investment bankers have also figured out how to issue *tax-deductible* preferred shares. The corporation issues a bond to a special purpose trust, which in turn issues preferred stock to investors. The trust is designed to be a tax-free conduit. The issuing corporation deducts interest, and corporate investors can receive preferred dividends at an effective tax rate of 10.5 percent. The first tax-deductible preferred was designed and successfully issued in 1993. By the end of 1997, there were 285 more issues raising $27 billion—another example of rapid supply response to a successful financial innovation (Khanna and McConnell, 1998; Irvine and Rosenfeld, 2000).

tively and significantly related to the firm's effective marginal tax rate. Again this shows that taxes affect financing decisions, at least at the tactical level. It does not show that the present value of interest tax shields is materially positive. Fama and French (1998), despite an extensive statistical search, could find no evidence that interest tax shields contributed to the market value of the firm.

The tradeoff theory of optimal capital structure has strong commonsense appeal. It rationalizes moderate debt ratios. It is consistent with certain obvious facts, for example, that companies with relatively safe, tangible assets tend to borrow more than companies with risky, intangible assets. (High business risk increases the odds of financial distress, and intangible assets are more likely to sustain damage if financial distress is encountered.) However, the words "consistent with" are particularly dangerous in this branch of empirical financial economics. A fact or statistical finding is often consistent with two or more competing capital structure theories. It is too easy to interpret results as supporting the theory that one is used to.

The Pecking Order Theory

We now look at the capital structure decision from a different point of view, the pecking order theory of Myers and Majluf (1984) and Myers (1984). Myers and Majluf analyzed a firm with assets-in-place and a growth opportunity requiring additional financing. They assumed perfect financial markets, except that investors do not know the true value of either the existing assets or the new opportunity. Therefore, investors cannot precisely value the securities issued to finance the new investment.

Assume the firm announces an issue of common stock. That is good news for investors if it reveals a growth opportunity with positive net present value. It is bad news if managers believe the assets-in-place are overvalued by investors and decide to try to issue overvalued shares. (Issuing shares at too low a price transfers value from existing shareholders to new investors. If the new shares are overvalued, the transfer goes the other way.)

Myers and Majluf (1984) assumed that managers act in the interest of existing shareholders, and refuse to issue undervalued shares unless the transfer from "old" to new stockholders is more than offset by the net present value of the growth opportunity. This leads to a pooling equilibrium in which firms can issue shares, but only at a marked-down price. Share prices fall not because investors' demand for equity securities is inelastic, but because of the information investors infer from the decision to issue; it turns out that the bad news (about the value of assets in place) always outweighs the good. Some good firms whose assets-in-place are *under*valued at the new price will decide not to issue even if it means passing by an opportunity with a positive net present value.

The prediction that announcement of a stock issue will immediately drive down stock price was confirmed by several studies, including Asquith and Mullins

(1986). The average fall in price is about 3 percent, that is, 3 percent of the pre-issue market capitalization of the firm. (The falls in price are much larger fractions of the amounts issued.)

This price drop should not be interpreted as a transaction cost or compared to the underwriting spreads and other expenses of stock issues. On average, the companies which issue shares do so at a fair price.[10] However, the companies that decide to issue are, on average, worth less than the companies that hold back. Investors downgrade the prices of issuing firms accordingly.

The price drop at announcement should be greater where the information asymmetry—in this case, the manager's information advantage over outside investors—is large. Dierkens (1991) confirms this using various proxies for information asymmetry. D'Mello and Ferris (2000) show that the price drop is greater for firms followed by few security analysts, and for firms with greater dispersion of analysts' earnings forecasts.

Now suppose the firm can issue either debt or equity to finance new investment. Debt has the prior claim on assets and earnings; equity is the residual claim. Investors in debt are therefore less exposed to errors in valuing the firm. The announcement of a debt issue should have a smaller downward impact on stock price than announcement of an equity issue. For investment-grade issues, where default risk is very small, the stock price impact should be negligible. Eckbo (1986) and Shyam-Sunder (1991) confirm this prediction.

Issuing debt minimizes the information advantage of the corporate managers. Optimistic managers, who believe the shares of their companies are undervalued, will jump at the chance to issue debt rather than equity. Only pessimistic managers will want to issue equity—but who would buy it? If debt is an open alternative, then any attempt to sell shares will reveal that the shares are not a good buy. Therefore equity issues will be spurned by investors if debt is available on fair terms, and in equilibrium only debt will be issued. Equity issues will occur only when debt is costly—for example, because the firm is already at a dangerously high debt ratio where managers and investors foresee costs of financial distress. In this case, even optimistic managers may turn to the stock market for financing.

This leads to the pecking order theory of capital structure:

1) Firms prefer internal to external finance. (Information asymmetries are assumed relevant only for external financing.)

2) Dividends are "sticky," so that dividend cuts are not used to finance capital expenditure, and so that changes in cash requirements are not soaked up in short-run dividend changes. In other words, changes in net cash show up as changes in external financing.

3) If external funds are required for capital investment, firms will issue the safest security first, that is, debt before equity. If internally generated cash flow

[10] The companies that decide *not* to issue face a kind of transaction cost equal to the difference between the attainable issue price and the true value per share of their assets and growth opportunities.

exceeds capital investment, the surplus is used to pay down debt rather than repurchasing and retiring equity.[11] As the requirement for external financing increases, the firm will work down the pecking order, from safe to riskier debt, perhaps to convertible securities or preferred stock, and finally to equity as a last resort.

4) Each firm's debt ratio therefore reflects its cumulative requirement for external financing.

The preference of public corporations for internal financing, and the relative infrequency of stock issues by established firms, have long been attributed to the separation of ownership and control, and the desire of managers to avoid the "discipline of capital markets." For example, Baumol (1965, p. 70) argued: "A company which makes no direct use of the stock market as a source of capital can, apparently, proceed to make its decisions confident in its immunity from . . . punishment from the impersonal mechanism of the stock exchange." Myers and Majluf (1984) suggest a different explanation: Managers who maximize market value will avoid external equity financing if they have better information than outside investors and the investors are rational.

The pecking order theory explains why the bulk of external financing comes from debt. It also explains why more profitable firms borrow less: not because their target debt ratio is low—in the pecking order they don't have a target—but because profitable firms have more internal financing available. Less profitable firms require external financing, and consequently accumulate debt.

Testing the Pecking Order vs. the Tradeoff Theory

It's instructive to compare the time-series predictions of the pecking order and tradeoff theories. The tradeoff theory implies a target-adjustment model (Taggart, 1977; Jalilvand and Harris, 1984; Auerbach, 1985). In this model, firms have a target debt level or ratio to which they gradually adjust. The target cannot be observed directly, but proxies can be calculated. The simplest proxy is the firm's average debt ratio over the relevant sample period.

The pecking order theory says that the key time-series variable is the firm's cumulative requirement for external financing—its cumulative "balance of payments" with outside investors. Each year's requirement equals internally generated cash flow less cash spent on capital investment and dividends. The pecking order says that this financial deficit will be covered entirely by borrowing, at least at low

[11] The Myers and Majluf (1984) analysis works equally well when the firm is distributing cash to investors. Information asymmetry leads to an equilibrium in which the firm is forced to pay down debt rather than repurchasing and retiring equity. See Shyam-Sunder and Myers (1999). However, the growing amounts of cash returned to investors via stock repurchases may undermine the pecking order, since stock repurchase programs are not as sticky as dividend payouts. See Jagannathan, Stephens and Weisbach (2000) and Guay and Harford (2000). Changes in repurchases may, for some companies at least, displace debt as the marginal source of financing.

or moderate debt ratios. If the deficit is negative, the surplus of internal funds is used to pay down debt.

Shyam-Sunder and Myers (1999) tested these time-series predictions on a panel of 157 firms from 1971 to 1989. They found support for both the pecking order and tradeoff theories. Each showed impressive statistical significance. Should we conclude that both theories were "consistent with" the financing decisions of the companies in the sample? Or is one theory wrong, its results spurious?

Consider the following experiment. First, calculate what the annual debt ratios would have been for each sample firm if the firm had followed the pecking order exactly. Then fit the target adjustment model to these simulated data. Can the model be rejected? Shyam-Sunder and Myers (1999) found that the target-adjustment model worked just as well on these simulated financing decisions as on the real decisions. The tradeoff theory, expressed as a target-adjustment model, was "consistent with" financing choices driven solely by the pecking order.

Why was the target-adjustment model not rejected even for simulated financing policies generated by the pecking order? Evidently the pecking order generated mean-reverting debt ratios. Why? The answer is simple: the capital investments of firms are "lumpy" and positively serially correlated, and internally generated cash varies over the business cycle. Therefore firms will tend to have strings of years with financial deficits, followed by strings of surpluses, or vice versa. If the firms finance by the pecking order, debt will "trend up" in deficit years and fall in surplus years. The pecking-order debt ratios will mean-revert, and the target-adjustment model will "explain" financing strategy.

This test can also be run in reverse, by simulating firm's debt ratios on the assumption that they gradually adjust to a fixed target ratio. Can the pecking order be rejected on this simulated data? Yes, it failed totally. Thus Shyam-Sunder and Myers (1999) concluded that their test of the pecking order had statistical power relative to the tradeoff-theory alternative, and that the pecking order was the best explanation of the financing behavior of the firms in their sample.

This lesson about statistical power is general. It applies also to cross-sectional tests of the tradeoff theory. The tests look for statistically significant coefficients on proxies for the determinants of optimal debt ratios. Such results might support the theory if it were the only game in town. But the same results can be observed in a cross-section of firms whose financing decisions are driven solely by the pecking order or by some other theory.[12]

What's Wrong with the Pecking Order?

Shyam-Sunder and Myers (1999, p. 242) concluded as follows: If their sample firms had "well-defined optimal debt ratios, it seems that their managers were not

[12] Shyam-Sunder and Myers (1999) regressed the debt ratios generated by their pecking order simulations on some of the typical proxies used in cross-sectional tests of the tradeoff theory. The coefficients on the proxies were plausible and significant.

much interested in getting there." But what were the managers interested in? Perhaps the tradeoff theory would work fine if managers were truly aiming to maximize shareholder wealth.

The pecking order, on the other hand, assumes that managers act in the interest of existing shareholders, maximizing the value of existing shares. Myers and Majluf (1984) do not show why managers should care if a new stock issue is over- or undervalued. There is no explicit treatment of management incentives, as in Ross's (1977) signaling equilibrium, where the design and parameters of the manager's compensation package drive the choice between debt and equity. The firm's financing decision then reveals the managers' information about the intrinsic value of the firm. In fact, Dybvig and Zender (1991) show that the pecking order's predictions could be generated by alternative models in which managers' compensation schemes are fine-tuned to assure optimal capital investment decisions.

The pecking order theory cannot explain why financing tactics are not developed to avoid the financing consequences of managers' superior information. For example, suppose that any special information available to the manager today will reach investors within the next year. Then the firm could issue "deferred equity" securities. For example, the firm could issue debt with a face value of $1000, to be repaid after one year by newly issued shares worth $1000 at the year-one stock price.[13] The manager cannot know today whether he or she will view the future stock price as too high or too low. Therefore issue of this deferred equity conveys no information; it is just as safe as the firm's regular debt. In fact it is debt, but payable in a particular currency, the firm's shares. Thus the firm can pre-commit to issue equity with no adverse signal to investors. Why is this type of security not widespread?[14]

The pecking order theory does show how information differences can affect financing. Like all theories of capital structure, it works better in some conditions and circumstances than in others.

Agency Costs and the Financial Objective of the Firm

So far we have assumed that the interests of the firm's financial managers and its shareholders are perfectly aligned, and that financial decisions are in the shareholders' interest. But perfect alignment is implausible in theory and impossible in practice.

[13] In other words, the debt will be converted to N shares, where N is not predetermined, but calculated as $N = 1000/P_1$, where P_1 is the stock price one year hence.

[14] PERCs (Preferred Equity Redemption Certificates), a special kind of convertible preferred stock, are in some ways similar to this deferred equity security, because they convert to a fixed dollar amount of the firm's stock if the stock price rises sufficiently. But otherwise PERCs convert to a fixed number of shares, thus leaving the downside risk to investors.

Ever since Berle and Means (1932), research on corporate governance has stressed the adverse consequences of the separation of ownership and control in public corporations. Jensen and Meckling (1976) argued for the inevitability of agency costs in corporate finance. Corporate managers, the agents, will act in their own interests, and will seek higher-than-market salaries, perquisites, job security and, in extreme cases, direct capture of assets or cash flows. They will favor "entrenching investments" which adapt the firm's assets and operations to the managers' skills and knowledge, and increase their bargaining power vs. investors (Shleifer and Vishny, 1989). The investors can discourage such value transfers by various mechanisms of monitoring and control, including supervision by independent directors and the threat of takeover. But these mechanisms are costly and subject to decreasing returns, so perfect monitoring is out of the question.

The interests of managers and investors can also be aligned by design of compensation packages. Here again, perfection is out of reach. First, the manager never bears the full costs that managerial actions impose on investors—unless, of course, the manager is also the owner. Second, there is no pure, observable measure of the performance of managers. The actions of a manager may account for a small fraction of the variance of observable outcomes, such as returns on common stock or changes in earnings. Investors would like to reward effort, commitment and good decisions, but these inputs are imperfectly observable. Even if good performance on these dimensions were observable by some informed monitor, the performance would not be verifiable. A contract offering a bonus for, say, "good decisions" would not be enforceable, because the decisions could not be evaluated by a disinterested outsider or by a court of law. In other words, "complete contracts" cannot be written.

Agency costs can also be triggered by conflicts between debt and equity investors. I review these costs now because of their importance for the tradeoff theory and the costs of financial distress.

Conflicts Between Debt and Equity Investors

Conflicts between debt and equity investors only arise when there is a risk of default. If debt is totally free of default risk, debtholders have no interest in the income, value or risk of the firm. But if there is a chance of default, then shareholders can gain at the expense of debt investors. Equity is a residual claim, so shareholders gain when the value of existing debt falls, even when the value of the firm is constant.

Suppose that managers act in the interests of stockholders and that the risk of default is significant. The managers will be tempted to take actions that transfer value from the firm's creditors to its stockholders. There are several ways to do this.

First, managers could invest in riskier assets or shift to riskier operating strategies. Higher risk increases the "upside" for stockholders. The downside is absorbed by the firm's creditors. Jensen and Meckling (1976) first stressed risk-shifting as an agency problem.

Second, the managers may be able to borrow still more and pay out cash to

stockholders. In this case the overall value of the firm is constant, but the market value of the existing debt declines. The cash received by stockholders more than offsets the decline in the value of their shares.

Third, the managers can cut back equity-financed capital investment. Normally the firm invests up to the point where the expected return just equals the cost of capital—that is, the point where the additional present value generated by investing just equals the investment required. But part of this additional present value goes to the firm's existing creditors, who are better protected once the investment is made. The greater the risk of default, the greater the benefit to existing debt from additional investment. The gain in the market value of debt acts like a tax on new investment. If that tax is high enough, managers may try to shrink the firm and pay out cash to stockholders. Myers (1977) stressed this "underinvestment" or "debt overhang" problem.

Fourth, the managers may "play for time," perhaps by concealing problems to prevent creditors from acting to force immediate bankruptcy or reorganization. This lengthens the effective maturity of the debt and makes it riskier. Again, creditors suffer and stockholders gain.

There are many examples of these temptations at work. Asquith and Wizman (1990) found that announcement of a leveraged buyout triggered an average loss in market value of 5.2 percent for bonds lacking covenant protection.[15] When RJR Nabisco's management proposed a leveraged buyout, the market value of the company's existing debt fell instantly by more that 10 percent. Alexander, Edwards and Ferris (2000) examine the returns of a large sample of junk bonds traded on Nasdaq. They find evidence that junk-bond and common-stock returns have a negative correlation at the announcement of "wealth-transferring events," such as an impending leveraged buyout.

Debt investors are of course aware of these temptations and try to write debt contracts accordingly. Debt covenants may restrict additional borrowing, limit dividend payouts or other distributions to stockholders, and provide that debt is immediately due and payable if other covenants are seriously violated.[16]

The recognition of the implications of potential conflicts of interest between lenders and stockholders was an important contribution to the tradeoff theory. Prior to that recognition, the costs of financial distress seemed limited to the transaction costs of bankruptcy and reorganization, for example, legal and administrative expenses and the costs of negotiating a reorganization or liquidating assets. But the conflicts of interest mean that the mere *threat* of default can feed back into the firm's investment and operating decisions, for example by deterring investments with a positive net present value or shifting the firm to riskier strategies. Investors foresee these possibilities, so the threat of financial distress can drag down

[15] At the time, investors were willing to buy the debt of supposedly blue-chip companies with minimal covenants. Asquith and Wizman (1990) found that the value of bonds with strong covenants actually increased when leveraged buyouts were announced.

[16] See Smith and Warner (1977) for a detailed analysis of debt contracts and covenants.

the current market value of the firm—which provides a good reason for operating at relatively conservative debt ratios.

The agency costs of suboptimal investment and operating decisions are potentially much more serious than "workout" costs incurred post-default.[17] The tradeoff theory needs both types of costs to provide a credible counterweight to the present value of interest tax shields. These agency costs also help to explain why growth firms tend to rely on equity. They have more to lose; the debt-overhang problem is no problem for a firm lacking valuable investment opportunities. Also, the value of those opportunities, which depends on *future* investment decisions, is lousy collateral for a loan today. Would you lend today to a growth firm on the strength of its management's promise to undertake "all future investment projects with positive net present value?" Even if the lender could identify all projects with a positive net present value, there would be no way to enforce such a contract.

Conflicts Between Managers and Stockholders

As Jensen and Meckling (1976) stressed, managers will act in their own economic self-interest. That self-interest can be redirected by share ownership, compensation schemes, or other devices, but the alignment between shareholders' and managers' objectives is necessarily imperfect. This brings us to Jensen's (1986) free cash flow theory, expressed in a brief but widely cited quotation (p. 323): "The problem is how to motivate managers to disgorge the cash rather than investing it below the cost of capital or wasting it on organizational inefficiencies." The answer to Jensen's problem can be debt, which forces the firm to pay out cash. A high debt ratio can be dangerous, but it can also add value by putting the firm on a diet. The leveraged buyouts of the 1980s were of course the classic examples of diet deals.

Contemporary accounts attributed various motives to the leveraged buyout organizers and investors: interest tax shields (Kaplan, 1989), artificially high junk bond prices (Kaplan and Stein, 1993), wealth transfer from existing bondholders, and attempts by raiders to capture value accruing to employees and other "stakeholders" in the target firm (Shleifer and Summers, 1988). There is some truth in each of these arguments, but with a decade's hindsight, it seems clear that the leveraged buyouts were first and foremost attempts to solve Jensen's (1986) free cash flow problem. They were shock therapy designed to cut back wasteful investment, force sale of underutilized assets, and generally to strengthen management's incentives to maximize value to investors. The role of leverage was to force managers to generate and pay out cash. Debt plays a similar role in leveraged restructurings, where a public firm all at once borrows a large fraction of the value of its assets and pays out the proceeds to stockholders. Wruck (1995) provides a fascinating case study of the leveraged restructuring at Sealed Air Corporation.

Debt can add value for cash-cow firms that are prone to overinvestment. Sometimes the managers of such firms will voluntarily shift to high debt ratios (as

[17] However, Parrino and Weisbach (1999), who conducted extensive numerical experiments, found few cases in which significant value would be lost due to underinvestment at high debt ratios.

in the Sealed Air case), but more often it takes pressure from outside investors (as in hostile leveraged buyouts or in the leveraged restructurings of several major oil companies when threatened by takeover in the 1980s). Therefore, the free cash flow theory is not really a theory predicting how managers will choose capital structures, but a theory about the consequences of high debt ratios.

These consequences do not hold for all types of firms. It does not appear that public corporations generally overinvest, nor that debt issues generally add value by disciplining management. Capital investments are generally viewed as good news by investors, that is, as having a positive net present value (McConnell and Muscarella, 1985). Shyam-Sunder (1991) found that announcements of debt issues had no significant effect on stock prices, even for junk debt issues, where the risk of default, and the pressure on managers to "disgorge cash," are high.

Jensen's (1986) key point—that debt can add significant value in diet deals—is nevertheless proved by many examples. It doesn't take a rocket scientist to appreciate why the managers of established companies do not voluntarily move to dangerous debt ratios. This point may assist the tradeoff theory in explaining why managers do not fully exploit the tax advantages of borrowing.

Conclusions: What are Financial Managers Really Maximizing?

This completes my review of the tradeoff, pecking order and free cash flow theories of capital structure. Although these theories date back to the 1970s and 1980s, there is no letup in the rate of flow of research. There are convincing examples of all three theories at work. The economic problems and incentives that drive the theories—taxes, information and agency costs—show up clearly in financing tactics. Yet none of the theories gives a general explanation of financing strategy.

The theories are not designed to be general. They are conditional theories of capital structure. Each emphasizes certain costs and benefits of alternative financing strategies. Because the theories are not general, testing them on a broad, heterogeneous sample of firms can be uninformative. The researcher may find statistical results "consistent with" two theories because each works for a subsample. It may be more useful to test a hypothesis distinguishing the subsamples.

The researcher may also generate results consistent with one theory even when financing decisions are actually generated by another. There is too little concern about the power of tests. The tests usually rely on indirect measures or proxies for the unobservable variables that are assumed to drive financing choices. A particular proxy may respond to more than one theory. If so, a significant coefficient on that proxy has no clear interpretation. Rejecting the null hypothesis proves that one or both of the two theories may be at work, but we already know that each theory applies in some circumstances.

There may be deeper, less conditional theories of optimal capital structure, but they will require careful modeling of the financial objectives of the managers of the

firm. (Each of the theories reviewed here assumes, but does not derive, a particular objective for managers.) However, these deeper models will not follow just from writing down the utility function of a chief executive officer or the parameters of his or her employment contract. Studies of capital structure focus on public corporations, not sole proprietors. These firms act as organizations, not individuals. They presumably act in the interests of some group or coalition of the managers or employees who make, or are affected by, the financial decisions of the firm. Treynor (1981), Donaldson (1983) and Myers (1993, 2000b) suggest that the firm acts to maximize the present value of current and future benefits to "insiders." The benefits come in various forms: cash, over and above opportunity wages; stock or options in the firm; and private benefits, such as perquisites.

I emphasize "present value" because insiders are investing and developing human capital in the expectation of future payoffs. The investment comes in the form of personal risk-taking, sweat equity (working extra-hard for less than an outside wage) and by specialization of human capital to the firm. So a general financial theory of the firm would model the coinvestment of human and financial capital.[18] Some basic theoretical work has been done here, focused primarily on the conditions under which insiders can raise financing from outside investors when insiders make the investment decisions and can extract cash or private benefits after the investment is made (for example, Hart, 1995; Burkart, Gromb and Panuzzi, 1997; Myers, 2000b). But this work has not focused on the form of outside financing, for example, on the choice of debt vs. equity. There are, to my knowledge, no formally developed theories of capital structure derived from the conditions for efficient coinvestment of human and financial capital.

■ *Parts of this paper are drawn from Myers (2000a).*

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[18] The importance of coinvestment by insiders and outside investors is stressed in Zingales (2000) and Myers (1999, 2000b).

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