The Contributions of Stewart Myers to the Theory and Practice of Corporate Finance*

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By exploring the possibility that financial structure can have significant effects on real corporate decisions—decisions involving operations and capital spending—the work of Stew Myers helped to reinstate corporate finance as both an important area of study and a critical corporate function.

In a career of teaching and research that has now run more than 42 years, and with a stream of publications that shows no sign of diminished vigor or insight, MIT finance professor Stewart Myers has had an extraordinary impact on the field of corporate finance. Among his contributions to finance theory are pioneering studies of capital structure, capital budgeting and valuation, and the cost of capital for regulated industries. And while advancing the theory of finance, Stew has also had a huge influence on corporate practice. Concepts such as “debt overhang,” the financial “pecking order,” “adjusted present value,” and “real options”—all formulated and given their names by Stew—have changed how finance is applied to practical problems. And generations of students have been, and will continue to be, introduced to finance by his textbook with Dick Brealey, Principles of Corporate Finance, a book that changed the way finance is taught.

In the pages that follow, we—that is, two of his former students, a colleague, and a co-author—offer a brief survey of these accomplishments. We begin by discussing Stew’s work on debt overhang and corporate underinvestment, and its role in setting out a research agenda for the field of corporate finance. Besides pointing to a key factor in current theories of capital structure, the concept of debt overhang has been used to shed light on issues such as the optimal design of financial contracts and the restructuring of distressed corporate and sovereign debt—critically important questions in today’s financial environment. After discussing Stew’s insights into these questions, we devote the second half of the article to his work on capital budgeting, real options, APV, and regulation—all instructive examples of how theoretical ideas can be used to improve the practice of finance.

Capital Structure (with a Look at the Optimal Restructuring of Distressed Debt)

The foundations of the modern theory of capital structure were laid in a classic 1958 paper by Franco Modigliani and Merton Miller called “The Cost of Capital, Corporation Finance, and the Theory of Investment.” There Modigliani and Miller (or “M&M,” as they and their papers came to be called) showed that, given a set of assumptions known as “perfect markets,” the way a company finances itself should not affect its cost of capital or market value. Differences in capital structure, or in the kinds of securities a company issues, were shown to be nothing more than different ways of slicing up the pie of corporate operating cash flows. As long as the size of the pie—that is, the fundamental earnings power of the firm—was assumed to be unaffected by the financing changes, firm value should remain the same.

In formulating this capital structure “irrelevance” proposition, M&M put an end to the debate over whether equity was cheaper than debt (because dividends were lower than interest payments) or debt was cheaper (because the cost of safer debt was obviously lower than investors’ required return on riskier equity). But what did it say to corporate practitioners, the people entrusted with making financial decisions?

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One message was that, for most companies in most situations, the choice of financing method has at most a “second-order” effect on firm value. And so most CEOs do not spend sleepless nights thinking about their capital structure; the asset side of the balance sheet is the main driver of value.

But perhaps the most important use of the M&M propositions, for academics and practitioners alike, was to tell us where to look for the effects of capital structure on corporate values. As Miller himself put it, “showing what doesn’t matter can also show, by implication, what does.” The M&M proposition effectively encouraged researchers (and CFOs) to look more carefully at each of the major underlying simplifying assumptions—things like no taxes and transactions costs, and perfect information—and to ask questions like the following: Could corporate or investor taxes be large enough to influence a financing choice? Would the firm face large costs in reworking its debt contracts in the event of financial trouble? And do outside investors have enough information about our plans and prospects to allow us to float a new equity offering, or even cut our dividend?

Perhaps even more important than these assumptions, M&M also assumed that the method of financing has no effect on corporate investment and operating decisions. But what if it does? What if companies financed mainly with equity are more likely to take all positive-NPV projects? And what if firms financed heavily with debt are better at saying no to value-destroying investments?

Each of these questions suggests the possibility that, although capital structure is generally a second-order concern, having the wrong capital structure can matter a lot for most companies in certain situations—say, when economic uncertainty makes it very costly to refinance debt or issue equity. Such questions also suggest that, for a small but growing subset of companies—think about firms controlled by private equity or venture capital—having the right capital structure can be critically important, an important part of their value proposition if you will.

The process of relaxing these restrictive assumptions was begun by M&M themselves in a 1961 paper that pointed to the tax shield provided by interest payments—a tax shield that could be worth as much as 35-40 cents (depending on the marginal tax rate on corporate income) for every dollar of debt finance. And so the theory had identified a possibly important benefit of issuing debt. But if there were no major costs associated with debt, why not, as M&M asked, finance companies with “99% debt?”

In the wake of M&M, a second generation of papers on capital structure focused on other real-world “frictions” that, by resulting in costs as well as benefits of debt, could build on the ground leveled by M&M and lead to a plausible theory of optimal, or value-maximizing, capital structure. Among the most important of these post-M&M papers were three by Stew Myers: (1) a 1977 paper setting out the concept of debt overhang, which became a cornerstone of the “static-tradeoff” theory; (2) a 1984 paper, co-authored with Nicholas Majluf, that laid the foundations of the “pecking order” theory, which continues to be the main rival to the static-tradeoff theory; and Stew’s 1983 Presidential Address to the American Finance Association, which staked out and evaluated the claims of these two rival theories.

Given Stew’s contributions to both of these theories, it is hard to think of anyone else—apart from M&M themselves and Michael Jensen, whose work on “agency costs” we take up later—having a comparable impact on the study of corporate finance. Like Jensen’s, Stew’s work explored the possibility that financial structure could have significant effects on real corporate decision-making—decisions involving operations and capital spending. And by so doing, they reinstated corporate finance as both an important area of study and a critical corporate function.

Debt Overhang and the Corporate Underinvestment Problem

Now let’s turn to the three papers themselves. The special appeal of Stew’s papers is their ability to convey insights of considerable practical import with remarkably simple language and clear exposition. Because of the simplicity of Stew’s models, it has been easy for other scholars to see what makes them work, and then build upon them. And there’s no better example of this than Stew’s 1997 paper, which was called “Determinants of Corporate Borrowing,” and is one of the indisputable classics of the corporate finance literature.

The paper begins by building a model that shows why a company with a material probability of defaulting on its debt is likely to cut back on positive-NPV investments that require new capital, investments that are expected to increase the firm’s earnings power and so benefit all the firm’s existing claimholders as a group (though not in equal measure, as we shall see). In Stew’s model, the possibility of such value-reducing underinvestment arises from the combination of two conditions: (1) the unwillingness of existing creditors to provide new funding for the investment, which must then be financed by either existing or new equity holders, or new and junior debt holders; and (2) the unwillingness of existing creditors to write down or otherwise reduce the value of their claims. Under these conditions, potential investors face a major deterrent to providing funding for the new investment: the prospect that much or all of the incremental payoff from the new investment project will go to shoring up the value of debt (as well as any tax benefits associated with equity). The current consensus on the tax benefits of debt, to the extent one exists, puts them in an intermediate range of 10-20 cents per dollar of debt.
of existing creditors’ claims instead of accruing to the new creditors or equity holders. 3

To illustrate this possibility with a simple example, consider a company that is expected to produce cash flows in the next year of either $90 or $130, with a 50% probability of each, and that, at the end of the year, the firm has promised to repay debt of $110. And let’s assume further that this firm has a new investment opportunity in its core business that requires an immediate investment of $10 and is expected to return at least $10 within the year. It would clearly be in the interest of the firm’s stockholders to fund the investment either by financing it themselves, or issuing new debt that is junior to its existing debt. But with the overhang of risky (and possibly distressed) debt in this example (that is to say, with a 50% probability the firm won’t be able to pay back its debt of $110 in a year), neither the firm’s equity holders or new investors are likely to invest unless the incremental cash flow from the investments exceeds $20, and not the expected $10. Why $20? Because under the “bad” scenario where base-case cash flows are $90, it would require at least $20 in incremental benefits before the new junior creditors would begin to see any payoff. Given the current expectations of a $10 incremental gain from the new investment, the new money earns a positive return only if the good scenario materializes.

As this example is intended to show, companies facing a material possibility of financial distress are likely to find it hard to raise capital to fund promising new investments (or even the basic maintenance required to preserve a given level of profitability), particularly under circumstances of great uncertainty. And this has clear implications for corporate capital structure. As we will discuss in more detail later, for corporate managements looking for the value-maximizing combination of debt and equity financing, the possibility of such underinvestment is likely to be an important reason—perhaps the most important reason—to limit debt.

More on Debt Overhang and How to Deal with It

But before discussing the implications of the debt overhang problem for corporate capital structure, let’s take a closer look at the problem faced by troubled companies in restructuring their debt. For, as the many finance scholars who have followed Stew into this area have discovered, the concepts of debt overhang and underinvestment are not only relevant to companies using or considering the use of high leverage. The concepts also raise important—and now of course highly topical—questions of optimal debt forgiveness and rescheduling for governments as well as corporations.

To provide the reader with a brief overview of this literature, let’s start with the simplest possible case of renegotiating debt in a “bilateral” context in which a single debtholder is negotiating with management and, importantly, knows as much about the firm’s plans and prospects as management. In this admittedly artificial setting, are there ways of structuring financing contracts or restructuring the claims of existing creditors that would solve the debt overhang problem and encourage new financiers to commit capital?

In a paper written in 1977—the same year “The Determinants of Borrowing” was published—Sudipto Bhattacharya (one of the authors of this article) argued that the underinvestment problem could be reduced, if not eliminated entirely, by “collateralizing” the cash flows arising from the investment funded by the new junior creditors—in other words, by guaranteeing such investors that, in the event of a future bankruptcy, they and not the old creditors would have prior right to the cash flows created by the investment. In this situation, although there would still be some transfer of value from the new investors to the existing senior debt, such a transfer—which is at the core of the debt overhang problem—would be less than the NPV of any new investment, allowing a positive NPV for the junior creditors and equity holders. 4

Of course, the key assumption here is that all the future cash flows from any new investment can be reliably identified and separated from the existing assets—which is likely to be very difficult if not impossible. But what if existing creditors could be persuaded to rework their claims so to achieve the same result—namely, limiting the wealth transfer from the junior creditors that results from the new investment? To the extent we can assume that all potential parties to such a transaction—new as well as existing creditors and equity-holders—are equally well-informed about the company’s prospects and the expected returns from the new investment, there ought to be room to strike a deal that benefits all parties and allows the investment to go forward.

But is that so? The answer provided by the model, even under these restrictive assumptions, is only a qualified “yes.” To ensure a deal even under these circumstances requires one more provision: that the debt rescheduling (in the form of a reduced claim for the existing creditors) is accomplished simultaneously, and in a way that can be verified by third parties, with the junior investors’ commitment to funding the new investment. This is often hard to bring about in practice. Credible commitments to make net new investments (in the future) are often impossible to verify in court, as can be seen in many ongoing disputes between privatized utilities and their former regulatory authorities. And in other contexts

3. More specifically, in future states of nature in which the firm’s current (without new funding) cash flow prospects would have turned out to have been insufficient to repay its prior debt claims, at least part of the incremental cash from the new investment would have gone to paying off existing creditors. And in such a case, the new claimants would not have been the full beneficiaries of the additional cash flows resulting from the new investment they financed.

4. See Bhattacharya (1977). Another necessary condition is that the cash flows from the new investment covary with those from the firm’s existing assets in a very weak sense; whenever the latter is strictly higher, the former is not strictly lower.
such as the rescheduling of sovereign debt, which is typically undertaken with the aim of preventing underinvestment in highly indebted countries, there may no judicial authority with a mandate to enforce the levels of new investments that are (implicitly) committed to by the absolved debtor.\(^5\)

The key question, therefore, is this: If the old creditors agreed to restructure their contracts, would the equityholders (and, by extension, the managers) find it in their interest to raise the new capital to fund the investment? In a 2001 paper, Bhattacharya and Faure-Grimaud\(^6\) concluded that, in general, the answer to this question is “no.” That is, there is no way of restructuring the debt of old creditors that would (1) give equity holders the incentive to make all new positive-NPV investments and (2) make the old creditors no worse off regardless of whether the new investments get made. That is the case even if we allow for restructurings that involve more than just reductions in the principal of pre-existing creditors.

At the same time, and somewhat surprisingly, the authors also concluded that the optimal solution in such circumstances is to reduce the claims of old creditors (to a level below what would have made them indifferent whether the new investments were carried out) and compensate them with equity or, better yet, warrants on the restructured firm's equity.

To illustrate this point, let’s go back to our earlier example where the firm is expected to produce cash flows of either $130 or $90, the debt repayment is $110, and the expected gains from new investment are at least $10. In this case, if the firm’s senior debt claim is renegotiated down to $100, its old creditors would be no worse off relative to the status quo of no investment. Thanks to the extra $10 or more from the investment, the old creditors would be repaid $100 even under the bad scenario. And investing equity holders would be at least as well off as under the status quo.

But, as the authors also show, once the senior debt claims have been reduced, the equity holders would choose to invest only if the incremental income from the new investment is at least $15. Why? Because after the old senior debt claim is renegotiated down to $100, the new equityholders under the good scenario, the expected gains from new investment are at least $10. In this case, if the new equityholders under the good scenario receive $200 and the new investment is $100, the payoff to the new equityholders is $100. Thus, the expected value of the equity increases to $15 from $10—even without any new investment requiring an outlay of $10. If the equityholders do choose to invest, the first $10 of the incremental cash flow increase in the new investment will be accretive to the old creditors in the event the bad scenario materializes.

To address this underinvestment problem, the optimal restructuring of the senior debt—a solution the old creditors would likely accept even without the assurance that the post-restructuring investment will be made—would be to reduce the debt claim below $100 and give the creditors warrants with an exercise price higher than $100. In this case, while the upside provided by these warrants would compensate the old creditors for their larger writedown, the equityholders would have greater incentive to invest because a smaller portion of the payoffs from the new investment would accrue to the old creditors in the bad scenario.\(^7\)

**Implications of Debt Overhang and Supporting Evidence.** In sum, Stew’s concept of debt overhang suggests circumstances in which both debt and equityholders could benefit—and thus total firm value be increased—by an agreement to write down the face value of debt. And history has furnished at least one supporting example. In the 1930s, when the U.S. went off the gold standard and devalued the dollar with respect to gold, the government declared that the courts would no longer enforce the gold indexation clauses that were contained in virtually all long-term private as well as public debt contracts. These gold clauses required borrowers to pay in gold if the dollar were devalued; and if the clauses had been enforced, the debt burden of borrowers would have increased by the extent of the devaluation, or almost 70%.

Creditors were unhappy with the government’s decision and took the case to the Supreme Court. But it’s not clear they suffered from the outcome of the case. In a recent working paper titled “Is it Better to Forgive than to Receive? An Empirical Analysis of Debt Repudiation,” Randy Kroszner (formerly at the University of Chicago, now a member of the Federal Reserve’s Board of Governors) examined the responses of corporate debt and equity to the Supreme Court’s decision to uphold this effective forgiveness of debt.\(^8\) Equity prices rose, as expected, but the debt relief also led to higher prices for corporate bonds (all of which contained gold clauses). These responses suggest that the benefits of eliminating debt overhang and avoiding bankruptcy more than offset the loss to creditors of the small chance of being repaid the additional 70%.

Debt overhang is important not just for corporations, but for countries. During the Latin American debt crisis in the mid-1980s, macroeconomists including recent Nobel laureate Paul Krugman seized on it as a reason why investment had collapsed, and why negotiating foreign debt down made sense. While their analysis of the underinvestment problem differed in details from Stew’s analysis,\(^9\) it was similar in spirit.

In today’s financial environment, debt overhang problems can be seen everywhere. When beleaguered mono-line insurers refused to raise equity (because the proceeds would have

7. With one possible caveat: since the old creditors would accept such a writedown only if promised an equity- or warrant-like payoff in the good scenario, the equityholders might be less inclined to undertake all positive NPV investments because they must be
9. In Krugman’s version of the debt overhang and underinvestment problem faced by sovereign governments, the country’s industrialists understand that their corporations will be asked to shoulder most of the higher taxes needed to pay off the debt, and they accordingly refuse to increase their investment.
gone to bolstering the insurance guarantees they had written rather than generating new business), they were effectively attempting to preserve the value of their existing equity, given the overhang of insurance commitments they had underwritten. And the same was true of Fannie and Freddie’s reluctance to issue equity, despite the benefits that would likely have accrued to taxpayers.

What’s more, the recent mandatory infusions of equity by the U.S. Treasury into nine U.S. financial institutions can be seen as a recognition of the importance and intractability of the debt overhang problem. By requiring the financial firms to accept the new equity, the Treasury is trying to ensure that the firms’ existing liabilities will not prevent them from raising new capital that will in turn make possible new investments—say, loans to consumers and industrial companies.

The Static Trade-off Theory
In this sense, Stew’s 1977 paper on debt overhang now seems remarkably prescient—a guide to our times for policy makers as well as economists and finance practitioners. But having discussed the debt overhang problem in some detail, let’s now turn to the important role the paper has played in our theories of capital structure.

Debt overhang, of course, suggests a serious cost of having too much leverage—the value lost through corporate failure to invest in promising projects if the firm gets into financial trouble. But this cost varies greatly among different kinds of companies. Stew begins the paper by arguing that the current market values of all companies can be viewed as having two main components: (1) “assets in place”—roughly speaking, the present value of the earnings generated by the firm’s existing operations and investments; and (2) “growth options”—the expected present value of earnings from possible future possible investments that, although not yet funded (and perhaps not even envisioned), are premised on the firm’s existing investments and capabilities.

The key insight of the paper is that, for companies whose value consists in large part of growth options, the expected costs of financial trouble in terms of underinvestment will generally outweigh the tax benefits of debt, and the value-maximizing capital structure is likely to consist largely if not entirely of equity. By contrast, for firms whose value consists mainly of tangible assets in place—think of “cash cows” with limited growth opportunities—the expected costs of forgone future investment are likely to be modest, while the tax shields and other benefits of debt (that we mention later) can be substantial. This cost-benefit tradeoff helps explain the aggressive use of leverage by the kinds of companies that make good LBO candidates.10

What we have here, then, are the basic elements of a theory of capital structure with two main counterbalancing factors—major sources of costs and benefits—that could yield an optimal level of debt. And in his 1983 President’s Address to the American Finance Association, Stew began by identifying this tension between the underinvestment costs and tax benefits of debt as the “static trade-off theory” of capital structure. But the greater part of that speech—as well as a paper co-authored with Nicholas Majluf and published a year later—was devoted to introducing a new rival to that theory, one that he called the “pecking order.”

The Pecking Order Theory
Stew’s 1977 paper highlighted a major cost of debt. But what explains the well-documented reluctance of larger, established public companies to issue equity after their initial IPO? And what explains the widely recognized tendency of such companies when funding new investment to begin by using internal cash, then consider issuing debt, and view equity as a last resort?

Stew’s 1984 paper with Nicholas Majluf explained this financing pattern as a value-conserving way of funding new investment—one that minimizes the information costs associated with raising outside capital. The argument goes as follows: Since a company’s top managers are generally in a position to know more than outside investors about its prospects and value, they have an incentive to issue new stock rather debt if they believe the equity is overvalued by the market. But the market understands this incentive to issue overvalued equity; and to compensate for their own informational disadvantage, investors typically respond to this negative “signal” by marking down the issuer’s share price, especially when there are no clearly profitable uses for the funds. Anticipating such markdowns, most established companies tend to avoid seasoned equity offerings, preferring instead to use internal funds or debt to finance new investment.

While this model—like all of Stew’s models—is remarkably simple, it is again full of implications. In the pecking order theory, the interest tax shields and concerns about financial distress that drive the static tradeoff theory become at most second-order effects. Changes in debt ratios are dictated mainly by the need for external funds, and not by any deliberate attempt to reach an optimal capital structure. And as the pecking order predicts—and researchers have confirmed—the debt ratios of increasingly profitable companies tend to

10. Since publication of Stew’s paper, these predictions have been borne out by repeated studies using a variety of indicators of corporate growth opportunities, including price-to-book ratios, R&D spending, and high ratios of intangible to tangible assets. Moreover, after recognizing that tangible assets provide better collateral for debt than intangible assets, Stew defended the conventional corporate practice of focusing on book rather than market measures of leverage in estimating expected costs of financial distress. This insight also has relevance to the design of optimal bankruptcy regimes, where what is at stake here is not just the extent of corporate investment opportunities, but also the disparity between the profitability and value of new investment opportunities and the value of existing investments. Recent empirical research on the impact of “soft” versus “hard” bankruptcy regimes on investment activities in more innovative as compared to the traditional sectors of economies appears to bear out this type of reasoning.
move lower over time instead of higher, as the static-tradeoff theory would suggest.\textsuperscript{11}

In addition to their ability to explain the financing behavior of large, publicly traded companies, the concepts of adverse selection and the signaling costs of raising outside equity are also of considerable help in understanding recent events. Commercial banks have been suffering significant losses. But unlike the mono-line insurers, banks appear to have productive uses for additional capital, with so many assets are trading at fire-sale prices. And until the recent government infusions of equity, they seemed unable or unwilling to raise capital through public issues. What little capital had been raised up to this point had come mainly from private placements with large institutions such as sovereign wealth funds.

The Myers-Majluf paper helps explain the difficulty of raising equity under these circumstances. Given the uncertainty about the quality of bank balance sheets, an announcement of a large public equity issue could take the bottom out of a bank’s stock price; it would be a signal to the market that the bank is worried about future losses and wants outsiders to share the burden. It would be far better in such cases for the bank to open its books to a sovereign wealth fund—or to a private investor like Warren Buffett—and explain why it needs capital and why its balance sheet might be healthier than the market believes it to be.

"Agency Costs" and Corporate Financing

In a 1976 article called “Theory of the Firm: Managerial Behavior, Agency Costs, and Capital Structure,”\textsuperscript{12} Michael Jensen and William Meckling identified another potentially important cost associated with issuing equity to outside investors. The source of such costs was the potential conflict between corporate managers and shareholders over the optimal size and risk of the firm, with managers tending to place a higher value than shareholders on corporate size and diversification. And there was also an important conflict over corporate payout policy. As Jensen himself argued in a follow-up article, corporate managers in mature industries have a natural tendency to retain and reinvest excess capital—in declining core businesses or diversifying acquisitions—instead of returning it to investors through dividends or stock buybacks.\textsuperscript{13}

One way of limiting this corporate “free cash flow problem,” as Jensen called it, is to pay out a larger fraction of corporate earnings as dividends. But another solution, at least for mature companies with stable cash flows and limited growth opportunities, is high leverage. By forcing such companies to pay out (in the form of interest and principal) cash flow that cannot be profitably reinvested, debt financing has the potential to conserve value that might otherwise be lost through negative-NPV investments.\textsuperscript{14}

The Liquidity Paradox. Thus, whereas Stew held up equity financing as the solution to a debt-induced \textit{underinvestment} problem, Mike Jensen saw debt as a means of curbing what might be described as a corporate \textit{overinvestment} problem—a problem stemming from excess cash or liquidity.\textsuperscript{15} In Stew’s early work on capital structure, he assumed that corporate decisions are aimed primarily at maximizing firm value. But in more recent work, he follows Jensen and Meckling by entertaining the possibility that corporate managers have motives other than value maximization.

For example, in a 1998 paper called “The Paradox of Liquidity,” Stew and Raghuram Rajan (another of the co-authors of this article) explore a different kind of corporate “liquidity” problem, but one that also has its roots in agency costs. In this case, the conflict is not the one between managers and shareholders discussed by Jensen and Meckling. Rather it’s a conflict between the managers (as representative of the shareholders) of companies with lots of liquid assets and the creditors of such companies. The problem is this: unless the liquid assets are placed in a “lock-box,” management may have no credible way of ensuring that it will not suddenly “transform” those assets in ways that hurt the creditors. To illustrate the problem, think of a bank that, having just closed a large 10-year debt financing after promising to invest the proceeds in loans to large, investment-grade companies, decides instead to take a big position in subprime mortgage-backed securities. As this example is meant to show, while liquidity helps ensure that assets can be sold for higher values \textit{if and when} creditors get their hands on them, the chances of creditors actually getting their hands on them are reduced by the possibility of management’s converting them into less liquid and riskier assets.

As a result of this ability to “shift liquidity” against the creditors, would-be borrowers tend to find extremely liquid assets almost as hard to borrow against as highly illiquid assets. This ability to transform assets against the interests of creditors—literally overnight—helps explain why investment banks tend to find long-term capital so costly, despite the liquidity of their own balance sheets, and why so much

\textsuperscript{11} Conversely, the market leverage of firms whose earnings fall tends to increase, at least in relation to the often depressed market value of their equity. In a 1999 paper, Stew and Lakshmi Shyam-Sunder run a “horse race” between the static trade-off theory and the pecking order theory, and the evidence comes out firmly in favor of the latter. See Myers and Shyam-Sunder (1999).

\textsuperscript{12} Jensen and Meckling (1976).

\textsuperscript{13} Jensen (1986).

\textsuperscript{14} Jensen and Meckling (1976) also identified a potentially important cost associated with high leverage: the incentive it provides managers of financially distressed firms to increase risk to take advantage of the “free option” represented by equity under those circumstances. A similar argument was also presented by Nobel laureate Joseph Stiglitz in a 1974 paper.

\textsuperscript{15} A number of finance scholars since then have attempted to integrate these two countervailing factors—the underinvestment problem associated with too much debt and the free cash flow problem associated with too little—into a unified theory of capital structure. Among the most notable is a modeling framework presented in a 1995 paper by Oliver Hart and John Moore that explores how these two offsetting factors are expected to influence the financing decisions of companies with different levels of (cash flow) profitability and growth opportunities.
of their financing takes the form of secured overnight loans, with the liquid assets posted as security. Indeed, the recent travails of investment banks can be attributed in significant part to the fact that assets that were once liquid, and thus formed the basis for secured borrowing, are no longer liquid. At the same time, the overall balance sheets of investment banks are still liquid enough that long-term unsecured financing is extremely expensive. Thus, the investment banks are caught between a rock and a hard place.

In two still more recent papers, Stew further explores the idea of capital structure being influenced by managers’ self-interest—more specifically, with the aim of maximizing the present value of their future compensation. Stew’s innovation here is to view the public corporation as a complex structure in which corporate managers and outside investors effectively co-invest to create value. The basic argument is that, in order to attract and retain the most talented and capable top management teams, outside investors must be willing to share some of the “rents,” or “private benefits,” that come with the running and control of large public companies. Although such a compromise may appear to leave value “on the table” for private equity firms or other true value maximizers, Stew offers the intriguing suggestion that this control- and value-sharing arrangement, besides being a more realistic account of how companies work, may end up creating more value for public corporations—those companies that, as one recent observer noted, “will continue to carry out the lion’s share of the world’s growth opportunities.”

One implication of this line of research, then, is to call into question the prescription that long guided corporate finance theory—that the clear duty of managers is to maximize shareholder value. Once we relax the insistence that shareholders are the sole residual claimants to firm value, the typical rationales for shareholder value maximization—especially the popular claim that maximizing shareholder value is equivalent to maximizing firm value—lose their validity. Starting as early as his 1977 paper, Stew has shown in different ways that shareholder value maximization is not always consistent with firm value maximization. And, in this most recent paper, he has proposed a promising alternative not just to the traditional concept of shareholder value maximization, but also to the goal—still held up by most financial economists—of maximizing the claims of all outside providers of capital. By focusing in on insights and providing a return for managers’ and employees’ human capital, Stew may well have pointed to a solution that ends up increasing the efficiency and overall earnings power of our public companies—the engine that M&M originally identified as the main source of value.

**Capital Budgeting and Real Options**

While Stew’s papers on capital structure opened up a new literature by exploring departures from the M&M framework, his contributions to the capital budgeting literature highlight a somewhat different but equally important aspect of his work. These contributions are examples of his unique ability to take an existing theory and explore its implications for different problems in finance—and, in so doing, to evaluate its usefulness in organizing our thinking about such problems. Stew’s work in capital budgeting also reflects his conviction that research needs to build frameworks that rely on a theoretical understanding of the problems—an understanding that, in this case, takes account of both capital markets and corporate financing strategy—and, as we shall see, corporate business strategy as well.

In fact, one might say that Stew’s work in capital budgeting has helped to close a literature. Generations of students, including some of the current authors, have been taught capital budgeting methods that rely on concepts like “value additivity” and “adjusted present values,” often without any reference to the original author—that is, Stew Myers. But, in the words of Michael Jensen, this might be the best indicator of accomplishment. Jensen once said that truly new discoveries in finance go through three stages. First people deny that a new idea is correct. Then, when they recognize that the new paradigm is correct, they often claim they had thought of it before. And when that proves wrong, people then declare the results to be obvious! A number of Stew’s insights into capital budgeting have attained this last stage of recognition, having become part of the stock of common knowledge in finance.

In the early 1970s, as we have already seen, the question of optimal capital structure had been set up by M&M as a market value maximization problem—one that, apart from tax effects, provided no clear way for differences in financial structure to affect firm value. This meant that the most fundamental problems in corporate finance were then thought to be mainly issues of valuation, in particular the valuation of real assets. But, for people like Stew who were working in corporate finance at this time, this represented a challenge in that the methods for valuing assets and financial securities had typically been produced by scholars working in the capital markets wing of finance, and so they often arrived in corporate finance with a lag.

Stew’s interest in capital budgeting problems started with his doctoral thesis, which can be viewed as a form of capital markets research. Out of that research came a 1968 article that used a “time preference model” to demonstrate the principle of “value additivity”—the idea that the values of individual projects within a single company can and
should be calculated independently of one another, with no concern about a given project’s correlation (or lack thereof) with the firm’s other assets. In other words, Stew showed why companies should view individual projects as standalone capital budgeting problems rather than as parts of a corporate-wide portfolio maximization problem.

Although this concept of value additivity is now so much a part of our common understanding that it’s hard to believe it has not always been this way, the idea was strongly contested at the beginning of the 1970s. Many prominent researchers at the time followed the approach of Nobel laureate Harry Markowitz, who in a 1959 article suggested that corporate capital budgeting problems be treated like an investor’s portfolio decision. Such a portfolio selection approach, premised on risk-interdependence among all investment projects within a firm, would require corporate planners and analysts to use complex portfolio selection maximization methods that take into account the risk characteristics of all the projects or divisions within a firm when evaluating each individual investment decision.

Stew’s work showed that, under very reasonable assumptions, risk-independence is a necessary condition for security market equilibrium, thereby justifying value-maximizing companies in treating the risk characteristics of each project independently when evaluating them. This theoretical result has two major implications for CFOs and other financial decision makers: First, it greatly simplifies the tasks of financial decision makers since they can use project-specific hurdle rates or cost-of-capital benchmarks to decide which investments to pursue. Second, it has implications for the optimal corporate asset structure. Perhaps most important, it suggests that corporate diversification per se does not contribute to shareholder value.

Although now generally accepted by finance practitioners as well as academics, this was a novel, and counterintuitive, proposition when Stew first made it. In the U.S. during the 1960s and 1970s, most practitioners appeared to believe that diversification strategies had the beneficial effect of reducing the cost of capital for all the investment projects within a firm—and the corporate landscape was dominated by large and highly diversified conglomerates. In fact, it would take another decade before the insight that diversification does not reduce the cost of capital took hold in the practice of corporate finance. But, prodded by the rise of private equity and leveraged restructuring in the mid-1980s, U.S. companies started on a path of restructuring toward greater focus and concentration on core competencies that has continued to this day.

**APV vs. NPV.** In addition to its theoretical insights, Stew’s work on capital budgeting has also produced a number of practical approaches and tools for addressing “real-world” problems. One such problem was how to capture the tax benefit of debt in the capital budgeting and valuation process, a question that continues to perplex many corporate analysts. The traditional approach was to reflect such benefits by using the after-tax cost of debt in calculating a company’s weighted average cost of capital, or WACC, which in turn was used to discount the company’s expected future (pre-interest) operating cash flows. But there was one important limitation of this WACC approach: it is premised on a fixed, or at least relatively stable, capital structure, an assumption that is likely to hold only for relatively large, established companies.

In a 1974 paper, Stew provided a way around this limitation by proposing an Adjusted Present Value (or APV) approach that divides the value of a company (or individual project) into two components: (1) the operating value of the company or project (if financed entirely with equity) and (2) the present value of the tax shield provided by debt. This approach has proved especially useful for growing companies that expect to adjust their capital structure over time. Although it took almost a decade for this logic to be fully accepted by practitioners, APV has become the valuation tool of choice in leverage buyouts and venture capital deals. But there has also been another, more general benefit of using APV: by separating the effects of financing from the real profitability of a project or company, it has provided the managers of all kinds of companies with a way of carrying out one of the first principles of modern finance: the corporate investment decision comes before the financing decision. In other words, in evaluating investments, start by looking at them on their operating merits alone; and if they pass the operating test, then worry about the financing.

**A Quick Look at Real Options.** One of Stew’s most important contributions to the capital budgeting literature, from a practical and conceptual standpoint, may well be his more recent work on “real options.” As noted earlier, in his 1977 paper he divided all corporate assets into two categories: assets in place and growth options. He later coined the term “real options” for the second of these two categories.

Real options are valuable sources of managerial flexibility that are either embedded in, or can be built into, existing corporate assets. Examples range from mineral and drilling rights held by commodity companies to patents of pharma companies, flexible manufacturing facilities, and expan-

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19. As Stew himself described the intellectual lineage of this work, “Hirshleifer discovered Arrow-Debreu, and I discovered Hirshleifer.”
20. This result does not deny the possibility of linkages among projects that could lead to risk interdependence. See, for example, Myers (2001).
21. And a growing percentage of managers in large, established companies appear to have gotten the message. In their 2001 survey of Fortune 500 CFOs, John Graham and Campbell Harvey reported that about 10% of the CFOs claimed to use APV as their primary valuation tool while about 30% reported using WACC. And, as one might expect, there was a strong positive correlation between use of APV method and the user’s having an MBA.
sion opportunities for multinationals. As this last example suggests, real options can also be thought of promising investment opportunities—some wholly unforeseen at the time of the valuation—stemming from a company’s existing capabilities and core competencies.

As Stew pointed out in a classic 1984 article called “Finance Theory and Financial Strategy,” conventional DCF capital budgeting, even when done correctly, cannot account for the value of real options. What is missing from simple DCF analysis is the ability to model the flexible responses of corporate managers and other decision makers when new information becomes available. The ability to structure projects to maximize a company’s learning opportunities while minimizing its upfront investment outlays is one of the attractions of this approach.

In its narrowest range of applications, the real options approach can be seen as an extension of financial option pricing models to the valuation of nonfinancial assets. In fact, Fischer Black, Myron Scholes, and Robert Merton mention this possibility in their famous 1973 papers. The accomplishment of Stew’s 1984 paper was to lay out explicitly how to translate the logic of financial options to address issues of capital budgeting and strategic planning decisions. Stew was the first consistent advocate of this way of thinking; as he described himself, he was “a cheerleader for real options.” And his advocacy has had a major impact on the world of practitioners as well as academia.²²

The real options valuation approach is best suited to companies whose operations involve a large component of “market” or “public” risk. Classic applications of this framework are investments in exploration by commodity companies such as oil and gold producers, where the main source of risk is the future price of the commodity and its volatility. In such cases, a real options approach encourages and enables analysts to make the greatest possible use of the very detailed information provided by the spot and futures markets for these commodities.

But in recent years, the real options approach has also attracted interest in areas such as pharmaceutical companies and venture capital, where risks tend to be “company-specific” or “private” (for example, the risk of a new drug’s failing to gain FDA approval or lead to a commercial opportunity). In these kinds of applications, the accuracy of real option valuations is more limited since, instead of market prices, analysts must rely on subjective estimates of future cash flows and their expected variability. And even in cases where real options has clear limitations as a valuation method, it can help in thinking about a company’s strategic course of action. For example, management can use the logic of real options to make an initial round of exploratory investments with the clear expectation that the investment will either be expanded (and perhaps modified) if the project turns out well, or abandoned if things go badly. In these kinds of situations, the valuations that are arrived at will be only as good as the cash flow estimates that are put into the formulas. But even so, the real options approach can help management structure the firm’s investment program in a way that achieves the most efficient resolution of uncertainty.²³

Using Finance in Regulation

Stew’s application of finance to corporate practice is also well illustrated by his work on regulation. This work started with his research on how to calculate a fair rate of return for public utilities while taking account of inflation. His contributions on insurance regulation have also been very influential. And in one area of regulation—rate-setting rates for railroads—that has had little success in recent decades, his work on the importance of “sunk costs” provides a simple explanation of why regulation has failed and how the problem can be corrected.

Let’s start with the case of public utilities. In a 1972 paper called “The Application of Finance Theory to Public Utility Rate Cases,” Stew laid out a clear framework for establishing economically “fair” rates of return. In 1949, the Supreme Court offered the following guidance in its ruling that

*The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital.*²⁴

In practice, state regulatory commissions have attempted to apply this ruling by setting consumer prices that would allow utilities to earn an adequate return on the book value of their capital investment. And this also meant using historical or book values in calculating the cost of debt and equity, and in determining the weights to be used in coming up with an historical weighted average cost of capital.

Stew, however, argued that the allowable rate of return should be “forward-looking” and proposed a number of adjustments to that end: (1) the weights of debt and equity should be based on market values rather than book values; (2) the rate on debt should be based on the current borrowing costs of the firm and adjusted for taxes; and (3) the cost of equity should be calculated using the beta of the firm’s

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²². An example of the latter is Stew’s work with Saman Majd on abandonment options. See Myers and Majd (1984).

²³. The tremendous growth in the appeal and range of applications of real options in the last 25 years has been attributed by many to the increasing rates of change and volatility in markets, which reinforces the importance for managers of positioning their

assets (using firm and industry data) and the Capital Asset Pricing Model. Although all these recommendations have since become standard practice, they represented a major change from the way things were done in the 1950s and 1960s.

A second area where Stew's work has had a significant impact is insurance regulation. His 1987 paper with Richard Cohn, "Insurance Rate of Return Regulation and the Capital Asset Pricing Model," proposed a simple principle for determining a fair rate of return to shareholders in insurance companies: "Rate regulation should ensure that whenever a policy is issued, the resulting equity value equals the equity invested in support of that policy." The implication here is that the premium should cover the present values of expected losses, the expenses incurred in administering the policies, and taxes, along with a normal return on equity. By adhering to this principle, insurance regulators can ensure that the value of shareholders' equity in insurance companies is kept roughly equal to the equity investment in the firm, thus providing them with an adequate rate of return and the ability to attract new capital. Moreover, as in the case of utilities, the authors also advocated use of the CAPM to determine a fair rate of return on equity and hence the discount rates to use in calculating these present values.

This methodology works well for insurance companies that are engaged in a single line of business. But, for insurance companies with multiple lines of business, the question is how the cost of equity capital should be allocated to the different lines when there is a common pool of equity available to all. At the end of the 1990s, the conventional wisdom among insurance academics was that allocation of capital by line of business was inappropriate for insurance companies, and the prices of differences lines of insurance should be determined on the basis of the overall risk and capital of the insurer. But, in a 2001 paper, Stew and James Read pointed out that this result depends crucially on the absence of frictions such as taxes and bankruptcy costs. They showed that when taxes and bankruptcy costs are considered, capital allocations can be assigned to different lines by reflecting the marginal contribution of each to default value (where these marginal default values add up to the total expected value of the firm in the event of default). This finding has considerable promise, holding out a possible basis for capital allocation among the business units of not only insurance companies, but all kinds of financial firms.

One area where regulation appears to have been ineffective is the railroads. The U.S. Interstate Commerce Commission (ICC) was established in 1887 to ensure that the railroads did not use their monopoly position to exploit farmers. After the Second World War, trucking became an increasingly important competitor to the railroads. By 1980 this competition and the requirement that the railroads provide services on even low-volume railroads had led to many bankruptcies in the industry and prevented the raising of new capital. The Staggers Act of 1980 was designed to reverse this trend by taking into account competition from the trucking industry and making regulation less onerous on the railroads. However, it has not achieved its aims, and railroads in the U.S. have failed to earn their cost of capital at any time in recent years.

And the U.K. has had a similar experience with its approach to regulation since privatizing its railways in 1993. In this case, regulation has led to a drastic deterioration of the infrastructure and the bankruptcy of the company owning and operating the track.

In an important 2001 paper, Stew and Jerry Hausman provided a convincing explanation of the failure of this U.S. and U.K. railroad regulation. The explanation begins by noting that the regulatory rate-setting process does not take account of what amount to significant "sunk costs" involved in owning and operating railroads. Such activities generally require major investments in tracks, bridges, and tunnels. And when there is a large decline in traffic, the rate of return on railroads invariably becomes significantly negative. To offset this possibility, regulators must allow the returns in periods of heavy traffic to be much higher than normal average returns in the industry—high enough to compensate for the losses in bad times. By continuing to ignore sunk costs and limit railroad returns in good times to "normal" levels, U.S. and U.K. regulators will continue to discourage not only new investment in, but even maintenance of, the existing capital stock.

After analyzing this regulatory problem, the paper presents a real-options approach that is designed to enable

25. In a series of papers, Stew put forward a range of arguments and evidence showing why this basic methodology was the most practical and robust, and why it was superior to other ways of finding rates of return (see, for example, Myers 1972b, 1973a, 1973b, and 1976). Myers and Borucki (1994) contains a case study of a sample electric and gas utilities to investigate one of the main alternative methods for finding costs of equity capital. This alternative methodology involves backing out the equity rate of return for each company from the current stock price and projections of future cash flows based on analyst estimates. For many of the companies investigated, the costs of equity found in this way are plausible. However, there is considerable noise in the estimates and this suggests that benchmark averages rather than single-company estimates should be used. More importantly, the results suggest that methodologies such as those based on the CAPM should also be used for confirmation.

26. The value of regulated utilities was also affected greatly by the high inflation of the 1970s and 1980s. The standard method of utility regulation involved measuring the rate base in terms of original cost. However, in inflationary times this leads to front-end loading as inflation eats away the value of the original cost. Myers, Kolbe and Yen (1985) show how an alternative called the "trended" original cost rate base can adjust for this problem by increasing the rate base with inflation (but with the unwanted consequence of providing a windfall gain to current shareholders. The moderation in inflation in the 1980's and the low inflation that was experienced in 1990's and early to mid 2000's meant that this kind of change became unnecessary, but the need for it may be revived in the coming years.

26. See Phillips, Cummins and Allen (1998), which uses the techniques developed in Black and Cox (1976) and Merton (1977) to determine the price of insurance by line using only line-specific liability growth rates and the overall risk of the firm.
regulators to incorporate such sunk costs when calculating allowable rates of return.\textsuperscript{27}

**Brealey and Myers**

The first corporate finance textbook was arguably Arthur Stone Dewing’s *The Financial Policy of Corporations*, which was first published in 1919. The book consisted mainly of institutional and legal details of corporations and how they financed themselves. There was little if any economic or financial analysis of why these institutions or patterns had come into being, or of the factors that would likely make them change. Over the years, corporate finance textbooks began to incorporate more economics and finance. But they remained largely “institutional” in their focus and methods.

Starting with Markowitz’s development of portfolio theory, the foundations of the field of finance, both capital markets and corporate finance, were laid by a number of breakthroughs and follow-up developments. Besides M&M’s famous capital structure and dividend irrelevance propositions noted earlier, there was the Sharpe-Lintner CAPM, the work of Fama and others on efficient markets, the Merton-Black-Scholes option pricing model, the work of Jensen and Ross on agency theory, and, finally, the work of Stew Myers on capital structure and capital budgeting discussed at length above. Although these topics had been treated in the existing textbooks, none had presented them as a unified whole.

This changed with the publication, in 1981, of Brealey and Myers’s *Principles of Corporate Finance*—a book that, by bringing together all the different parts of this relatively new subject, revolutionized the teaching of finance. It rapidly became known as the “bible” of finance, a reputation that continues to this day. The global sales of the book have long been and continue to be the largest of any textbook in finance at the advanced level. What’s more, the phenomenal success of the book cannot be explained solely by its effectiveness in capturing the key conceptual elements of the revolution in finance theory. Also worth noting is a rich vein of humor that runs through the book, affording moments of pleasure to even the most reluctant students of this branch of the dismal science.

Many generations of MBA students have learned most of the finance that they know from Brealey and Myers. And the book is not likely to be displaced or superseded by a competitor any time soon—if only because the time involved in writing a textbook from scratch means that this is no longer an economic proposition for finance academics. By 2058 “gargle blasters” will be a reality. And when the 25th edition of Brealey and Myers is published in that year, it will be co-authored by Aggarwal and Chen, while Shanghai and Mumbai will have overtaken London and New York as financial centers. But students around the world will continue to get their introduction to finance from the “bible.”

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