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Financing Corporate Capital Formation: An Introduction and Overview

Benjamin M. Friedman

The financing of the U.S. economy's capital formation has been a major subject of business and public policy discussion for more than a decade and a major focus of empirical inquiry by the National Bureau of Economic Research over a much longer time. Even in the 1950s and 1960s, for example, the National Bureau conducted a series of "Studies in Capital Formation and Financing," which culminated in Simon Kuznets' important volume, *Capital in the American Economy: Its Formation and Financing*. Earlier still, the National Bureau conducted a series of "Studies in Business Finance" and "Studies in Corporate Bond Financing."

This focus on the financing of capital formation is an appropriate one, no less so today than then. The central importance of capital formation to the economy's further growth and development is broadly recognized, and physical investment decisions and their financial counterparts are fundamentally interdependent. The financial environment therefore influences both the amount and the composition of the capital formation that an economy like that of the United States undertakes.

Questions about capital formation in the United States, and especially about the financing of that capital formation, inevitably focus in large part on the economy's corporate sector. Since World War II, business corporations have consistently accounted for about three-quarters of all investment in plant and equipment in the United States. The economic behavior of the corporate sector, including corporations' physical investment decisions as well as their corresponding financial decisions, constitutes a primary determinant of the economy's overall capital formation process and performance.

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The papers in this volume summarize the principal findings of the second stage of a current, wide-ranging National Bureau effort to investigate "The Changing Roles of Debt and Equity in Financing U.S. Capital Formation." The first group of studies sponsored under this project, which were published individually and summarized in a 1982 volume bearing the same title (Friedman 1982), took a broad-based view of the evolving financial underpinnings of U.S. capital formation, addressing not only corporate sector behavior but also such issues as household saving incentives, international capital flows, and government debt management. The project's second series of studies, published together in 1985 under the title *Corporate Capital Structures in the United States* (Friedman 1985), focused more narrowly on capital formation undertaken by the U.S. corporate business sector.[1] At the same time, because corporations' securities must be held, a parallel focus in this second stage of the research was on the behavior of the markets that price the financial claims which the corporate sector issues.

The financial capital structure of an economy's business corporations, either individually or in the aggregate, is the joint product of decisions taken by claim-issuing corporations and claim-holding investors—collectively, "the market." The capital structure existing at any one time reflects the cumulative result of the entire prior history of corporate decisions on what kind of claims to issue, and how much of each, in response to the associated history of the relevant market prices. Changes in the capital structure over time therefore reflect corporate responses either to changing nonfinancial influences or to changes in the financial market environment, which in turn stem from investors' responses to a wide variety of further economic and noneconomic factors. The main goals motivating the research in the second stage of this National Bureau project was not only to advance understanding of the basic corporate-sector behavior connecting debt and equity financing to physical capital formation in the United States, but also, and more specifically, to assess how the roles of debt and equity in this process have changed over time.

Within this overall direction, three sets of questions about corporate sector and financial market behavior directly framed the research undertaken in these papers: First, what has been the actual experience of the use of debt and equity financing by U.S. business corporations in recent years? Second, what factors drive the financial markets' pricing of—that is, the setting of terms on which investors are willing to hold—debt and equity securities? And third, what is the relationship (if any) between corporations' real investment decisions and their financial decisions? Ten papers addressing these questions, written by eighteen researchers, constituted the second stage of this National Bureau project.

1. This introduction draws heavily on the introduction to that volume.

The papers in this volume are the authors' summaries of six of those ten papers. These six papers were prepared for a conference for corporate and financial sector practitioners that the National Bureau sponsored at Williamsburg, Virginia, on September 20–21, 1984. The conference itself provided an opportunity for the participating researchers to report their findings to, and receive valuable feedback from, an audience consisting of senior corporate sector financial executives and senior executives of financial firms. The six papers presented at that conference, and published here for the first time, provide an overview of the second stage of this National Bureau project, which is now complete.

The first three of the ten papers comprising this stage of the project established the basic empirical facts of the changes that have (and, in some cases, have not) taken place in U.S. corporate capital structures and in the financial price and yield relationships that U.S. corporations have faced in recent years.

Robert A. Taggart's paper, "Secular Patterns in Corporate Finance," set the stage for the entire series of studies by first developing a conceptual framework for thinking about changes in corporate capital structures and then assembling and analyzing relevant time series data going back in many cases to the beginning of the twentieth century. Taggart began by using available aggregate time series data to document the main features of the changes that have occurred over time. He showed that the use of debt by U.S. corporations has increased considerably since World War II, as is familiar, but also that current debt levels are not necessarily high by prewar standards. The postwar surge in corporate debt certainly appears less dramatic when viewed in the context of the whole century's experience. Taggart also documented several other changes that have occurred, including the increasing importance of short-term relative to long-term debt, and the declining importance of new issues of either common or preferred stock relative to internally generated equity.

In his paper's more theoretical sections, Taggart reviewed several basic explanations of the determination of firm and/or aggregate corporate capital structures, including those relying on the trade-off between bankruptcy costs and tax savings from deductibility of interest payments, on the relative agency costs of debt and equity, on problems of providing relevant information to security holders, and on the differential between personal and corporate tax rates. Taggart laid out the relationships among these four separate approaches and used them to examine a series of potential influences on corporate capital structures including tax factors, price inflation, supplies of competing securities, and the physical characteristics of corporate investment.

Taggart then went on to ask which among these different explanations could plausibly account for the main changes that have taken place. He concluded that tax factors in conjunction with inflation have played an

important role, but nevertheless not one sufficient to explain the chief trends that have occurred over long periods of time. He argued that, in addition, supplies of competing securities like government bonds, along with the secular development of the nation's financial intermediary system, may also be important determinants of long-run corporate financing patterns.

Taggart's paper, "Have U.S. Corporations Grown Financially Weak?", which appears as Chapter 1 of this volume, summarizes the chief findings of this extensive work.

John H. Ciccolo and Christopher F. Baum's paper, "Changes in the Balance Sheet of the U.S. Manufacturing Sector, 1926–1977," took a closer look at an important slice of the corporate sector's capital structure on the basis of a new data series developed as part of this National Bureau project and now available to other researchers. Ciccolo and Baum developed a new data series for a rolling sample of approximately 50 manufacturing firms, spanning a half-century and including for each firm a large number of balance sheet and income account items. A major contribution of this data set is the ready availability, for the first time, of accurate information on the market value of corporations' publicly traded liabilities. In addition, the data set Ciccolo and Baum developed provides estimates of the replacement value of firms' physical assets, as well as computations of rates of return based on both market and replacement values.

Ciccolo and Baum showed that the chief aggregate features exhibited by this data set over time are broadly consistent with the principal developments documented at the aggregate level by other researchers. The data show an increasing importance of external funds, and especially of debt, in financing corporations' physical capital formation. On the asset side, the data show a substantial decline in corporations' holdings of cash and short-term marketable securities. Rates of return have declined on balance within the post–World War II period, but not from the perspective of a longer time frame. In the latter half of the postwar period, market valuations of corporations' net assets have declined dramatically in relation either to replacement values or to realized rates of return.

As an illustration of its potential applications, Ciccolo and Baum used the 1927–35 and 1966–77 panels of their data set to examine the relationship of movements of corporations' key balance sheet items to changes in their net cash flow and to changes in the ratio of market to replacement value of their net assets. The principal idea at issue here is that firms face different constraints, and therefore behave differently, when they are attempting to increase their stock of physical capital than when they are trying to reduce it. The empirical results that Ciccolo and Baum found generally support this kind of relationship for the later (more normal) period, but not for the earlier one dominated by the Depression.

Patric H. Hendershott and Roger D. Huang's paper, "Debt and Equity Yields, 1926–1980," provided a parallel review and analysis of the market prices and yields that U.S. corporations have faced in deciding on their capital structures. Hendershott and Huang first documented the principal movements of and interrelationships among debt and equity yields in the United States over a half-century, including both secular and cyclical movements. They then went on to test several familiar propositions about these yield relationships.

Hendershott and Huang focused in the first instance on corporate bond and equity yields, the market prices most directly relevant to capital structure decisions, but for purposes of analysis and comparison their work also included the yields on both short- and long-term U.S. Treasury securities. A familiar result, which their review of the experience of these yields reinforced, is the contrast between the patterns that have dominated the post–World War II period and the events of the 1930s. A less familiar result, which emerged strongly in their work nevertheless, is the appearance of strong regularities in security yield movements over the business cycle, including systematic differences in the cyclical movements of ex post returns on bonds and equities. The strength of equity returns during the year surrounding business cycle troughs stands out especially clearly.

Hendershott and Huang also investigated several familiar hypotheses about the determination of debt and equity yields. The principal conclusion of their work here is that unanticipated price inflation, which they represented by the difference between the actual inflation experience and the corresponding estimate in the Livingston survey, is a major determinant of these yields. Other factors also emerged from their analysis as bearing on the determination of yields, however—including, in particular, measures of real economic activity like industrial production and capacity utilization.

Hendershott's paper, "Debt and Equity Returns Revisited," which appears as Chapter 2 of this volume, summarizes and extends this work.

Against the background of this general review of the experience of both the quantities and the prices associated with changes in corporate capital structures in the United States, the next four papers addressed more directly the market mechanism determining the prices and yields on debt and equity securities. Of these four, the first two focused on more general aspects of the behavior of investors in debt and equity securities, while the next two examined the market pricing mechanism in contexts more specifically related to actual or potential changes in corporate capital structures.

Zvi Bodie, Alex Kane, and Robert McDonald's paper, "Inflation and the Role of Bonds in Investor Portfolios," explored both theoretically and empirically the role of nominal (that is, not indexed) bonds of various maturities in the portfolios of U.S. investors. A principal goal of their analy-

sis was to determine whether an investor constrained to hold bonds only in the form of a single portfolio of nominal debt instruments—as is the case, for example, in employer-sponsored saving plans offering a choice between a common stock fund and a single bond fund—will suffer a serious welfare loss. For this purpose Bodie and his colleagues took as their measure of welfare gain or loss, due to a given change in the investor's opportunity set, the increment to the investor's current wealth needed to offset that change. A second goal of their analysis was to study the desirability and feasibility of introducing a market for indexed bonds, offering a riskless real return, in the United States.

Bodie and his colleagues used the risk structure of real returns computed from historical data for 1953–81, in combination with assumptions about net asset supplies and about investors' average degree of risk aversion, to derive estimates of the risk premia on the various assets they studied. From this procedure they concluded that a substantial loss in welfare can be associated with participation in a savings plan offering a choice only between a diversified common stock fund and an intermediate-term bond fund. They argued that it is possible to eliminate most of this loss, however, by introducing, as a third option in such plans, a fund consisting of short-term money market instruments. Bodie et al. also concluded that the potential welfare gain from introducing explicitly indexed bonds in the U.S. financial market is probably not large enough to justify the costs of innovation by private issuers. The major reason the gain would be so small is that 1-month U.S. Treasury bills, with their small variance of real returns, already constitute an effective substitute for indexed bonds in investors' portfolios.

"Risk and Required Returns on Debt and Equity," which appears as Chapter 3 of this volume, summarizes this work by Bodie et al. and applies it to help explain why real interest rates have been so high in recent years in the United States. Their principal conclusion is that the increased volatility of bond prices since the 1979 change in the Federal Reserve System's operating procedures has substantially increased the required risk premium on long-term bonds. By contrast, they consider but reject the possibility that increased risk alone accounts for the recent high level of U.S. short-term interest rates.

My own paper, "The Substitutability of Debt and Equity Securities," investigated empirically the degree to which investors in U.S. markets consider debt and equity as substitutes in their portfolios—an aspect of investors' behavior that has an important influence on, among other matters, whether government deficits "crowd out" private financing and private capital formation. The analysis first applied fundamental relationships connecting portfolio choices with expected asset returns to infer key asset substitutabilities directly from the risk structure of U.S. asset returns during 1960–80. It then compared these implied substitutabilities with

corresponding estimates obtained from data on the actual portfolio behavior of U.S. households.

The resulting evidence provided little ground for any conclusion about even the sign, much less the magnitude, of the substitutability of short-term debt and equity. Although the risk structure indicated that these two assets are substitutes, observed household portfolio behavior indicated that investors have treated them as complements. By contrast, the evidence consistently indicated that *long-term* debt and equity are substitutes, albeit with a small degree of substitutability. This analysis therefore bears mixed implications for broader substantive economic and financial questions.

My paper, "Implications of Government Deficits for Interest Rates, Equity Returns and Corporate Financing," which appears as Chapter 4 of this volume, summarizes parts of this work and applies it to consider the crowding-out question explicitly. The results indicate that government financing raises expected debt returns relative to expected equity returns, regardless of the maturity of the government's financing. Continuing large government deficits at full employment therefore lead to market incentives for individual business corporations to emphasize reliance on equity (including retentions), and reduce reliance on debt, in comparison with the composition of corporate financing that would prevail in the absence of the need to finance the government's deficit.

Wayne H. Mikkelson's paper, "Capital Structure Change and Decreases in Stockholders' Wealth: A Cross- sectional Study of Convertible Security Calls," examined the financial markets' pricing of corporate securities in the specific context of the changes in common stock values that occur when firms call outstanding convertible debt or preferred stock. Mikkelson's goals were to investigate the potential determinants of the usually observed negative common stock price reaction to the announcement of a convertible security call forcing conversion and, on the basis of this analysis, to draw inferences about the pricing of corporate securities and hence about the determination of corporate capital structures more generally.

Mikkelson's empirical work related the observed changes in common stock prices following 164 convertible security calls made by U.S. corporations during 1962–78 to several quantifiable effects associated with these calls—including the change in interest expense tax shields, the potential redistribution of wealth from common stockholders to holders of debt or preferred stock, the decrease in value of the conversion option held by owners of the convertible securities, the increase in the number of common shares outstanding, and the change in earnings per share. Among these various effects, only the reduction in interest expense tax shields exhibited a significant relationship to the change in common stock price.

Mikkelson argued that this result is consistent with systematic reductions in common stock prices due not only to reductions in interest expense tax shields, as would be implied by theories relating optimal capital structure to tax factors, but also to the negative information about corporations' earnings prospects conveyed by convertible security calls. He therefore concluded that this evidence is also consistent with theories which relate a corporation's capital structure to its earnings prospects, and hence which imply that a reduction in leverage conveys unfavorable information about the corporation's value.

E. Philip Jones, Scott P. Mason, and Eric Rosenfeld's paper, "Contingent Claims Valuation of Corporate Liabilities: Theory and Empirical Tests," addressed the specific question of how the financial markets value the complicated securities, encumbered by numerous covenants and indenture provisions, that U.S. corporations typically issue. The central tool in their analysis is the familiar contingent claims model, which applies to the pricing of corporate liabilities the fundamental insight that every corporate security is a contingent claim on the value of the underlying firm. Hence it is possible to model the financial markets' pricing of these securities via an arbitrage logic that is independent of other, less straightforward aspects of the structure of risk and return. Under this useful model, the price of every security depends in a formally quantifiable way on the rate of return on riskless assets and on the issuing firm's market value and the volatility of that value.

Jones and his colleagues laid out the basic contingent claims model, extended it to cover such practically relevant special cases as multiple debt issues of a single firm and debt issues with sinking funds (with and without an option to double the associated payment schedule), and then tested the expanded model using monthly 1975–82 data on the actual market prices of 177 bonds issued by 15 U.S. corporations. They concluded that their empirical results do not warrant using the model, in its conventional form, as a practical basis for valuing corporate securities. Although there is almost no systematic bias in the pricing errors that the model makes for the sample as a whole, the model does systematically over- or underprice bonds with specific characteristics. In particular, the model tends to *underprice* less risky bonds and *overprice* more risky bonds. This failure led Jones and his colleagues to suggest that several of the standard assumptions underlying contingent claims analysis in its usual form are inconsistent with the actual workings of the U.S. financial markets.

Mason's paper, "Valuing Financial Flexibility," which appears as Chapter 5 of this volume, summarizes this work and extends it to demonstrate the impact of changing interest rate volatility on the value of call provisions and call protection.

The last three papers in this second stage of the research returned to a more direct focus on the observed capital structures of U.S. corporations,

now emphasizing in particular the question of the relationship (if any) of capital structure decisions to corporations' real-sector behavior.

Michael S. Long and Ileen S. Malitz's paper, "Investment Patterns and Financial Leverage," focused on one of the major elements underlying familiar theories of corporate capital structures: the role of investment opportunities. An important implication of such models is that corporations' real and financial decisions are connected. In this case the connection takes the form of a systematic bias toward underinvestment when firms with risky debt outstanding act in the interest of their shareholders. One potential role of complex covenants in debt contracts is to alleviate this problem.

Long and Malitz argued that, because growth opportunities that are firm-specific and intangible (and hence unobservable) reduce the effectiveness of debt covenants, corporations with a high proportion of their investment opportunities in intangible form can limit the agency costs imposed on holders of their debt only by limiting the amount of risky debt they have outstanding. Conversely, by using appropriately structured debt covenants, corporations with a high proportion of their investment opportunities in the form of tangible assets like capital equipment can reduce these costs and therefore can support a greater level of debt. Hence a key determinant of the corporation's optimal capital structure is the specific type of investment opportunity it faces.

Long and Malitz presented empirical results, based on 1978–80 data for a sample of 545 U.S. corporations, that provide evidence in support of such a relationship between real and financial corporate behavior. In particular, their results show that corporations that invest heavily in intangibles—research and development, for example, or advertising—systematically rely less on debt than do corporations that invest largely in tangibles. These results also stand up in the presence of other variables like tax factors that represent alternative explanations of capital structure decisions, although there is evidence that the most important single determinant of corporations' borrowing decisions remains the availability of internal funds.

Michael Spence's paper, "Capital Structure and the Corporation's Product Market Environment," examined the potential relationship between corporations' real and financial behavior from a different perspective. Spence argued that, if choosing an optimal capital structure is a way for a corporation to reduce its costs in some relevant sense, then corporations facing greater competitive pressure in their product markets will have a greater incentive, and hence a greater tendency, to do so than will corporations enjoying more sheltered competitive environments. Alternatively, if theories treating financial structure as irrelevant are correct, then there would be no observed connection between competitive product markets and observed patterns of corporate capital structures.

Spence tested this hypothesis by relating the observed interfirm variance of capital structures to measures of product market competitive pressure for 1183 U.S. corporations in 403 four-digit industries. His measures of competitiveness included returns earned by firms as well as variables directly and indirectly reflecting entry barriers and potential oligopolistic consensus. Spence also included in the empirical work measures of product market diversification for each firm, so as to be able to distinguish the behavior of the full sample from the behavior of a smaller sample of relatively undiversified firms.

Spence found that, although industry product market environments help explain the returns that firms earn and also bear systematic relationships to firms' actual capital structures, they apparently do not much influence intra-industry deviations of firms' capital structures from the respective implied industry optima. One possible explanation for this negative result, of course, is that capital structure does not strongly influence corporations' costs, or hence their total value—in other words, that there exists no optimal capital structure. The positive results that emerged from Spence's analysis seem inconsistent with this view, however. An alternative explanation is that, while optimal capital structures do exist, the factors which give rise to them simply do not become significantly more influential in more competitive environments.

Finally, Alan J. Auerbach's paper, "Real Determinants of Corporate Leverage," focused on still another of the key factors underlying several familiar theories of optimal corporate capital structures: the role of taxes. Here again, what makes such models especially interesting is that corporations' real and financial decisions are connected. In particular, Auerbach argued that the U.S. corporate income tax distorts corporations' real-sector behavior, via the variation in depreciation allowances and investment tax credit provisions across different types of physical investments, and also distorts financial behavior via the differential treatment of debt and equity returns. The object of his analysis of corporations' real and financial decisions was to determine the extent to which these biases offset one another.

Auerbach's analysis began from the basic idea that corporations prefer to finance different physical investments in different ways. Such behavior would be important in this context because the conclusion that tax effects bias investment choices is necessarily valid only if there is a separation between real and financial decisions. For example, if a corporation's optimal capital structure depends on a tax advantage to debt financing which is dissipated by risk-related costs as the firm's leverage increases, and if these risk-related costs in turn depend on the corporation's investment mix, then the resulting *financial* bias in favor of investing in structures could offset the initial *tax* bias in favor of investing in equipment.

Auerbach's empirical work, based on 1958–77 data for a panel of 189 U.S. corporations, suggested that observed patterns of real and financial behavior are only partially consistent with familiar theories of optimal capital structure based on tax factors and on costs connected to agency considerations and risks of bankruptcy. The effect of corporations' growth rates on their borrowing is inconsistent with the predictions of models based on agency costs. In addition, although the effect of the tax loss carry-forward is consistent with models based on tax shields, the effect of earnings variance is not. Auerbach also concluded that there is no obvious financial offset to the tax bias against investment in structures, since, on the whole, corporations do not appear to borrow more to invest in structures than in equipment.

Auerbach's paper, "The Economic Effects of the Corporate Income Tax: Changing Revenues and Changing Views," which appears as Chapter 6 of this volume, summarizes and extends this analysis.

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