

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Corporate Capital Structures in the United States

Volume Author/Editor: Benjamin M. Friedman, ed.

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-26411-4

Volume URL: <http://www.nber.org/books/frie85-1>

Publication Date: 1985

Chapter Title: Corporate Capital Structure in the United States: An Introduction and Overview

Chapter Author: Benjamin M. Friedman

Chapter URL: <http://www.nber.org/chapters/c11416>

Chapter pages in book: (p. 1 - 12)

---

# Corporate Capital Structures in the United States: An Introduction and Overview

Benjamin M. Friedman

In recent years questions about U.S. capital formation have increasingly become a major focus of both public and private concern. Such questions inevitably deal in large part with the economy's corporate sector. Since World War II, business corporations consistently have accounted for about three-quarters of all investment in plant and equipment in the United States. As a result, corporate behavior—including corporations' physical investment decisions and their corresponding financial decisions—constitutes a primary determinant of the economy's overall capital formation process and performance.

The research reported in this volume represents the second stage of a wide-ranging National Bureau of Economic Research 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 have been published individually and summarized in a 1982 volume bearing the same title (Friedman 1982), addressed several key issues relevant to corporate sector behavior along with such other aspects of the evolving financial underpinnings of U.S. capital formation as household saving incentives, international capital flows, and government debt management. In the project's second series of studies, presented at a National Bureau of Economic Research conference in January 1983 and published here for the first time along with the commentaries from that conference, the central focus is the financial side of capital formation undertaken by the U.S. corporate business sector. At the same time, because corporations' securities must be held, a parallel focus is on the behavior of the markets that price these claims.

Benjamin M. Friedman is professor of economics at Harvard University and program director for financial markets and monetary economics at the NBER.

This focus on both the corporate sector and the financial environment which it confronts is valuable, not only because of corporations' large role in undertaking the economy's capital formation but also because the corporate sector context itself helps to define more sharply, and render more operational for purposes of empirical research, key elements of the debt and equity financing process. A major advantage at the theoretical level, for example, is that business corporations, unlike households (and, by extension, unincorporated businesses for some purposes), do no direct consumption. A variety of research strategies can therefore conceptually connect corporate financing to firms' capital formation objectives without at the same time having to deal with issues affecting consumption-saving decisions. Major advantages of the corporate sector context at the empirical level include the more formally explicit nature of corporate debt and equity claims, the superior availability of data summarizing central elements of corporate financial behavior, and, of course, the availability of observable market prices for claims that are publicly traded.

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 on one side and by claim-holding investors—collectively, “the market”—on the other. 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 market prices. Changes in the capital structure over time in turn 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 presented here are not only to advance understanding of the basic behavior connecting debt and equity financing to physical capital formation in the United States but also, and more specifically, to assess how the roles in this process of debt and equity have changed over time.

Within this overall direction, three sets of questions about corporate sector and financial market behavior emerge as the direct objects of 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? Have corporate capital structures changed significantly? It is well known that the use of debt has increased in some ways, but has the debt component of capital structures actually increased after allowance for erosion due to the secular upward trends in price inflation and in nominal interest rates?

Second, what is the relationship (if any) between firms' real investment decisions and their financial decisions? Does the external environment that firms face in the product markets help shape their debt and equity

decisions? How important are specific institutional factors like taxes, or arrangements for monitoring performance and contract compliance? Do firms have individually optimal capital structures? If so, what determines them? Does the entire corporate sector, or even the entire economy, have an optimal aggregate capital structure? If so, can identifiable movements in the factors determining it account for the changes in capital structures that have taken place in recent years?

Third, 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? Are single-factor models of market pricing behavior adequate? Are securities markets “efficient” in the familiar sense? Are debt and equity securities substitutes or complements in investors' portfolios? Have significant changes taken place in recent years in the structure of equilibrium market prices? If so, can identifiable changes in market risks or other objective factors, or in investors' assessments of risks, account for them?

In addition to these substantive questions of economic behavior at the individual firm and market levels, the work presented here inevitably addresses several methodological issues, including some that frequently arise in empirical economic research regardless of its subject, as well as some that are more specific to the study of corporate capital structures. What standards are useful for evaluating formal models of behavior? Is the appropriate use of such models limited to the explanation of observed behavior, or is prediction also warranted? If the latter, then under what circumstances? How can empirical research discriminate among competing hypotheses when key explanatory variables are unobservable, and the best available proxies for them not only are highly collinear but could each be proxying for more than one concept? Is it useful to assume that the market is always “correctly” pricing assets? In what contexts are market values versus replacement values more relevant? What is the best way to infer market participants' unobservable assessments from magnitudes that are observable? What is the best way to make operational models relying centrally on aspects of the exchange of information, including such examples as agency costs and signaling phenomena?

The first three of these ten papers establish 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 the Financing of United States Corporations,” sets the stage for the entire series of studies. In it Taggart develops a conceptual framework for thinking about changes in corporate capital structures and assembles and analyzes relevant time-series data going back in many cases to the beginning of the twentieth century. He begins by using available aggregate time-series

data to document the main features of the changes that have occurred over time. He shows that the use of debt by U.S. corporations has increased considerably since World War II, but he leaves open the question of whether current debt levels are 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 documents 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 the paper's theoretical sections, Taggart reviews 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, on the relative agency costs of debt and equity, on information transfer problems and signaling, and on the differential between personal and corporate tax rates. Taggart lays out the relationships among these four classes of theories and uses them to examine a series of (at least potentially) measurable influences on corporate capital structures including tax factors, price inflation, supplies of competing securities, and the physical characteristics of corporate investment.

Taggart then asks which among these different explanations could plausibly account for the changes that have taken place. He concludes that tax factors in conjunction with inflation have played an important role but not one sufficient to explain the main trends that have occurred over long periods of time. He argues 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.

John H. Ciccolo and Christopher F. Baum's paper, "Changes in the Balance Sheet of the U.S. Manufacturing Sector, 1926-1977," takes a closer look at an important slice of the corporate sector's capital structure on the basis of new data series developed as part of this NBER project and now available to other researchers. Ciccolo and Baum describe a micro-level dataset that they developed for a rolling sample of approximately fifty 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 dataset is the ready availability, for the first time, of accurate information on the market value of corporations' publicly traded liabilities. In addition, the dataset 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 show that the chief aggregate features exhibited by this dataset 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 both to replacement values and to realized rates of return.

As an illustration of its potential micro-level applications, Ciccolo and Baum use the 1927-35 and 1966-77 panels of their dataset to test a simple portfolio model relating the 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 underlying their model 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 generally support their model for the later period but not the earlier one.

Patric H. Hendershott and Roger D. Huang's paper, "Debt and Equity Yields, 1926-1980," provides a parallel review and analysis of the market prices (yields) that U.S. corporations have faced in deciding on their capital structures. Hendershott and Huang first document 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, and then go on to test several familiar propositions about yield relationships.

Hendershott and Huang focus 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 includes the yields on both short- and long-term U.S. Treasury securities. A familiar result, which their review of the experience of these yields reinforces, is the contrast between the patterns that have dominated the post-World War II period and the events of the 1930s. A significant but less familiar result 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 investigate several familiar hypotheses about the determination of debt and equity yields. The principal conclu-

sion of their work here is that unanticipated price inflation, which they represent 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 emerge 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.

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 address more directly the market mechanism determining the prices (yields) of debt and equity securities. The first two of the four focus on general aspects of the behavior of investors in debt and equity securities; the next two examine the market pricing mechanism in contexts 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," explores 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 analysis is 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 et al. take as their measure of the welfare gain or loss due to a given change in the investor's opportunity set the increment to current wealth needed to offset that change. A second goal of their analysis is to study the desirability and feasibility of introducing a market for indexed bonds, offering a riskless real return, in the United States.

A novel feature of the empirical approach of Bodie et al. is their method of deriving equilibrium risk premia on the various asset classes they study. They employ the variance-covariance structure of real returns computed from historical data for 1953–81, in combination with assumptions about net asset supplies and about the economy's overall average degree of risk aversion, to derive estimates of these risk premia. By using this procedure they circumvent the problems that would be associated with estimating risk premia on the basis of historical *mean* returns, which are sometimes negative.

Bodie et al. conclude that a substantial loss in welfare can be associated with participation in a saving plan offering a choice only between a diversified common stock fund and an intermediate-term bond fund. They argue 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 conclude 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 one-month U.S. Treasury bills, with their small variance of real returns, already constitute an effective substitute for indexed bonds in investors' portfolios.

My own paper, "The Substitutability of Debt and Equity Securities," investigates empirically the degree of substitutability between debt and equity securities in the United States. The analysis first applies fundamental relationships connecting portfolio choices with expected asset returns to infer key asset substitutabilities directly from the observed variance-covariance structure of U.S. asset returns, using quarterly data for 1960–80. It then compares these implied substitutabilities with the corresponding econometrically estimated portfolio behavior of U.S. households.

The resulting evidence provides little ground for any conclusion about even the sign, much less the magnitude, of the substitutability of short-term debt and equity. Although the implied optimal behavior indicates that these two assets are substitutes, the observed behavior indicates that households have treated them as complements. By contrast, the evidence consistently indicates that long-term debt and equity are substitutes. Moreover, with a few exceptions the empirical estimates of the associated substitution elasticity are quite closely clustered around the value  $-.035$ .

The conclusion that long-term debt and equity are substitutes with elasticity  $-.035$  bears mixed implications for broader economic and financial questions. At one level, the finding that the two assets are indeed substitutes validates the standard assumption underlying a variety of familiar models in both corporate finance and monetary economics. At the same time, if the absolute magnitude of the elasticity of substitution is so small, then many of these models' more important substantive conclusions do not follow.

E. Philip Jones, Scott P. Mason, and Eric Rosenfeld's paper, "Contingent Claims Valuation of Corporate Liabilities: Theory and Empirical Tests," addresses 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 models, 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 the specific equilibrium structure of risk and return. If this model is correct, then 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 et al. lay out the basic theory of the contingent claims model, extend 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 test the expanded theory using monthly 1975–82 data on the actual market prices of 177 bonds issued by 15 U.S. corporations. Even though they restrict their sample to corporations with relatively simple capital structures, the numerical solution of the model to derive predicted securities prices is complex. The required data include interest rates, volatility of firms' market values, and specific aspects of the bonds' indentures including principal amount outstanding, coupon rate, call price schedule and deferment period, and sinking fund schedule and associated options.

Jones et al. conclude 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 leads Jones et al. 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.

Wayne H. Mikkelson's paper, "Capital Structure Change and Decreases in Stockholders' Wealth: A Cross-sectional Study of Convertible Security Calls," examines 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. The goals of the paper are 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 relates 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 exhibits a significant relationship to the change in common stock price.

Mikkelson argues 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 concludes that this evidence is also consistent with theories which relate capital structure to earnings prospects and hence which imply that reductions in leverage convey unfavorable information about firm value.

The last three papers examine directly the observed capital structures of U.S. corporations, emphasizing in particular the question of the relationship (if any) of capital structure decisions to corporations' real-sector behavior.

Alan J. Auerbach's paper, "Real Determinants of Corporate Leverage," focuses on one of the key factors underlying several familiar theories of optimal corporate capital structures: the role of taxes. Auerbach argues 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 is to determine the extent to which these biases offset one another.

Auerbach's model connecting firms' real and financial behavior rests on the 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 a separation prevails 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 firm'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, suggests that observed patterns of real and financial behavior are only partially consistent with familiar theories of optimal capital structure based on tax factors and costs connected to agency considerations and risks of bankruptcy. The effect of firms' 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 concludes that there is no obvious financial offset to the tax bias against investment in structures since, on the whole, firms do not appear to borrow more to invest in structures than in equipment.

Michael S. Long and Ileen B. Malitz's paper, "Investment Patterns and Financial Leverage," focuses on another of the major elements underlying familiar theories of corporate capital structures: the role of investment opportunities. Here, too, 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 argue 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 of their debt only by limiting the amount of risky debt that they have outstanding. Conversely, corporations with a high proportion of their investment opportunities in the form of tangible assets like capital equipment can support a greater level of debt. Hence a key determinant of optimal corporate capital structure is the specific type of investment opportunity that the firm faces.

Long and Malitz present 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 behavior. In particular, their results show that corporations which invest heavily in intangibles—research and development, for example, or advertising—systematically rely less on debt than do corporations which 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.

Finally, A. Michael Spence's paper, "Capital Structure and the Corporation's Product Market Environment," examines the question of a relationship between corporations' real and financial behavior from a different perspective. Spence argues 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 struc-

ture as irrelevant are correct, then there will be no observed connection between competitive product markets and observed patterns of corporate capital structures.

Spence tests this hypothesis by relating the observed interfirm variance of capital structures to measures of product market competitive pressure for 1,183 U.S. corporations in 403 four-digit industries. His measures of competitiveness include returns earned by firms as well as variables directly and indirectly reflecting entry barriers and potential oligopolistic consensus. Spence also includes in the empirical work measures of product market diversification for each firm, so as to be able to distinguish results based on the full sample from results based on a smaller sample of relatively undiversified firms.

Spence finds 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 emerge seem inconsistent with this view, however. An alternative explanation is that, while optimal capital structures do exist, the factors that give rise to them simply do not become significantly more influential in more competitive environments.

## Reference

Friedman, Benjamin M., ed. *The Changing Roles of Debt and Equity in Financing U.S. Capital Formation*. Chicago: University of Chicago Press, 1982.

