

Financial Contracting: A Survey of Empirical Research and Future Directions

Michael R. Roberts¹ and Amir Sufi²

¹The Wharton School, University of Pennsylvania, Philadelphia, Pennsylvania 19104; email: mrrobert@wharton.upenn.edu

²Booth School of Business, The University of Chicago, Chicago, Illinois 60637; email: amir.sufi@chicagobooth.edu

Annu. Rev. Financ. Econ. 2009. 1:207–26

First published online as a Review in Advance on August 27, 2009

The *Annual Review of Financial Economics* is online at financial.annualreviews.org

This article's doi:
10.1146/annurev-financial-071808-145241

Copyright © 2009 by Annual Reviews.
All rights reserved.

1941-1367/09/1205-0207\$20.00

Key words

security design, incentive conflicts, control rights, corporate finance, moral hazard, adverse selection, collateral, renegotiation, corporate governance

Abstract

We review recent evidence and future directions for empirical research on financial contracting in the context of corporate finance. Specifically, we survey evidence pertaining to incentive conflicts, control rights, collateral, renegotiation, and interactions between financial contracts and other governance mechanisms. We also discuss directions for future research, concluding that the financial contracting approach offers a potentially fruitful perspective for empirical researchers seeking to better understand a variety of issues in corporate finance including capital structure, investment policy, payout policy, and corporate governance.

INTRODUCTION

In laying the foundation for the role of incentives in corporate finance, Jensen & Meckling (1976) characterize the firm as a nexus of contracts. Since then, a great deal of theoretical research has focused on rationalizing and characterizing the different contractual relations between firms and their investors. This rich and growing theoretical literature—often referred to as financial contracting or security design—includes models based on a variety of economic principles, such as costly state verification, adverse selection, moral hazard, the allocation of control rights, and risk sharing. Yet despite their different assumptions, this literature is united by its primary purpose, which is to derive optimal mechanisms, namely contracts, for overcoming various frictions between agents.¹

Although empirical research on financial contracting has progressed more slowly than the theory has, there have been a number of recent exciting advancements as applied researchers become aware of the theoretical insights of financial contracting and take advantage of novel data sources. Our main goals with this survey are to review the empirical evidence on financial contracting and to provide direction for future empirical research. Through this survey, we hope to convey our belief that the richness of the theoretical financial contracting literature offers many opportunities for applied researchers to broaden our understanding of a variety of issues in corporate finance including capital structure, investment policy, payout policy, and corporate governance.²

From the outset, we acknowledge the limitations of our review. We restrict attention to the contracting relationships between the firm and its investors, primarily creditors and shareholders, leaving other important contractual relations, such as those with employees and customers, to other studies.³ We also exclude most research on corporate capital structure, or the usage and mix of various corporate securities, which is closely related to financial contracting.⁴ We motivate this distinction with the fact that much of the empirical capital structure literature takes the existence of financial securities such as debt and equity as given. We believe that the financial contracting literature, where optimal securities are derived as opposed to assumed, offers a novel perspective on positive and normative questions in empirical capital structure research.

Finally, financial contracting is one form of corporate governance, a subject expertly reviewed in the survey article by Shleifer & Vishny (1997).⁵ However, our survey is quite different from theirs in two dimensions. First, our emphasis is on the characteristics of financial contracts and the implications of these contract characteristics for corporate behavior, as opposed to the importance of legal protection of investors and of ownership

¹The theoretical literature is well summarized and carefully examined in a number of excellent surveys [Harris & Raviv (1992), Allen & Winton (1995) and Hart (2001)] and texts [Hart (1995), Bolton & Dewatripont (2005), and Tirole (2006)].

²Stein (2003) provides an excellent survey of the investment literature, and Allen & Michaely (2003) give an excellent summary of the payout literature.

³See, for example, the survey of executive compensation by Murphy (1999).

⁴Leading hypotheses from this literature include the traditional trade-off hypothesis, in which capital structure is determined by balancing the tax benefits of debt with the deadweight losses in bankruptcy (e.g., Scott 1976), and the pecking-order hypothesis, in which adverse selection costs lead firms to finance investment with the least informationally sensitive security (Myers & Majluf 1984). Several excellent surveys of the capital structure literature include Harris & Raviv (1991), Myers (2003), Frank & Goyal (2008), and Parson & Titman (2008).

⁵Becht et al. (2003) and Zingales (2000) also provide a number of insights into governance and financial contracting. See the articles by Hermalin & Weisbach (2003) and Adams et al. (2008) for surveys of the role of boards of directors in corporate governance.

concentration. Second, much of our review focuses on recent empirical evidence on the governance role of large creditors. As Shleifer & Vishny (1997) note, there was almost no empirical evidence on the role of creditors in corporate governance at the time of their survey.

The remainder of the review begins with an introduction to the relevant theory. The goals of this discussion are to illuminate the basic ideas and concepts of financial contracting theory and to highlight the fundamental concepts on which the empirical literature has focused. Doing so provides for a natural organizational structure for the subsequent discussion of the empirical evidence. We discuss several key concepts highlighted by the theoretical literature: incentive conflicts, control rights, collateral, renegotiation, and interactions with other governance mechanisms. Although these concepts are far from exhaustive, they have received the most attention from empirical researchers.

Much of the review is spent discussing debt securities. This does not reflect a judgment on the relative importance of financial contracts. Rather, we choose to focus on debt contracts because they are typically more complex securities containing numerous features and provisions that create a significant amount of heterogeneity within this class of securities. In addition, debt, or debt-like, securities often emerge as the optimal contract in financial contracting theories. Finally, empirical evidence on the design of debt securities and the role of creditors has received significantly less attention in previous reviews of capital structure and corporate governance.

We close the survey with concluding thoughts for future research. Our focus on future directions reflects our view that the literature surveyed here represents only the first chapter in an exciting novel of future empirical financial contracting research.

FINANCIAL CONTRACTING THEORETICAL FOUNDATIONS

Given our primary focus on empirical research, this section presents and discusses a small number of the most visible theoretical papers that have had the largest influence on empirical work in financial contracting thus far. We refer the reader to the original papers for more detail. Further, as consumers of theoretical research focused on the empirical evidence, we draw heavily from the outstanding surveys by Harris & Raviv (1992), Allen & Winton (1995), and Hart (2001), as well as from the texts by Bolton & Dewatripont (2005) and Tirole (2006).

Incentive Conflicts and Control Rights

One of the distinguishing characteristics of theoretical financial contracting research is the assumption of incentive conflicts and the derivation of optimal securities in the presence of these conflicts. One of the earliest examples is Townsend (1979). His model of costly state verification is based on a simple risk-sharing problem between a risk-neutral agent (i.e., lender) with constant income and a risk-averse agent (i.e., borrower) with random income. The market imperfection is that the borrower's income can be hidden, and the lender is required to pay a so-called audit cost in order to verify the borrower's true income. Townsend derives the optimal incentive-compatible contract, where incentive compatibility refers to a contract that ensures good behavior by the borrower—truthful revelation regarding income.

The contract has the following features. Income is verified whenever reported income is below a certain level—a level that implicitly incorporates the audit cost ultimately borne by the borrower should income need to be verified. Payments to the lender are constant when income is not verified, and payments are strictly lower than this when income is verified. This contract has many features of a simple debt contract, a point Gale & Hellwig (1985) reinforce by showing that, if both agents are risk neutral, the optimal contract gives all of the borrower's income to the lender whenever this income falls below the unverified fixed payment. Diamond (1984) derives debt as the optimal contract in a similar setting but uses nonpecuniary penalties that impose a disutility equal to the payment shortfall as a disciplining device, as opposed to an audit cost.

The key insight from these models is that the debt contract is a useful financing arrangement because the penalties that nonpayment imposes on the borrower—audit costs and disutility—ensure truthful revelation by the borrower. In other words, the contract aligns the incentives between the borrower and lender because of the costs that lenders may impose upon borrowers when the borrower misbehaves. These foundational models of financial contracting highlight the importance of incentive conflicts in the derivation of optimal securities.

The incomplete contracts paradigm pioneered by Grossman & Hart (1986) and Hart & Moore (1988, 1990) shifts the focus from the allocation of cash flows to the allocation of control rights. Additionally, whereas costly state verification focuses mainly on managers' incentives, the incomplete contracting literature emphasizes investors' incentives as well. However, it is crucial to note that incentive conflicts remain the key friction motivating the security design problem. The key additional assumption that distinguishes this literature is that in dynamic relationships, eventualities arise upon which parties cannot contract. Thus, any contract is incomplete in the sense that it does not address every possible future contingency.

Aghion & Bolton (1992) build on this idea by assuming that a wealth-constrained entrepreneur has an investment opportunity requiring financing. Whereas investors care only about project cash flows, entrepreneurs care about both project cash flows and nonpecuniary private benefits (e.g., personal satisfaction, reputational enhancements). As Aghion & Bolton show, the resolution of this conflict depends to a large extent on who has the right to make decisions, such as to continue or to terminate the project, once the relationship is under way. The optimal contract allocates the decision right in a state-contingent manner: When the state of the world is such that monetary profit maximization is most (least) efficient, the investor (entrepreneur) receives control. The cutoff delineating investor-entrepreneur control is determined so that the investor breaks even, and the contingent allocation is achieved by conditioning the control right on a contractible, but noisy, signal of the state of the world.

As in the costly state-verification models, this contract resembles debt financing by giving control to creditors in states of the world in which the incentive conflicts are likely to bias managers toward inefficient behavior. More simply put, when things go well for the entrepreneur (e.g., high cash flow, low leverage, high net worth), he retains control over the investment project. When things go poorly, control shifts to the investor. It is important to emphasize that the contractible signal in the Aghion & Bolton (1992) model is quite general: It can represent net worth, profitability, payment default, etc.

Hart & Moore (1998), however, assume that contracts cannot be written on project returns. Instead, contracts are characterized only by the amount a firm borrows and

the promised repayment.⁶ Contracts specify a liquidation right for financiers; if the promised repayment is not made, financiers obtain the liquidation value of existing assets. The primary conflict of interest in the model is the ability of managers to steal all cash flow with the exception of physical assets. As a result, the only threat the lender has over firm behavior is liquidation following payment default, which lowers future cash flow to the manager.

There is an important difference between the Hart & Moore (1998) and Aghion & Bolton (1992) control-allocation mechanisms, and this difference has played an important role in empirical financial contracting research. Control rights in the Aghion & Bolton (1992) model can shift to creditors even in the absence of a missed debt payment. As noted above, the signal on which contracts are written is quite general and need not represent payment default. In contrast, payment default in the Hart & Moore (1998) setting is crucial for creditors to seize assets. This conflict is apparent in Hart (1995, p. 101), who writes,

One of the most basic features of a debt contract is the idea that what triggers a shift in control is the non-payment of debt. . . . the Aghion and Bolton contract does not have this property. Shifts in control are stochastic or contingent on the realization of a verifiable state of the world, not on a failure to pay.

The different assumptions introduce an interesting empirical question: Do shifts in control to creditors occur uniquely in a situation of payment default on debt? We examine research on this question in the section entitled Empirical Financial Contracting Research.

Collateral

A basic consequence of the incentive conflict underlying contracting models is a reduction in pledgeable income, or the amount of money that borrowers can credibly commit to return to investors. One important way in which managers can boost pledgeable income is through the pledging of collateral, such as liquid assets, physical capital, or future project returns. Collateral helps ensure, to a degree, that investors earn a fair return should the project cash flows fall short of any required payments—either because of a bad draw or because of managerial misbehavior.

Of course, a crucial characteristic of collateral is the ultimate value to investors should they need to seize and sell it, a concept that studies by Hart & Moore (1994, 1998), and Bolton & Scharfstein (1996), among others, refer to as liquidation value. Simply put, the greater the liquidation value of the collateral, the greater the credit availability because investors can be assured of a higher return. Of course, the cost of pledging assets is that they may have a lower value for the lender than for the borrower. For example, there may be direct costs associated with the recovery and resale of assets, borrowers may derive nontransferable private benefits, or some assets may be inherently difficult to sell. Under this assumption, Lacker (1991) shows that collateralized debt is an optimal contract.⁷

⁶The Hart & Moore (1998) model first assumes the optimality of the debt contract in order to show the importance of renegotiation and liquidation rights. The second part of their model revisits the assumption of the optimality of debt and finds that debt is the optimal contract under reasonable assumptions. See also Hart & Moore (1994).

⁷See also studies by Chan & Kanatas (1985), Stulz & Johnson (1985), Bester (1985, 1987), Besanko & Thakor (1987), Berkovitch & Kim (1990), Boot et al. (1991), and Triantis (1992).

Williamson (1988) and Shleifer & Vishny (1992) refine the notion of liquidation value along two dimensions. The former identifies the redeployability of an asset or the option to use the asset for other purposes. Commercial real estate is highly redeployable and therefore associated with higher liquidation value, whereas a specialized asset, such as high-tech medical equipment, is relatively less redeployable and associated with lower liquidation value. The latter study uses an industry equilibrium model to show that liquidation values are affected by the number and financial condition of potential buyers. When borrowers get into financial trouble because of an industry downturn, the resale of collateralized assets by creditors is hampered by the financial troubles of other potential buyers, many of which are in the same industry and affected by the downturn as well.

Renegotiation

Theoretically, renegotiation is an issue that arises largely as an out-of-equilibrium phenomenon (Maskin & Moore 1999). When agents design a contract, they are presumably interested in ensuring Pareto optimal outcomes, and so an equilibrium outcome of the contract will be efficient in this sense; that is, there will be no scope for renegotiation. But out of equilibrium, outcomes might be far from Pareto optimal, leaving open the possibility that the agents will simply tear up their contract and renegotiate a new one in order to realize any Pareto improvement.⁸ Thus, renegotiation can be viewed as a game played by agents when there exists an ex post surplus under the initial terms of the contract.

Such a surplus is most likely to occur when unanticipated or noncontractable states of the world (specifying preferences, endowments, productive technology, etc.) occur. Hart & Moore (1998) show that long-term debt contracts are not renegotiation proof, a result subsequently extended to more than two periods by Gromb (1994). Specifically, when a high-cash flow state is realized in their model, the entrepreneur may be able to negotiate down any possibly onerous or restrictive terms in the initial contract (see also Gorton & Kahn 2000 and Garleanu & Zwiebel 2007). Similarly, deteriorations in credit quality can lead to renegotiation when liquidation is ex post Pareto inefficient because information accrues at an intermediate stage (e.g., von Thadden 1995). This phenomenon is referred to as a softening of the budget constraint (Tirole 2006) and is particularly acute when monetary punishments are limited because of their costs.

In order for changes in credit quality to affect renegotiation, each party must have available outside options—alternative sources of financing for the borrower, alternative sources of business for the lender. As these outside options change, so does the relative bargaining power and ultimate outcome of the renegotiation game. For example, without a credible threat to leave their current lender, borrowers will have little bargaining power despite any improvements in their financial condition and investment opportunities (Rajan 1992).

In addition to the accrual of new information and changing outside options, the original terms of the contract play an important role in renegotiation. Aghion et al. (1994) examine a setting in which parties are able to control the renegotiation process contractually; in their model, the assignment of ex post bargaining power is specified in

⁸This perspective of renegotiation as an exogenous game determined by the relative bargaining strengths of the involved parties is common throughout the financial contracting literature. For an alternative perspective where renegotiation is controlled contractually by the assignment of bargaining power, see Aghion et al. (1994), which is also discussed below.

the contract rather than being given exogenously (see also Harris & Raviv 1995). This perspective is in contrast to other contracting studies that exogenously assume monopolistic bargaining power (Hart & Moore 1988) or Nash bargaining (Bolton & Scharfstein 1996). This difference is important because Aghion et al. (1994) show that, when the initial contract can impose trade unilaterally at a price prespecified in the contract, the underinvestment problem of Hart & Moore disappears. In other words, the simple use of outside options in the renegotiation game generates the correct marginal incentives to invest for both parties.

EMPIRICAL FINANCIAL CONTRACTING RESEARCH

Incentive Conflicts and Control Rights

In this subsection, we explore the role of incentive conflicts and control rights by reviewing three areas of empirical research: creditor control rights in bankruptcy, creditor control rights outside of bankruptcy, and the incentive effects of leveraged buyouts (LBOs) and venture capital contracts.

Creditor control rights in bankruptcy. Financial contracting theory argues that a critical aspect of debt is the control obtained by lenders after a payment default. This idea is supported in a series of empirical studies. Gilson (1990) finds that bank lenders frequently become major stockholders or appoint new directors when firms enter Chapter 11 or privately restructure their debt to avoid default, and more than half of incumbent directors are replaced. He also finds evidence of an increase in direct creditor monitoring, as is evidenced by restrictive covenants on financial and investment policy in private lending agreements.⁹

Hotchkiss (1995) provides evidence that Chapter 11 bankruptcy proceedings may provide insufficient control rights to creditors relative to managers. She finds that 40% of firms that emerge from Chapter 11 experience operating losses in the three years after emergence, and she argues that the continued involvement of prebankruptcy management is strongly associated with postbankruptcy performance.

More recently, an increase in the use of debtor-in-possession (DIP) financing with tight covenants has increased the power of creditors in bankruptcy. Postpetition DIP financing, which is usually provided by a group of banks via a syndicated loan, provides special creditor rights to postpetition loans through Section 364 of the U.S. Bankruptcy Code (Dahiya et al. 2003). DIP financing is almost always senior and secured relative to existing claims.

Skeel (2004) provides qualitative evidence on the importance of DIP financing, and argues that “the DIP agreement has become the single most important governance lever in many Chapter 11 cases” (p. 1906). The mechanism by which DIP financing increases creditor control is described by Skeel (2004) as follows: “By structuring the loan as a revolving credit agreement and imposing strict conditions on each new round of financing, the lender is assured that it will have significant leverage over the debtor’s managers’ decision-making throughout the Chapter 11 process” (p. 1907).

⁹See also Gilson et al. (1990) on creditor control associated with private debt restructuring versus Chapter 11.

Using a sample of 153 firms filing for Chapter 11 in 2001, Ayotte & Morrison (2008) provide strong evidence that creditors control most major decisions in Chapter 11. For example, 70% of chief executive officers (CEOs) are replaced within two years of the filing, and the vast majority of DIP financing contains covenants imposing line-item budgets, profitability targets, or deadlines for submitting a plan of reorganization. Ayotte & Morrison (2008) argue that “in contrast to traditional views of Chapter 11, equity holders and managers exercise little or no leverage during the reorganization process” (p. 1). In addition, deviations from absolute priority are rare; they occur in only 8% of cases. This evidence on the declining incidence of deviations of absolute priority is consistent with the findings of Bharath et al. (2007), who also attribute the increase in creditor control and reduction in absolute priority violations to DIP financing.

The increasing presence of control-oriented DIP financing has significantly altered the debate over who controls corporate policy in bankruptcy. Whereas previous research emphasizes the conflict between managers and creditors in bankruptcy, the more recent body of research suggests that the relevant conflict is between secured and unsecured creditors. For example, Ayotte & Morrison (2008) show that objections by the unsecured creditors committee to asset sales and terms of DIP financing are common. Further, they find that when secured lenders are oversecured—meaning that the value of their claims is smaller than the value of the firm—they tend to favor quick resolution and asset sales. In contrast, when secured lenders are undersecured, the cases are relatively long and more likely to result in a traditional reorganization.

Collectively, the evidence on bankruptcy and restructuring overwhelmingly supports the hypothesis in theoretical financial contracting research that debt represents a powerful control rights—transfer mechanism in cases of payment default. Especially over the past decade, secured creditors in Chapter 11 have exerted control over the hiring of managers and directors, corporate investment policy, corporate financial policy, and the ability of a company to successfully reorganize.

A question that remains open for debate is the efficiency of creditor control. From an empirical standpoint, it is difficult to determine whether creditors create or destroy value. Chang & Schoar (2007) use probdebtor judge fixed effects to identify the effect of a probdebtor bias on future performance. They find that a probdebtor bias leads to increased rates of refiling and firm shutdown as well as lower postbankruptcy credit ratings. Dahiya et al. (2003) find that firms in Chapter 11 that obtain DIP financing have a shorter reorganization period. Chatterjee et al. (2004) find positive abnormal returns to announcement of a DIP facility by both stocks and bonds. They interpret this as evidence of the value of the information processing role of financial intermediaries. Although more evidence is needed, the existing studies suggest that creditor control in bankruptcy improves firm value.

Creditor control rights outside of bankruptcy. As mentioned above (in the section titled Financial Contracting Theoretical Foundations), an interesting debate within the theoretical financial contracting literature is: At what precise moment do creditors exercise control? As the previous subsection demonstrates, creditors exert a tremendous amount of influence over firm policy following payment default and in Chapter 11. In this section, we review research showing that creditors begin to exert control even before payment default.

It is important to emphasize that the prevailing opinion in the corporate governance literature until recently is that creditors play almost no role in corporate decision making of public firms unless a payment default occurs. For example, although the corporate governance survey of Shleifer & Vishny (1997) covers theoretical research on creditor control rights, the authors discuss only a few articles showing that creditors play a direct role in corporate governance outside of bankruptcy.

The legal research literature provides qualitative evidence on the importance of creditor control outside of bankruptcy. The central claim of Baird & Rasmussen (2006, p. 1212) is best summarized in their own words: “When a business enters financial distress, the major decisions—whether the CEO should go, whether the business should search for a suitor, whether the corporation should file for Chapter 11—require the blessings of the banks.”

Baird & Rasmussen emphasize that it is the holders of private debt—typically banks on syndicated secured-term loans and revolving credit facilities—that enjoy broad powers through the use of covenants in private credit agreements (Bradley & Roberts 2004). As they point out, “when a business trips one of the wires in a large loan, the lender is able to exercise de facto control rights—such as replacing the CEO of a company—that shareholders of a public company simply do not have” (p. 1211). The article by Baird & Rasmussen (2006) highlights the crucial role of creditors in corporate governance and disputes the view that only the board of directors exerts significant control over corporate decisions outside of bankruptcy.¹⁰

Covenants are central to the analysis of creditor control outside of bankruptcy, given that a violation of a covenant in a private credit agreement gives lenders that right to accelerate the loan. The importance of covenant violations has been recognized in the accounting literature since the 1990s (Beneish & Press 1993, 1995, Chen & Wei 1993, Smith 1993, Sweeney 1994). However, more recently several research articles have employed larger samples and more advanced econometric techniques to isolate the causal effect of covenants and covenant violations on firm behavior.

Chava & Roberts (2008) and Nini et al. (2009) examine the effect of covenants on firm investment policy. Chava & Roberts (2008) use a regression discontinuity design and find that violation of financial covenants in private credit agreements leads to a sharp drop in investment. This effect is concentrated among firms in which agency and information problems are relatively more severe. Nini et al. (2009) find that creditors regularly impose explicit restrictions on firm investment in private credit agreements. They find that the restrictions are binding—they lead to lower investment than would otherwise be observed. Most importantly, the samples employed by Chava & Roberts (2008) and Nini et al. (2009) are composed almost exclusively of firms outside of formal payment default. In other words, these articles demonstrate that creditors exert influence over investment policy even in the absence of payment default.

Roberts & Sufi (2009a) examine the impact of financial covenant violations on firm financial policy. They find that creditors exert significant control over firm financial policy by restricting access to credit and increasing interest rates. Firms that violate a covenant experience a significant decline in net debt-issuing activity that translates into a decline in firm leverage ratios. Supporting their interpretation, Sufi (2009) finds a sharp decline in bank line-of-credit availability following violations of financial covenants.

¹⁰See also Baird & Rasmussen (2002, 2003).

The findings on creditor control outside of bankruptcy are important in two dimensions. First, they show that creditors obtain and exert control over important financial and real decisions even in the absence of payment default. In this sense, they support the framework by Aghion & Bolton (1992), which suggests a more general state space for which control shifts to creditors can occur. The findings also suggest that an explicit consideration of creditors is important even for the grand majority of firms that are current on debt payments. Creditors play an active role in corporate governance even for solvent firms.

Second, the recent work on covenants shows how empirical research motivated by financial contracting theory can answer long-standing questions in corporate finance. For example, researchers have long argued that so-called financial constraints may lead to inefficient investment decisions by firms. Financial contracting theory suggests that these financial constraints may emerge endogenously as a result of conflicts of interest between managers and creditors. The empirical research suggests that conflicts of interest are an especially important channel through which financial policy affects investment policy.

Venture capital and leveraged buyouts. There is a substantial body of research that shows the importance of incentive conflicts and control rights in venture capital contracts. Research by Kaplan & Strömberg (2001, 2003) represents the earliest empirical application of incomplete financial contracting theory to real-world contracts. Kaplan & Strömberg (2003) study contracts between venture capitalists (VCs) and entrepreneurs. They report several characteristics of real-world contracts that are consistent with predictions of financial contracting theory. They find that the allocation of control rights between the VC and the entrepreneur is a central feature of contracts. More specifically, board seats and voting rights are allocated to either the VC or the entrepreneur, depending on financial performance. For example, they find that if earnings before interest and tax or net worth falls below some threshold, VCs are allocated additional board seats.

Kaplan & Strömberg (2003) find that contracts are contingent on a number of events, including financial performance, the offering of securities, and future product development. The finding that contracts are contingent on many events has interesting implications for financial contracting research. Even among these relatively small ventures, contracting parties are able to contract on many verifiable pieces of information. Yet despite the prominence of contingencies, venture capital contracts allocate control in a manner consistent with incomplete contract theory. This suggests that the most relevant theories of financial contracting are ones in which some signals are available for contracting, but these signals imperfectly capture the full state space.¹¹

Perhaps no other area of empirical research focuses on the disciplinary and incentive effects of debt more than research on LBOs does. In LBO transactions, the company is taken private, leverage ratios are dramatically increased, and the management team is often reorganized. Jensen (1989) argues that LBOs resolve the central weakness of the public corporation—the conflict between owners and managers over the control and use of corporate resources. He argues that these transactions make remarkable gains in operating efficiency, employee productivity, and shareholder value. Following his earlier work (Jensen 1986), Jensen (1989) argues that a primary function of leverage in the LBO

¹¹For more information on venture capital contracts, see Kaplan & Strömberg (2004).

transaction is to limit the waste of free cash flow by compelling managers to pay out funds that they would otherwise retain.

Kaplan (1989) examines management buyouts completed from 1980 to 1986 and finds that these companies experience increases in operating income, decreases in capital expenditures, increases in net cash flow, and increases in market value. Kaplan (1989) argues that the improved performance is a result of better incentives. His findings are confirmed in DeAngelo et al. (1984) and Marais et al. (1989). Both Warga & Welch (1993) and Asquith & Wizman (1990) find that prebuyout bondholders experience losses upon LBO announcements but that these losses are small relative to the gains by shareholders. A review of the literature by Pelepu (1990) suggests that LBOs in the 1980s created value and that there is little evidence that buyouts led to widespread layoffs or wage reductions.¹²

The empirical literature on LBOs in the 1980s suggests that concentrated ownership and high leverage provide powerful incentives for managers to perform. This finding confirms the disciplinary role of debt, as is discussed in the theoretical financial contracting literature (e.g., Dewatripont & Tirole 1994, Zwiebel 1996). The value effects of the more recent LBO wave of 2005 to 2007 are not yet known. Preliminary research on the recent LBO wave includes Kaplan & Strömberg (2008) and Axelson et al. (2007).

Collateral

One of the primary implications of incomplete financial contracts is the importance of liquidation value in financing arrangements. Benmelech et al. (2005) focus on the redeployability of property as determined by commercial zoning regulation. They find that properties that are more redeployable, and therefore have higher liquidation value, receive larger loans with longer maturities and durations, lower interest rates, and fewer creditors. These findings strongly support the hypothesis that liquidation value matters for ex ante contracts.

Benmelech (2009) exploits the diversity of track gauges in nineteenth-century American railroads to assess the effect of asset liquidation value on financing arrangements. Although he does not find evidence that liquidation value affects leverage ratios, he does find evidence that higher liquidation value leads to longer maturities on debt.

John et al. (2003) examine the relation between collateral and public bond yields, and they find that collateralized debt has higher yields than unsecured debt. Although this finding appears to contradict the assertion that higher liquidation value leads to cheaper financing, the authors explain these findings in the context of a risk-shifting moral hazard model. Benmelech & Bergman (2009) examine the difference in pricing of debt claims based on collateral and redeployability in the U.S. airline industry. A main advantage of their analysis is a focus on within-borrower variation in the collateral of debt claims. When comparing more secured claims within the same airline, they find that liquidation value and redeployability are negatively correlated with yield spreads. They also show that claims with higher liquidation value have higher credit ratings and higher loan-to-value ratios.

¹²For more information on the LBO wave of the 1980s, see Kaplan & Stein (1990, 1993) and Kaplan (1991). Denis (1994) suggests that high leverage alone does not improve performance as much as a combination of high leverage and management reorganization does. One exception to the view that LBOs are unambiguously positive for value is Matsa (2008), who finds that LBOs in the supermarket industry lead to costly underinvestment in inventories.

Although the literature on liquidation value and ex ante contractual terms is still nascent, the conclusions appear to be broadly consistent with the incomplete contracting hypotheses. In particular, the liquidation value of assets leads to longer debt maturity, lower interest spreads, and higher credit ratings.¹³

Renegotiation

One of the most important insights of the more recent wave of theoretical financial contracting research is that ex post renegotiation plays a critical role in ex ante optimal contracts. Contracting parties in an incomplete contracting world understand that renegotiation is likely, and this knowledge shapes the terms of the original agreement.

Early studies of debt contract renegotiation focus on whether debt is restructured inside or outside of formal bankruptcy proceedings. Gilson et al. (1990) find that half of all borrowers that experience severe financial distress restructure their debt outside of formal bankruptcy. Firms that restructure outside of bankruptcy have more intangible assets, owe more of their debt to banks, and owe fewer lenders.

Asquith et al. (1994) find that renegotiation outside of Chapter 11 is less likely if there are both secured private loans and numerous public debt issues. Gilson (1997) finds that firms that restructure in Chapter 11 have larger reductions in debt than do firms that restructure outside of Chapter 11. He interprets this finding as evidence that transaction costs discourage debt reductions by financially distressed firms when they restructure debt outside of court.

Taken together, the findings on renegotiation in financial distress suggest that the number of creditors plays a crucial role in the ease of renegotiation between creditors and borrowers. The evidence supports the incomplete contracting model proposed by Bolton & Scharfstein (1996). They argue that a benefit of a dispersed group of creditors is that managers know, ex ante, that they cannot extract concessions from creditors by threatening strategic renegotiation. As a result of ex post renegotiation costs, creditors are more willing to provide financing ex ante.

A related article by Benmelech & Bergman (2008) focuses on how liquidation value of collateral affects renegotiation. The authors focus on U.S. airlines and find that airlines successfully renegotiate their lease obligations downward when their financial position is sufficiently poor and when the liquidation value of their fleet is low. They also present evidence on the importance of strategic renegotiation in the airline industry. Their findings confirm the hypothesis in the theoretical financial contracting literature that liquidation value plays a crucial role in renegotiation outcomes when contracts are incomplete.

Whereas the majority of empirical research focuses on renegotiation of debt contracts in financial distress, Roberts & Sufi (2009b) study all renegotiations of a sample of loan agreements by public firms. They find that renegotiation is extremely likely: More than 90% of long-term loan contracts are renegotiated before maturity, and renegotiation is rarely a consequence of distress or default. They also find that renegotiation is determined by the accrual of new information regarding credit quality, investment opportunities, and collateral of the borrower, as well as macroeconomic fluctuations. Finally, they find evidence that ex ante contractual contingencies are used to influence bargaining power of the contracting parties in ex post renegotiation.

¹³Other related empirical work includes Berger & Udell (1995), who investigate the use of collateral in small business lines of credit in the United States.

The findings of Roberts & Sufi (2009b) suggest that renegotiation is the norm, not the exception, in private debt contracts. When the probability of ex post renegotiation is 90% for long-term loan contracts, the expectation of renegotiation likely plays an important role in ex ante contractual terms. We believe that empirical research of renegotiation will be an increasingly important area of corporate finance going forward.

Contracting and Interactions with Other Governance Mechanisms

In this section, we review studies investigating the interaction of contracting with other governance mechanisms, and in particular, recent progress in the law and finance literature (La Porta et al. 1997, 1998). In recent years, there has emerged a small but growing body of literature on the difference between financial contracts across countries with different legal environments. One of the central arguments underlying the law and finance approach is that some environments are more conducive to writing and enforcing financial contracts than others, and that better contracting leads to better outcomes (Qian & Strahan 2007). The advantage of the financial contracting approach is that many financing arrangements are prevalent across different countries. As a result, it is possible to exploit variation in legal protection across countries to examine how financial contracting terms vary with the legal environment.

Qian & Strahan (2007) study the international syndicated loan market, which is one of the largest and most important global sources of finance. They find that in countries with strong creditor protection, loans have more concentrated ownership, longer maturities, and lower interest rates. They also find that foreign banks lending to domestic borrowers are especially sensitive to the legal and institutional environment, with their ownership declining relative to domestic banks as creditor protection falls.

Davydenko & Franks (2008) examine how varying degrees of creditors' rights across France, Germany, and the United Kingdom affect lending and reorganization practices. They find that in France, which has the least protection for creditors, loan contracts require more collateral. Further, idiosyncrasies in the French law influence the composition of collateral used in contracts. Despite the differences in the contracts, recoveries in the event of default remain significantly higher in countries with strong creditor protection.

Lerner & Schoar (2005) focus on private equity contracts and find that legal enforcement of the country in which the investment takes place has a strong effect on the contractual agreement between the private equity firm and managers. They find that in countries with a common-law tradition and better legal enforcement, private equity contracts are far less likely to employ common stock or straight debt, and they are more likely to use convertible preferred stock. In addition, contracts in strong legal-enforcement countries are associated with greater contractual protection for the private equity group. In contrast, in civil or socialist legal environments with weaker legal enforcement, private equity contracts are more likely to use straight debt and common stock, and stock ownership is critical to control. Lerner & Schoar (2005) also find that transactions in higher-enforcement countries have higher valuations and returns. They interpret this latter result as showing that a reliance on ownership rather than contractual provisions in civil-law countries cannot fully offset the negative effects of weak legal enforcement.¹⁴

¹⁴See also Kaplan et al. (2007).

Although the application of the law and finance literature to empirical financial contracting is still in its infancy, the findings thus far are promising. Given the global nature of the financial services industry, it is likely that there are a number of contractual environments in which variation across legal regimes is available. For example, many large international banks have contractual arrangements in different countries for the same type of financial instrument. Comparing contracts drafted by the same financial institution operating in different legal environments is a promising avenue for identifying the causal effect of law on finance.

FUTURE DIRECTIONS

In this section we discuss the empirical implications of more recent theoretical work in dynamic financial contracting, which reflects our belief that dynamic financial contracting models will exert increasing influence on empirical corporate finance research. DeMarzo & Fishman (2007a) begin with a familiar setting: An agent raises external capital for a project from investors concerned about the agent's ability to covertly divert the project's cash flows for private consumption. The key difference from previously discussed studies is that the business generates risky cash flows over an arbitrary number of future discrete periods, in which the agent can underreport cash flow generated from the initial investment. The optimal contract is a complicated mechanism specifying the payments between the agent and investors, as well as the conditions under which the project is terminated. However, DeMarzo & Fishman show that this mechanism can be implemented with a combination of common securities: equity, long-term debt, and a line of credit.

Although others have developed theories for a diversity of securities (e.g., Dewatripont & Tirole 1994; Diamond 1991, 1993a,b; Bergloff & von Thadden 1994), the DeMarzo & Fishman model provides a number of interesting empirical implications, one of which is the appearance of a credit line (Sufi 2009). Additionally, capital structure depends on the distribution of the firm's cash flows, both past and future. This view of capital structure stands in stark contrast to more traditional trade-off views of capital structure mentioned in the introduction, and it is very appealing in light of survey evidence that shows that the single most important determinant of corporate debt policy is financial flexibility (Graham & Harvey 2001)—precisely what the credit line offers. Interestingly, the authors also find that the terms of long-term debt and credit line are independent of the amount financed and, under certain circumstances, the severity of the moral hazard problem.

DeMarzo & Sannikov (2008) extend the DeMarzo & Fishman (2007a) model into a continuous time setting, which enables the former study to provide several additional insights. For example, when the risk of loss from the project is severe, the optimal contract may require that firms hold compensating balances as a requirement for the credit line. Their results also suggest that the firm's total debt capacity (long-term debt plus the credit line) is largely insensitive to the risk of the project and its liquidation cost. Rather, these factors determine the relative usage of these two forms of credit. Recent evidence on the stickiness of debt levels (Lemmon et al. 2008) and the tendency of firms to "spread" their capital structure across nonprice credit terms (Rauh & Sufi 2009) suggest that further investigation of the theoretical implications is needed.¹⁵

¹⁵Tchisty (2008) shows that when the cash flows in the DeMarzo & Fishman (2007a) model are correlated, the pricing of the credit line increases with the outstanding balance—akin to the performance pricing feature found in many private credit agreements (Asquith et al. 2005).

Whereas these studies focus primarily on optimal capital structure, a number of other recent dynamic contracting studies provide new insights into firm investment and growth. These studies include Quadri (2004), Clementi & Hopenhayn (2006), and DeMarzo & Fishman (2007b), and generate a number of implications generated from the large investment-financing constraints literature (see Hubbard 1998). For example, DeMarzo & Fishman show that current investment is positively correlated not only with cash flow, but also with past cash flows and investment. Further, investment–cash flow sensitivity covaries negatively with firm size and the propensity to pay dividends.

One of the novelties of this literature relative to existing q -theoretic based models (e.g., Hennessy & Whited 2005, 2007) is that the mechanism behind the investment-financing relation is fundamentally different. In neoclassical models, more internal funds lower the cost of capital since external capital is costly to raise. In DeMarzo & Fishman (2007b), the return on investment is what adjusts to the firm's internal cash flow. Specifically, as the authors note: “[T]he return on investment increases with the agent's share of the rents, and the agent's share of the rents rises as a reward for current performance, for which cash flows are a natural indicator” (p. 152). In fact, a recent working paper by DeMarzo et al. (2008) integrates the two literatures by embedding an optimal contracting problem within a neoclassical framework.

CONCLUSION

The optimality of financial contracts has played an important role in corporate finance theory for the past three decades. Theoretical research since the seminal work of Jensen & Meckling (1976) has recognized the importance of contracts in resolving incentive conflicts between managers and external financiers. Financial contracts, which have long been a focus of corporate finance theory, are now the subject of an increasing body of empirical research.

This survey has focused on these empirical advancements, which have provided novel insights into long-standing questions in corporate finance. For example, studies suggest that optimal capital-structure decisions are shaped by concerns over the transfer of control rights to creditors even before bankruptcy. In addition, financing affects real economic activity due in part to creditor constraints on firm investment imposed to mitigate managerial misbehavior. Further, an examination of financial contracts offers unique insights into the role of law in explaining variation in financial outcomes across countries.

Although there have been significant advancements in empirical financial contracting, we believe that this body of research is still in its infancy. We hope that this survey provides a compelling motivation for future research explicitly motivated by financial contracting theory. For example, recent advancements in dynamic financial contracting provide rich theoretical predictions that should motivate further empirical research. In addition, novel and rich data, such as those detailing financial contracts, covenant violations, and renegotiations, should spark additional studies in this area. We believe that a focus on financial contracts, and the underlying conflicts of interest that shape these contracts, will be an important component of empirical corporate finance research in the future.

DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

LITERATURE CITED

- Adams R, Hermalin B, Weisbach M. 2008. The role of boards of directors in corporate governance: a conceptual framework and survey. *J. Econ. Lit.* Forthcoming
- Aghion P, Bolton P. 1992. An incomplete contracts approach to financial contracting. *Rev. Econ. Stud.* 59:473–94
- Aghion P, Dewatripont M, Rey P. 1994. Renegotiation design with unverifiable information. *Econometrica* 62:257–82
- Allen F, Michaely R. 2003. Payout policy. In *Handbook of the Economics and Finance*, ed. G Constantinides, M Harris, R Stulz, pp. 337–429. Amsterdam: Elsevier North-Holland
- Allen F, Winton A. 1995. Corporate financial structure, incentives and optimal contracting. In *Handbooks in Operations Research and Management Science*, ed. RA Jarrow, V Maksimovic, WT Ziemba, 9:693–720. Amsterdam: Elsevier
- Asquith P, Beatty A, Weber J. 2005. Performance pricing in bank debt contracts. *J. Acc. Econ.* 40:101–28
- Asquith P, Gertner R, Scharfstein D. 1994. Anatomy of financial distress: an examination of junk-bond issuers. *Q. J. Econ.* 109:625–58
- Asquith P, Wizman T. 1990. Event risk, covenants, and bondholder returns in leveraged buyouts. *J. Financ. Econ.* 27:195–213
- Axelson U, Jenkinson T, Strömberg P, Weisbach MS. 2007. Leverage and pricing in buyouts: an empirical analysis. Work. Pap. Stockholm Sch. Econ.
- Ayotte K, Morrison E. 2008. *Creditor control and conflict in Chapter 11*. Columbia Univ. Cent. Law Econ. Res. Pap. No. 321
- Baird D, Rasmussen R. 2002. The end of bankruptcy. *Stanford Law Rev.* 55:751–89
- Baird D, Rasmussen R. 2003. Chapter 11 at twilight. *Stanford Law Rev.* 56:673–99
- Baird D, Rasmussen R. 2006. Private debt and the missing lever of corporate governance. *Univ. Penn. Law Rev.* 154:1209–52
- Becht M, Bolton P, Roell A. 2003. Corporate governance and control. In *The Handbook of the Economics of Finance*, ed. G Constantinides, M Harris, R Stulz, pp. 1–109. Amsterdam: Elsevier North-Holland
- Beneish M, Press E. 1993. Costs of technical violation of accounting-based debt covenants. *Acc. Rev.* 68:233–57
- Beneish M, Press E. 1995. The resolution of technical default. *Acc. Rev.* 70:337–53
- Benmelech E. 2009. Asset salability and debt maturity: evidence from nineteenth-century American railroads. *Rev. Financ. Stud.* 22:1545–84
- Benmelech E, Bergman N. 2008. Liquidation values and the credibility of financial contract renegotiation: evidence from U.S. airlines. *Q. J. Econ.* 123:1635–77
- Benmelech E, Bergman N. 2009. Collateral pricing. *J. Financ. Econ.* 91:339–60
- Benmelech E, Garmaise M, Moskowitz T. 2005. Do liquidation values affect financial contracts? Evidence from commercial loan contracts and zoning regulation. *Q. J. Econ.* 120:1121–54
- Berger A, Udell G. 1995. Relationship lending and lines of credit in small firm finance. *J. Bus.* 68:351–81
- Bergloff E, von Thadden E. 1994. Short-term versus long-term interests: capital structure with multiple investors. *Q. J. Econ.* 109:1055–84
- Berkovitch E, Kim E. 1990. Financial contracting and leverage-induced over- and under-investment incentives. *J. Finance* 45:765–94
- Besanko D, Thakor A. 1987. Collateral and rationing: sorting equilibria in monopolistic and competitive credit markets. *Int. Econ. Rev.* 28:671–89
- Bester H. 1985. Screening vs. rationing in credit markets with imperfect information. *Am. Econ. Rev.* 75:850–55
- Bester H. 1987. The role of collateral in credit markets with imperfect information. *Eur. Econ. Rev.* 31:887–99

- Bharath ST, Panchapegesan V, Werner IM. 2007. *The changing nature of chapter 11*. Fisher Coll. Bus. Work. Pap. No. 2008-03-003
- Bolton P, Dewatripont M. 2005. *Contract Theory*. Cambridge, MA: MIT Press
- Bolton P, Scharfstein D. 1996. Optimal debt structure and the number of creditors. *J. Polit. Econ.* 104:1–25
- Boot A, Thakor A, Udell G. 1991. Secured lending and default risk: equilibrium analysis, policy implications, and empirical results. *Econ. J.* 101:458–72
- Bradley M, Roberts M. 2004. *The structure and pricing of debt covenants*. Work. Pap., Duke Univ.
- Chan Y, Kanas G. 1985. Asymmetric valuations and the role of collateral in loan agreements. *J. Money Credit Bank* 17:84–95
- Chang T, Schoar A. 2007. *Judge specific differences in Chapter 11 and firm outcomes*. Work. Pap., MIT Sloan
- Chatterjee S, Dhillon U, Ramirez G. 2004. Debtor-in-possession financing. *J. Bank. Finance* 28:3097–111
- Chava S, Roberts M. 2008. How does financing impact investment? The role of debt covenants. *J. Finance* 63:2085–121
- Chen K, Wei K. 1993. Creditors' decisions to waive violations of accounting-based debt covenants. *Acc. Rev.* 68:218–32
- Clementi G, Hopenhayn H. 2006. A theory of financing constraints and firm dynamics. *Q. J. Econ.* 121:229–65
- Dahiya S, John K, Puri M, Ramirez G. 2003. Debtor-in-possession financing and bankruptcy resolution: empirical evidence. *J. Financ. Econ.* 69:259–80
- Davydenko S, Franks J. 2008. Do bankruptcy codes matter? A study of defaults in France, Germany, and the U.K. *J. Finance* 63:565–608
- DeAngelo H, DeAngelo L, Rice E. 1984. Going private: minority freezeouts and stockholder wealth. *J. Law Econ.* 27:367–401
- DeMarzo PM, Fishman MJ. 2007a. Optimal long-term financial contracting. *Rev. Financ. Stud.* 20:2079–128
- DeMarzo PM, Fishman MJ. 2007b. Agency and optimal investment dynamics. *Rev. Financ. Stud.* 20:151–88
- DeMarzo PM, Fishman MJ, He Z, Wang N. 2008. *Dynamic agency and the Q theory of investment*. Work. Pap., Columbia Univ.
- DeMarzo PM, Sannikov Y. 2008. Optimal security design and dynamic capital structure in a continuous-time agency model. *J. Finance*. Forthcoming
- Denis D. 1994. Organizational form and the consequences of highly leverage transactions: Kroger's recapitalization and Safeway's LBO. *J. Financ. Econ.* 36:193–224
- Dewatripont M, Tirole J. 1994. A theory of debt and equity: diversity of securities and manager-shareholder congruence. *Q. J. Econ.* 109:1027–54
- Diamond DW. 1984. Financial intermediation and delegated monitoring. *Rev. Econ. Stud.* 51:393–414
- Diamond DW. 1991. Debt maturity structure and liquidity risk. *Q. J. Econ.* 106:709–37
- Diamond DW. 1993a. Seniority and maturity of debt contracts. *J. Financ. Econ.* 33:341–68
- Diamond DW. 1993b. Bank loan maturity and priority when borrowers can refinance. In *Capital Markets and Financial Intermediation*, ed. C Mayer, X Vives, pp. 46–68. Cambridge, MA: Cambridge Univ. Press
- Frank M, Goyal V. 2008. Trade-off and pecking order theories of debt. In *The Handbook of Corporate Finance: Empirical Corporate Finance*, ed. BE Eckbo, Vol. 2, Chapter 12. Amsterdam: Elsevier/North-Holland
- Gale D, Hellwig M. 1985. Incentive compatible debt contracts: the one-period problem. *Rev. Econ. Stud.* 52:647–69
- Garleanu N, Zwiebel J. 2007. Design and renegotiation of debt contracts. *Rev. Financ. Stud.* 22: 749–81. Forthcoming

- Gilson S. 1997. Transaction costs and capital structure choice: evidence from financially distressed firms. *J. Finance* 52:161–96
- Gilson S. 1990. Bankruptcy, boards, banks, and blockholders: evidence on changes in corporate ownership and control when firms default. *J. Financ. Econ.* 27:355–87
- Gilson S, John K, Lang L. 1990. Troubled debt restructurings: an empirical study of private reorganization of firms in default. *J. Financ. Econ.* 26:315–53
- Gorton G, Kahn J. 2000. The design of bank loan contracts. *Rev. Financ. Stud.* 13:331–64
- Graham J, Harvey C. 2001. The theory and practice of corporate finance: evidence from the field. *J. Financ. Econ.* 60:187–243
- Gromb D. 1994. *Renegotiation in debt contracts*. Work. Pap., London Bus. Sch.
- Grossman S, Hart O. 1986. The costs and benefits of ownership: a theory of vertical and lateral integration. *J. Polit. Econ.* 94:691–719
- Harris M, Raviv A. 1991. The theory of capital structure. *J. Finance* 46:299–355
- Harris M, Raviv A. 1992. Financial contracting theory. In *Advances in Economic Theory, Sixth World Congress*, Vol. II, ed. J Laffont. Cambridge, UK: Cambridge Univ. Press
- Harris M, Raviv A. 1995. The role of games in security design. *Rev. Financ. Stud.* 8:327–67
- Hart O. 1995. *Firms, Contracts, and Financial Structure*. London, UK: Oxford Univ. Press
- Hart O. 2001. Financial contracting. *J. Econ. Lit.* 39:1079–100
- Hart O, Moore J. 1988. Incomplete contracts and renegotiation. *Econometrica* 56:755–85
- Hart O, Moore J. 1990. Property rights and the nature of the firm. *J. Polit. Econ.* 98:1119–58
- Hart O, Moore J. 1994. A theory of debt based on the inalienability of human capital. *Q. J. Econ.* 109:841–79
- Hart O, Moore J. 1998. Default and renegotiation: a dynamic model of debt. *Q. J. Econ.* 113:1–42
- Hennessy C, Whited T. 2005. Debt dynamics. *J. Finance* 60:1129–65
- Hennessy C, Whited T. 2007. How costly is external financing? Evidence from a structural estimation. *J. Finance* 62:1705–45
- Hermalin B, Weisbach M. 2003. Boards of directors as an endogenously determined institution: a survey of the economic literature. *Econ. Policy Rev.* 9:7–26
- Hotchkiss E. 1995. Postbankruptcy performance and management turnover. *J. Finance* 50:3–21
- Hubbard G. 1998. Capital market imperfections and investment. *J. Econ. Lit.* 36:193–225
- Jensen M. 1989. Eclipse of the public corporation. *Harvard Bus. Rev.* 67(Sept.):61–74
- Jensen M. 1986. Agency cost of free cash flow, corporate finance, and takeovers. *Am. Econ. Rev.* 76:323–29
- Jensen M, Meckling W. 1976. Theory of the firm: managerial behavior, agency costs, and ownership structure. *J. Financ. Econ.* 3:305–60
- John K, Lynch A, Puri M. 2003. Credit ratings, collateral, and loan characteristics: implications for yield. *J. Bus.* 76:371–409
- Kaplan S. 1989. The effects of management buyouts on operating performance and value. *J. Financ. Econ.* 24:217–54
- Kaplan S. 1991. The staying power of leveraged buyouts. *J. Financ. Econ.* 29:287–313
- Kaplan S, Martel F, Strömberg P. 2007. How do legal differences and experience affect financial contracts? *J. Financ. Intermed.* 16:273–311
- Kaplan S, Stein J. 1990. How risky is the debt in highly leveraged transactions? *J. Financ. Econ.* 27:215–45
- Kaplan S, Stein J. 1993. The evolution of buyout pricing and financial structure in the 1980s. *Q. J. Econ.* 108:313–57
- Kaplan S, Strömberg P. 2001. Venture capitalists as principals: contracting, screening, and monitoring. *Am. Econ. Rev.* 91:426–30
- Kaplan S, Strömberg P. 2003. Financial contracting theory meets the real world: evidence from venture capital contracts. *Rev. Econ. Stud.* 70:281–315

- Kaplan S, Strömberg P. 2004. Characteristics, contracts, and actions: evidence from venture capital analyses. *J. Finance* 59:2177–210
- Kaplan S, Strömberg P. 2008. *Leveraged buyouts and private equity*. NBER Work. Pap. No. 14207
- Lacker JM. 1991. Why is there debt? *Econ. Rev.* July/Aug:3–19. Fed. Reserve Bank Richmond
- La Porta R, López-de-Silanes F, Shleifer A, Vishny R. 1997. Legal determinants of external finance. *J. Finance* 52:1131–50
- La Porta R, López-de-Silanes F, Shleifer A, Vishny R. 1998. Law and finance. *J. Polit. Econ.* 106:1113–55
- Lemmon M, Roberts M, Zender J. 2008. Back to the beginning: persistence and the cross-section of corporate capital structure. *J. Finance* 63:1575–608
- Lerner J, Schoar A. 2005. Does legal enforcement affect financial transactions? The contractual channel in private equity. *Q. J. Econ.* 120:223–46
- Marais L, Schipper K, Smith A. 1989. Wealth effects of going private on senior securities. *J. Financ. Econ.* 23:155–91
- Maskin E, Moore J. 1999. Implementation and renegotiation. *Rev. Econ. Stud.* 66:39–56
- Matsa D. 2008. *Financial leverage and costly underinvestment: evidence from the supermarket industry*. Work. Pap., Northwest. Univ., April
- Murphy K. 1999. Executive compensation. In *Handbook of Labor Economics*, ed. O Ashenfelter, D Card, 3B:2485–567. Amsterdam: Elsevier
- Myers S. 2003. Financing corporations. In *Handbook of the Economics and Finance*, ed. G Constantinides, M Harris, R Stulz, pp. 215–47. Amsterdam: Elsevier
- Myers S, Majluf N. 1984. Corporate financing and investment decisions when firms have information that investors do not have. *J. Financ. Econ.* 13:187–221
- Nini G, Smith D, Sufi A. 2009. Creditor control rights and firm investment policy. *J. Financ. Econ.* 92: 400–20
- Parson C, Titman S. 2008. *Empirical capital structure*. Work. Pap., Univ. Tex.
- Pelepu K. 1990. Consequences of leveraged buyouts. *J. Financ. Econ.* 27:247–62
- Qian J, Strahan P. 2007. How laws and institutions shape financial contracts: the case of bank loans. *J. Finance* 62:2803–34
- Quadrini V. 2004. Investment and liquidation in renegotiation-proof contracts with moral hazard. *J. Monetary Econ.* 51:713–51
- Rajan R. 1992. Insiders and outsiders: the choice between informed and arm's length debt. *J. Finance* 1992:1367–400
- Rauh J, Sufi A. 2009. *Capital structure and debt structure*. NBER Work. Pap. 14488. Chicago, IL: Booth Sch. Bus./NBER
- Roberts M, Sufi A. 2009a. Control rights and capital structure: an empirical investigation. *J. Finance* 64:1657–95
- Roberts M, Sufi A. 2009b. Renegotiation of financial contracts: evidence from private credit agreements. *J. Financ. Econ.* 93:159–84
- Scott J. 1976. A theory of optimal capital structure. *Bell J. Econ. Manag. Sci.* 7:33–54
- Shleifer A, Vishny R. 1992. Liquidation values and debt capacity: a market equilibrium approach. *J. Finance* 47:1343–66
- Shleifer A, Vishny R. 1997. A survey of corporate governance. *J. Finance* 52:737–83
- Skeel D. 2004. The past, present, and future of debtor-in-possession financing. *Cardozo Law Rev.* 25:1905–34
- Smith C. 1993. A perspective on accounting-based debt covenant violations. *Acc. Rev.* 68:289–303
- Stein J. 2003. Agency, information, and corporate investment. In *Handbook of the Economics and Finance*, ed. G Constantinides, M Harris, R Stulz, pp. 109–63. Amsterdam: Elsevier
- Stulz R, Johnson H. 1985. An analysis of secured debt. *J. Financ. Econ.* 14:501–22
- Sufi A. 2009. Bank lines of credit in corporate finance: an empirical analysis. *Rev. Financ. Stud.* 22:1057–88

- Sweeney A. 1994. Debt covenant violations and managers' accounting responses. *J. Acc. Econ.* 17:281–308
- Tchistyi A. 2008. *Security design with correlated hidden cash flows: the optimality of performance pricing*. Work. Pap., New York Univ.
- Tirole J. 2006. *The Theory of Corporate Finance*. Princeton, NJ: Princeton Univ. Press
- Townsend R. 1979. Optimal contracts and competitive markets with costly state verification. *J. Econ. Theory* 21:265–93
- Triantis G. 1992. Secured debt under conditions of imperfect information. *J. Legal Stud.* 21:225–58
- von Thadden E. 1995. Long-term contracts, short-term investment and monitoring. *Rev. Econ. Stud.* 62:557–75
- Warga A, Welch I. 1993. Bondholder losses in leveraged buyouts. *Rev. Financ. Stud.* 6:959–82
- Williamson O. 1988. Corporate finance and corporate governance. *J. Finance* 43:567–92
- Zingales L. 2000. In search of new foundations. *J. Finance* 55:1623–53
- Zwiebel J. 1996. Dynamic capital structure under managerial entrenchment. *Am. Econ. Rev.* 86:1197–215



Contents

Preface to the <i>Annual Review of Financial Economics</i> <i>Andrew W. Lo and Robert C. Merton</i>	1
An Enjoyable Life Puzzling Over Modern Finance Theory <i>Paul A. Samuelson</i>	19
Credit Risk Models <i>Robert A. Jarrow</i>	37
The Term Structure of Interest Rates <i>Robert A. Jarrow</i>	69
Financial Crises: Theory and Evidence <i>Franklin Allen, Ana Babus, and Elena Carletti</i>	97
Modeling Financial Crises and Sovereign Risks <i>Dale F. Gray</i>	117
Never Waste a Good Crisis: An Historical Perspective on Comparative Corporate Governance <i>Randall Morck and Bernard Yeung</i>	145
Capital Market-Driven Corporate Finance <i>Malcolm Baker</i>	181
Financial Contracting: A Survey of Empirical Research and Future Directions <i>Michael R. Roberts and Amir Sufi</i>	207
Consumer Finance <i>Peter Tufano</i>	227
Life-Cycle Finance and the Design of Pension Plans <i>Zvi Bodie, Jérôme Detemple, and Marcel Rindisbacher</i>	249
Finance and Inequality: Theory and Evidence <i>Asli Demirgüç-Kunt and Ross Levine</i>	287

Volatility Derivatives	
<i>Peter Carr and Roger Lee</i>	319
Estimating and Testing Continuous-Time Models in Finance:	
The Role of Transition Densities	
<i>Yacine Aït-Sahalia</i>	341
Learning in Financial Markets	
<i>Lubos Pastor and Pietro Veronesi</i>	361
What Decision Neuroscience Teaches Us About Financial	
Decision Making	
<i>Peter Bossaerts</i>	383

Errata

An online log of corrections to *Annual Review of Financial Economics* articles may be found at <http://financial.annualreviews.org>