

Controlling Financial Distress Costs in Leveraged Buyouts With Financial Innovations

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■ This study investigates innovative methods used to reduce the cost of financial distress in leveraged buyouts. These methods include strip financing, where debt and equity are shared by the same investors, the use of LBO specialist sponsors, who represent both equityholders and debtholders, and debt provisions which allow the postponement of cash outflows. In theory, methods like these encourage stockholders and debtholders to reallocate their

claims to a firm's cash flow with minimum rancor (see Jensen [21] and Wruck [44]). Thus, they have the potential to significantly reduce the direct and indirect costs of financial distress.

This study offers evidence on whether such innovative financing methods reduce the expected costs of financial distress in LBOs. I document the prevalence of these financing techniques in a sample of 63 LBOs and ascertain whether they are associated with lower risk-adjusted financing costs. Other things being equal, firms which control the deadweight costs of debt financing should have a lower cost of capital.

Evidence on the impact of LBO financing techniques addresses the broader argument that highly levered firms have become more sophisticated in managing the deadweight costs of debt. Such evidence is also relevant in addressing policymaker concerns about the potential adverse macroeconomic consequences of LBO debt. Alan Greenspan [19], Chairman of the Federal Reserve Board,

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testified in 1989 that “. . . the worrisome and possibly excessive degree of leveraging associated with [corporate restructuring] could create a new set of problems for the financial system.”¹ Greenspan and others continued to express these types of concerns throughout the 1990-1992 recession.² To the extent that LBOs are successfully engineered to avoid the deadweight costs of financial distress, their potential adverse impact on the stability of the financial system is ameliorated.

Section I of this study discusses the role that LBO financing methods may play in reducing the expected costs of financial distress. Section II documents the prevalence of various financing methods in a sample of 63 LBOs. Section III describes the empirical methods and risk-adjustment procedure used to study the impact of these methods on financing costs. Section IV describes the results, and Section V draws several conclusions.

I. Financial Innovation in Leveraged Buyouts

A. Costs of Financial Distress

While disagreement persists about the magnitude of financial distress costs, almost all financial economists would agree that firms in financial distress experience some deadweight losses. At the very least, there are the direct costs of bankruptcy filings and attorney fees associated with bankruptcy proceedings. The findings of four studies of these costs summarized in Wruck [44] show that the direct costs of bankruptcy range from three to eight percent of firm value. However, to the extent that firms can avoid Chapter 11 bankruptcy filings through asset sales or debt workouts, they may be able to lower these costs. Gilson, John, and Lang [18], for example, show the direct costs of debt restructuring through exchange offers to be less than one-half of one percent of total assets. Attempts at informal debt workouts, nonetheless, can become more costly and prolonged when firms have many classes of debtholders and a large pool of securityholders.

Perhaps more important are the indirect costs of bankruptcy. These costs involve lost profits attributable to dis-

ruptions of “business as usual,” due to financial distress. Firms may lose customers who fear that the firm will not be able to meet promises to service its products (Titman [38]). Suppliers may also desert firms fearing nonpayment.³ Other possible problems may arise from inappropriate incentives given to managers and workers, from aggressive pricing on the part of rivals and from distortions in investment policy (Bolton and Scharfstein [6], Gilson and Vetsuypens [17], Jensen and Meckling [23], and Myers [30]). While it is difficult to estimate these indirect costs empirically, the existing literature suggests that they are substantial (Altman [1], Lang and Stulz [27], and Opler and Titman [32]).

There are few contexts in which financial distress costs cause more concern than in leveraged buyouts. In these deals, firms assume debt-equity ratios of ten to one or higher, leaving little equity cushion to withstand business downturns. Many leveraged buyout firms are threatened with financial difficulty from their inception. With this threat, one would expect LBO financings to be carefully designed to reduce the costs of financial distress should they arise (Opler and Titman [31]). These design elements include the use of specialist sponsors, strip financing, forced asset sales, and provisions which allow deferral of debt payments.

B. LBO Specialist Sponsors

The use of LBO specialist sponsors may lower the expected costs of financial distress by reducing problems which arise when the interests of debtholders and equityholders conflict. LBO specialist sponsors include firms such as Forstmann Little and Kohlberg Kravis and Roberts. These specialists usually finance transactions with equity contributed by a number of investors and debt borrowed from several sources. In essence, many LBO sponsors act as intermediaries between investors and management. There are several ways in which LBO specialists may reduce the costs of financial distress. First, in a financially distressed situation these investor intermediaries have strong incentives to act in the interests of both equityholders and debtholders.⁴ This should ease the pro-

¹Other observers, including Bernanke, Campbell, and Whited [5] and Friedman [15], also express concern that the trend towards higher leverage, augmented by LBO activity, has increased the fragility of the financial system.

²Merton Miller [29] in his Nobel Lecture refers to these systemic effects of debt as a “bankruptcy multiplier” and argues that there is little evidence that waves of bankruptcies have large effects in economic downturns.

³For example, as the Best Products LBO failed to generate expected cash flows in 1990, its suppliers slowed shipment of catalog showroom products to the firm. Company executives estimate that this problem caused sales to drop by more than 20%.

⁴Leonard Shaykin [33], a principal of the LBO sponsor Adler & Shaykin, explains:

The safety that we provide is that the bank can really maintain itself as a lender and can turn to us when the business is not performing.

cess of resolving problems with a debt workout. Second, LBO specialists work directly on behalf of equityholders and indirectly on behalf of debtholders, given that they negotiate the terms of debt contracts at the beginning of LBOs. As the representative of all classes of liabilityholders, they have incentives to encourage management of the LBO target in a way that maximizes the wealth of all parties. Third, LBO sponsors have reputational reasons to protect creditor interests which should minimize agency-related indirect financial distress costs involving asset substitution and underinvestment. As emphasized by DeAngelo and DeAngelo [12] and Jensen [22], expropriation of creditors is likely to have strong repercussions on a sponsor's ability to finance future LBOs with affordable terms. In contrast, when management or some other one-time investor controls project selection there is little incentive to protect bondholder interests, especially in a financially distressed situation. Similar arguments have been made that firms generally can build reputation in debt markets to protect creditors (Diamond [13] and John and Nachman [24]).

Leveraged buyouts are also often sponsored by traditional investment banks which carry out the bulk of their business in other areas. Because some investment banks repeatedly transact in the LBO market, they also have reputational incentives not to expropriate bondholders. Investment banks also have incentives to avoid doing deals involving capital structure changes which may damage firms in the event of financial distress. In such cases, they may lose the opportunity to charge fees in a later public offering of equity. A countervailing incentive is that investment banks may profit by issuing the debt offered in leveraged buyouts. This can create a conflict of interest with securityholders when opportunities arise to charge the LBO firm various issuance fees. It is an empirical question whether this conflict of interest is significant.

C. Strip Financing

Another means of mitigating conflict between the owners of debt and equity is to give each owner some of both securities in a strip financing arrangement (Galai and Masulis [16]). In a complete strip financing arrangement,

Every time one of us makes an investment in a company and borrows two or three or four hundred million in bank debt, we are putting our reputations on the line with the whole financial community. We are responsible for insuring that the banks are going to be made whole and that the transaction will work out. If that requires a shift in management or if that requires spending 120% of your time for the next 24 months, that's what you do to make it work.

each investor holds some debt and equity. Strip financing is partial when some but not all investors hold both debt and equity of the same firm. Jensen [22] and Stulz [36] have argued that strip financing is an institutional feature of LBOs which significantly reduces the expected bankruptcy costs in these transactions. By aligning the incentives of bondholders and equityholders, complete strip financing essentially eliminates any need for restructuring financial claims in financial distress. Even when it is partial, strip financing will also decrease the costs of renegotiation because of a greater confluence of interests among negotiating parties (Arzac [2]).

Debt and equity are never completely equally divided among LBO investors — thus, strip financing observed in LBOs is always partial. For one, banks who are heavy lenders in these deals are prohibited from owning equity with a few exceptions by the Glass-Steagall Act.⁵ In fact, in large transactions where many banks make loans through a large syndicate, strip financing is all but nonexistent. Strip financing is typically used in deals in the \$50 to \$500 million range, when junior debtholders, such as insurance companies, share in the equity.

While it is a potentially promising means to decrease the agency costs of debt, strip financing can be costly. Strip financing is open to manipulation in that some investors may sell their debt and proceed to support policies which expropriate other debtholders.⁶ Spatt and Sterbenz [35] point out that equityholders have an incentive to unbundle arrangements which align their interests with those of a firm under a variety of circumstances. Strip financing is also potentially costly in the presence of tax or risk clientele. Risk-averse or tax-disadvantaged investors who would ordinarily only hold debt must be paid a risk premium for holding equity in a strip financing arrangement as well (Arzac [2]).

⁵The most notable exceptions take place when the largest money center banks such as Citicorp and Manufacturers Hanover finance LBO equity through subsidiaries which do not use federally insured funds. Exceptions also occur when LBO investment funds accept money from large banks. Since the identity of investors in these funds is rarely disclosed, it is not possible to ascertain how widely banks participate in the equity side of LBOs. However, many investors in a fund organized by Adler & Shaykin were identified in a *Wall Street Journal* news story (December 11, 1991, p. A3) discussing dissatisfaction with the fund. Several of the investors were banks such as Manufacturers Hanover.

⁶In practice it is likely to be difficult to manipulate strip financing because buyers of unbundled securities will demand a discount to compensate them for the heightened risk of expropriation. In addition, the manipulation problem can be controlled with resale restrictions on debt and equity. In fact, strip financing is usually carried out using private placements of relatively illiquid debt and equity.

D. Cash Disgorgement Covenants

Smith and Warner [34] argue that debt covenants can be used to restrict borrower actions which could expropriate bondholders. Common covenants on LBO debt require that firms pay out excess cash flows and sell off assets. Covenants which directly or indirectly constrain dividend payout can significantly reduce the risk of expropriation by forcing equityholders to give the firm to debtholders before severe financial distress is experienced (Brennan, Detemple, and Kalay [7]). Covenants which force early payout of cash flow and asset sales also are a means of quickly working down debt. While this may limit funds for investment and maintenance, it may be an important means to reduce the likelihood of early bankruptcy. This may be especially important in LBOs where managers hold large equity stakes. Even when other parties may have used strip financing, managers never hold debt in LBOs. As a result, they may have strong incentives to invest in projects not desired by debtholders in poor states of nature.

Covenants which affect operating risk, such as those which require firms to hedge their exposure to interest rate fluctuations, may also control the agency problems of debt. Campbell and Kracaw [9] demonstrate that the incentive of manager-equityholders to substitute toward riskier assets may be related to the observable risk of the firm. They reason, for example, that R. H. Macy's equityholders financed their LBO debt with a mandatory hedging provision in order to reduce their incentive to adopt risky projects.

E. Cash Payout Postponement Provisions

Leveraged buyouts are sometimes funded with payment-in-kind (PIK) debt which gives the issuer the right to meet interest payments by issuing additional debt. At first glance, the advantages of this type of financing may not be clear, especially because issuing this debt is likely to signal that the buyout's managers anticipate cash flow problems. However, one important advantage of PIK debt is that it can significantly reduce financial distress costs. Without PIK debt, a firm in financial distress will have to renegotiate the allocation of rights to cash flow using a workout or Chapter 11; with PIK debt, the firm does an "automatic workout" by giving debtholders greater claims to cash flow in the form of new debt claims. Thus, PIK debt avoids the costs of negotiating some type of debt for equity swap which typically occurs in a workout. Tufano [40] presents a related analysis of deferred interest securities, arguing that PIK-type provisions allow a firm to commit to payout

cash flow while maintaining the flexibility to realize cash flows in a value-maximizing manner.

Another related type of bond has interest rates which can be reset (RESET debt). RESET bonds have interest rates which are adjusted at fixed dates if the market value of the bond falls below a set threshold. In the sample studied here, the RESET rate is always capped from above. RESET debt can be rationalized in much the same way as PIK debt. RESET provisions operate to direct a greater proportion of the firm's cash flow to bondholders in periods of financial distress. This reduces financial distress costs by postponing a debt workout or obviating its need altogether.

F. Debt Workouts and Direct Bankruptcy Costs

Other features of LBO capital structures may affect the costs of financial distress. For example, Gilson, John, and Lang [18] and Asquith, Gertner, and Scharfstein [3] find that firms with more classes of debtholders are more likely to resolve financial distress with a costly Chapter 11 filing. This is likely to be due to the difficulty of resolving all disputes and holdouts among multiple claimholders. In addition, Gilson, John, and Lang [18] also find that firms which have more bank debt relative to total debt have a greater chance of resolving financial distress with a low-cost workout. They reason that banks tend to be fewer in number and more experienced in the process of resolving financial distress, which decreases the probability that a holdout party will force a Chapter 11 filing.

G. Summary

In this section, I have discussed a number of ways in which the careful design of financing structures in LBOs can reduce the expected direct and indirect costs of financial distress. As an empirical matter, however, relatively little is known about how frequently these approaches to financial design are used.⁷ Moreover, even when used, these financing methods may turn out not to have the desired effect. In particular, these financing methods may soften the disciplinary impact that debt has in curtailing the desire of management to engage in non-value-maximizing behavior (Grossman and Hart [20] and Townsend [39]). To achieve a better understanding of the empirical importance of these financing methods, I document the

⁷Other studies which give evidence on the prevalence of some of these elements of LBO financings include Kaplan and Stein [25] and Tufano [40].

prevalence of these methods and assess their impact on financing costs in the remainder of the paper.

II. The Prevalence of Innovative Financing Techniques

A. Sample Selection

In order to study leveraged buyout financings, data on debt and equity issued in LBOs were obtained for a sample of 63 companies which went private in 1987 and 1988 at the peak of the LBO boom. This sample accounts for slightly more than 65% of the dollar value of all LBOs which took place in those years. The average firm in the sample was financed with \$1.1 billion in debt.

The sample was selected from the ADP *M&A* file, subject to the criteria that full financing information be available and that deal value exceed \$50 million. The dataset includes many large transactions such as the buyouts of American Standard and RJR Nabisco.⁸ Each record contains the amount of the various layers of debt and equity used to finance the transaction and the interest rate promised on each. In addition, ADP gives information on loan syndicate participants, debt covenants and transaction sponsors.⁹ Exhibit 1 lists the LBOs in the sample, their transaction value, their sponsors and their sponsors' experience.

B. Capital Structures of LBO Firms

Exhibit 2 describes the capital structures of the firms in the sample. The exhibit shows that bridge financing consists of 25% of total debt when it is used. Exhibit 2 also shows that while revolving lines of credit offered by banks are the most frequently used form of financing, they are not the largest as a proportion of total financing. As a proportion of total financing, senior notes and bonds are used most. On average, this senior debt accounts for 46% of all deal financing, followed by revolving debt which accounts for 27% of all financing. Senior subordinated and subordinated debt was offered more than half of the time, with flotations averaging 27% and 20% of total financing, respectively.

⁸Because the sample contains mostly large leveraged buyouts, the results which follow are not necessarily generalizable to all LBOs. Debt is not publicly offered in most smaller transactions, and in many deals only bank debt is used.

⁹ADP collects this information from various sources including SEC Schedule 13E-3s, 14As and bank term sheets.

Exhibit 2 also reports the average term to maturity, margin over the Treasury rate and fees charged for each layer of the debt in the sample.¹⁰ The exhibit shows that the term to maturity decreases with seniority from subordinated debt (151 months) down to bridge debt which has an average term to maturity of 15 months.

Senior and revolving LBO debt usually floats at a specified percentage rate above a base interest rate such as the prime rate, LIBOR or Treasury. Senior subordinated and subordinated debt has fixed coupons which, in a few cases, may be reset. Exhibit 2 shows that the initial margin over Treasury for revolving debt is 1.98% and 2.09% for senior debt. Measured by term to maturity and margin over Treasury, revolving and senior debt are clearly very similar. On the other hand, the average margin over Treasury is 5.19% for senior subordinated debt, 5.27% for subordinated debt, and 5.29% for preferred stock. Exhibit 2 shows that fees charged on LBO debt are greater for less senior debt. The fees on revolving and senior debt, on average, are below two percent, while on senior subordinated and subordinated debt the average fees are in the neighborhood of three percent of face value.

Some basic features of the sample LBOs are described in Exhibit 3. This exhibit shows that the average debt to total liabilities ratio after going private was 0.91. The exhibit also shows that the average transaction was financed at approximately 300 basis points over the Treasury rate. Nonetheless, this estimate of the risk premium on debt in LBOs is crude, given that the expected duration of LBO debt may be very different from the duration of Treasury bonds with a similar term to maturity because of call provisions and the likelihood of future refinancing. This financing cost is only a few percentage points above the yield on corporate debt and suggests that market participants anticipated a low default rate on LBO debt.¹¹

C. Use of Bankruptcy-Cost-Reducing Innovations

Exhibit 4 shows the prevalence of the various types of financial innovations used in the sample LBOs. Debt covenants which required excess cash to be paid out to debtholders were used ten percent of the time as were covenants which mandated interest rate swaps to hedge exposure to interest rate risk. RESET debt was used in 11%

¹⁰Many of the loans and bonds required some repayment prior to the final maturity date. The term to maturity is not adjusted for these payments.

¹¹As of 1993, seven out of 63 sample firms had filed for Chapter 11 bankruptcy and two had completed debt workouts.

Exhibit 1. Listing of the Dataset Showing the LBO Target Name, Identity of the LBO Sponsor, the Announcement Date, the Dollar Value of the Deal, and the Number of Previous LBOs Completed By the Sponsor

Target Name	LBO Sponsor	Announcement Date	Value (\$000,000)	Deals by Sponsor
AFG Industries Inc.	Glaverbel SA	02/25/88	940.9	0
ALCO Health Services	Citicorp Venture Capital	11/14/88	527.4	15
American Income Life	Golder Thomas	11/21/88	221.9	1
American Standard	Kelso & Co.	03/17/88	2,512.2	3
Arkansas Best Corp.	Kelso & Co.	06/17/88	313.0	4
Plantronics Inc.	Kidder Peabody	08/04/88	152.3	0
Becor Western Inc.	Management	02/17/87	280.1	0
Bell & Howell Co.	Acadia Partners	11/25/87	502.8	1
Best Products Co. Inc.	Adler & Shaykin	10/10/88	684.8	2
Budget Rent-A-Car	Gibbons Green	10/31/88	316.7	9
Buehler International	Citicorp Venture Capital	08/09/88	63.8	13
C3 Inc.	Knoll Capital Mgt.	09/29/88	137.3	0
Colt Industries	Morgan Stanley Gp.	03/10/88	542.4	7
Cullum Cos. Inc.	Morgan Stanley Lf.	07/12/88	380.2	9
Duracell	Kohlberg Kravis Roberts	05/05/88	1,800.0	23
Duro-Test Corp.	AIG Capital Corp.	08/24/87	71.3	0
Dyncorp	Management	11/02/87	264.5	0
Farm Fresh Inc.	Citicorp Venture Capital	03/10/88	181.1	10
Florida Steel Corp.	Goldman Sachs & Co.	07/08/88	302.7	5
Foodmaker Inc.	Fulcrum III LP	08/29/88	254.1	0
Fort Howard Corp.	Morgan Stanley Gp.	06/22/88	3,589.3	8
Health Management Assn.	First Chicago Inv.	07/12/88	61.8	3
Hospital Corporation	Morgan Capital CP	09/15/88	3,685.8	10
IDC Services Inc.	Apollo Partners	10/01/87	62.4	0
INSILCO Corp.	Private Investors	08/25/88	812.8	0
Interstate Bakeries	Management	09/14/87	375.4	0
Jim Walter Corp.	Kohlberg Kravis Roberts	07/16/87	2,436.5	17
KDI Corp.	Wasserstein Perrella	09/19/88	200.3	1
Lear Siegler Seating	Kidder Peabody Group	08/23/88	507.0	1
Micom Systems Inc.	Odyssey Partners	05/08/88	301.3	4
Mohasco Corp.	Citicorp Venture Capital	05/09/88	489.3	11
Morse Shoe Inc.	Donaldson Lufkin	06/03/87	256.7	3
Multi-local Media Co.	Acadia Partners	09/06/88	79.8	3
Munford Inc.	Management	05/23/88	66.8	0
Musicland	Acadia Partners	02/08/88	405.5	2
Pay'N Pak Stores Inc.	Citicorp Venture Capital	06/08/87	221.5	8
Payless Cashways Inc.	Broad Street Investment	06/24/88	908.8	1
Redman Industries	Wingate Partners	09/02/88	98.5	0
Rhodes Inc.	Goldman Sachs & Co.	04/26/88	242.4	4
RJR Nabisco	Kohlberg Kravis Roberts	10/24/88	2,4716.9	24
Seaman Furniture Co.	Kohlberg Kravis Roberts	11/02/87	354.2	19
Shoe-Town	General Electric Capital	12/15/87	112.4	7
Specialty Equipment	Management	07/22/88	325.8	0
Stanadyne	Forstmann Little	02/01/88	796.5	8
Stop & Shop Cos. Inc.	Kohlberg Kravis Roberts	03/04/88	1,227.0	21
TW Services Inc.	Donaldson Lufkin	10/06/88	1,335.7	7
Welbilt Corp.	Private Investors	06/13/88	213.9	0
Wherehouse	Equitable Capital Mgt.	12/21/87	118.1	0
Wickes Cos. Inc.	Private Investors	10/26/88	537.8	0
William Carter Co.	Wesray Capital	04/28/88	116.1	8
York International	Citicorp Venture Capital	06/27/88	627.0	12

Exhibit 2. Type and Amount of Financing in 63 Leveraged Buyouts in the 1987-1988 Period

Type of Financing	Number of Transactions	Proportion of Total Amount	Average Months to Maturity	Average Margin Over Treasury (%)	Average Fee (%)
Bridge financing	6	0.25	15	3.54	1.95
Revolving debt	58	0.27	69	1.98	1.84
Senior debt	52	0.46	78	2.09	1.61
Senior subordinated	38	0.27	121	5.19	3.14
Subordinated	32	0.20	151	5.27	3.25
Preferred	31	0.10	NA	5.29	NA

Note: NA means not applicable.

Exhibit 3. Value, Debt to Equity Ratio, Characteristics of Liabilities and Controlling Parties for the Sample of 63 Leveraged Buyouts Which Occurred in 1987 and 1988

Variable	N	Mean	Median
Transaction value (\$ millions)	63	887	254
Ratio of transaction value to EBITDA before deal	63	8.23	7.00
Weighted cost of debt above Treasury (no fees)	63	2.96%	2.88%
Weighted cost of debt above Treasury (fees)	34	3.13%	3.13%
Debt to assets ratio	63	0.83	0.79
Levels of debt	63	4.2	4
Percentage with more than one class of common	63	16%	16%
Percentage where bank debt syndicated	63	63%	63%
Number of banks	63	6	2
Number of U.S. banks	63	2.9	1

Exhibit 4. Frequency of Innovative Financing Practices in 63 Leveraged Buyouts Completing in 1987 and 1988

Financing Practice	Frequency of Use (%)
Forced cash payout covenant	10
Forced asset sale covenant	47
Mandatory hedging of interest rate risk with swaps	10
Provision allowing debt interest rate to be reset	11
Payment-in-kind provision	14
Major strip financing	20
LBO specialist controls deal	49

of transactions and PIK debt was used in 14% of transactions. Strip financing was used in some form in 38% of the transactions. However, in many cases, strip financing involved the sharing of debt and equity by only a few of many holders of a firm's liabilities. I defined a transaction with major strip financing as one where more than 70% of debt and equity was shared by the same parties (almost always insurance companies). Major strip financing of this type was employed in 20% of sample transactions. Thus, strip financing was an important but not a dominant tool in the sample. It appears that strip financing was more prevalent

in LBOs of the early 1980s (see Kaplan and Stein [25]). Covenants which forced the early sale of assets were widely used (47% of transactions). As discussed earlier, these covenants may reduce the scope of the asset substitution problem and may also be ways to guarantee early payout of cash flow. Exhibit 4 also shows that transactions in the sample were usually sponsored by an LBO specialist (49% of cases), several of which were highly experienced. In 26% of transactions, an investment bank such as Goldman Sachs assumed control, and in 25% of cases, management of the firm itself took control of the LBO.

III. Financial Innovations and the Cost of Debt

A. Deadweight Cost of Debt and Financing Costs

The basic argument that financial innovations in LBOs reduce the expected costs of bankruptcy is plausible but difficult to empirically investigate. There are basically two ways to examine the issue empirically. The first would be to associate the frequency and costs of financial distress ex post with the use of financing methods. While attractive, this approach is difficult to execute because financial distress costs are not easily measured and because the transactions in which many of these methods have been most widely used are relatively recent. The second approach would be to assume that financing costs in LBOs reflect the rational expectations of market participants about the likelihood of and costs of financial distress. Thus, if financial innovations lower bankruptcy costs they should be associated with a lower cost of capital. In this paper, I adopt this second approach and associate the ex ante costs of debt financing with the use of bankruptcy-cost-reducing innovations.

There are, unfortunately, several difficulties with this approach. First, while the ex ante cost of debt is directly observable in LBOs, the ex ante cost of equity is not. Therefore, it is not possible to see whether the cost of a firm's capital declines when financial innovations are used; it is only possible to see if the cost of debt is lower when these innovations are used. However, given that debt financing is predominant in LBO transactions the impact of financial innovations on the cost of financing can largely be assessed by examining the determinants of the cost of debt. It is also possible to impute the ex ante cost of equity financing in LBOs by estimating the determinants of the implicit discount rate used when bidding on a deal from cash flow forecasts reported in proxies. Kaplan and Ruback [26] show that the implicit discount rate used in LBOs is influenced most strongly by firm and industry level betas. I use their estimates of the impact of firm level beta on the cost of capital in LBOs to find the expected cost of equity for transactions examined in this paper. I then compute the weighted average cost of capital as the weighted cost of debt and the imputed weighted cost of equity.¹²

¹²The imputed cost of equity is computed as,

$$5.71 + 2.05\beta - (\text{debt/assets})(\text{weighted average cost of debt}).$$

A second problem is that firms which have unstable cash flows may wish to adopt measures which increase the duration of their debt to reduce default risk. By *signalling* the instability of expected cash flows, they may face higher borrowing costs that are unrelated to the exposure of their liabilities to interest rate risk. For example, measures such as sinking funds which change the duration of debt may signal changes in the firm's cash flows (Flannery [14] and Titman [37]). The use of payment-in-kind and RESET bonds may also signal that the firm anticipates future changes in its operating performance (Crabbe, Pickering, and Prowse [11] and Van Horne [41]). Thus, a covenant which lowers debt costs may spuriously appear to increase them. Consequently, the coefficients on variables which characterize debt duration test both the effect of exposure to interest rate risk and the effect of cash flow signalling on debt costs.

B. Empirical Model

The effect of asset sell-offs, strip financing and other financing practices in LBO transactions is assessed by relating the risk-adjusted weighted average cost of LBO debt to variables which quantify the extent of strip financing, promised asset sales and sponsor experience. The risk adjustment process is carried out, including variables which proxy for the riskiness of the firm's debt suggested by contingent claims analysis bond pricing models (e.g., Merton [28]).

I measure the impact of these financing arrangements and risk proxies using an OLS regression which predicts the weighted average cost of debt financing over the Treasury yield. Measuring the cost of debt as a spread over the risk-free rate partially controls for the effect of debt duration on promised yields. The spread over the Treasury bond yield is computed by subtracting the yield on U.S. Treasury bonds with a similar term to maturity from the weighted average yield on LBO debt.

The price of risky bonds depends on their exposure to interest rate (basis) risk. Weinstein [42], Crabbe [10] and others document an empirical relation between bond risk premia and interest rate risk exposure measured by term to maturity. Factors which affect interest rate risk exposure include:

Betas could not be computed for all firms in the sample because of insufficient data on the NYSE and NASDAQ CRSP returns tapes. Consequently, regressions predicting the weighted average cost of capital have fewer observations than other analyses in this paper.

- *Call provisions* which shorten the duration of a bond and limit debtholder gains when interest rates fall;
- *Sinking funds and bank debt amortization provisions* which reduce duration by requiring scheduled repayments of debt;
- *The proportion of all debt with floating interest rates* which protects investors from interest rate fluctuations;
- *Payment-in-kind provisions* which increase expected duration by giving the firm the option to postpone payment of debt in cash; and
- *Forced asset sale covenants* which require that assets be sold to pay down debt. Such covenants may dramatically shorten debt duration.

Operating risk and interest rate risk may influence the cost of debt financing in a highly nonlinear way. Option pricing approaches for corporate debt value bonds as a function of the underlying risk to cash flows and interest rate risk (Merton [28] and Galai and Masulis [16]). Interest rate risk, in turn, depends on term to maturity and call risk.

The regression model above is a linear model that allows variables such as cash flow volatility to influence the weighted average cost of debt. However, as noted above, contingent claims bond valuation formulas typically price bonds nonlinearly in terms of underlying state variables.¹³ While the linear model discussed above has performed well in previous studies, the possibility remains that specification error induced by linearization may affect both the direction and strength of conclusions drawn in this study.¹⁴ In an unreported nonparametric regression, I allowed for nonlinear effects of the risk proxies on the cost of capital and found that the main conclusions of this study were not materially changed.

IV. Results

This section discusses regression analyses that relate the weighted average cost of debt (and the imputed cost of capital) to proxies for agency and financial distress costs and operating and interest rate risk exposure. Two multivariate regression models are shown in Exhibit 5. The first model is a regression predicting the weighted average cost

of debt while the second model is a regression predicting the imputed weighted average cost of capital. These regressions have fewer observations than available in the entire sample because of missing observations for some of the variables used.

The dummy variable for sponsorship by an LBO specialist has good explanatory power. The coefficient on the LBO specialist sponsor dummy variable indicates that control by a specialist is associated with savings in debt financing costs of approximately 60 basis points; the impact on the overall imputed cost of capital is slightly larger. This is consistent with the theory that suggests that specialists have incentives to avoid actions which harm debtholders which creates value.¹⁵ The major strip financing dummy variable is not statistically significant in either regression.¹⁶ This fails to support the argument that strip financing can control many of the deadweight costs of LBO financing. The dummy variable for whether PIK debt was used is positive and economically and statistically significant in both regressions. This is consistent with the argument that issuance of PIK debt requires payment of a premium to debtholders for the option to delay cash outflow (Tufano [40]). This premium paid for the PIK option appears to outweigh the gain to bondholders from reduced financial distress costs. The higher coefficient on the PIK dummy in the regression predicting the cost of equity indicates that firms which use PIK debt also have higher betas. This is consistent with the use of PIKs when the firm's cash flows are more risky. I hypothesized that firms with fewer layers of debt would have lower debt financing costs, using the logic of Gilson, John, and Lang [18] that firms with these characteristics are more likely to resolve financial distress with workouts. The results do not show that the number of layers of debt significantly affects financing costs. The fraction of debt with call provisions is strongly and positively related to the cost of debt financing. This is consistent with the argument that firms which finance with callable debt need to compensate investors for giving them an option to refinance more cheaply if interest rates fall. The weighted term to maturity of debt, a proxy for interest rate risk, is negatively related to the imputed cost of capital and the directly measured cost of

¹³For example, Zimmer [45] shows empirically that the relation between required rate of return on debt and firm leverage ratios is highly nonlinear.

¹⁴One problem with estimating linearized versions of nonlinear models is that the coefficient estimates do not necessarily correspond to the parameters of the Taylor expansion around the sample mean (White [43]). This implies that the OLS estimates do not always give reliable information about the local properties of an unknown function such as elasticities.

¹⁵In an unreported regression, I found that the number of previous deals carried out by an LBO sponsor (a crude measure of track record and reputation) was not related to the cost of financing.

¹⁶Strip financing is measured by dividing the total amount of debt and equity shared by the same parties and the total amount of debt with provisions allowing conversion to equity by the book value of nonsecured debt.

Exhibit 5. OLS Regressions Predicting the Weighted Average Cost of Debt and Imputed Weighted Average Cost of Capital With Proxies for Expected Financial Distress Costs, Agency Costs of Debt and Interest Rate Risk

Independent Variable	Expected Sign	Weighted Average Cost of Debt	Imputed Weighted Average Cost of Capital
Intercept		3.00 (5.55)*	4.47 (5.75)*
Specialist sponsor dummy	-	-0.61 (-2.29)*	-0.80 (-1.75)**
Dummy for strip financing	-	0.009 (0.03)	0.54 (1.09)
Fraction mandatory asset sales	-	0.043 (0.10)	-0.49 (-0.83)
Layers of debt	+	0.081 (0.72)	0.0019 (0.01)
Payment-in-kind debt dummy	-/+	0.93 (2.49)*	1.12 (2.02)*
Fraction of debt callable	+	2.17 (2.74)*	1.44 (1.27)
Weighted term to maturity	+	-0.0084 (-1.98)*	-0.014 (-1.97)*
Debt-equity ratio	+	-0.0025 (-0.92)	-0.0068 (-1.52)
Industry earnings volatility	+	0.0035 (0.46)	0.011 (1.20)
Observations		52	31
Adjusted R ²		0.31	0.34

Note: The sample consists of 52 firms that initiated leveraged buyouts in 1987 and 1988. *T*-statistics associated with tests that a regression coefficient is different from zero are reported in parentheses. All coefficients marked * are significant at the 0.05 level. Those marked ** are significant at the 0.10 level.

debt. This result was not expected and suggests that firms which are able to finance long-term are less risky in the first place.

V. Conclusion

This paper provides evidence consistent with the theory that innovative financing methods used by highly levered firms control incentive problems of debt and in turn reduce expected financial distress costs. Sponsorship by an LBO specialist such as Forstmann Little may decrease expected bankruptcy costs because these sponsors have incentives not to adopt risky projects at creditor expense. Consistent with this hypothesis, this study finds that sponsorship by an LBO specialist is associated with a reduction in financing costs of approximately 60 basis points.

Asset sale covenants which may also force early payout of cash are frequently used but not associated with lower financing costs. One factor which may partly explain this result is that asset sales may hinder the productivity of

remaining assets with the effect of decreasing the probability of on-time payout of cash flows from the remaining assets (see Baker and Wruck [4]). Strip financing was hypothesized to be valuable both in reducing conflict among different classes of securityholders in times of financial distress and in ensuring that first best investment policies are adopted in normal times. While employed in one-fifth of the transactions examined in this study, strip financing does not appear to appreciably lower financing costs.

Firms which undertake LBOs also have incentives to assume capital structures which decrease the likelihood that periods of financial distress will require costly Chapter 11 bankruptcy proceedings. However, the prediction that firms with more layers of debt have lower financing costs was not supported. In addition to having an institutional structure that aligns the interests of debtholders and equityholders, LBO firms finance in a way that gives them the means to reduce the costs of temporary liquidity problems. Many of the firms in the sample used payment-in-

kind or RESET bonds which give debtholders of LBO firms a greater stake in the firm when cash is or may not be available to make scheduled bond payments.

While this paper gives evidence which suggests that some LBO financing techniques reduce the ex ante costs of financing LBOs, the conclusion that these techniques reduce the expected costs of financial distress is subject to several important qualifications. First, I have not directly measured the impact of these methods on the cost of capital. The main evidence in the paper shows how the cost of debt, one component of the cost of capital, is affected by these methods. Second, the use of financing methods that allow management to avoid bankruptcy (e.g., PIK debt "softens" debt contracts). This may reduce the value of debt in curtailing non-value-maximizing behavior on the part of management. This concern may be one justification for the asset sale covenants and provisions which require immediate payout of cash flow that are often used in LBOs. Third, the design of LBO capital structures is endogenous. Thus, firms that use provisions which reduce the costs of financial distress may actually appear to increase these costs if these provisions are used when the likelihood of financial distress is perceived to be high, and vice versa. The analysis in the paper uses several controls for risk, but to the extent that risk differentials remain across firms that are not captured by the controls used (a likely possibility), it is not possible to conclude that the effect of the financial structure variables observed in this study depends solely on their impact on financial distress costs.

Hoshi, Kashyap, and Scharfstein [21] write that "... the recent leveraged buyout wave has increased corporate debt burdens in the U.S. The central question is whether this increase in leverage also comes with a change in the institutions needed to cope with financial distress." This paper gives evidence which supports an affirmative answer to their question. While LBOs are certainly not riskless, as evidenced by the financial distress that has followed some deals, there is clear evidence that leveraged buyout firms are equipped with several types of "armor" that lower their vulnerability to liquidity crises in the event of a major economic downturn.

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