THE EVOLUTION OF BUYOUT PRICING AND FINANCIAL STRUCTURE IN THE 1980s*

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We examine changes in the pricing and financial structure of large management buyouts in the 1980s. Over time, (1) buyout price to cash flow ratios rose in absolute terms (particularly in deals financed using public junk bonds); (2) required bank principal repayments accelerated, leading to sharply lower ratios of cash flow to total debt obligations; (3) private subordinated and bank debt were replaced by public junk debt; and (4) management teams and dealmakers took more money out of transactions up front. These patterns are consistent with an "overheating" phenomenon in the buyout market. Preliminary post-buyout evidence lends some support to this interpretation.

I. INTRODUCTION

The leveraged buyout boom of the late 1980s has given way to the buyout bust of the early 1990s. After rising from less than $1 billion in 1980 to a peak of more than $60 billion in 1988, buyout volume has fallen dramatically, to less than $4 billion in 1990.[1]

How does one make sense of this enormous rise and abrupt fall? According to a wide range of observers, from financiers to journalists, the story is a straightforward one, albeit one that does not fit comfortably with traditional notions of efficient markets. Simply put, the buyout market overheated. The success of early deals attracted a large inflow of new money, and by the late 1980s too much financing was chasing too few good deals. The end result was that many transactions were overpriced, recklessly structured, or both. In this view, the decline in buyout volume seen recently represents a warranted market correction.[2]

Many statements of the "overheated buyout market hypothesis" explicitly point to the use of publicly issued subordinated

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1. See W. T. Grimm's Mergerstat Review [1991]. The figures refer to buyouts of public companies only.

2. See Smith [1990]; "The takeover game isn't dead, it's just gone private," *Forbes*, October 1, 1990, p. 63; "Many firms find debt they piled on in 1980s is a cruel taskmaster," *Wall Street Journal*, October 9, 1990, p. a1; "Hard lessons from the debt decade," *Fortune*, June 18, 1990, p. 76; "Leveraged buyouts fall to earth," *Business Week*, February 12, 1990, p. 62.

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debt—"junk" bonds—in later deals as an important factor. *Forbes* quotes one buyout specialist as saying: "It was so much easier to go to the public markets. It was cheaper, and there were very few covenants . . . It was fantasy." The *Forbes* article continues, "as long as the junk bond market existed, smart money was able to raise dumb money from passive investors—money that would accept high risks for skimpy rewards."[3]

With the benefit of hindsight there would appear to be some support for the overheated buyout market hypothesis. Of the 41 deals in our sample put together between 1980 and 1984, we have found only one that defaulted on its debt; a default rate of just over 2 percent. In stark contrast, 22 of 83 deals put together between 1985 and 1989 had (by August 1991) defaulted: a rate of almost 27 percent. Nine of these defaulted transactions have subsequently landed in bankruptcy court. And these numbers surely understate the proportion of later deals that eventually will experience financial difficulties, as many are only a few years old.

Of course, hindsight is always 20/20, and it could be that the poor outcomes in the later deals are at least partly the product of subsequent developments, rather than poor ex ante deal pricing or structuring. Such developments could include adverse macroeconomic conditions as well as regulatory actions that make it more difficult and costly to restructure troubled buyouts.[4]

In an effort to shed more light on these issues, this paper examines detailed evidence from a sample of 124 large buyouts completed between 1980 and 1989. Our goal is to determine whether there were indeed important ex ante differences between the deals done in the latter part of the decade and those done earlier. In other words, were there ex ante reasons to believe that the later deals were the product of an overheated market and hence more likely to run into difficulties, or must any such difficulties be attributed to unforeseeable ex post bad luck?

We study three broad categories of data that bear on the overheating hypothesis. The first relates to the overall price paid to take the company private. Regardless of the details of the capital structure, or the extent to which there are costs of financial distress, it is clear that investors will earn lower returns as the

3. "The takeover game isn't dead, it's just gone private," *Forbes,* October 1, 1990, p. 63.

4. Jensen [1991] develops the argument that subsequent regulatory developments have been costly for highly leveraged transactions, although he also subscribes to the view of an overheated buyout market.

prices paid increase relative to the fundamental value of company assets.

The second category of data we examine pertains to buyout capital structure. Even if the price paid to take a company private is a reasonable multiple of cash flow, a poorly designed capital structure can, by raising the likelihood and costs of financial distress, lower the prospective returns to some classes of investors. In evaluating this possibility, it is important to go beyond such aggregate measures of leverage as debt to capital and interest coverage. While these measures can provide useful information about the likelihood that a company will be unable to meet its contractual obligations, they have less to say about the attendant costs. In principle, very low coverage need not impose large costs so long as the debt is structured in such a way as to make renegotiation frictionless (see Jensen [1989]). For this reason, we focus not just on the absolute magnitude of the debt burden, but also on its contractual features: seniority, maturity, and the division between public and private lenders. As emphasized in recent theoretical work by Gertner and Scharfstein [1991] and Diamond [forthcoming], the complex interaction between these features can play a key role in determining costs of financial distress.

The third and final category of data we look at concerns the incentives of buyout investors. One of the supposed spurs to improved performance in buyouts is the increased equity stake of management: managers who own a large percentage of post-buyout equity might be expected to do a better job. On the other hand, managers who "cash out" a large fraction of their pre-buyout equity holdings at the time of the deal may have more of an incentive to take part in an overpriced or poorly structured transaction. A similar argument can be made when large up-front fees are paid to other interested parties. We examine whether these types of incentives changed over time.

We document a large number of changes in the buyouts of the late 1980s relative to those done earlier. (1) Buyout price to cash flow ratios rose, though not more sharply than marketwide or industrywide ratios. (2) Prices were particularly high in deals financed with junk bonds. (3) As prices rose, buyouts were undertaken in riskier industries, and with somewhat higher leverage ratios. (4) Banks took smaller positions in later deals, and at the same time accelerated required principal repayments, leading to sharply lower ratios of cash flow to total debt obligations. (5) Public junk debt displaced private subordinated debt, and the associated

practice of "strip" financing (in which subordinated debt-holders also receive equity stakes). (6) Finally, management and other interested parties such as investment bankers and deal promoters took more money up front out of the later deals.

As we discuss in detail below, this evidence fits well with a specific version of the overheated buyout market hypothesis. According to this version, the "demand push" from the public junk bond market that began around 1985 caused the buyouts of the later 1980s to be both more aggressively priced and more susceptible to costly financial distress (in a sense we shall make precise) than earlier deals.

We acknowledge, however, that the data do not constitute definitive proof of an overheated market. Alternative explanations consistent with rational investor behavior exist. For example, the inflow of money from the junk bond market may have coincided with (or indeed may have been prompted by) other beneficial changes, such as increased liquidity in the market for asset sales, that reduced the likelihood of a costly distress situation ever arising.

Although we cannot fully resolve such ambiguities, we make an effort in this direction by examining preliminary ex post data. We do not find strong trends in ex post operating performance, suggesting that ex ante factors did indeed play a role in the increased defaults of later buyouts. We also investigate the cross-sectional correlation between ex post outcomes and the ex ante variables that changed notably. For example, the presence of junk bonds in a buyout turns out to be a good predictor of various types of financial distress. Arguably, this is because the presence of junk bonds captures both a tendency toward higher prices and more fragile capital structures. We believe that this result favors the junk bond/demand push version of the overheating hypothesis.

The remainder of the paper is organized as follows. Section II describes our sample and data. Sections III through VII lay out our empirical findings. Section III examines pricing issues, by looking at the relationship between buyout valuations and the underlying company cash flows. Section IV takes a first cut at the capital structures of our sample companies, presenting aggregate data on company risk, debt ratios, and coverages. The next three sections focus more closely on capital structure components: Section V on senior bank debt, Section VI on subordinated debt, and Section VII on the composition of equity ownership and the associated manage-

ment incentives. In Section VIII we pull together our ex ante findings and discuss how they might be interpreted in light of the overheated buyout market hypothesis. We also discuss possible alternative interpretations. In Section IX we turn to ex post data in an effort to sharpen our conclusions. Section X concludes.

II. Sample Description

A. Buyout Companies

Our sample of buyouts is taken from companies listed as leveraged buyouts or as acquisitions by private companies in Securities Data Corporation's merger database, in Morgan Stanley's merger database, and in W. T. Grimm's Mergerstat Review from 1980 to 1989. We restrict this sample to management buyouts (MBOs) in which at least one member of the incumbent management team obtains an equity interest in the new private firm. We focus on MBOs because ex ante data for these transactions are generally more readily available and more complete. The final sample satisfies the following criteria.

1. The *Wall Street Journal* (*WSJ*) contains an announcement that the company proposes to go private and the transaction is completed by the end of 1989.
2. The newly private firm is an independent entity, not a subsidiary of another private company.
3. The proxy statement, 14D statement, or *WSJ* confirms that at least one member of the incumbent management team obtains an equity interest in the new private firm.
4. The total transaction value exceeds $100 million.[5]
5. The majority of debt financing is not obtained through a leveraged employee share ownership plan (ESOP).[6]

We obtained 124 buyouts completed between 1980 and 1989

5. The intent of this size criterion is to restrict the sample to larger, more fully disclosed transactions. This criterion also lowers the likelihood that the reduction of regulatory costs is a major source of value. Savings on the costs of preparing documents for public shareholders and the SEC are likely to be small in relation to value in these transactions.

6. We exclude ESOPs for two reasons. First, in a typical leveraged ESOP, employees (as opposed to top management) borrow a large fraction of the purchase price to gain control of the post-buyout equity. There are reasons to believe that these employees place a different value on control, which may affect the pricing of such deals. Second, lenders to ESOPs receive an interest rate subsidy not present in other transactions, which may also affect the pricing. We exclude seven transactions because of this restriction.

that satisfy these criteria.[7] The total value of these 124 transactions exceeds $132 billion. Over the same period W. T. Grimm's Mergerstat Review identifies $170 billion in going private transactions. Our sample, therefore, represents over three-quarters of the dollar volume of going private transactions during this period.

Throughout the paper we classify MBOs by the year in which the final transaction terms of the buyout are set. Although this date is often the buyout announcement date, it can be some time after the initial announcement date. We use this classification because the transaction setting date is the date on which investors commit to provide capital to the buyout at the actual deal price. Column (1) of Table I summarizes the distribution of MBOs by the year in which the final transaction terms are set.

B. Pre-buyout and Post-buyout Data

For each successful MBO, information describing the transactions is taken from proxy, 10-K, 13-E, and 14-D statements and from the *WSJ*. Stock prices two months before the buyout is announced and at delisting are obtained from the Center for Research in Security Prices (CRSP) database and Standard & Poor's *Daily Stock Price Record*. Other financial data are obtained from the COMPUSTAT Tapes.

The existence and extent of post-buyout financial distress is determined by searching the NEXIS database for the buyout companies and reading post-buyout financial statements. Post-buyout financial statements (and data) are available for 89 of the 124 MBOs.

III. Buyout Pricing

A. Price and Cash Flow Measures

The first question we ask is how buyout prices have varied over time relative to fundamentals. We measure the buyout price (which we also refer to as "total capital") as the sum of (1) the

7. The sample includes the buyout of RJR Nabisco because the buyout sponsor, Kohlberg, Kravis and Roberts, explicitly stated that they would offer equity to some members of the incumbent management team (which they, in fact, did). All of our results are insensitive to the inclusion of this observation. In contrast, we exclude several transactions in which the buyout sponsor stated that they might offer equity to incumbent management, but made no firm guarantee. The disclosure for these transactions was much less comprehensive, and as noted above, this is our primary reason for excluding them.

TABLE I
PRICING

Annual medians of buyout capital, prices relative to fundamentals, market earnings price ratios, and buyout premiums. The sample includes 124 management buyouts completed in the period 1980–1989. Buyouts are listed by year in which final transaction terms are set. Net cash flow equals EBITDA less capital expenditures in the last full year before the management buyout announcement. EBITDA equals operating income before interest, taxes, depreciation, and amortization. Capital equals the sum of (1) the market value paid for the firm's equity; (2) the value of the firm's outstanding debt; and (3) the fees paid in the transaction; less (4) any cash removed from the firm to finance the buyout. The value of the firm's outstanding debt equals the retirement value for debt that is retired and book value for debt that is retained. Premium equals the percentage difference between the price paid for a firm's equity and the price two months before the first announcement of buyout or takeover activity. Market E/P ratio is the ratio of earnings to price for the S&P 500 in the month uncertainty about the buyout price is resolved.

Year	(1) Number of MBOs	(2) Capital ($ millions)	(3) Net cash flow to capital (as %)	(4) EBITDA to capital (as %)	(5) Market E/P ratio (as %)	(6) Net cash flow to capital less mkt. E/P (%)	(7) EBITDA to capital less mkt. E/P (%)	(8) Premium (as %)
1980 + 1981	6	397.3	8.85	16.30	11.25	−2.22	5.19	51.1
1982	8	164.2	13.27	17.18	13.24	0.07	3.88	64.8
1983	10	392.3	7.10	13.54	8.07	−1.54	5.74	34.4
1984	17	383.4	7.85	14.34	9.86	−1.66	4.59	40.8
1985	12	923.3	8.39	12.98	8.53	0.66	4.23	25.7
1986	15	371.1	7.54	13.48	6.01	1.03	7.52	38.7
1987	20	439.0	4.48	10.81	5.03	−0.66	5.56	41.2
1988	31	476.7	7.27	11.48	6.93	−0.48	4.40	48.1
1989	5	315.5	9.16	13.32	7.86	1.02	5.54	56.7
Total	124	395.4	7.56	12.75	7.65	−0.56	4.80	43.0
N obs.		124	120	124	124	120	124	122
Time trend		(+)	(−)**	(−)***	(−)***	(+)	(−)	(+)
1980–1982 vs. 1983–1985		(+)*	(−)**	(−)***	(−)***	(+)	(−)	(−)***
1983–1985 vs. 1986–1989		(+)	(−)**	(−)***	(−)***	(+)	(+)	(+)**

***Significantly different over time or across comparison periods at 1 percent level; **at 5 percent level; and *at 10 percent level.

market value paid for the firm's equity,[8] (2) the value of the firm's outstanding debt,[9] and (3) the fees paid in the transaction, less (4) any cash removed from the firm to finance the buyout.[10]

Column (2) of Table I presents the annual and sample medians of total capital. The median buyout in our sample has total capital of $395.4 million. Although there is a trend toward increasing size over time, that trend is not statistically significant over the entire period.

We consider two primary measures of cash flow. The first is earnings before interest, depreciation, amortization, and taxes (EBITDA). EBITDA is a measure of gross cash generated from operations, and thus represents an upper bound on the cash available to pay investors. The second measure, net cash flow, equals EBITDA less capital expenditures. In a world without taxes, net cash flow would be the primary component of the numerator in a discounting analysis that sought to value a company under its current operating strategy. We calculate the two cash flow measures for the most recently completed fiscal year available when the proxy statement or 14D describing the buyout is released.[11]

In much of the analysis that follows, we use two methods to quantify the statistical significance of the temporal patterns in the data. First, we measure the nonparametric or rank correlation between (all individual observations of) our variables and a simple annual time trend over the entire period, 1980 to 1989. This is a

8. In computing the market value paid for the firm's equity, we value noncash distributions paid to stockholders (usually debt or preferred stock) using the market value of the securities as recorded in the Capital Changes Reporter. When we cannot obtain a value from the Capital Changes Reporter, we use the last traded price of the stock to estimate the combined market value of the cash and securities distributed to old shareholders. We also value shares retained by insiders at the same price as the shares purchased from outside shareholders.

9. The firm's outstanding debt that is repurchased or retired as part of the transaction is valued at the repurchase price. Outstanding debt that is retained is valued at book value. We use book values because of the well-known difficulty of determining market values for nontraded debt. Our use of book values, however, should have little impact on the results, as a relatively small amount of pre-buyout debt is retained by the post-buyout company. The median book value of retained pre-buyout debt to total capital is only 6 percent.

10. In making this adjustment, we implicitly assume that the cash remaining on the balance sheet when the buyout is completed is the minimal level necessary to operate the business. We obtain essentially identical results when we subtract *all* cash on the balance sheet at the time of the buyout.

11. Because some of the buyouts are announced well into the following fiscal year, we also have recalculated the cash flow measures for the most recent twelve months using quarterly financial statements. Unfortunately, these computations are less reliable because some buyout firms do not report capital expenditures, depreciation, or both in those quarterly reports. Nevertheless, both sets of measures generally produce qualitatively similar results. In order to conserve space, we only report the results based on complete fiscal years in what follows.

crude method and, in some cases, may be inappropriate. We should not necessarily expect all variables of interest to exhibit a steady trend over the decade. Some of the changes may be more discrete in nature. Accordingly, we also use nonparametric rank tests to compare the values of the variables in three distinct periods: 1980 to 1982 (or the "early 1980s"), 1983 to 1985 (or the "mid-1980s"), and 1986 to 1989 (or the "late 1980s").[12]

B. Cash Flow to Price Ratios Over Time

Columns (3) and (4) display median ratios of net cash flow and EBITDA to total capital by buyout year. Figure I presents this information graphically. The ratios of net cash flow and EBITDA to capital decline over time, exhibiting a pattern broadly consistent with the popular notion that buyout prices rose relative to fundamentals in the 1980s. Over the entire sample period both ratios exhibit a statistically significant downward trend. Furthermore, both ratios are statistically lower (at the 5 percent level or better) for late 1980s buyouts than for mid-1980s buyouts, and are statistically lower (at the 5 percent level or better) for mid-1980s buyouts than for early 1980s buyouts.[13]

The decline in buyout cash flow to price ratios over time does not necessarily reflect anything unique to the buyout market. As column (5) indicates, the earnings to price ratio of the entire S&P 500 also falls during the 1980s (as the general level of the stock market rises). Columns (6) and (7) provide crude market-adjusted measures of buyout pricing by subtracting the earnings to price ratio of the S&P 500 (for the quarter in which the deal was priced) from the buyout ratios of net cash flow and EBITDA to capital. The market-adjusted measures do not exhibit a significant downward trend. In fact, the trend for the net cash flow to capital ratio is slightly positive though not significant. Although not presented in the table, we obtain similar results when we use an industry-based, rather than marketwide adjustment.[14]

12. Arguably, the 1989 deals do not belong in our classification of the late 1980s. These buyouts took place as the public junk bond market began to falter, and, thus, do not necessarily fit with the overheating hypothesis. Indeed, the few observations we have suggest that the 1989 buyouts are different from those of the preceding three years. However, eliminating 1989 buyouts from the late 1980s sample has no effect on our statistical results.

13. We obtain qualitatively identical results using means and t-tests rather than medians and rank tests, both here, and in the analyses that follow.

14. The industry-based adjustment subtracts the median net cash flow or EBITDA to capital ratio for all larger firms (assets of at least $50 million) with the same four-digit SIC code as the buyout firm.

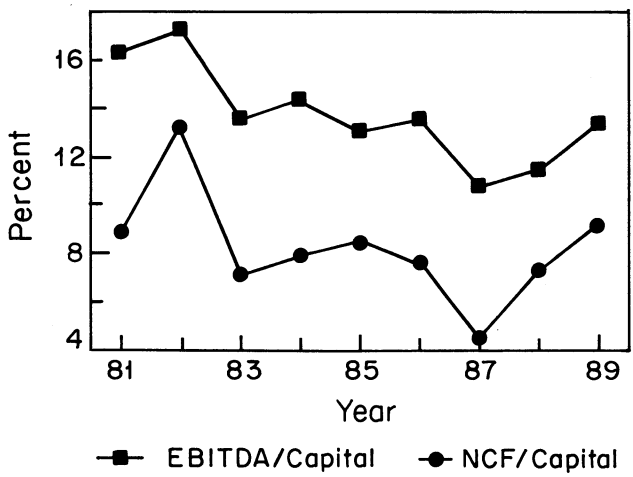

FIGURE I

Annual Medians of Net Cash Flow to Capital and EBITDA to Capital

Net cash flow equals EBITDA less capital expenditures in the last full year before the management buyout announcement. EBITDA equals operating income before interest, taxes, depreciation and amortization. Capital equals the sum of (1) the market value paid for the firm's equity; (2) the value of the firm's outstanding debt; and (3) the fees paid in the transaction; *less* (4) any cash removed from the firm to finance the buyout.

The fact that buyout prices seem to move largely in line with the rest of the stock market can be interpreted in two ways. On the one hand, if we maintain the assumption that the stock market as a whole is efficient, then the absence of a buyout-market-specific pattern in prices casts a measure of doubt on the overheating hypothesis. On the other hand, it could be argued that if we are going to entertain the possibility of overheating at all, it may be unnatural to expect it to be completely confined to just the buyout market. The work of De Long et al. [1990] suggests that to the extent that waves of optimism or pessimism by "noise traders" have an impact on asset prices, this impact will be a systematic one; i.e., it will fall on a wide range of assets.

Another way to gauge the extent of a buyout-specific trend in prices is to examine the premiums paid in buyout transactions. Column (8) presents the yearly median premiums paid to shareholders. The premiums are measured as the percentage difference between the price paid for a firm's equity and the price two months before the first announcement of buyout or takeover activity. Here again, the data provide little support (at least to first order) for a

buyout-specific pricing phenomenon. Premiums show no significant linear time trend in the 1980s.

In sum, the time series data presented in this section provide somewhat mixed support for the overheating hypothesis. Although buyout prices increased over the decade, this increase was not specific to the buyout market. It was evident in the broader stock market as well. This is not, however, our final word on buyout pricing. In Sections V and VI we present evidence on the cross-sectional determinants of buyout prices.

IV. Aggregate Debt Burdens and Riskiness of Buyout Companies

Pricing is only one of several factors that can affect the ultimate success of a buyout. Even if a buyout is completed at the "right" price, it may be structured in a way that will lead to higher expected costs of financial distress. In this section we examine whether capital structures in later deals changed in a way that might have increased the ex ante likelihood and costs of financial distress. As a first cut, we lump all forms of debt together and examine simple statistics on the proportion of debt to total capital and on the coverage of contractual obligations.

One cannot, of course, look at debt and coverage ratios in a vacuum. The extent to which a company's debt ratio is deemed "high" or its coverage is deemed "tight" should depend in part on the underlying riskiness of its assets. Thus, we start by briefly summarizing changes in company risk over time.

A. Changes in Buyout Company Risk

Table II presents two measures of total risk. Total risk (not systematic risk) is the more relevant measures because it has a first-order impact on the likelihood and, therefore, on the expected costs of financial distress.

Column (1) presents a measure of total risk calculated using financial data for the individual buyout companies: the standard deviation of the growth rate of operating margins (where operating margin equals the ratio of EBITDA to sales). This is calculated using up to ten years, but not fewer than six years of pre-buyout financial data. This measure trends upward throughout the 1980s, but not significantly. The late 1980s buyouts, however, have significantly more risk (at the 5 percent level) than those in the mid-1980s.

TABLE II
RISK

Annual medians of buyout company risk for 124 management buyouts completed in the period 1980–1989. Buyouts listed by year in which final transaction terms are set. Standard deviation of fractional change in operating margin is calculated from at least six years and up to ten years of pre-buyout financial data. Bernanke et al. standard deviations are taken from Bernanke et al. [1990]. The two rows in each cell are the median and number of observations, respectively.

	Risk measures	
Year	(1) Std. dev. fractional change in operating margin	(2) Bernanke et al. estimated std. dev. industry earnings
1980 + 1981	0.18	0.213
	6	6
1982	0.19	0.249
	8	7
1983	0.17	0.074
	10	9
1984	0.13	0.249
	16	16
1985	0.13	0.249
	11	12
1986	0.19	0.348
	12	13
1987	0.20	0.249
	17	18
1988	0.18	0.249
	24	28
1989	0.18	0.262
	3	5
Total	0.17	0.249
	108	114
Time trend	(+)	(+)**
1980–1982 vs. 1983–1985	(−)	(−)
1983–1985 vs. 1986–1989	(+)**	(+)*

***Significantly different over time or across comparison periods at 1 percent level; **at 5 percent level; and *at 10 percent level.

Column (2) presents a measure of industry total risk used by Bernanke et al. [1990]: the standard deviation of the growth rate of industry real earnings. The pattern of this industry measure is similar to that of our firm-specific measure. The trend is positive

and significant (at the 5 percent level), and the risk is significantly higher (at the 10 percent level) for buyouts of the late 1980s than for those of the mid-1980s.

In sum, our measures of total risk suggest that buyout companies in the late 1980s were somewhat riskier than those in earlier years. Other things equal, this would seem to dictate a more conservative capital structure. With this observation in mind, we now turn to the aggregate capital structure data.

B. Aggregate Debt Burdens

Column (1) of Table III presents the yearly medians of total post-buyout debt to capital where total post-buyout debt equals the sum of (the market value of) new debt issued to finance the buyout and (the book value of) pre-buyout debt retained. The market value of most new debt is equal to its face value. When it is not, usually in the case of new debt issued directly to selling shareholders (so-called "cram down" debt), we obtain the market value from the Capital Changes Reporter.

The median debt to total capital ratios indicate an increase in leverage over time. The time trend is positive and significant at the 5 percent level, and the ratios in 1986 to 1989 (median of 90.3 percent) are statistically greater than those in 1983 to 1985 (median of 86.5 percent) at the 5 percent level.

Moreover, our measure of total debt may understate the amount of debt in the capital structure because it excludes preferred stock with fixed commitments. In several cases, such preferred stock is exchangeable into subordinated debt. Accordingly, column (2) of Table III presents the yearly medians of post-buyout common stock to total capital, where post-buyout common stock includes preferred stock convertible into common stock (but not straight preferred stock or preferred stock convertible into debt). These common stock ratios fall significantly over time, with the lowest ratios (median of 5.56 percent) from 1986 to 1989.

The increase in debt ratios and the decline in equity ratios are interesting and somewhat puzzling aspects of buyout financial structures. The higher prices paid relative to cash flows in late 1980s buyouts—even if perfectly rational—would appear to suggest that these buyouts were associated with more optimistic growth expectations than earlier ones. But if the later deals were associated with cash flows that were more "back-loaded" in time (as well as somewhat riskier), one might have expected them to be

TABLE III
AGGREGATE DEBT AND COVERAGE RATIOS

Annual medians of capital structure variables for 124 management buyouts completed in the period 1980–1989. Buyouts listed by year in which final transaction terms are set. Capital equals the sum of (1) the market value paid for the firm's equity; (2) the value of the firm's outstanding debt; and (3) the fees paid in the transaction; less (4) any cash removed from the firm to finance the buyout. Post-buyout debt includes new buyout debt and pre-buyout debt that is not refinanced. Net cash flow equals EBITDA less capital expenditures in the last full year before the management buyout announcement. EBITDA equals operating income before interest, taxes, depreciation, and amortization. Expected interest payments are calculated using the interest rates and debt amounts projected in the proxy or 14D statements describing the buyouts. Because most of the bank debt in these transactions is priced at a spread over the London Interbank Offering Rate (LIBOR) or the prime rate, we calculate expected interest payments on the bank debt using the rates in effect at the date uncertainty about the bid is resolved. Cash interest equals interest less noncash interest payments. Required debt repay in two years equals the principal amount of bank debt required in the first two post-buyout years. The two rows in each cell are the median and number of observations, respectively.

Year	(1) Post-buyout debt to capital (as %)	(2) Common stock to capital (as %)	(3) Net cash flow to interest	(4) EBITDA to interest	(5) Net cash flow to cash interest	(6) EBITDA to cash interest	(7) Req'd debt repay in 2 years to EBITDA (as %)	(8) Net cash flow to [cash interest + (repay in 2 yrs)/2]	(9) EBITDA to [cash interest + (repay in 2 yrs)/2]
1980 + 1981	88.3	10.53	0.56	1.15	0.56	1.15	0.0	0.56	1.15
	6	6	6	6	6	6	6	5	6
1982	87.3	6.67	0.90	1.28	0.90	1.28	0.0	0.75	1.16
	8	8	8	8	8	8	6	5	6
1983	87.2	11.54	0.67	1.26	0.67	1.20	22.3	0.69	1.18
	10	10	10	10	10	10	7	7	7
1984	88.7	7.91	0.74	1.29	0.74	1.29	32.3	0.66	1.12
	17	17	17	17	17	17	11	11	11
1985	86.0	7.03	0.75	1.22	0.82	1.30	59.2	0.59	1.09
	12	12	12	12	12	12	11	11	11
1986	90.7	5.60	0.73	1.50	0.73	1.75	160.0	0.36	0.72
	15	15	13	15	13	15	10	8	10
1987	88.9	4.04	0.43	1.12	0.52	1.27	103.5	0.21	0.76
	20	20	19	20	19	20	14	14	14
1988	90.5	6.13	0.60	1.11	0.70	1.16	103.5	0.41	0.66
	31	31	30	31	30	31	21	20	21
1989	83.2	13.20	0.83	1.27	0.83	1.27	43.3	0.62	0.89
	5	5	5	5	5	5	4	4	4
Total	89.1	6.52	0.68	1.20	0.74	1.27	60.0	0.46	0.89
	124	124	120	124	120	124	90	85	90
Time trend	(+)**	(−)*	(−)	(−)*	(−)	(−)	(+)***	(−)**	(−)***
1980–1982 vs. 1983–1985	(−)	(+)	(−)	(−)	(+)	(+)	(+)***	(−)	(−)
1983–1985 vs. 1986–1989	(+)***	(−)***	(−)	(−)	(−)	(−)	(+)***	(−)***	(−)***

***Significantly different over time or across comparison periods at 1 percent level; **at 5 percent level; and *at 10 percent level.

structured with less debt relative to total value, so that the ability to service current debt obligations would not be impaired.

To explore this issue further, the remainder of Table III presents several measures of the adequacy of current cash flows relative to contractual obligations. These measures use net cash flow and EBITDA in the last full year before the buyout. We calculate expected interest payments from the interest rates and debt amounts projected in the proxy or 14D statements describing the buyouts. Because most of the bank debt in these transactions is priced at a spread over the London Interbank Offering Rate (LIBOR) or the prime rate, we calculate expected interest payments on the bank debt using the rates in effect at the date uncertainty about the bid is resolved.[15]

Columns (3) and (4) compare net cash flow and EBITDA to expected total interest payments in the first post-buyout year. Consistent with the lower cash flow to price ratios and rising leverage ratios, we find a negative time trend for both interest coverage measures, with both net cash flow and EBITDA to interest reaching a minimum in 1987 and 1988. The time trend is significant (at the 10 percent level) for EBITDA, although not for net cash flow.[16]

The ratios in columns (3) and (4) use total interest obligations, which include both cash and noncash interest. Noncash interest is associated with deferred interest debt, which includes zero-coupon and pay-in-kind (PIK) bonds. Including noncash interest payments may present a misleading picture because the use of such payments increased significantly in the second half of the 1980s (as we show below in Section VI). In fact, they may have been introduced precisely to allow firms with more "back-loaded" cash flows to safely assume high levels of debt. Columns (5) and (6) repeat our coverage calculations using cash interest payments that exclude interest payments on deferred interest debt. As expected, this adjustment improves the relative standing of the coverage ratios of

15. This may underestimate true expected interest payments in the later deals because many of the later buyouts involve interest rate swaps that effectively convert some floating rate debt into fixed rate obligations. Because the yield curve has an upward slope during most of the sample period, the fixed swap rates would have been greater than the floating rates.

16. The relative lack of variation in the interest coverage ratios may surprise some readers. Wigmore [1990] presents similar EBITDA to interest ratios for all junk bond issues (not just buyout-related issues) in the 1980s, and finds a steady decline. His annual ratios exceed 2.73 before 1983, average 1.74 between 1983 and 1985, and drop to 1.26 between 1986 and 1988. It is likely that the large decline in his sample is caused by a shift to merger and buyout-related issues over time.

the later deals. None of the time trends or period comparisons presented in the table is significant.

Although interest coverage is an often used measure of financial soundness, it does not fully capture a firm's ability to meet all its debt-related obligations. Cash flow must also be devoted to making principal repayments. Ninety of the transactions in our sample report a principal repayment schedule for the bank debt portion of the capital structure. Column (7) displays the ratio of required debt repayments to EBITDA in the first two post-buyout years for these 90 transactions. Required repayments rise sharply over time, with an especially pronounced break between 1985 and 1986, when principal repayments rise by a factor of more than 2.7. The time trend and period comparisons all show increases in this ratio that are significant at the 1 percent level.

Columns (8) and (9) repeat our coverage calculations, but now consider how net cash flow and EBITDA compare with total cash debt obligations, which we define as the sum of cash interest and one-half of the first two years' required principal repayments. These ratios are also presented graphically in Figure II. These coverages are now substantially (and significantly) lower for buyouts of 1986 to 1989 than for earlier deals. For example, the median ratio of EBITDA to cash obligations is always above one before 1986, but falls to between 0.76 and 0.66 for the 1986–1988 period before recovering somewhat to 0.89 in 1989. Similarly, the median ratio of net cash flow to cash obligations, which was always above 0.56 before 1986, does not exceed 0.41 from 1986 to 1988. Again, the ratio recovers in 1989, rising to 0.62.

This change in the coverage ratios after 1985 implies a sharp deterioration in the ability of buyout firms to meet their total debt-related obligations out of operating cash flows. For example, a buyout with the 1988 median ratio of 0.41—the highest median of the 1986 to 1988 period—would need to increase net cash flow by 144 percent (0.59/0.41) in its first year to meet its debt obligations. This is a much larger increase than the roughly 40 percent found in Kaplan [1989] for a sample of management buyouts announced between 1979 and 1985. In light of these historical performance data, it is hard to see how operating cash flows could be expected to meet required debt service payments.

These coverage numbers, however, present only part of the overall picture on financial soundness. First, as Shleifer and Vishny [1992] emphasize, asset sales may represent an alternative

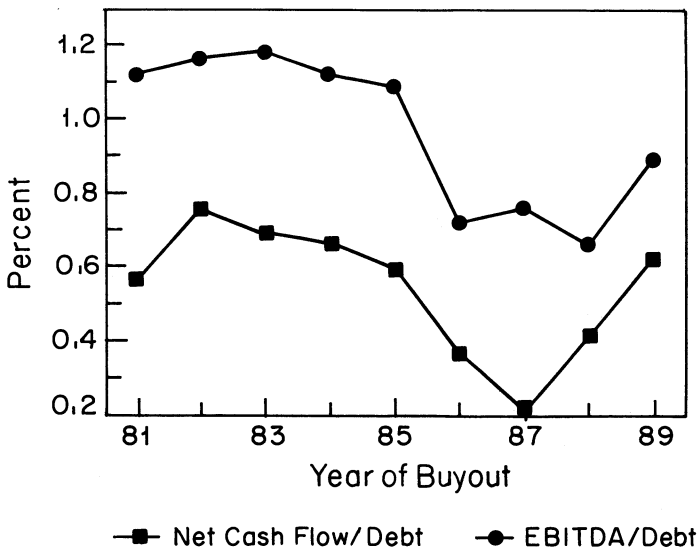

FIGURE II

Annual Medians of Net Cash Flow and EBITDA to Total Cash Debt Obligations

Net cash flow equals EBITDA less capital expenditures in the last full year before the management buyout announcement. EBITDA equals operating income before interest, taxes, depreciation and amortization. Total cash debt obligations equal the sum of (1) expected cash interest payments; and (2) one-half of the principal repayments required in the first two post-buyout years. Expected interest payments are calculated using the interest rates and debt amounts projected in the proxy or 14D statements describing the buyouts. Cash interest equals interest less noncash interest payments. Required debt repayments in the first two post-buyout years equals the principal amount of bank debt required in the first two post-buyout years.

means of generating the cash to make debt-related payments. The acceleration in principal repayment schedules in later buyouts probably led to an increased reliance on (and expectations of) asset sales. Second, even if planned asset sales fail to materialize, and required payments cannot be met, this need not necessarily spell disaster. The costs at this point will depend critically on the ability of creditors to restructure their claims in an efficient manner.

In sum, then, the data in this section strongly suggest that the buyouts of the late 1980s had a higher ex ante probability of winding up in a restructuring situation, particularly if planned asset sales were subject to some uncertainty. The data have thus far had less to say about the possible costs of such restructurings.

V. Senior Bank Debt and the Role of Asset Sales

We now focus our attention on specific components of buyout capital structures. The most senior part of the capital structure for most of our MBOs is a term loan (and, often, an accompanying revolving credit loan) arranged by one or more commercial banks. We refer to these loans as bank debt.[17] As we already have seen, banks accelerated required principal payments over time. Table IV presents additional evidence on bank debt characteristics.

The first column in the table shows the median value of the ratio of bank debt to total debt by year. This ratio declines significantly (at the 5 percent level) over time, with a distinct break in 1985.[18] Bank debt represents over 70 percent of total debt in 1982 to 1984. In 1985 it drops to 42 percent of all debt. After that, the ratio stabilizes, ranging between 52 and 57 percent from 1986 to 1989. As we discuss in more detail in Section VI, the decline in bank debt ratios coincides with an increased usage of public bonds in the subordinated debt tier of the capital structure.

In the second and third columns we report the interest rate terms of the bank loans. These may provide a measure of banks' assessments of buyout riskiness. In most of the deals, the interest rate on the bank debt is set as the minimum of a spread over the prime rate or a spread over LIBOR. We report the median spreads over both prime and LIBOR by year. (In the few cases the term loan and revolving credit loan spreads differ, we use the value-weighted average of the spreads.) In a statistical sense the spreads trend upward over time (at the 1 percent level). However, in economic terms the spreads seem remarkably stable. The median values of the prime-based spreads are 1.125, 1.50, and 1.50 percent respectively, in the early, mid-, and late 1980s.

The relative lack of variation in spreads shows up in the cross section as well. When we pool all deals between 1984 and 1989, 58 of 89 buyouts have prime-based spreads of 1.50 percent. The highest spread is 2 percent; the lowest, 1 percent. The uniformity in loan pricing seems puzzling. If we take a heterogeneous group of companies, and impose a similar highly leveraged capital structure on all of them, one might expect a great deal of variation in the

17. We also classify similarly structured term loans made by bank-like organizations such as General Electric Credit as bank debt.

18. In three transactions the amount of bank debt is uncertain at the date the buyout is priced because they are financed using short-term "bridge loans" provided by investment banks. Our results are similar when we assume that these loans will be replaced by bank loans.

TABLE IV
BANK DEBT

Summary statistics for bank debt variables. Annual medians are presented for all variables except for the percentage of buyouts using asset sales. Sample includes 124 management buyouts completed in the period 1980–1989. Buyouts listed by year in which final transaction terms are set. Bank debt is debt provided to finance the buyout in the form of a senior term loan or revolving credit loan. Bank interest rate is the interest rate charged for the bank debt as a spread over the prime rate or over LIBOR—the London Interbank Offer Rate. Bank fees are up-front fees paid to the bank lenders. Fee-adjusted bank interest rate calculates the effective interest rate on the bank debt after reducing the bank debt by the up-front bank fees and amortizing the bank debt. Asset sales are present if they are mentioned as expected in the proxy or 14D statement describing the buyout transaction. The two rows in each cell are the median and number of observations, respectively.

Year	(1) Bank debt to total debt	(2) Bank interest rate versus prime	(3) Bank interest rate versus LIBOR	(4) Bank fees to bank debt	(5) Fee-adjusted bank interest rate versus prime	(6) Asset sales (% of deals)	(7) Asset sale amount as % of capital (if asset sale)
1980 + 1981	39.0	0.75	1.25	0.21	N.A.	50.0	15.5
	6	5	2	1	0	6	3
1982	72.9	1.25	2.50	1.28	1.31	0.0	N.A.
	8	7	2	5	5	8	0
1983	75.7	1.38	2.25	0.40	1.44	33.3	21.1
	10	8	6	8	8	9	3
1984	72.0	1.44	2.25	0.79	1.59	18.8	23.2
	17	16	13	14	13	16	3
1985	42.0	1.50	2.25	1.94	2.13	33.3	14.2
	12	11	7	7	7	12	4
1986	52.0	1.50	2.75	2.06	2.21	60.0	19.3
	15	13	12	13	12	15	8
1987	54.3	1.50	2.50	2.06	2.13	40.0	22.4
	19	17	14	15	15	20	8
1988	55.3	1.50	2.50	2.49	2.24	32.3	14.8
	29	27	25	22	22	31	10
1989	57.1	1.50	2.50	2.38	1.98	20.0	11.4
	5	5	4	4	3	5	1
Total	56.4	1.50	2.50	1.93	2.12	33.6	18.1
	121	109	85	89	85	122	40
Time trend	(−)**	(+)***	(+)***	(+)***	(+)***	(+)	(−)
1980–1982 vs. 1983–1985	(−)	(+)	(+)	(−)	(+)	(+)	(−)
1983–1985 vs. 1986–1989	(−)*	(+)***	(+)***	(+)***	(+)***	(+)	(−)

***Significantly different over time or across comparison periods at 1 percent level; **at 5 percent level; and *at 10 percent level.

riskiness of the debt, and, hence, a good deal of variation in its pricing.

One explanation for the lack of time-series variation in loan pricing is that banks adjusted their fees over time. This is demonstrated in Column (4) of Table IV. The median fee is 0.78 percent through 1984, and rises thereafter to a peak of 2.49 percent in 1988. Since the increased fee income may be economically equivalent to higher interest rates, we calculate a fee-adjusted interest rate and a corresponding fee-adjusted spread to the reference rate. Column (5) reports the annual median fee-adjusted spreads over the prime rate. The fee-adjusted spread over prime jumps noticeably from 1.59 percent in 1984 to 2.13 percent in 1985 and remains between 1.98 percent and 2.24 percent from 1985 to 1989. There is both a statistically and economically significant increase in this spread over time. This is consistent with banks expecting later buyouts to become distressed more often.

There are, however, two reasons why it may be misleading to treat fees and interest income as economically equivalent. First, the fees bank lenders receive are not always proportional to the size of their loans. Conversations with bankers indicate that the originating bank retains some fee income even when it sells most of the loan. If so, the fee-adjusted spreads reported in Table IV overstate the returns to banks that actually fund the loan and bear the risk. Second, banks also might plausibly prefer fee income because of capital regulations and compensation practices. Fee income shows up in earnings in the first year of the buyout. Because this increases both book net worth and any compensation based on earnings, it can have a higher shadow value to banks and bankers than an economically equivalent interest rate. The greater fee income in the late 1980s buyouts may thus have tempted bankers to make buyout loans that offered a less favorable risk-return trade-off.

Focusing on interest rate spreads also ignores a potentially important set of "nonprice terms of credit," such as collateral and covenants, available for bankers to adjust their risk-return trade-off. Nonprice credit terms are particularly relevant because banks are the senior lenders in the buyout transactions. Given that bank debt typically equals only 50 percent of total capital, it may have been possible for banks to structure their loans to largely eliminate default losses. If so, it would have made sense to lend at the same interest rate in all deals. Recent theoretical work by Diamond [forthcoming] predicts exactly this reaction. In his model of buyout

financing, senior short-term bank lenders optimally structure their loans to have low risk and, correspondingly, a low promised return. As borrower risk increases, Diamond argues that the quantity of short-term bank debt will decline and the quantity of long-term junior debt will increase; that is, banks will react to changes in credit quality by adjusting the size of the loan rather than its pricing.

We do not have comprehensive data on nonprice credit terms for the bank loans in our sample, for example, on required collateral or covenants. As we have reported, however, banks both reduced the amount they loaned and required more rapid principal repayments in later deals. Both of these reactions are consistent with banks protecting themselves in reaction to lower overall buyout quality.

As noted earlier, the acceleration of repayment schedules may reflect an increased reliance on asset sales. In fact, these schedules (and the correspondingly tighter coverages) might have been a mechanism for forcing buyout companies to sell assets in order to raise cash. We examine the expected role of asset sales by recording post-buyout asset sales intentions as described in the buyout proxy and 14D statements. Columns (7) and (8) present annual medians for both (i) the fraction of deals where there are explicit plans to sell assets, and (ii) the amount of anticipated asset sales as a percentage of total capital for those deals where asset sales are planned. The numbers indicate some increase in expected asset sales over time. Asset sales are expected in 21 percent of the pre-1983 MBOs, 27 percent of the 1983 to 1985 MBOs, and 39 percent of the 1986 to 1989 MBOs. These differences are not, however, statistically significant. Conditional on a planned sale, asset sales are a roughly constant fraction of total capital, at medians of 15.5, 19.8, and 18.5 percent, respectively, for the three periods.

The correlation between tight coverages and asset sales appears more strongly in the cross section. In columns (1) and (2) of Table V, we regress the ratios of net cash flow and EBITDA to expected cash debt obligations against a dummy variable that equals one for buyouts with expected asset sales. As with most of the regressions that follow, these regressions also include dummy variables that control for the year of the buyout. The year dummies are included to pick up the time-series variation in the dependent variable—in this case, cash flow to debt obligations—leaving the asset sales dummy variable to pick up variation within a given year.

Regression (1) shows that buyouts with expected asset sales

TABLE V

REGRESSIONS OF CASH FLOW TO DEBT OBLIGATIONS AND CASH FLOW TO TOTAL CAPITAL AS A FUNCTION OF EXPECTED ASSET SALES

The sample includes 124 management buyouts completed in the period 1980–1989. Net cash flow equals EBITDA less capital expenditures in the last full year before the management buyout announcement. EBITDA equals operating income before interest, taxes, depreciation, and amortization. Cash debt obligations equal the sum of expected post-buyout cash interest payments and bank debt principal repayment in the first post-buyout year. Capital equals the sum of (1) the market value paid for the firm's equity; (2) the value of the firm's outstanding debt; and (3) the fees paid in the transaction; less (4) any cash removed from the firm to finance the buyout. Expected Asset Sales variable equals 1 if proxy or 14D statement acknowledges plans to sell assets after the buyout; it equals 0 otherwise.

	(1) Net cash flow to cash debt obligations		(2) EBITDA to cash debt obligations		(3) Net cash flow to total capital (%)		(4) EBITDA to total capital (%)	
	Coeff.	*S.E.*	Coeff.	*S.E.*	Coeff.	*S.E.*	Coeff.	*S.E.*
Constant	0.90***	0.16	1.26***	0.13	11.3***	2.1	17.2***	1.3
1982 MBOs	−0.46**	0.23	−0.12	0.18	−0.2	2.8	1.2	1.7
1983 MBOs	−0.17	0.21	−0.09	0.17	−3.4	2.7	−3.2*	1.7
1984 MBOs	−0.11	0.19	−0.06	0.16	−2.2	2.4	−2.1	1.5
1985 MBOs	−0.20	0.19	−0.19	0.16	−2.6	2.5	−4.2**	1.6
1986 MBOs	−0.34*	0.21	−0.25	0.16	−2.7	2.5	−2.7*	1.5
1987 MBOs	−0.51***	0.19	−0.42***	0.15	−5.6**	2.4	−5.5***	1.5
1988 MBOs	−0.38**	0.18	−0.41***	0.14	−4.8**	2.3	−5.9***	1.4
1989 MBOs	−0.27	0.24	−0.30	0.20	−2.5	3.1	−4.3**	1.9
Expected asset sales	−0.26***	0.09	−0.27***	0.07	−2.0**	1.0	−0.7	0.6
N obs.	85		90		118		122	
R^2	0.28		0.35		0.15		0.28	

***Significant at 1 percent level. **Significant at 5 percent level. *Significant at 10 percent level.

are associated with ratios of net cash flow to debt obligations 0.26 lower (significant at the 1 percent level) than buyouts without expected asset sales. For example, the coefficients imply that a typical 1987 buyout without expected asset sales has a ratio of 0.39 (0.90 − 0.51), while one with expected asset sales has a ratio of only 0.13 (0.39 − 0.26). Similarly, regression (2) indicates that expected asset sales are associated with a 0.27 decrease (significant at the 1 percent level) in the ratio of EBITDA to debt obligations.

A correlation between tight coverages and the use of asset sales is not very surprising. As the foregoing discussion suggests, the two features would appear to be clearly complementary. Perhaps more interesting is that asset sales are also associated with somewhat more aggressive pricing of buyout transactions. Table V presents regressions in which our pricing measures are regressed against the expected asset sales and yearly dummy

variables. Regression (3) associates asset sales with a decrease in the net cash flow to capital ratio of 2 percent (significant at the 5 percent level). For example, a typical 1987 buyout without asset sales has a ratio of 5.7 percent (11.3 – 5.6), while one with expected asset sales has a ratio of only 3.7 percent (5.7 – 2.0). Regression (4) indicates that asset sales are also associated with a decrease in EBITDA to capital ratios of 0.7 percent although this estimate is not statistically significant.

Regressions (3) and (4) in Table V are interesting because it is not obvious on theoretical grounds why plans to sell assets should make a firm more valuable in the aggregate. The first-order effect of asset sales would seem to be to transfer value from junior to senior creditors, not to create new value. To see this, consider the polar case where the asset sale generates enough cash to completely repay the senior debt. In this case, the use of asset sales makes the senior debt riskless, thereby increasing its value while shifting more risk onto the junior debt. It is therefore understandable why senior bank lenders would be willing to lend to more aggressively priced deals only if they could force asset sales. It is less clear why junior lenders would be willing to participate in such deals.[19]

To summarize the results of this section: senior bank lenders appear to have placed a relatively small emphasis on interest rate spreads in their structuring of buyout loans. Rather, it seems that, over time, they (1) increased fees, (2) reduced the fraction of the total debt they provided, and (3) imposed more rapid repayment schedules, which could only be met by firms selling assets and giving them the proceeds. Asset sales look to have played a somewhat more prominent role in the more aggressively priced deals.

The overall picture that emerges is one of the banks making "defensive" structuring adjustments in the later, higher priced buyouts. While these adjustments may have made sense from the banks' senior perspective, they raise several questions. Who and why were the junior lenders agreeing to these structuring changes?

19. Shleifer and Vishny [1992] offer one possible explanation. They argue that a liquid asset-sales market can lead to higher asset values for companies that can readily sell off assets. However, given the relatively small magnitude of planned asset sales for our MBOs—the annual median, conditional on a stated intent to sell assets, never exceeds 24 percent of capital—it is unclear whether this story can account for the entire pricing difference associated with the stated intent to sell assets.

And what are the implications of these changes for the likelihood and costs of financial distress?

VI. Subordinated Debt

We now turn to an examination of the subordinated debt in our sample transactions. In what follows, we focus on nonprice attributes of this debt: private placement versus public issuance, the use of deferred interest securities, and the use of "strip" financing techniques. In contrast to our analysis of the senior bank debt, we pay very little attention to promised coupon yields. Given the extremely junior nature of some of this debt, variations in promised yields are likely to be relatively uninformative about variations in expected returns. In other words, promised yields probably do not give an accurate picture of "true" subordinated debt pricing.[20]

Table VI presents yearly averages of several characteristics of the subordinated debt used to finance the sample buyouts. Column (2) shows the fraction of buyouts financed using publicly issued low-grade, or junk bonds—bonds rated less than BBB by Standard and Poor's or Baa by Moody's. Only one pre-1985 buyout uses public junk bonds. In contrast, over 54 percent of the subsequent buyouts use them.

Many buyouts also issue a second type of widely held debt as part of the buyout financing, commonly called "cram down" debt. Cram down is debt issued by the new buyout firm as part of the payment to the pre-buyout shareholders to take the company private. Because the pre-buyout shares are widely held, so is the cram down debt. Column (3) also shows an increased reliance on the use of cram down debt, particularly after 1984.

Column (4) of Table VI presents the ratio of new public buyout

20. An example helps make this clear. Suppose that we have two LBOs. In the first the senior debt has a slow repayment schedule, and the subordinated debt receives cash interest starting right away. In the second the senior debt has a very fast repayment schedule, and the subordinated debt receives no cash interest for several years. Suppose further that the coupon on the second buyout's subordinated debt is 200 basis points higher. This does not say much about the relative *expected* returns on the two junk bonds. The subordinated debt in the second deal is effectively more junior and will expect to suffer greater losses in adverse states. For evidence on the returns and risk of low grade debt, see Asquith, Mullins, and Wolff [1989] and Kaplan and Stein [1990].

Interest rate spreads will also be unreliable when subordinated debt-holders invest in post-buyout equity. Such debt-holders may be willing to accept lower interest rates in exchange for the equity "kicker." As we document below, the use of such arrangements changed over time.

TABLE VI
SUBORDINATED DEBT

Summary statistics on subordinated debt variables for 124 management buyouts completed in the period 1980–1989. Junk debt is publicly issued debt rate below BBB– by Standard & Poor's or below Baa3 by Moody's. Cram down debt is debt issued to pre-buyout shareholders as part of the going private payment. PIK (pay-in-kind) and discount debt are debt obligations that do not require cash interest payments. Strip financing refers to transactions in which some debt-holders hold at least 5 percent of post-buyout equity.

Year	(1) Number of MBOs	(2) % of deals with public junk debt	(3) % of deals with cram down debt	(4) Average junk and cram down to capital (%)	(5) % of deals with PIK or discount debt	(6) Average PIK or discount debt to capital (%)	(7) Strips (% of deals)	(8) Average strip debt to capital (%)
1980 + 1981	6	0.0	0.0	0.0	0.0	0.0	83.3	36.6
1982	8	0.0	12.5	1.2	25.0	3.0	75.0	24.5
1983	10	0.0	10.0	1.1	10.0	1.1	70.0	27.5
1984	17	5.9	23.5	5.7	11.8	2.1	47.1	17.3
1985	12	58.3	58.3	25.9	50.0	7.6	50.0	19.7
1986	15	40.0	26.7	17.5	26.7	5.6	33.3	7.4
1987	20	50.0	45.0	24.9	50.0	9.7	10.0	4.4
1988	31	61.3	38.7	22.5	61.3	8.5	29.0	12.0
1989	5	60.0	40.0	21.5	60.0	10.6	20.0	9.4
Total	124	37.1	32.3	16.1	37.9	6.1	39.4	14.8
Time trend		(+)***	(+)**	(+)***	(+)***	(+)***	(−)**	(−)***
1980–1982 vs. 1983–1985		(+)*	(+)*	(+)**	(+)	(+)	(−)	(−)
1983–1985 vs. 1986–1989		(+)***	(+)	(+)***	(+)***	(+)***	(−)***	(−)***

***Significantly different over time or across comparison periods at 1 percent level; **at 5 percent level; and *at 10 percent level.

debt—combined junk and cram down debt—to total capital over time. Consistent with the previous two columns, the ratio rises sharply in 1985. Before 1985, new public debt is a small fraction of total capital; from 1985 and beyond it always exceeds 17 percent of total capital. The increase over time is significant at the 1 percent level. Note that these are unconditional averages, including buyouts both with and without widely held debt. These averages, therefore, understate the importance of public debt in those transactions that actually utilize it.

As we noted earlier, the trend toward increased use of public subordinated debt coincides with the adjustment by banks to reduce the size of their loans. In a regression that does not control for the year of the transaction, the ratio of bank debt to total debt is 15.2 percent lower (significant at the 1 percent level) in buyouts that rely on junk bonds than in buyouts that do not. Column (1) of Table VII repeats this regression, but includes dummy variables that control for the year of the buyout. Even in this purely cross-sectional regression, the ratio of bank debt to total debt is still 11.1 percent lower in buyouts using junk bonds (again, significant at the 1 percent level). This pronounced crowding out of the bank debt by junk bonds is consistent with the notion that overheated junk bond investors were willing to bid more aggressively for buyout loans than were the relatively defensive bankers.

Table VI points out two additional trends in subordinated debt financing, both significant at the 5 percent level or better. First, columns (5) and (6) show that the use of deferred interest debt increases after 1984. Such debt is used in only 12 percent of pre-1985 buyouts, but in more than 50 percent of the buyouts thereafter. Similarly, deferred interest debt as a percentage of total capital increases as well, exceeding 8.5 percent in all years after 1986.

The increase in deferred interest on the subordinated debt has, all else equal, a similar effect to the faster senior debt repayment. It further "juniorizes" the subordinated debt, potentially transferring value to the senior bank lenders. In buyouts that use deferred interest debt, much of the bank debt is scheduled to be paid off before the buyout firm begins cash payments on the deferred interest debt. Interestingly, the deferred interest debt is disproportionately public subordinated debt: either junk or cram down. Of the 59 buyouts that do not use junk or cram down debt, only three issue deferred interest debt. In contrast, deferred interest securities are present in 44 of 65 buyouts that use public debt.

TABLE VII

REGRESSIONS OF BANK DEBT TO TOTAL DEBT AND CASH FLOW TO TOTAL CAPITAL AS A FUNCTION OF USE OF JUNK DEBT

Sample includes 124 management buyouts completed in the period 1980–1989. Bank debt to total debt is the ratio of the senior debt (term loan and revolving credit loan) to the total debt of the buyout company. Net cash flow equals EBITDA less capital expenditures in the last full year before the management buyout announcement. EBITDA equals operating income before interest, taxes, depreciation, and amortization. Capital equals the sum of (1) the market value paid for the firm's equity; (2) the value of the firm's outstanding debt; and (3) the fees paid in the transaction; less (4) any cash removed from the firm to finance the buyout. Use junk debt variable equals one if the buyout is financed using publicly held junk debt; it equals 0 otherwise. Junk debt is publicly issued debt rated below BBB– by Standard & Poor's or below Baa3 by Moody's.

	(1) Bank debt to total debt (%)		(2) Net cash flow to total capital (%)		(3) EBITDA to total capital (%)	
	Coeff.	*S.E.*	Coeff.	*S.E.*	Coeff.	*S.E.*
Constant	48.6***	7.3	10.4***	2.1	16.8**	1.3
1982 MBOs	21.9**	9.7	0.7	2.7	1.3	1.7
1983 MBOs	25.3***	9.3	−3.4	2.6	−3.6**	1.7
1984 MBOS	16.0*	8.6	−1.8	2.4	−2.2	1.5
1985 MBOs	−0.9	9.4	−1.4	2.6	−3.0*	1.7
1986 MBOs	10.0	8.9	−2.4	2.5	−1.6	1.6
1987 MBOs	8.1	8.7	−4.7*	2.4	−4.8***	1.6
1988 MBOs	13.8	8.5	−3.6	2.4	−4.4***	1.5
1989 MBOs	10.4	11.1	−0.9	3.1	−3.0	2.0
Use junk debt	−11.1***	4.0	−1.6	1.1	−1.6**	0.7
N obs.	121		120		124	
R^2	0.26		0.06		0.26	

***Significant at 1 percent level. **Significant at 5 percent level. *Significant at 10 percent level.

The use of public subordinated debt also appears to be related to the overall pricing of transactions. Columns (2) and (3) of Table VII regress our pricing measures against the junk debt and yearly dummy variables. The year dummies control for the time series (and, therefore, market) variation in cash flow to price variables.[21] The regressions indicate that the use of junk debt is associated with a decline in both net cash flow and EBITDA to total capital ratios of 1.6 percent. Both of these coefficients are economically significant.

21. Alternatively, we obtain virtually identical results when we run the regressions using market- or industry-adjusted cash flow to price ratios on the left-hand side.

For example, the coefficients imply that 1988 buyouts financed without junk bonds have net cash flow and EBITDA to total capital ratios, respectively, of 6.8 percent and 12.4 percent; for those financed with junk bonds the implied ratios are 5.2 and 10.8 percent, respectively. The coefficient in the EBITDA to capital regression is statistically significant at the 5 percent level. This finding also fits with the notion that junk bond investors were particularly aggressive bidders for buyout loans.

Finally, at the same time that the use of deferred interest and public subordinated debt increases, the use of strip financing declines. The last two columns of Table VI present (1) the percentage of transactions using some form of strip financing and (2) strip debt as a fraction of total capital. Strip financing is present when lenders invest in post-buyout equity. In most cases of strip financing, it is the subordinated debt-holders who hold the equity. However, we also include several cases in which the senior lender or lenders purchase equity. Over 70 percent of the buyouts before 1984 utilize some form of strip financing. The debt owned by strip holders equaled at least 24 percent of the total capital of these buyouts. In contrast, fewer than 25 percent of the post-1985 buyouts use strip financing, with strip debt worth at most 12 percent of total capital.

As in the case of deferred interest debt, the use of strip financing is related to the use of public debt, although in this case the relation goes the opposite way. Over 59 percent (35/59) of the buyouts that do not use public debt use strip financing, compared with fewer than 22 percent (14/65) of the buyouts that do use public debt.

In sum, the results in this section indicate that beginning in 1985, financing from the public junk bond market displaced not only private subordinated debt, but also to some degree senior bank debt. Junk bond financing was more likely to involve deferred interest securities, less likely to involve strips, and was associated with higher buyout prices.

VII. INCENTIVES

The third and final category of data we examine concerns the incentives of buyout investors. One of the supposed spurs to improved performance in buyouts is the increased equity stake of management. Managers who invest a large portion of their wealth in and own a large percentage of post-buyout equity might be

expected to manage better. As we noted in Table III, the percentage of common stock to total capital declines after 1985, just as pricing and coverages become more aggressive. Table VIII considers the change in equity ownership in more detail.

Columns (1) and (2) present the median percentage of pre-buyout and post-buyout equity (fully diluted to account for stock options) owned by the post-buyout management team. Before the buyout, the new management team owns a median of 5 percent of equity. This percentage trends upward (significant at the 5 percent level), peaking at more than 8 percent in both 1987 and 1988. The median management equity ownership of the post-buyout company is 22.3 percent, and also trends upward (significant at the 10 percent level). Column (3) combines the information in columns (1) and (2) by calculating the ratio of the percentage of post- to pre-buyout equity owned by the management team. This ratio provides a measure of the change in the intensity of the relationship between managerial effort and compensation. The median ratio for the 102 buyouts with pre- and post-buyout information is 4.14. The ratio trends downward, but not significantly.

While their large percentage stakes in post-buyout equity suggest that managers will work hard to maximize shareholder value once the buyout has been completed, the large post-buyout stakes alone do not ensure that managers will only enter into transactions that are ex ante well priced and structured. It is important to recognize that managers typically "cash out" in dollar terms at the time of a buyout. That is, although their percentage ownership of the now-levered equity rises sharply, *the dollar amount* invested tends to fall. This cashing out could have important and potentially adverse ex ante incentive effects. In particular, the larger the capital gain they are able to realize at the time of the deal, the more managers may be tempted to go along with (or even encourage) a buyout that they know to be overpriced or poorly structured. At the extreme, a manager who is offered a significant ownership stake in post-buyout equity at no cost may find it hard to turn down what is, in effect, a free option, even if the buyout has only a small chance of success.

Column (4) of Table VIII and Figure III present the annual median ratios of the dollar value of post- to pre-buyout equity owned by the management team. The median ratio is 0.460, indicating that the management team typically invests less than half as much in post-buyout equity as it receives for its pre-buyout equity. The time trend of this variable over the 1980s is signifi-

TABLE VIII
INCENTIVES

Summary statistics for pre- and post-buyout management percentage and dollar equity ownership, hostile pressure, and total fees to capital. Annual medians are presented for all variables except for hostile pressure which has annual averages. Sample includes 124 management buyouts completed in the period 1980–1989. Old management equity percentage is the percentage of pre-buyout equity held by the post-buyout management team. New management equity percentage is the percentage of post-buyout equity held by the post-buyout management team. New %/old % mgmt. equity is the ratio of new management equity percentage to old management equity percentage. New $/old $ mgmt. equity is the ratio of the dollar value of post- to pre-buyout equity held by the post-buyout management team. Old equity is valued at the final buyout equity value. Hostile pressure is present if (1) a competing takeover bid is made or (2) a stockholder owns at least 5 percent of the company's stock and is opposed in some way by management in the six months before the buyout. Total fees include all fees reported in the proxy or 14D statement describing the buyout transaction. Capital equals the sum of (1) the market value paid for the firm's equity; (2) the value of the firm's outstanding debt; and (3) the fees paid in the transaction; less (4) any cash removed from the firm to finance the buyout. Number of observations is below median.

Year	(1) Old mgmt. equity(%)	(2) New mgmt. equity (%)	(3) New %/ old % mgmt. equity	(4) New $/ old $ mgmt. equity	(5) Hostile pressure	(6) Total fees to capital
1980 + 1981	1.5	10.1	7.58	0.707	50.0	2.05
	6	6	6	6	6	6
1982	2.0	23.1	6.79	0.958	50.0	2.66
	8	8	8	8	8	8
1983	5.2	15.5	3.42	0.524	30.0	2.58
	10	9	9	9	10	9
1984	4.4	27.5	3.81	0.670	23.5	2.21
	17	17	17	17	17	17
1985	3.5	22.5	4.51	0.334	41.7	3.69
	12	11	11	11	12	12
1986	5.1	20.8	6.28	0.314	46.7	5.06
	12	13	11	11	15	15
1987	8.1	19.0	3.54	0.410	50.0	4.32
	17	14	14	14	20	20
1988	8.4	28.5	2.86	0.349	30.0	5.97
	25	24	22	22	30	31
1989	6.2	15.3	2.93	0.542	25.0	5.73
	4	4	4	4	4	5
Total	5.0	22.3	4.14	0.460	37.7	3.81
	111	106	102	102	122	123
Time trend	(+)**	(+)*	(−)	(−)*	(−)	(+)***
1980–1982 vs. 1983–1985	(+)**	(+)**	(−)	(−)	(−)	(+)
1983–1985 vs. 1986–1988	(+)	(+)	(−)	(−)*	(+)	(+)***

***Significantly different over time or across comparison periods at 1 percent level; **at 5 percent level; and *at 10 percent level.

cantly negative at the 10 percent level, with a particularly sharp drop between 1984 and 1985. Before 1984 the median ratio is 0.57. From 1985 to 1989 the median ratio is 0.35. This difference is significant at the 5 percent level. These results, therefore, indicate

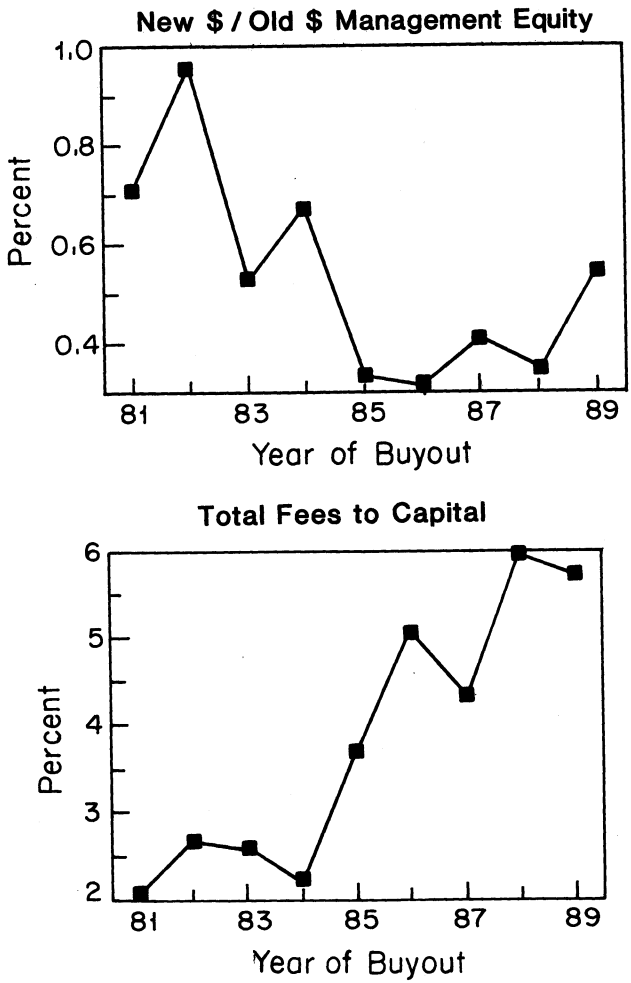

FIGURE III

Annual Medians of New $ to Old $ Management Equity and Total Fees to Capital

New $/Old $ Management

Equity is the ratio of the dollar value of post- to pre-buyout equity held by the post-buyout management team. Old equity is valued at the final buyout equity value. Old management equity is calculated using the pre-buyout equity held by the post-buyout management team. New management equity is calculated using the post-buyout equity held by the post-buyout management team. Total fees include all fees reported in the proxy or 14D statement describing the buyout transaction. Capital equals the sum of (1) the market value paid for the firm's equity; (2) the value of the firm's outstanding debt; and (3) the fees paid in the transaction; *less* (4) any cash removed from the firm to finance the buyout.

that management cashed out more in the buyouts of the later 1980s than in earlier ones.

It has also been suggested that managers increasingly used buyouts as a mechanism to escape from hostile takeovers. According to this view, as hostile takeover pressure increases, managers will want to maintain control at any cost, and again, may be more inclined to go along with "bad" deals. Column (5) of Table VIII presents the annual fraction of transactions subject to overt hostile pressure. We define hostile pressure as (1) the presence of a competing takeover bid or (2) the presence of a stockholder who owns at least 5 percent of the company's stock and is opposed in some way by management in the six months before the buyout. Surprisingly, we find an insignificant time trend in hostile pressure for these firms; such pressure has always been present in larger buyouts.

Management investors are not the only parties driven by incentives. So are buyout promoters, investment banks, and lenders. Most buyout participants are compensated both with long-term security interests and with up-front fees. As we showed in Section V, banks required higher up-front fees in the later 1980s than before. Column (6) of Table VIII and Figure III indicate that the same is true for total buyout-related fees.[22] The largest portion of these fees is paid to buyout promoters, investment banks, and commercial banks. The upward trend in fees is significant at the 1 percent level. The column indicates that total fees to total capital make their largest jump in the late 1980s. They range from 2.05 percent to 2.66 percent before 1985, rise to 3.69 percent in 1985, and peak at 5.97 percent in 1988.

VIII. Interpreting the Evidence

As was noted earlier, many of the facts documented here can be interpreted in more than one way. In this section we pursue two of these interpretations in more detail. We start by discussing how our ex ante evidence might be used as support for the overheated buyout market hypothesis. We then examine an alternative story more consistent with rational investor behavior. Finally, we examine some preliminary ex post data in an effort to sharpen our conclusions.

22. Total buyout-related fees are almost always listed in the proxy or 14D statement describing the buyout. We do not present separate fees for different parties because these fees are not always disaggregated.

A. The Overheated Buyout Market Hypothesis

The evidence we have compiled so far can be used to tell a detailed story of overheating in the buyout market, one that centers largely on the role of publicly issued junk bonds.

The story goes as follows: beginning in 1985, junk bond investors, attracted by the success of earlier deals, pour large amounts of money into the buyout market. This pushes up prices in general, and especially, prices in those deals in which junk bonds are actually used. Other, less aggressive classes of lenders (i.e., banks and private subordinated lenders) react defensively to the "demand push" from the junk bond market. They reduce their participation in deals, and in the case of the banks, take steps—i.e., faster principal repayments and forced asset sales—to effectively enhance their senior status. The junk bond investors do not prevent themselves from being "juniorized" in this way. Indeed, by accepting large quantities of deferred interest securities, they further accelerate the process.

Even more so than the bankers, other interested parties are also successful in extracting money from the deals up front. Ostensibly well-informed players such as management, buyout promoters, and investment bankers are increasingly able to earn compensation simply for completing a transaction, rather than having their fortunes ride on its eventual success or failure. Thus, instead of providing a system of checks and balances, these "smart money" participants may be quite eager to go along, even with deals that they view as precarious.

If this junk bond/demand push story is correct, it implies two channels through which investor returns in later deals might be reduced. The first, obvious channel, is pricing. All else equal, the higher prices relative to fundamentals will mean lower returns for some categories of investors. The second, more subtle, channel relates to costs of financial distress. Although ex ante expected costs of financial distress are hard to assess, many of the capital structure changes that accompanied the inflow of junk bond financing can be viewed as having negative implications for these costs.

First, the dramatic shift from privately placed to widely held subordinated debt that occurred in 1985 points toward higher expected costs of financial distress. With widely dispersed creditors, free-rider problems are more likely to impede efficiency-enhancing actions. For example, it can be in the collective interest of subordinated debt-holders to contribute new funds for investment,

but any single holder may find it individually rational not to do so.[23] Gilson, John, and Lang [1990] find evidence consistent with this. In their sample, financially distressed firms are more likely to restructure debt outside of bankruptcy when there is a higher proportion of private bank debt to total liabilities and when there are fewer classes of debt outstanding.[24]

A second change that may have increased the potential for costly financial distress is the decline of the strip financing technique common in earlier buyouts. When a firm is in distress, conflicts of interest between lenders and equityholders can lead to the types of distortions discussed by Jensen and Meckling [1976] and Myers [1977]. By partially resolving conflicts of interest, strip financing arguably reduces these distortions. Some observers have singled out strips as an important innovation that made highly leveraged capital structures more prudent than they otherwise appeared. Jensen [1988] writes "because every securityholder in the highly leveraged firm has the same claim on the firm, there are no conflicts between senior and junior claimants over reorganization of the claims in default. Thus the firm will not go into bankruptcy; a reorganization can be accomplished voluntarily, quickly, and at a lower cost than in bankruptcy proceedings." If this logic is correct, the decline of strip financing in the late 1980s is puzzling, to say the least.

In addition to the movement toward public debt and away from strip financing, other changes in buyout debt structure may also have had important implications for expected costs of financial distress. One such change is the "juniorizing" of the public subordinated debt that resulted from both faster principal repayments on the senior bank debt and the trend toward deferred interest junk bonds.

Gertner and Scharfstein [1991] point out that the combination of senior bank debt and junior public debt can have an adverse impact on the ability of distressed firms to invest. The logic is as follows. Suppose that a firm is in financial difficulty and needs an infusion of new money to make a positive net present value investment. On the one hand, bank lenders would seem to be the

23. See Bulow and Shoven [1978] and White [1980, 1983] for early models that show how the inability to renegotiate with public debt-holders leads to inefficiencies.

24. In this regard, it is also worth noting the rapid emergence of the secondary market for senior bank buyout loans. Although we do not have accurate data for buyouts, conversations with commercial bankers suggest that, over time, the ownership of senior bank loans became more fragmented. Gorton and Pennachi [1991] present evidence that this is true for bank loans in general.

best hope for putting up the new money, since they do not face as severe a free-rider problem as the widely dispersed junior lenders. On the other hand, the banks' senior status probably reduces their incentive to invest. The banks may already be well protected and may not have much upside to gain from further investment.

Now consider what happens if the bank's principal repayments are moved forward in time. This has two negative effects. First, the higher debt service burden raises the probability that there will be a distress situation, as it is more likely that the firm will be unable to meet its contractual obligations. Second, the fact that the banks extract value more rapidly effectively enhances their senior status relative to the subordinated debt.[25] This further protects the banks and may correspondingly further reduce their incentives to contribute new money. It seems possible, at least in theory, that the faster repayment schedules might, therefore, increase expected costs of financial distress. In fact, Asquith, Gertner, and Scharfstein [1992] present evidence on junk-bond issuers that is strongly consistent with this conjecture. They find that distressed companies with greater proportions of secured bank debt are more prone to go bankrupt. In other words, the better protected are the senior bank lenders, the worse a junk-bond-financed company fares in financial distress.

B. An Alternative Interpretation

An interpretation of our evidence more consistent with investor rationality can be generated by appealing to an exogenous "technological" change in the buyout environment. One (though not the only) candidate for such a change might be an increase in the liquidity of the asset sales market. A secular increase in the liquidity of the asset sales market could help explain rising buyout prices in general, to the extent that buyouts typically create some of their value by relocating assets to different owners.

More subtly, there could arise an endogenous correlation between deals where asset sales are expected to play an important role, and the use of public junk bonds. If junk bonds make it harder for a distressed firm to recast its capital structure, then one might expect junk bonds to be used most often in those deals where there are alternatives to recasting the capital structure; i.e., deals where asset sales can be used as a substitute method for averting or

25. This is true so long as the firm does not immediately file for bankruptcy protection. In this case, the repayment schedules would no longer be relevant, since all debt would effectively come due immediately.

coping with a cash shortfall. Shleifer and Vishny [1992] argue that it was precisely this increase in asset liquidity in the early and mid-1980s that made the large growth of the public junk bond market possible.

Such an endogenous correlation would have a number of implications. First, it could help explain the cross-sectional relationship between deal pricing and the use of junk bonds, which may simply be an indicator that the firm in question has a lot of easily detachable and marketable assets. If the potential for doing asset sales is in itself value-increasing, this "detachability" attribute might legitimately command a higher buyout price. Second, if junk bonds are an indicator of asset detachability, it would be incorrect to conclude that deals with junk bonds have, on net, higher expected costs of financial distress.

It should be noted that this alternative story does not explain *all* of our empirical findings. For example, increased liquidity in the asset sales market would not appear to offer much insight into the trend toward more front-loaded compensation for managers and other interested parties. Nonetheless, this alternative explanation demonstrates that our ex ante results do not constitute definitive proof of the overheated buyout market hypothesis.

IX. Ex Post Evidence

While it may be impossible to fully resolve the ambiguities raised above, we make an effort in this direction by examining post-buyout data. The overheating hypothesis holds that buyouts in the later 1980s were more precariously structured, ex ante, than earlier deals. This suggests that, even with operating improvements, later deals would have run into difficulty more often. The alternative interpretation that deals were rationally priced and structured, ex ante, but simply experienced bad luck, ex post, suggests that expected operating improvements failed to materialize.

Furthermore, from a cross-sectional perspective the overheating hypothesis would seem to imply that "poorly structured" deals—in terms of pricing, capital structure, or incentives—should become financially distressed more often. This should be especially true of deals financed with junk bonds because these deals tended to have both higher prices as well as capital structures that were less easily renegotiated.

The alternative interpretation of the evidence does not make the same predictions about ex post outcomes. Because cross-sectional variations in price, capital structure, and incentives are

seen as reflecting legitimate variations in unobserved fundamentals, they should not necessarily be correlated with ex post difficulties. For example, if junk bonds are (sensibly) used only in deals where asset sales provide an alternative means of averting distress, we should not expect to see a disproportionate number of junk-bond-financed deals become distressed.

In this section we present preliminary evidence on (1) the extent to which management buyouts have become financially distressed; (2) the nature of post-buyout operating performance; and (3) the cross-sectional relation between ex post financial distress and ex ante measures of pricing, capital structure, and incentives. We obtain post-buyout information by consulting 10-K filings, the *WSJ* index, and the NEXIS database. We stress the preliminary nature of these results, particularly for buyouts undertaken in the last several years of our sample period. First, the ultimate success or failure of many later deals is still unresolved. And second, there may be a bias against finding financial distress for companies with no public junk bonds outstanding.[26]

A. Frequency of Distress

We present three measures of distress as of August 1991: (1) encountering some form of distress, (2) defaulting on a debt payment, and (3) filing for Chapter 11 bankruptcy protection. We consider a buyout to have encountered distress if it has defaulted on a debt payment or if a press report indicates that the buyout has attempted to restructure its debt because of difficulty in making debt payments.[27] Buyout companies that encounter some form of distress after a post-buyout releveraging are not considered to have defaulted because the original buyout did not default.

Before analyzing the three measures of distress further, we should emphasize that they do not necessarily address the same phenomena. For example, encountering distress likely indicates that some class of investors has lost money (and, hence, may suggest that a deal was overpriced), but has little to say about the deadweight costs of financial distress. A transaction that encounters distress may be able to restructure at low cost. At the other

26. We do not believe lack of disclosure is an important problem. Because a Chapter 11 filing is announced to the public, any such filing would have appeared in NEXIS database searches. It is possible that we would miss cases in which companies with private debt missed debt payments, but restructured. However, many, if not all, of these would have been reported because the companies involved are not small. Supporting this view, we found post-buyout stories in the NEXIS database for all but five of our sample companies.

27. We obtain similar results if we define distress as obtaining an infusion of new private equity or retiring bonds below par in addition to defaulting on debt payments.

extreme a Chapter 11 filing is more likely to proxy for a costly distress situation.

Column (1) of Table IX presents the percentage of each year's buyouts that have encountered some form of distress. Overall, 25 percent of our sample firms fall in this category. The incidence of financial distress increases significantly (at the 1 percent level) over time, with 1985 as the apparent breakpoint. Before 1985 only 1 of 41 buyouts experienced distress; from 1985 and onward, 30 of 83 have. Column (2) presents the percentage of each year's buyouts that have subsequently been unable to meet their post-buyout debt payments. As noted in the Introduction, defaults increase significantly (at the 10 percent level) over time, again with 1985 appearing to be the year of change. Column (3) presents the percentage of buyouts that have filed for Chapter 11 bankruptcy. Fewer than one-half of the companies that have defaulted on debt payments also have filed for Chapter 11. The time trend here is positive, but not statistically significant. However, because defaults usually precede a Chapter 11 filing, this trend may become more pronounced with the passage of time.

B. Post-buyout Operating Performance

The increase in defaults may be caused by a combination of ex ante changes in pricing and structuring as well as ex post surprises in performance. Columns (4) and (5) of Table IX present the annual medians of changes in EBITDA and net cash flow to sales in the first post-buyout year relative to the last pre-buyout year. For the entire sample the ratios change by 9.1 percent and 43.0 percent, respectively. There are no significant differences in these operating changes over time. Columns (6) and (7) presents the analogous ratios for the second post-buyout year. Overall, they increase by 12.1 percent and 41.8 percent. While the changes in EBITDA to sales do not exhibit any significant trends over time, the ratio of net cash flow to sales does decline over time (significant at the 10 percent level). This decline seems to be largely driven by the poor performance of 1986 buyouts.

These patterns of operating changes, therefore, do not offer much support for the view that ex post performance surprises, exclusively, have driven the increase in financial distress over time. Many of the buyouts of 1985, 1987, and 1988 have experienced financial distress despite performance increases.[28] Overall, the

28. It is always possible that these increases, although robust, are smaller than expected. We are, however, skeptical of this view. We reported in an earlier version of this paper that we find no significant increases in performance changes projected at the time of the buyout.

TABLE IX

POST-BUYOUT PERFORMANCE

Percentage of transactions defaulting on debt payments and filing for Chapter 11 bankruptcy, and medians for post-buyout performance measures for 124 management buyouts completed in the period 1980–1989. A firm experiences financial distress if it has defaulted on a debt payment or a press report indicates that the buyout has attempted or will attempt to restructure its debt because of difficulty in making debt payments. Firms that default on debt payments have been unable to meet debt service requirements incurred under the terms of the going private transaction. Net cash flow equals EBITDA less capital expenditures (CAPX) in the last full year before the management buyout announcement. EBITDA equals operating income before interest, taxes, depreciation, and amortization. Year $T + i$ is the ith full fiscal year of post-buyout operations. Growth in operating margins $T - 1$ to $T + i$ is the percentage change in the ratio of EBITDA to sales from the last full fiscal year of pre-buyout operations to the ith fiscal year of post-buyout operations. Growth in cash flow margins is the percentage changes for the ratio of net cash flow to sales from year $T - 1$ to year $T + i$. Number of observations is on second line.

Year	(1) Experience financial distress	(2) Default on debt payment	(3) Chapter 11	(4) Actual growth operating margins $t-1$ to $t+1$	(5) Actual growth cash flow margins $t-1$ to $t+1$	(6) Actual growth operating margins $t-1$ to $t+2$	(7) Actual growth cash flow margins $t-1$ to $t+2$
1980 + 1981	0.0	0.0	0.0	2.5	22.7	8.9	132.6
	6	6	6	3	2	3	3
1982	0.0	0.0	0.0	1.6	29.4	26.6	48.5
	8	8	8	5	4	5	4
1983	0.0	0.0	0.0	9.2	55.7	26.3	60.1
	10	10	10	8	7	7	7
1984	5.9	5.9	5.9	−1.3	28.4	−1.5	40.0
	17	17	17	12	12	11	11
1985	33.3	25.0	16.7	14.3	30.2	21.9	31.4
	12	12	12	11	11	9	9
1986	46.7	46.7	26.7	−7.9	17.7	−32.6	−45.5
	15	15	15	9	8	9	8
1987	45.0	30.0	15.0	15.6	67.0	22.5	30.8
	20	20	20	17	16	15	14
1988	29.0	16.1	0.0	14.2	48.4	12.3	22.8
	31	31	31	20	19	7	7
1989	20.0	20.0	0.0	25.2	40.7	N.A.	N.A.
	5	5	5	2	2		
Total	25.0	18.5	8.1	9.1	43.0	12.1	41.8
	124	124	124	87	81	66	63
Time trend	(+)***	(+)*	(+)	(+)	(+)	(−)	(−)*
1980–1982 vs. 1983–1985	(+)	(+)	(+)	(+)	(+)	(−)	(−)
1983–1985 vs. 1986–1989	(+)***	(+)**	(+)	(+)	(+)	(−)	(−)**

***Significantly different over time or across comparison periods at 1 percent level; **at 5 percent level; and *at 10 percent level.

results are consistent with ex ante changes in buyout pricing and financial structure playing a role in increased financial distress.[29]

Again, we emphasize the preliminary nature of these ex post results. We do not have post-buyout EBITDA results for approximately 30 percent of the sample companies. This leaves open the possibility of a selection bias, and may ultimately affect our conclusions on the trend of ex post performance.[30]

C. Relation Between Ex Post Distress and Ex Ante Variables

Table X presents ordinary least squares regressions of our three (ex post) financial distress variables against selected ex ante measures of pricing, capital structure, and incentives.[31] In separate regressions we use five variables that displayed significant trends in the 1980s as our independent variables. We run each of the regressions two different ways: with and without dummy variables for the year the buyout terms are set. On the one hand, annual dummies have the advantage of providing a control for ex post bad luck or changing market conditions. On the other hand, they may have the disadvantage of absorbing much of the relevant independent variation in the other right-hand-side variables. (Because of space constraints, the year coefficients are not presented.)

Since the regressions we present in the table are all univariate, they lack a precise structural interpretation. Rather, they are best thought of as a simple first pass at the data, an effort to see whether any meaningful patterns exist. We also have tried various multivariate specifications, and we shall comment on the most relevant ones below. However, it should be noted at the outset that not all multivariate specifications will be equally sensible because some of the five right-hand-side variables may be different proxies for the same basic concept: the junk bond/demand push phenomenon.

29. We are not implying that ex post surprises have not contributed at all to the increases in defaults. The particularly poor performance of 1986 buyouts undoubtedly contributes to their high default percentage. Furthermore, short-term interest rates reached a minimum in 1986 and rose steadily thereafter. Because most buyouts have some unhedged floating rate debt, ex post rate increases may have led to increased defaults.

30. See also Long and Ravenscraft [1991] and Opler [1992], who present evidence on ex post buyout performance. Long and Ravenscraft find that industry-adjusted increases in operating margins are smaller for later buyouts than for earlier ones. Because our results do not control for industry performance, it is not possible to compare our results directly. Opler, in contrast, finds that nominal and industry-adjusted increases in operating margins and cash flow margins are, if anything, larger for later buyouts than for earlier ones.

31. The results are qualitatively similar using logit regressions. We present the OLS results because they are easier to interpret.

TABLE X

RELATION OF FINANCIAL DISTRESS TO PRICING, CAPITAL STRUCTURE, AND INCENTIVE VARIABLES

Ordinary least squares regressions of measures of financial distress against pricing, capital structure, and incentive variables, with and without year dummies. Sample includes 124 management buyouts completed in the period 1980–1989. A firm experiences financial distress if it has defaulted on a debt payment or a press report indicates that the buyout has attempted or will attempt to restructure its debt because of difficulty in making debt payments. Firms that default on debt payments have been unable to meet debt service requirements incurred under the terms of the going private transaction. Chapter 11 indicates a firm has made a Chapter 11 bankruptcy filing. EBITDA equals operating income before interest, taxes, depreciation and amortization. Capital equals the sum of (1) the market value paid for the firm's equity; (2) the book value of the firm's outstanding debt; and (3) the fees paid in the transaction; less (4) any cash removed from the firm to finance the buyout. Cash debt obligations equal the sum of expected post-buyout cash interest payments and bank debt principal repayment in the first post-buyout year. Industry risk highest quartile equals one if the buyout firms is in the highest quartile of industry risk for the sample. Industry risk equals the buyout's Bernanke et al. industry earnings standard deviations. New $/old $ lowest quartile equals 1 if New $/old $ management equity is in the lowest sample quartile. New $/old $ mgmt. equity is the ratio of the dollar value of post- to pre-buyout equity held by the post-buyout management team. Use junk debt equals one if the buyout is financed using publicly held junk debt; it equals zero otherwise. Junk debt is publicly issued debt rated below BBB– by Standard & Poor's or below Baa3 by Moody's.

Ordinary least squares regressions

	Dependent variable equals one if firm:														
	A. Encounters financial distress					B. Defaults on debt payment					C. Firm enters Chapter 11				
Year dummies	Est. [S.E.]	R^2	Est. [S.E.]	R^2	N	Est. [S.E.]	R^2	Est. [S.E.]	R^2	N	Est. [S.E.]	R^2	Est. [S.E.]	R^2	N
	No		Yes			No		Yes			No		Yes		
(1) EBITDA/ capital	−1.82*	0.03	−0.43	0.16	124	−0.84	0.01	−0.04	0.14	124	−0.67	0.01	−0.75	0.13	124
	[0.99]		[1.11]			[0.90]		[1.01]			[0.63]		[0.71]		
(2) EBITDA/cash debt obligations	−0.09	0.00	0.18	0.19	90	−0.05	0.00	0.09	0.15	90	−0.05	0.00	−0.04	0.09	90
	[0.13]		[0.14]			[0.12]		[0.13]			[0.08]		[0.09]		
(3) Industry risk highest quartile	0.17*	0.03	0.19	0.19	114	0.17**	0.04	0.14*	0.17	114	−0.01	0.00	−0.04	0.11	114
	[0.09]		[0.13]			[0.08]		[0.08]			[0.06]		[0.07]		
(4) New $/old $ lowest quartile	0.09	0.01	0.04	0.25	102	0.17*	0.03	0.15*	0.28	102	−0.05	0.00	−0.05	0.18	102
	[0.10]		[0.10]			[0.09]		[0.08]			[0.06]		[0.06]		
(5) Use junk debt	0.31***	0.12	0.21**	0.20	124	0.17**	0.05	0.10	0.15	124	0.11**	0.04	0.11*	0.15	124
	[0.08]		[0.08]			[0.07]		[0.08]			[0.05]		[0.06]		

Two tailed tests: ***significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level.

The first set of six regressions (in row (1) of Table X) indicates that the likelihood a buyout encounters distress, defaults, or enters Chapter 11 is negatively related to the pricing variable, EBITDA to capital. However, only one of these relations is significant, that is for encountering distress without year dummies. The coefficients for the coverage variable, EBITDA to cash debt obligations, in the second set of regressions are negative in four of six regressions, but all are insignificant. The general lack of significance in the first two sets of regressions is consistent with the rational view that a substantial part of the variation in pricing and capital structure reflects variations in unobservable fundamentals. On the other hand, it may reflect the low power of our tests.

The third set of regressions includes a dummy variable that equals one if the Bernanke et al. [1990] standard deviation of industry earnings, industry risk, is in the highest quartile for the sample. We use a dummy variable here because the industry risk measure itself is severely skewed. We find that industry risk has a positive relation to the likelihood of distress and default. The point estimates are similar with and without year dummies, and appear to be both statistically and economically meaningful. Buyouts in the highest industry risk quartile are 19 percent more likely to encounter distress and 14 percent more likely to default. (If the likelihood other buyouts default is 11 percent, the likelihood a buyout with high industry risk defaults is 25 percent.)

The fourth set of regressions includes a dummy variable that equals one if the ratio of the dollar value of post- to pre-buyout equity owned by the management team is in the lowest quartile. Again, we use a dummy variable because the underlying variable is highly skewed. The ratios become very large for management teams with little pre-buyout equity. A high degree of cashing-out on the part of management is associated with a significant increase in the probability of default—15 percent and 17 percent—both with and without year dummies. The coefficients in the other regressions are not significant.

The final set of regressions includes a dummy variable that equals one if the buyout was financed using junk bonds. The coefficients are always economically meaningful and are statistically significant in all but one case. Even controlling for year effects, the use of junk bonds is associated with an increase in the likelihood of distress, default, and Chapter 11 of 21 percent, 10 percent, and 11 percent, respectively.

Because we view this last correlation to be the most interesting

finding in Table X, we investigated its robustness to several multivariate specifications. When the four other independent variables are added individually or all together with the junk bond variable in regressions without year dummies, the estimated coefficients on the junk bond variable are always economically and generally statistically similar to their values in univariate regressions. This is also true for regressions including year dummies except when the dummy variable for management equity investment is included. Only in this case are the estimated coefficients on the junk bond variable notably smaller in magnitude and of lower statistical significance.

We interpret the relatively strong and robust ability of junk bonds to predict future distress as supportive of the overheating hypothesis. According to the story sketched above, one would expect the presence of junk bonds to be an especially useful summary statistic, as it captures a tendency toward both higher prices and more fragile capital structures.

X. Conclusions

We now come back to the question we asked at the outset. Were there ex ante differences in the pricing and capital structure of buyouts in the late 1980s that might have led one to expect disappointing investor returns relative to those in earlier deals? In brief, our analysis of 124 large MBOs completed between 1980 and 1989 yields the following conclusions. (1) Buyout price to cash flow ratios rose (although not more sharply than marketwide or industrywide ratios). (2) Prices were particularly high in deals financed with junk bonds. (3) As prices rose, buyouts were undertaken in riskier industries, and with somewhat higher leverage ratios. (4) Banks took smaller positions in later deals, and at the same time accelerated required principal repayments, leading to sharply lower ratios of cash flow to total debt obligations. (5) The public junk bond financing that largely replaced private subordinated debt beginning in 1985 was much more likely to include deferred interest securities, and less likely to involve equity "strips." (6) Finally, management and other interested parties such as investment bankers and deal promoters were able to take more money up front out of the later deals.

On balance, our evidence, while not unambiguous, fits well with a version of the overheated buyout market hypothesis. According to this version of the story, the demand push from the

junk bond market that began around 1985 fundamentally altered both the pricing and capital structure of later buyouts. We view the changes in capital structure as particularly important. In an apparently defensive reaction, senior bank lenders participated less in the later, junk-bond-financed deals, and tried to extract their money more rapidly. While this reaction may have made good sense from the narrow perspective of the senior lenders, it arguably increased the expected costs of financial distress by exacerbating conflicts of interest between junior and senior claimants. Further support for this junk bond/demand push interpretation comes from our analysis of the ex post data, which finds the presence of junk bonds in a buyout to be a good predictor of various types of financial distress. Presumably, this is because the presence of junk bonds captures both a tendency toward higher prices and more fragile capital structures.

If this interpretation is correct, the question arises as to *how* the junk bond investors made the mistakes they did. Although such a question is inevitably difficult to answer satisfactorily, our data do provide some hints. To the extent that junk bond investors miscalculated, they probably did so by focusing too much on stated coupon yields and past buyout successes, and too little on the subtle capital structure details of the deals they were investing in. Holding everything else constant, there is a big difference between owning a debenture that does not begin to receive any cash payout until after the senior debt has been largely repaid, versus one that gets repaid along roughly the same schedule as the senior debt.

Whether or not one accepts the overheating interpretation—that many of the deals of the later 1980s should have been ex ante unattractive to smart investors—our data provide a helpful post-mortem of the buyout boom. At least with the benefit of hindsight, it seems clear that some of the changes in capital structure and incentives seen in the deals of the later 1980s were bad ideas. Thus, one might expect future buyouts to look more like those of the earlier 1980s: with less stringent principal repayment schedules, more closely held subordinated debt and strip financing, and less front-loaded compensation for management and other interested parties.

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