

On the Heterogeneity of Leveraged Going Private Transactions

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In contrast to previous literature, we argue that there are two types of poorly performing firms going private through a leveraged buyout (LBO). One group consists of firms in which managers own an insignificant fraction of their firm's stock and are vulnerable to a hostile takeover. The other group consists of firms in which managers own a significant fraction of their firm's stock and so face little risk of hostile takeover. Our evidence indicates that there are two such groups of LBOs and that their motivations and posttransaction actions are different.

Jensen's (1986a) "free cash flow" hypothesis is the leading argument for what motivates and describes leveraged buyouts (LBOs). Jensen characterizes LBOs as "firms or divisions of larger firms that have stable business histories and substantial free cash flow (i.e., low growth prospects and high potential for generating cash flows) — situations where agency costs of free cash flow are likely to be high" (1986a, p. 325). Managers in such firms have an incentive to spend free cash flows on value-dissipating investments that increase firm size, since a larger firm offers incumbent managers greater compensation, power, and opportunities for advancement. Jensen (1986b) also hypothesizes that the prebuyout firms will have underutilized their debt capacity, so one benefit of the high level of postbuyout debt is the forced distribution by management of the firm's free cash flows to service the debt rather than value dissipating investments. Further, the increased managerial equity after the LBO serves to more closely align the interests of inside and outside equity holders. Jensen views LBOs as a new organizational form

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for controlling the agency costs of free cash flows in firms with inadequate insider equity ownership.

Evidence is mixed on the applicability of the free cash flow hypothesis to LBOs. Lehn and Poulsen (1989), Denis (1992), and Opler and Titman (1993) provide evidence that is consistent with the free cash flow hypothesis for LBOs. In contrast, Maupin, Bidwell, and Ortegren (1984), Kieschnick (1989, 1998), and Servaes (1994) provide evidence that is inconsistent with this hypothesis for LBOs. We argue that such mixed evidence arises from the fact that there are really two types of poorly performing firms that go private through an LBO.

To illustrate, in 1985, Beatrice Companies Inc. and Jupiter Industries Inc. went private through LBOs. Prior to the buyout, the officers and directors of Beatrice controlled approximately 0.46% of the outstanding common stock and were subject to market pressure to change the way the firm was managed.¹ In contrast, the officers and directors of Jupiter controlled 70% of the outstanding common stock prior to the buyout and were under no threat of a third-party takeover. However, both firms experienced sagging share prices prior to their buyouts. By 1993, the buyout group that took Beatrice private had sold off a number of business segments and returned the resulting company to public markets as E-II Holdings Inc. In contrast, by 1993, Jupiter remained a private company.

These companies illustrate the thesis of this article, that there are two types of poorly performing firms that go private through LBOs. Thus the population of LBOs is heterogeneous and understanding the differences among LBOs is important to understanding both why each type of firm engaged in this transaction and what they did after the transaction. Further, this position implies that prior evidence is based on misspecified statistical tests, which explains why previous evidence on the free cash flow hypothesis has been mixed.

To test our argument, which we call the “heterogeneity hypothesis,” we organize this article as follows. Section 1 develops the heterogeneity hypothesis. Section 2 describes our samples and the data collected. Section 3 reports the results of a cluster analysis that demonstrates that the LBO sample does cluster into two groups, as expected. Section 4 reports the results of logistic regression analyses of which firm characteristics significantly influence the odds of a firm engaging in an LBO. Section 5 reports an analysis of the determinants of final premiums paid in LBOs. Section 6 reports what happened to the sample LBOs after they went private. Finally, in Section 7, we summarize our results and set out some implications.

¹ Prior to its buyout, Beatrice faced sagging profits, downgraded debt, and rumors of possible takeover. To address these concerns, Beatrice sold units, replaced divisional managers, and implemented several antitakeover protections.

1. The Heterogeneity Hypothesis

Morck, Shleifer, and Vishny (1988) and McConnell and Servaes (1990) provide evidence that suggests that firm performance is increasing in managerial equity for low levels of managerial equity and decreasing in managerial equity for high levels of managerial equity. Given this evidence, we expect to observe two different types of poorly performing firms. In both types of firms there is a misalignment of the interests of inside and outside shareholders, but in one type of firm insiders own too small a portion of the firm's stock, while in the other type of firm insiders own too large a portion of the firm's stock. We argue that the population of LBOs represents draws from these two different types of firms and call this the heterogeneity hypothesis. The reasons why these two different types of firms make up the population of LBOs and what their differences imply are set out below.

We expect that poorly performing corporations with low managerial shareholdings will more frequently be subject to third-party takeover interest with a significant probability of success [Stulz (1988)]. Many of these takeover attempts will be resisted by management and thus are deemed hostile takeover attempts. One option for management in these circumstances is to participate in an LBO of the firm. However, management in these targets will typically play a subsidiary role in the buyout as new, outside private investors will be critical to funding the LBO. Further, the success of these buyouts requires material changes in the management team, their equity stake, the firm's incentive arrangements, and monitoring mechanisms; the very things Jensen (1986a,b) emphasizes.

For the second group of poorly performing corporations, management has such a large share of the stock that we would not expect much third-party takeover interest. This is consistent with Stulz's (1988) model and the evidence reported in Weston (1979). Nevertheless, managers in these firms are imposing costs on outside shareholders. Evidence on the size of such costs is given by the stock market's reaction to the demise of a large blockholder, particularly an insider, as observed in Slovin and Sushka (1993) or Johnson, et al. (1985). These costs arise because such managers act according to a number of distorted incentives from the viewpoint of outside shareholders. For example, if they have a large amount of their personal wealth invested in the firm, they have a tendency to put undue weight on their unsystematic risk exposure in investment decision making.² Hubbard and Palia (1995) and May (1995) document evidence of such managers making diversifying investments that reduce outside shareholders' wealth.

² It does not necessarily follow that when management owns most of the firm's stock most of its wealth is invested in the firm. Nevertheless, it would be hard to explain continued poor performance by a firm in which management had a majority of the outstanding stock if it did not also have most of their wealth invested in the firm.

Managers may put themselves in the predicament of having too much wealth invested in the firm because they value control (voting) rights and cash flow rights of common stock differently.³ This point suggests that these same managers will find an LBO an attractive vehicle to reduce the amount of their wealth invested in their firms while consolidating the firm's residual claims into their own hands.⁴ Further, for any given amount of debt financing, the higher the premium managers pay for the firm in an LBO, the greater the reduction in personal wealth they will have tied up in the resulting entity. Thus they are likely to pay outside shareholders a portion of the gains from changing the incentive structure of the firm as well as from any tax benefits and wealth transfers from creditors.

The differences in problems faced by dysfunctional low and high prior managerial equity LBOs also have implications for their postbuyout behavior. Ross (1987) points out that "an arbitrage exists whenever the firm is mismanaged" for whatever reason. The standard procedure to arbitrage an undervalued asset is to borrow funds, buy the asset, and sell when prices have corrected. A variation on this theme for a whole company would be to borrow funds, buy the firm, restructure the firm, and then either sell it or return it to public markets. Low prior managerial equity LBOs will tend to be led by outside private investors who will want to cash in their investment after the value of the asset has been improved. Consequently these LBOs should tend to return to public capital markets or be sold after the buyout. Further, the successful cashing out of the buyout group's investment will fuel outside private investors' desire to fund additional leveraged acquisitions of poorly performing firms.

In contrast, we expect that high prior managerial equity LBOs, particularly those led by management, will tend to remain private concerns. Fama and Jensen (1983) argue that the concentration of residual claims in the hands of decision makers and decision controllers makes a private corporation a more efficient organizational state. Consequently, since these LBOs allowed managers to reduce the portion of their wealth invested in the firm while further concentrating the residual claims of the firm into their hands, these postbuyout companies should tend to remain private concerns.

Thus we expect the differences in problems faced by dysfunctional low and high prior managerial equity LBOs to be significant determinants of the posttransaction status of the LBO. Further, we argue that these differences explain Kaplan's (1991, 1993) observation that the postbuyout behavior of LBOs suggests that the LBO population is segmented into two distinct

³ Certainly this separation is at the heart of a number of models of entrenched managerial behavior [e.g., Hubbard and Palia (1995)].

⁴ Consistent with this argument are Frankfurter and Gunay (1992) and Kaplan and Stein's (1993a,b) findings that managers in some LBOs decrease their dollar investment in the LBO target at the same time that they increase their share of the voting rights in the post-LBO firm.

groups: “[T]hose in which the process of going private functions as a kind of shock therapy for accomplishing one-time changes, and those in which the LBO is an inherently more efficient form of organization” [Kaplan (1993, p. 24)].

2. Description of Samples and Variables

2.1 Description of Sampling Procedures and Data Sources

The focus of the remainder of this article is on testing whether the heterogeneity hypothesis for LBOs provides a better characterization of these transactions than that provided by the free cash flow hypothesis. To address this issue we employ three samples: a sample of LBOs effected during the period January 1, 1981–January 1, 1986; a sample of firms that remained public corporations throughout this period; and a sample of firms acquired by another public corporation during this period. The time period is appropriate for two reasons. First, it is prior to changes in the U.S. tax code that may have induced structural changes in the determinants of LBO premiums [see Scholes and Wolfson (1992) and Newbould, Chatfield, and Anderson (1992)]. Second, it is the time period from which Muscarella and Vetsuypens (1990) and Kaplan (1989a, 1991, 1993) sampled firms for their post-LBO performance analyses. Thus the results of this study will be relevant to interpreting their findings.

The LBO sample was created in the following manner. First, a list of rumored going private transactions was identified by (1) examination of the journal *Mergers & Acquisitions* from 1981 through 1986; (2) examination of W. T. Grimm’s *Mergerstat Review* from 1981 to 1985; and (3) references in the literature.⁵ By examining the *Wall Street Journal Index (WSJ Index)* and company proxy statements, this list was reduced to a list of completed going private transactions. Next we examined either the proxy or the 13e-3 filing associated with the buyout to determine whether or not the buyout was effected with over 50% debt financing. If this last condition held the transaction was considered a leveraged going private transaction.⁶ These procedures resulted in a sample of 126 completed LBOs during the study period. Data on these firms’ prebuyout characteristics were collected from 10K filings, proxy filings, Compustat PC Plus data files, and Standard & Poor’s stock price histories for the reporting periods prior to the LBO offer.

We also conducted a review of all regulatory filings associated with each buyout in the sample to determine who led the buyout group. From this examination, we determined that out of the 126 sample LBOs, 78 were

⁵ For example, there are a number of going private transactions identified in Lehn and Poulsen (1989).

⁶ Only two firms were excluded due to this condition, and none of the inferences drawn in this study would change if we included them in the analysis.

insider-led and 48 were third-party-led buyouts. Next we examined the *WSJ Index* from the year of the buyout through 1993, as well as the 1993 editions of Dun & Bradstreet Inc.'s *Million Dollar Directory* and *America's Corporate Families* to determine the postbuyout status of each sample firm. Using these sources we were able to determine the status as of 1993 for 120 of the 126 sample LBOs.

For some analyses we compare our LBO sample to corporations that either continued as public corporations or were acquired by other companies. To create these comparison samples we used temporal matching with random sampling. In other words, we randomly selected the corporations that continued as public corporations and the corporations that were acquired by another company in equal number to the number of sample LBOs for a particular year. We employed the temporal matching procedure, as did Ambrose and Megginson (1992), to adjust for economy-wide influences. The matched sample design was used because Manski and McFadden (1981) show this design to be the more efficient sample design for choice-based samples.

The sample of corporations remaining public throughout the sample period (PUBLIC firms) was determined by random selection from a list of public corporations. This list was generated using the Securities and Exchange Commission's *Directory of Companies Required to File Annual Reports with Securities and Exchange Commission under the SEC Act of 1934*, excluding investment companies and financial institutions. Data for the PUBLIC sample firms was obtained from 10K filings, proxy filings, Compustat PC Plus data files, and Standard & Poor's stock price histories for reporting periods comparable to those of matched LBO firms.⁷

The sample of corporations acquired by another operating company during the sample period (MA firms) was determined through random selection from a list of mergers and acquisitions identified in pertinent issues of Securities Data Company's *Yearbook on Corporate Mergers, Joint Ventures and Corporate Policy*, excluding financial institutions. Data on the preacquisition characteristics of MA firms comes from 10K filings, proxy filings, Compustat PC Plus data files, and Standard & Poor's stock price histories for appropriate reporting periods.

We did not condition the inclusion of a comparison firm in its respective sample by matching its industrial classification, firm size, or other indicators to those of a sample LBO firm; this conditioning would introduce an additional sampling bias to be accounted for in subsequent logistic regressions.⁸

⁷ To compute stock returns for the PUBLIC sample firms we matched each such firm to an LBO sample firm occurring in the same year with the closest fiscal year end. Then we computed its return over the same period that we calculated the return for the matched LBO sample firm.

⁸ See Manski and McFadden (1981) for a discussion of the effect of conditional sampling on logistic regression analysis of choice-based samples. Basically it can cause a maximum likelihood function based on a random sampling assumption to generate biased parameter and parameter variance estimates.

Table 1
Industrial distribution of samples

		1981	1982	1983	1984	1985	Total
Construction (SIC 15–17)	LBO	0	1	1	0	0	2
	MA	0	0	0	1	0	1
	PUBLIC	1	1	1	1	0	4
Manufacturing (SIC 20–39)	LBO	9	16	20	18	13	76
	MA	9	11	15	24	16	75
	PUBLIC	10	14	18	18	13	73
Transportation, Communications, Electric, Gas, and Sanitary Services (SIC 40–49)	LBO	0	1	0	1	2	4
	MA	0	1	2	0	1	4
	PUBLIC	0	2	2	3	0	7
Wholesale and Retail Trade (SIC 50–59)	LBO	2	2	5	11	8	28
	MA	2	4	8	9	5	28
	PUBLIC	2	1	3	9	6	21
Finance, Insurance, and Real Estate (SIC 60–67)	LBO	1	2	0	2	0	5
	MA	1	2	0	1	0	4
	PUBLIC	0	0	2	1	2	5
Services (SIC 70–89)	LBO	3	0	2	5	1	11
	MA	3	4	3	2	2	14
	PUBLIC	2	4	2	5	3	16
Total	LBO	15	22	28	37	24	126
	MA	15	22	28	37	24	126
	PUBLIC	15	22	28	37	24	126

LBO sample firms went private anytime from January 1981 to January 1986. MA sample firms were acquired by another operating company during the sample period. PUBLIC sample firms were public corporations throughout the sample period.

Further, it is not clear that such conditioning is either necessary or meaningful. Song and Walkling (1993) argue for conditioning samples based on industrial classification in order to avoid any biases that might arise from oversampling one industrial group. However, none of their results appear to change when they use a randomly selected matched sample rather than their preferred industry-conditioned matched sample. Moreover, there is the issue of what constitutes an industry. Clarke (1989) presents evidence that standard three- or four-digit SIC identifications of industry are poor delineators and recommends grouping firms at the one-degree level of aggregation.⁹ We present the industrial distributions of our samples in Table 1 using Clarke's preferred industrial classification scheme. This table suggests that our samples are similarly distributed over these industrial groupings and so we believe that our tests are not subject to any serious biases that might arise from not controlling for "industry" effects.

⁹ Another problem with using SIC codes to identify industrial groupings is the consistency with which different sources report these values. For example, Guenther and Rosman (1994) provide evidence of differences between the SIC codes reported by Compustat and CRSP for different firms and show that these differences influence industry-adjusted results.

2.2 Relevant Firm Characteristics and Univariate Comparisons

Firms acquired by another operating company or taken private might be expected to be subject to prior takeover interest. Also, as demonstrated in Bradley, Desai, and Kim (1988) and Amihud (1989), final premiums paid to acquire firms are often positively influenced by bidder competition. Thus we need a measure of prior takeover interest and a measure of bidder competition for our sample firms.

To discern prior takeover interest, we examine the *WSJ Index* over the year prior to the first bid by the final acquirer (the benchmark date) of a sample firm in the LBO or MA samples. For the PUBLIC sample we use the balance sheet date as the relevant benchmark date. Thus the prior acquisition interest variable takes on the value of 1 if there is a story in the *WSJ Index* indicating significant takeover interest in the firm or if a party makes a bid for the firm prior to the benchmark date, and 0 otherwise. As expected, both LBO (54 firms) and MA (37 firms) samples show a greater incidence of prior acquisition interest than does the PUBLIC sample (4 firms).

To discern bidder competition, we examine the *WSJ Index* for evidence of alternative bids for the firm. A bidder competition variable is then defined to take the value 1 if there is any other bid for the firm after the first bid, and 0 otherwise. Note that this variable differs from our prior acquisition interest variable in that it only considers bids, whereas the prior acquisition interest variable considers bids and rumors of acquisition interest. As we use this variable in our analysis of LBO premiums, we only measure it for our LBO sample.

Central to the free cash flow hypothesis is a firm's level of free cash flow, which Jensen (1986a) defines as cash flow in excess of what is required to fund all positive net present value projects. Such cash flow is not measured easily since it requires information on the firm's ex ante set of positive net present value projects. Thus several measures have been employed in the empirical literature. Gupta and Rosenthal (1991) and Opler and Titman (1993) use a net operating cash flow measure of a firm's free cash flows. Unfortunately this measure is misleading. Consider two firms that are alike in their poor investment prospects and possess the same net operating cash flow. Firm A distributes those cash flows as cash dividends, but firm B reinvests them in operations. Clearly firm B is incurring the higher agency costs associated with its free cash flows, but this would be missed under the net operating cash flow measure. This consideration takes on added empirical significance when one considers that Maupin, Bidwell, and Ortegren (1984) find that their LBO sample paid significantly higher cash dividends on average prior to their buyouts than did their comparison sample of public firms.

As a consequence of these considerations, our measure is similar to that used by Lehn and Poulsen (1989) and adjusts for firm size by scaling the raw

Table 2
Comparison of LBO and PUBLIC samples

	LBO Sample		PUBLIC Sample		T-test
	Mean	Std. Dev.	Mean	Std. Dev.	
Free cash flows	0.047	0.093	0.067	0.129	-1.460
Debt : Equity ratio	0.588	0.871	0.489	0.714	0.986
Tax expenditures	0.034	0.038	0.029	0.035	1.030
Investment expenditures	0.046	0.098	0.072	0.090	-2.147**
q ratio proxy	1.218	0.791	1.707	2.259	-2.293**
Prior stock performance	0.994	0.155	1.067	0.241	-2.847**
Managerial stock ownership	29.344	22.536	20.698	19.424	3.262**

All accounting variables are measured as of the balance sheet date just prior to the first LBO offer for LBO sample firms, the first takeover bid for MA sample firms, and the LBO year for PUBLIC sample firms matched to an LBO sample firm. Prior stock performance represents the stock performance of the firm relative to the S&P 500 over a year's period ending 1 month prior to the first indication of takeover interest in the firm. The free cash flow measure, the tax expenditure measure, and the investment expenditure measure are scaled by net sales (a total cash inflow measure) to adjust for the influence of firm size. Managerial stock ownership represents the percentage of common stock held by officers and directors prior to the LBO announcement date. ** denotes significance at the 5% level, * denotes significance at the 10% level.

free cash flow estimate by the firm's net sales (a total cash inflow measure).¹⁰ Specifically we measure a firm's raw free cash flows as its operating income before depreciation, minus its total income taxes adjusted for the change in deferred taxes, minus its cash dividends to common and preferred stock holders, minus net common stock repurchases. Such a measure is a preferred proxy for a firm's free cash flows because it is likely to be more highly correlated with any "true" measure of a firm's free cash flows than the alternatives.¹¹ Examining univariate test results in Tables 2 and 3, we do not find any evidence that the average LBO had significantly higher levels of free cash flows than did firms either acquired by another operating company or remaining public corporations.

¹⁰ We use a firm's net sales, a total cash inflow measure, to scale a number of variables to adjust for firm size. We chose not to use the market value of the firm's equity, as in many other studies, because the market value of equity impounds a number of influences, such as the effect of capital structure, which are important to separate. Thus we feel our adjustment introduces less "noise."

¹¹ Alternative measures, including Lehn and Poulsen's (1989) measure, were employed in subsequent analyses and did not materially change the results. We therefore report results for only one definition.

Table 3
Comparison of LBO and MA samples

	LBO Sample		MA Sample		T-test
	Mean	Std. Dev.	Mean	Std. Dev.	
Free cash flows	0.047	0.093	0.052	0.099	-0.418
Debt : Equity ratio	0.588	0.871	0.542	0.892	0.416
Tax expenditures	0.034	0.038	0.032	0.039	0.315
Investment expenditures	0.046	0.098	0.054	0.048	-0.755
q ratio proxy	1.218	0.791	1.658	1.954	-2.339**
Prior stock performance	0.994	0.155	1.172	0.529	-3.624**
Managerial stock ownership	29.344	22.536	19.796	17.214	3.779**

All accounting variables are measured as of the balance sheet date just prior to the first LBO offer for LBO sample firms, the first takeover bid for MA sample firms, and the LBO year for PUBLIC sample firms matched to an LBO sample firm. Prior stock performance represents the stock performance of the firm relative to the S&P 500 over a year's period ending 1 month prior to the first indication of takeover interest in the firm. The free cash flow measure, the tax expenditure measure, and the investment expenditure measure are scaled by net sales (a total cash inflow measure) to adjust for the influence of firm size. Managerial stock ownership represents the percentage of common stock held by officers and directors prior to the LBO announcement date. ** denotes significance at the 5% level, * denotes significance at the 10% level.

Another dimension of interest under the free cash flow hypothesis is the firm's use of financial leverage. Our measure of the firm's use of financial leverage is the ratio of the book value of the firm's long-term debt to the market value of its common stock. Jensen (1986b) suggests that likely LBO candidates tend to underutilize their debt capacity and so one should expect such firms to demonstrate less use of debt than either firms acquired by other firms or firms remaining public. Univariate test results in Tables 2 and 3 do not support this notion as we do not find the debt to equity ratios of sample LBOs were significantly less than our two comparison samples. However, these results should be interpreted with caution because our variable measures the prior use of leverage rather than the divergence between potential and actual use of leverage. Unfortunately, we are aware of no clearly superior measurable alternative that captures this divergence.¹²

¹² We did explore the use of a few alternatives, such as the ratio of the book value of long-term debt to the sum of the market value of common stock, the book value of preferred stock, and the book value of long-term debt. Since these alternatives do not significantly change our results, we focus only on one measure.

While a firm's tax expense is related to its use of debt, Kaplan (1989b) and Newbould, Chatfield, and Anderson (1992) show that the reduction of taxes in an LBO is captured in buyout premiums. Therefore we measure the tax expense of a firm, adjusted for deferred taxes, prior to the buyout for LBO sample firms and prior to being acquired for MA sample firms. This tax expenditure measure is scaled by a firm's net sales to adjust for firm size effects. Neither Table 2 nor Table 3 provides any evidence that LBO sample firms paid more in taxes on average than did either MA or PUBLIC sample firms.

Nevertheless, under the free cash flow hypothesis, it is the firm's use of its net cash flows on negative NPV projects that causes shareholder wealth to be dissipated and thereby creates a source of premiums to be paid in taking a firm private. Thus we need to measure the firm's level of investment expenditures and its prospects for profitable reinvestment.

To measure a firm's investment expenditures, we use a firm's expenditures on plant and equipment. We scale this measure by net sales to adjust for the influence of firm size. If LBO premiums capture gains from reducing such expenditures, LBOs should show significantly higher relative levels of investment expenditures than either firms acquired by other operating companies or firms remaining public. The univariate test results in Tables 2 and 3 are not consistent with this expectation. Instead, the evidence in these tables suggests that LBO sample firms' investment expenditures were significantly less on average than firms remaining public, and slightly less on average than firms acquired by another operating company. Of interest, these results are consistent with the evidence presented in Servaes (1994).

To capture the firm's prospects for profitable reinvestment we use the ratio of the market value of a firm's common stock to its book value. This ratio is shown in Varaiya, Kerin, and Weeks (1987) and Amit, Livnat, and Zarowin (1989) to be an excellent proxy for a firm's q ratio. As such, it reflects the firm's prospects for profitable reinvestment.¹³ Under the free cash flow hypothesis for LBOs, these firms should possess lower q ratios than either firms acquired by other operating companies or firms remaining public. The univariate statistical test results in Tables 2 and 3 confirm these expectations. The LBO sample firms have significantly lower q ratios than either the MA or the PUBLIC sample firms. However, given Morck, Shleifer, and Vishny's (1988) evidence, these results are also consistent with the heterogeneity hypothesis for LBOs.

¹³ In its original form, Tobin's q [Tobin (1969)] was a determinant of desired business investment. It has also been used in studies to proxy for attributes ranging from a firm's performance [Morck, Shleifer, and Vishny (1988)] to a firm's market power [Lindenberg and Ross (1981)]. One problem in interpretation is due to the different implications of a firm's marginal q versus its average q . The market : book ratio is probably a good proxy for a firm's average q ratio. However, typically a firm's marginal q will be less than its average q .

While Morck, Shleifer, and Vishny (1988) use a firm's q ratio as their sole firm performance measure, we use an additional measure. We assume that the market makes assessments of how a firm's competitive problems influence its future performance and these ex ante assessments are impounded in our q ratio proxy. Nevertheless, unless one is willing to assume that the market makes perfect assessments of these problems, then their severity will be revealed over time by the firm's competitive behavior and captured in its stock price movements. Consequently, the more severe the firm's competitive problems, the poorer the firm's stock performance is expected to be over time relative to the market.

To capture this consideration, we measure the ratio of the firm's stock performance relative to the S&P 500 over a year's period ending 1 month prior to the first hint (i.e., *Wall Street Journal* story) of takeover interest in either LBO or MA sample firms.¹⁴ By measuring prior stock performance over a period ending 1 month prior to any hint of takeover interest we hope to avoid the potential contamination of stock price run-ups associated with takeover interest in the firm.¹⁵ Under either the free cash flow hypothesis or the heterogeneity hypothesis for LBOs, we should observe evidence that LBOs perform more poorly before the buyout than firms taken over by other firms or firms remaining public corporations. Consistent with these expectations, Tables 2 and 3 report that the prior stock performance of LBOs was significantly less than the performance for firms taken over by other firms or firms remaining public corporations. Consequently these data suggest that stockholders in sample LBO firms were experiencing wealth losses prior to the buyout. Further, these data are consistent with Zingales's (1995) model that suggests that the share prices of a firm going private should decline prior to the firm going private.

More than any other variable, management's shareholdings in the target firm is central to the heterogeneity hypothesis. To measure management's stock ownership, we use the percentage of voting stock held by officers and directors of the company, just as in Morck, Shleifer, and Vishny (1988). We use this definition because directors who are not officers, but who possess sizable equity positions in the firm, will have incentives to closely monitor corporate officers who do not have large stakes. Consequently the potential for agency problems in the target firm are better measured by the stock ownership of officers and directors. The univariate statistical test results in Tables 2 and 3 indicate that managers had more, rather than less, stock

¹⁴ We do not adjust sample firms' stock returns for either risk or industry returns because to do so would introduce measurement error, which some studies show [e.g., Guenther and Rosman (1994)] can alter inferences. Further, as shown in subsequent analyses, the use of our measure leads us to similar inferences to those drawn in Kovenock and Phillips (1995) and Phillips (1995) about the product market performance of these firms.

¹⁵ Statistical results in Tables 6 and 7 confirm that we did avoid such contamination.

in firms that subsequently engaged in an LBO than they did in firms that either were acquired by another firm or continued as public corporations.¹⁶ This evidence is inconsistent with the free cash flow hypothesis. Whether it supports the heterogeneity hypothesis or not requires additional analysis.

To conclude, our univariate tests suggest that sample LBO firms can be characterized as having significantly poorer prior stock performance, poorer prospects for profitable reinvestment, and management teams holding more stock in their firms than sample firms that either continued as public corporations or were acquired by another operating company. LBO sample firms also spent less on average on plant and equipment than did sample firms that continued as public corporations. Thus the univariate tests appear more consistent with the heterogeneity hypothesis than with the free cash flow hypothesis for LBOs.

3. Cluster Analysis of the LBO Sample

Prior research, and the free cash flow hypothesis, presumes that the LBO population is homogeneous in key characteristics, including management's shareholdings. In contrast, the heterogeneity hypothesis prescribes that the LBO population is drawn from two types of poorly performing firms distinguished by the management holdings of the firm's shares. Under the heterogeneity hypothesis, we expect the LBO sample to cluster into two groups according to management's prior equity position in the firm. Under the free cash flow hypothesis, no such clustering is expected. To test these expectations, we perform cluster analysis of the LBO sample.

Cluster analysis is a set of methods to discern heterogeneity in a sample based on the measured characteristics of observations in that sample.¹⁷ We use the partitioning techniques described in Hartigan and Wong (1979) to identify clusters of sample LBO firms. Effectively this technique allocates a sample LBO firm to a cluster based on its Euclidean distance (norm) from the mean vector of characteristics of a cluster. Starting with an initial allocation, the procedure reassigns observations to clusters so as to minimize the Euclidean distance between an observation assigned to a cluster and that cluster's multivariate mean. Thus the procedure is analogous to a least squares estimation procedure.

This analysis reveals that our LBO sample separates into two clusters according to managerial equity.¹⁸ To highlight the difference between these

¹⁶ These results are consistent with Maupin, Bidwell, and Ortengren (1984), Kieschnick (1989), and Mikkelson and Partch (1989).

¹⁷ See Everitt (1993) for an introductory presentation of cluster analysis.

¹⁸ We also examined whether or not our PUBLIC or MA comparison samples separate into clusters according to managerial equity. Using the same partitioning techniques we used for the LBO sample, we identify two clusters in the PUBLIC sample and in the MA sample. ANOVA tests of the difference between

Table 4
Comparison of LBO clusters

Variable	Summary statistics for cluster 1 (76 Firms)		Summary statistics for cluster 2 (50 Firms)		F-ratio	Probability
	Mean	Std. Dev.	Mean	Std. Dev.		
Prior stock performance	0.98	0.30	1.06	0.33	2.188	0.141
Free cash flows	0.05	0.06	0.04	0.12	0.243	0.623
Tax expenditures	0.03	0.02	0.03	0.05	0.032	0.858
Investment Expenditures	0.04	0.05	0.05	0.14	0.102	0.749
Debt : equity ratio	0.25	0.18	0.31	0.25	2.359	0.127
Managerial stock ownership	13.90	9.93	52.83	14.35	318.791	0.000***
q ratio proxy	1.25	0.62	1.17	0.99	0.355	0.552

This is a cluster analysis of the LBO sample using the partitioning techniques set out in Hartigan and Wong (1979). Prior stock performance represents the stock performance of the firm relative to the S&P 500 over a year's period ending 1 month prior to the first indication of takeover interest in the firm. The free cash flow measure, the tax expenditure measure, and the investment measure are scaled by net sales to adjust for the influence of firm size. Managerial stock ownership represents the percentage of common stock held by officers and directors prior to the LBO announcement date. The firm's *q* ratio is proxied by its market : book ratio. *** denotes significance at the 1% level.

clusters we report in Table 4 the results of an analysis of variance comparison of the observed LBO clusters over the different measured characteristics. With respect to managerial equity, the separating variable, average managerial equity in cluster 1 firms is 13.90% while average managerial equity in cluster 2 firms is 52.83%. Managerial equity holdings is the only variable that distinguishes these two groups of LBOs. Thus if one argues that the low prior managerial shareholding LBO targets are incurring agency costs, then one must infer that the high prior managerial shareholding LBO targets are incurring moral hazard costs.

Under the heterogeneity hypothesis for LBOs, management's equity position also has implications for who will tend to lead the LBO and any takeover interest expressed in a pre-LBO target. We expect insiders to lead LBOs more frequently when they have a dominant share of the firm's equity and outsiders to lead LBOs more frequently when management has a minority equity position. Note that our distinction is based on whether some members of management lead the buyout group and not if they participate in the buyout.¹⁹ Further, we expect LBOs in which management

the average managerial shareholdings of the two PUBLIC clusters reveal no significant difference (*F*-ratio = 0.7465, *p* = .39). Likewise, ANOVA tests for the two MA clusters reveal no significant difference (*F*-ratio = 1.0536, *p* = .31) in their average managerial shareholdings. Consequently neither sample separates into clusters according to managerial shareholdings using these methods.

¹⁹ Unfortunately some authors refer to LBOs as management buyouts (MBOs) simply because some members of the prior management team participate in the buyout group. To avoid confusion we avoid the use

Table 5
Analysis of LBO clusters by identity of party which led the LBO

	High prior managerial equity LBO cluster	Low prior managerial equity LBO cluster	Total
Insider-led LBO	43 (86.00)	35 (46.05)	78 (61.90)
Outsider-led LBO	7 (14.00)	41 (53.95)	48 (38.10)
Total	50 (100.00)	76 (100.00)	126 (100.00)

Whether an LBO was led by an insider (to the firm) or an outsider was determined by examination of the 13e-3 filings and proxy statements associated with the transactions. For the above table $\chi^2 = 20.407$, which is significant at the 1% level.

had a dominant share of the firm's equity to demonstrate less prior takeover interest than LBOs in which management had a minority equity position. These expectations are consistent with the hypothesized voluntary nature of high prior managerial equity LBOs and the hypothesized forced nature of low prior managerial equity LBOs.

To test the first set of expectations, we report in Table 5 a cross-tabulation of whether an LBO was in the high prior managerial equity cluster or the low prior managerial equity cluster versus whether the LBO was led by an insider or by an outsider. The results reported in this table show a significantly different pattern of who leads the buyout across our LBO clusters. Our high prior managerial equity LBO cluster is overwhelmingly comprised of LBOs taken private by a management-led team, while our low prior managerial equity LBO cluster is evenly split between teams led by management and teams led by outsiders (e.g., Kohlberg Kravis Roberts & Co).

To test the second set of expectations, we report in Table 6 a cross-tabulation of whether an LBO was in the high prior managerial equity cluster or the low prior managerial equity cluster versus whether the LBO was or was not subject to prior takeover interest. Given our measure of prior takeover interest, there will be an upward bias in the identification of prior takeover interest for the high prior managerial equity LBO targets as the rumor of takeover interest reported in the *WSJ* may have concerned management's planned bid for their firm. Nevertheless, the results reported in Table 6 suggest that low prior managerial equity LBOs were the objects of significantly more prior takeover interest than were high prior managerial equity LBOs. This evidence is consistent with the view that the high prior managerial equity LBOs were largely the result of voluntary decisions by their managers, while the low prior managerial equity LBOs were largely involuntary or forced transactions.

of this term to describe our high prior managerial equity LBO cluster.

Table 6
Analysis of LBO clusters by prior control interest

	High prior managerial equity LBO cluster	Low prior managerial equity LBO cluster	Total
No prior control interest	39 (78.00)	33 (43.42)	72
Prior control interest	11 (22.00)	43 (56.58)	54
Total	50 (100.00)	76 (100.00)	126

Whether an LBO faced prior control interest was determined by examining the *WSJ Index* for over 1 year prior to the first bid by the final acquirer to determine if there was a rumor of a bid forthcoming or a bid for the firm. For the above table, $\chi^2 = 15.363$, which is significant at the 1% level.

Clearly there are a significant number of LBOs in which management is deciding to take the firm private through a leveraged buyout even though management owns most of the firm's equity and faces no external takeover pressure.²⁰ Such observations are inconsistent with the logic of the free cash flow hypothesis, but are consistent with the heterogeneity hypothesis.

4. Distinguishing Features of Corporations that Engage in LBOs

While the above results are consistent with the heterogeneity hypothesis, they do not account for the joint influence of different firm characteristics. Consequently we estimate a series of multinomial logistic regressions to examine the conditional influence of different prior firm characteristics on the odds of a firm engaging in an LBO. Our intent is to discern those firm characteristics that best describe the firms that engaged in an LBO.

Under the free cash flow hypothesis, LBOs should be distinguished by relatively higher levels of free cash flows, lower managerial equity stakes, poorer investment prospects, lower debt use, and greater exposure to takeover interest than other firms (either firms still public or firms acquired by another operating company). Under the heterogeneity hypothesis for LBO transactions, the sign of the managerial stock ownership variable will depend upon the mix of firms with high or low managerial stock ownership in the sample. A sufficiently large number of firms with dysfunctionally high levels of managerial equity implies that the coefficient on this variable will be positive: a result that is inconsistent with the free cash flow hypothesis for LBOs. Further, such a mix suggests that our free cash flow, debt use, and reinvestment prospects variables may not be significant in the expected directions if such problems are associated with low rather than high levels of managerial equity. However, in either case, we expect poor prior stock

²⁰ It is interesting to note in this regard that over 15% of Lehn and Poulsen's (1989) sample includes firms in which management had over 50% of their firm's common stock.

performance and thus a significantly negative coefficient on this variable.

The free cash flow hypothesis does not explain the results reported in Table 7 very well.²¹ First, when compared to firms remaining public corporations, LBO targets demonstrate higher tax expenditures, poorer prior stock performance, higher managerial shareholdings, and greater exposure to prior acquisition interest. The significantly positive sign on the managerial stock ownership variable, along with the significantly negative coefficient on the prior relative stock performance variable, suggests that LBO sample firms were incurring the costs associated with high rather than low managerial equity positions in the pre-LBO firm.

Next, when compared to firms acquired by other public corporations, LBO targets appear to spend less on plant and equipment, spend more on taxes, perform more poorly, have managers with more equity in the firm, and be exposed to greater prior acquisition interest. If the free cash flow hypothesis for LBOs holds, then LBOs might be expected to demonstrate higher investment expenditures and lower managerial stock ownership positions than firms acquired by other operating companies. These expectations are not supported by the data.

While these results are consistent with the heterogeneity hypothesis, they do not substantiate its characterization of the types of poorly performing corporations that engage in an LBO. To do this, we compare the two LBO clusters identified in our prior cluster analysis to the comparison samples and report the results in Table 8. The high prior managerial stock ownership LBO cluster appears to demonstrate poorer prior stock performance, higher managerial stock ownership, greater use of debt, and higher tax expenditures than firms remaining as public corporations. The low prior managerial ownership LBO cluster differs from the PUBLIC sample in demonstrating less use of debt, poorer prior stock performance, lower managerial stock ownership, and greater prior acquisition interest. These characterizations are reinforced when these same LBO groups are compared to public corporations acquired by another operating company. The one significant difference in results is that low prior managerial ownership LBO firms spend less on capital investments than do firms acquired by other corporations. Altogether these pieces of evidence are consistent with the heterogeneity hypothesis.

5. Analysis of LBO Premiums

We now examine the determinants of the premiums paid in LBOs to identify the relative explanatory power of the free cash flow hypothesis versus

²¹ The multinomial logistic regressions reported in this article were estimated using a conditional maximum likelihood estimation procedure developed in Manski and Lerman (1977). As discussed in Cosslett (1981), our sampling procedures introduce sample choice bias which must be accounted for in order to derive consistent parameter and variance estimates.

Table 7
Analysis of the prior characteristics of a corporation that significantly influence the odds of it engaging in an LBO

	LN (odds of a firm engaging in an LBO rather than remaining a public corporation)	LN (odds of a firm engaging in an LBO rather than being acquired in an MA)
Constant	1.055 (1.654)*	-0.335 (-0.528)
Prior acquisition interest	0.840 (2.747)**	3.480 (6.205)**
<i>q</i> ratio proxy	-0.162 (-1.403)	-0.094 (-0.835)
Free cash flows	-0.012 (-0.008)	0.263 (0.165)
Investment expenditures	-1.233 (-0.515)	-3.923 (-1.774)*
Debt : equity ratio	-0.041 (-0.243)	0.098 (0.522)
Tax expenditures	9.946 (2.067)**	8.088 (1.701)*
Prior stock performance	-1.965 (-3.679)**	-1.053 (-1.901)*
Managerial stock ownership	0.030 (4.067)**	0.033 (4.444)**
χ^2 (df)	124.75** (16)	124.75** (16)

These equations represent multinomial logistic regressions estimated using conditional maximum likelihood techniques. Prior acquisition interest represents a dummy variable that takes on the value 1 if there was evidence in the *WSJ index* of interest in acquiring the firm prior to the winning bidder's first LBO announcement. Prior stock performance represents the stock performance of the firm relative to the S&P 500 over a year's period ending 1 month prior to the first indication of takeover interest in the firm. The free cash flow measure, the tax expenditure measure, and the investment measure are scaled by net sales to adjust for the influence of firm size. The firm's *q* ratio is proxied by its market : book ratio. Managerial stock ownership represents the percentage of common stock held by officers and directors prior to the LBO announcement date. Z-statistics reported in parentheses under coefficient estimates. ** denotes significance at the 5% level and * denotes significance at the 10% level.

the heterogeneity hypothesis. As in Kaplan (1989a) and Lehn and Poulsen (1989), we examine the total returns accruing to shareholders in the pre-LBO firm, as measured by final premiums paid, rather than abnormal announcement period returns, in order to discern how well the premiums paid in these transactions comport with the different hypotheses. We measure the final premium paid as the change in price from one week prior to the first announcement of takeover interest to the final traded price, relative to the first price.²² This definition impounds changes in bid prices due to new information, competing bids, and other factors (such as information revealed

²² The final traded price will reflect the value of the final bid, and therefore will provide a market assessment of the value of a bid comprising cash and securities.

Table 8

Analysis of the prior characteristics of either a high prior managerial ownership LBO or a low prior managerial ownership LBO which significantly distinguish them from either corporations which continue as public corporations or corporations which are acquired by another firm

	High prior managerial ownership LBOs versus public corporations	Low prior managerial ownership LBOs versus public corporations	High prior managerial ownership LBOs versus corporations acquired by another firm	Low prior managerial ownership LBOs versus corporations acquired by another firm
Constant	-2.820 (-2.620)**	2.385 (2.851)**	-4.008 (-3.816)**	1.119 (1.332)
Prior acquisition interest	2.803 (3.924)**	3.608 (6.317)**	0.198 (0.370)	1.003 (3.058)**
<i>q</i> ratio proxy	-0.107 (-0.821)	-0.274 (-1.547)	-0.040 (-0.311)	-0.207 (-1.163)
Free cash flows	-1.593 (-0.548)	1.189 (0.678)	-1.415 (-0.489)	1.367 (0.763)
Investment expenditures	-1.171 (-0.388)	-5.173 (-1.343)	-3.944 (-1.484)	-7.946 (-2.042)**
Debt : equity ratio	0.426 (1.903)*	-0.543 (-2.007)**	0.495 (2.136)**	-0.475 (-1.595)
Tax expenditures	20.480 (2.791)**	3.283 (0.545)	17.961 (2.497)**	0.764 (0.124)
Prior stock performance	-2.082 (-2.559)**	-2.179 (-3.195)**	-1.163 (-1.419)	-1.260 (-1.788)*
Managerial stock ownership	0.094 (9.978)**	-0.017 (-1.648)*	0.094 (7.009)**	-0.017 (-1.511)
χ^2 (df)		242.80** (24)		242.80** (24)

These equations represent multinomial logistic regressions estimated using conditional maximum likelihood techniques. High prior managerial ownership LBOs represent cluster 2 in Table 4. Low prior managerial ownership LBOs represent cluster 1 in Table 4. Prior acquisition interest represents a dummy variable that takes on the value 1 if there was evidence in the *WSJ index* of interest in acquiring the firm prior to the winning bidder's first LBO announcement. Prior stock performance represents the stock performance of the firm relative to the S&P 500 over a year's period ending 1 month prior to the first indication of takeover interest in the firm. The free cash flow measure, the tax expenditure measure, and the investment measure are scaled by net sales to adjust for the influence of firm size. The firm's *q* ratio is proxied by its market : book ratio. Managerial stock ownership represents the percentage of common stock held by officer and directors prior to the LBO announcement date. Z-statistics reported in parentheses under coefficient estimates. ** denotes significance at the 5% level and * denotes significance at the 10% level.

by mandated auctions, external independent appraisals, and the fiduciary duties exercised by independent board members).

To compare the relative explanatory value of the two hypotheses, we estimate two equations. In each equation we include a variable for bidder competition and prior relative tax expenditures to adjust for the influence of bidder competition and tax benefits on LBO premiums. The key differences between the two equations are the firm characteristics assumed to

influence LBO premiums and how these characteristics are influenced by management's shareholdings.

Under the free cash flow hypothesis, the firm's prior level of free cash flows should be a significant determinant of the premiums paid to take the firm private. Further, as Garvey's (1992) model implies, the agency costs associated with a firm's free cash flow decrease as management's equity increases.

Under the heterogeneity hypothesis, premiums paid will be influenced by the potential for improved firm performance, but this potential will interact with management's shareholdings in a nonlinear fashion. When management owns a small portion of the firm's stock, the logic is straightforward. The buyout group will likely compete with others for the firm and will therefore pay prices that reflect their expectations for increasing the value of the firm. When management owns a large portion of the firm's stock, the logic is different. While these managers do not face significant competition for the firm, they do have an incentive to take as much cash out of the firm as they desire to invest in other opportunities. Consequently, for a given target post-LBO debt level, these managers will have an incentive to pay higher rather than lower premiums to take their firm private.²³ Further, the higher management's equity in the firm, the greater the incentive they will have to take cash out of the firm and the more likely outside shareholders will have suffered at the hands of entrenched managers. Altogether these expectations suggest an interaction between managerial equity and prior firm performance that is similar to the situation where managers own a small portion of their firm's stock.

We can express these two models formally as $\text{PREM} = \beta + \mathbf{X}'\beta + f(\text{Mgmt Equity}) + \text{PPM} + \varepsilon$, where $f(\dots) = \alpha_0 + \alpha_1(\text{Mgmt Equity})$ under the free cash flow hypothesis, or $f(\dots) = \alpha_0 + \alpha_1(\text{Mgmt Equity}) + \alpha_2(\text{Mgmt Equity})$ under the heterogeneity hypothesis; $\mathbf{X}'\beta$ represent determinants that do not interact with managerial equity; and PPM is a prior firm performance measure. For the free cash flow hypothesis, PPM is our free cash flow measure for the target firm. For the heterogeneity hypothesis, PPM is our measure of the firm's prior relative stock performance. We argue that such a measure captures the firm's potential for improved performance and/or evidence of moral hazard costs being incurred.²⁴

Table 9 presents the results from estimating these two models. Following the recommendations of Aiken and West (1991), these equations were estimated with centered values for the continuous independent variables in order to minimize the potential for multicollinearity from including interac-

²³ Elitzur, et al. (1998) provide a model and a numerical example of how the structuring of a buyout is influenced by managerial incentives in these cases.

²⁴ We also estimated an equation using the firm's *q* ratio as our measure of performance problems. It implied the same results we report for the equation using prior stock performance, but with less overall explanatory value. Consequently we report only the results for the one nonlinear specification.

Table 9
Analysis of LBO premiums

	FCF hypothesis	Heterogeneity hypothesis
Constant	36.894 (8.513)**	36.337 (9.441)**
Bidder competition	6.398 (1.050)	4.571 (0.818)
Tax expenditures	-102.435 (-1.132)	-39.451 (-0.588)
Free cash flows	41.529 (0.928)	
Prior stock performance		37.497 (1.655)*
{Managerial stock ownership}{Free cash flows}	-6.514 (-2.408)**	
{Managerial stock ownership}{Prior stock performance}		0.345 (0.377)
{Managerial stock ownership} ² {Prior stock performance}		-0.201 (-5.893)**
Adj R^2 (F -test)	0.026 (1.84)	0.333 (9.92)**

The bidder competition variable takes on the value 1 if there was a bid after the first bid for the firm, 0 otherwise. Prior stock performance represents the stock performance of the firm relative to the S&P 500 over a year's period ending 1 month prior to the first indication of takeover interest in the firm. The free cash flow and the tax expenditure measures are scaled by net sales to adjust for the influence of firm size. A firm's q ratio is proxied by the firm's market : book ratio. Managerial stock ownership represents the percentage of common stock held by officers and directors prior to the LBO announcement date. All independent variables are centered with respect to their sample means so as to minimize the potential for multicollinearity due to the use of interaction terms. Examination of the condition number for each regression reveals no evidence of multicollinearity problems. T -statistics are reported in parentheses. ** denotes significance at the 5% level and * denotes significance at the 10% level.

tion terms. Of the two estimated models, the heterogeneity model provides a better description of the data. While the coefficient on the interaction between managerial equity and the firm's free cash flow measure is as expected under the free cash flow hypothesis, the overall equation is insignificant.

On the other hand, the second equation is highly significant and explains significantly more of the variation in LBO premiums than other estimated equations in prior research [e.g., Kaplan (1989b), Lehn and Poulsen (1989), and Torabzadeh and Bertin (1987)]. Further, the strongly negative interaction between our measure of the pre-LBO firm's prior performance and the square of its management's prior equity position comports with the heterogeneity hypothesis. Basically this equation suggests that at the low end of prior managerial equity and at the high end of prior managerial equity, the poorer the prior stock performance of the company, then the higher the premium paid to take it private.

6. Determinants of Post-LBO Status

As noted earlier, Kaplan (1991, 1993) observes that the postbuyout behavior of LBOs suggests that the LBO population is segmented into two distinct groups: “those in which the process of going private functions as a kind of shock therapy for accomplishing one-time changes, and those in which the LBO is an inherently more efficient form of organization” [Kaplan (1993, p. 24)]. Kaplan’s explanation of this observation is that since “LBO organizations solve the free cash flow problem faced by companies in low-growth industries by providing superior incentives to managers and their monitors” (1991, p. 288), then “LBOs should remain private for an unspecified, but significant period” (1991, p. 288). This explanation is consistent with Jensen’s (1989) notion that the LBO organization is a new, durable organizational form for controlling the agency costs of free cash flows.

On the other hand, the heterogeneity hypothesis provides a markedly different interpretation of why the LBO population would appear to be segmented into two distinct groups after the buyout. As suggested earlier, the low prior managerial equity LBOs will typically be led by third parties for whom the LBO is a way to arbitrage the undervaluation of the pre-LBO firm due to agency problems. Thus for this group, we expect a significant proportion either to return to public capital markets as public firms or to be sold to other companies after the buyout. These are the firms for whom “going private functions as a kind of shock therapy for accomplishing one-time changes.” For the high prior managerial equity LBOs, and particularly those led by insiders, we argue that the LBO enables management to reduce their dollar investment in the firm while further concentrating its residual claims into their hands. Thus, as Fama and Jensen (1983) argue, continuing as a private firm is more “natural” or appropriate for these firms.

To test these different characterizations, we determine the status of each of our sample LBO firms through 1993 and classify them into one of four groups: public, acquired, other, and private. Those sample LBOs (16 firms) that became public corporations by the end of 1993 are classified as public. Those sample LBOs (44 firms) that became a subsidiary or division of another operating company are classified as acquired, even though a number of these firms went public after the LBO and before being acquired. Those sample LBOs (56 firms) that remained private companies are identified as private. And finally, those sample LBOs (11 firms), for which we either could not determine their current status or determined that they had gone bankrupt, are classified as other. While these path-independent categories may miss some important features of the firms’ transitions, they are suitable for determining which firms tend to remain private.

In Table 10 we display the mean values of different pre-LBO firm characteristics for each of these post-LBO groupings. For each characteristic we perform analysis of variance to test for significant differences between these groups. The analysis of variance tests for our free cash flow measure

Table 10
Basic pre-LBO statistics on sample LBO firms by their post-LBO status

Current status	Managerial stock ownership	Market value of common stock	Free cash flows	<i>q</i> ratio proxy
Public	14.927 (14.690)	315.827 (674.978)	0.045 (0.040)	1.205 (0.574)
Acquired	19.355 (15.438)	176.745 (196.297)	0.030 (0.061)	1.156 (0.581)
Other	19.498 (11.547)	277.867 (701.619)	0.069 (0.124)	1.340 (0.581)
Private	43.497 (23.120)	134.660 (226.207)	0.055 (0.115)	1.247 (1.007)

Prior LBO characteristics are as described in Table 2. The market value of common stock represents the firm's pre-LBO market value (in millions of dollars) of common stock outstanding, and as such is a proxy for firm size. Mean values are reported, with standard deviations within parentheses. Analysis of variance tests for each column variable reveals significant differences between row values only for managerial stock ownership (F -statistic = 18.43, which is significant at the 1% level).

and our *q* ratio proxy were insignificant. Thus these tests are inconsistent with the notion that firms that had higher levels of free cash flows or poorer investment prospects prior to the buyout demonstrate any lesser tendency to return to public capital markets. The analysis of variance test on managerial stock ownership was significant ($F = 18.43$). Examination of Table 10 suggests that LBOs with lower prebuyout managerial equity tend to return to public markets, while LBOs with higher prebuyout managerial equity tend to remain private firms.

Because this evidence does not account for the joint variation of firm characteristics, we estimate a multinomial logistic regression using those LBO firms that remain private as the comparison firms. The results, displayed in Table 11, suggest that the odds of an LBO either coming back as a public company or being sold to another company is determined primarily by management's equity position in the pre-LBO firm. The lower management's equity position in the pre-LBO firm, the more likely the LBO will return as a public firm or be sold after the buyout. Thus these data are more consistent with the heterogeneity hypothesis than with the free cash flow hypothesis.

This inference is seen even more clearly when we examine the frequency distribution of post-LBO sample firm status by pre-LBO managerial equity cluster. The results displayed in Table 12 are striking. The firms that return to public markets as public corporations or are acquired by another firm tend to be firms from our low prior managerial equity group of LBOs. Those firms that have stayed private tend to be firms that come from our high prior managerial equity group.

As a final check on the heterogeneity hypothesis, we gathered additional information on firms in our high prior managerial ownership group from proxies and prior 10K filings. We collected data on the average dollar

Table 11
Pre-LBO determinants of post-LBO status

	LN (odds of going public rather than remaining private)	LN (odds of selling the company rather than remaining private)
Constant	1.187 (1.386)	2.302 (3.335)**
Managerial stock ownership	-0.079 (-3.630)**	-0.069 (-4.664)**
Firm size proxy	-0.0002 (-0.327)	-0.001 (-1.399)
<i>q</i> ratio proxy	-0.187 (-0.364)	0.018 (0.048)
Free cash flow measure	0.222 (0.041)	-5.251 (-1.355)

The following logistic regression equations are estimated using an unconditional maximum likelihood procedure. Managerial stock ownership represents the percentage of common stock held by officers and directors prior to the LBO announcement date. The firm size proxy is the firm's pre-LBO market value of common stock. The free cash flow measure is a modified version of the Lehn and Poulsen (1989) measure. The above multinomial logistic regression has a $\chi^2 = 46.09$, which is significant at the 1% level, and a pseudo, $R^2 = 0.201$. Asymptotic *t*-statistics are reported in parentheses, with ** denoting significance at the 5% level and * denoting significance at the 10% level.

Table 12
Post-LBO status of LBO firms by pre-LBO categorization

Current status	High prior LBO	Low prior LBOs
Public	2 (12.50)	14 (87.50)
Acquired	10 (22.73)	34 (77.27)
Other	1 (9.09)	10 (90.91)
Private	37 (66.07)	19 (33.93)
Total	50 (39.68)	76 (60.32)

The classification of whether an LBO as a high prior or a low prior LBO was determined by the cluster analysis reported in Table 4. Row percentages are reported below number within parentheses. The chi-square statistic for this contingency table is 32.016, which is significant at the 1% level.

amount that management invested in the pre-LBO firm prior to buyout, the dollars that management received from the buyout and invested in the new LBO firm, the percentage of stock they had in the pre-LBO firm, and the percentage of stock that they acquired in the post-LBO firm. For 40 of the 50 high prior managerial equity firms, we determine that management had over \$176 million dollars on average invested in their firms as of the end of the fiscal year end prior to their buyouts. For 38 of these 40 firms, management increased their share of the postbuyout firm's voting stock by an average of 35%. And finally, in 10 of the 40 firms, management decreased their dollar

investment in the postbuyout firm by an average of \$66 million.²⁵ These data suggest that management had a large amount of wealth invested in these firms and that the buyout allowed them to substantially reduce that amount while concentrating the residual claims of the postbuyout firm in their hands. Thus these data confirm the heterogeneity hypothesis' explanation of why high prior managerial equity firms go private through an LBO.

7. Summary and Conclusions

Prior research on corporations that go private through a leveraged transaction, or LBO, has presumed that this population is homogeneous in the essential characteristics that motivate their decision to go private. While recognizing reduced taxes and reduced bondholder wealth as sources of premiums paid in these transactions, this literature focuses on the reduction of agency costs as the source of wealth that motivates these transactions. The leading argument in this regard is Jensen's (1986a) free cash flow hypothesis. However, as Garvey (1992) shows, Jensen's arguments apply to firms with dysfunctional low levels of managerial equity.

However, Morck, Shleifer, and Vishny (1988) and McConnell and Servaes (1990) provide evidence that firm performance is increasing in managerial equity for low levels of managerial equity and decreasing in managerial equity for high levels of managerial equity. Given this evidence, one should expect to observe two different types of poorly performing firms: those in which management has a small portion of the firm's stock and those in which management has a large portion of the firm's stock.

We argue that the LBO population is heterogeneous and draws from both of these groups for very different reasons. For poorly performing firms in which management has a small shareholding, third-party takeover pressures force management to consider a third party led buyout of the firm or face the prospect of a hostile takeover. For poorly performing firms in which management has much of the firm's equity, management faces other problems. While they do not face external takeover pressure, they do hold large, undiversified portfolios and so have an incentive to take cash out of their firm by taking it private through an LBO. This action further concentrates the residual claims of the post-LBO firm into their hands. Thus the second type of LBO will tend to remain private, while the first type of LBO will tend to be either sold or return to public capital markets to enable their third-party investors to reap the rewards from restructuring the firm.

To test whether the heterogeneity hypothesis describes LBOs better than does the free cash flow hypothesis we examine LBOs from 1981 to 1986.

²⁵ We were only able to discern how management's share of common stock changed in 38 of the transactions and how management's dollar investment changed in 10 of the transactions. We should note, however (see footnote 6), that these patterns are consistent with evidence reported in Frankfurter and Gunay (1992) and Kaplan and Stein (1993a,b).

Our analysis reveals the following findings:

- Our sample LBOs cluster into two groups according to management shareholdings: one cluster with high prior managerial stock ownership and the other cluster with low prior managerial stock ownership.
- High prior managerial equity LBOs are typically led by management in a voluntary transaction, while low prior managerial equity LBOs are typically led by third parties in the context of a takeover battle.
- Pretransaction characteristics of high prior and low prior managerial equity LBO clusters differ significantly from one another and from corporations that are acquired by other companies or corporations that remain public concerns. For example, high prior managerial equity LBOs display higher managerial stock ownership, poorer stock performance, greater use of debt, and higher expenditures on taxes than companies that remain public corporations. Low prior managerial equity LBOs display lower managerial stock ownership, less use of debt, and poorer stock performance when compared to these same firms.
- LBO premiums impound the value of reducing performance problems that are related to management's stock ownership in a nonlinear fashion. Specifically, the poorer the prior performance of the LBO the higher the premiums paid to take it private. However, this effect is moderated by managerial equity such that it is decreasing in managerial equity for low levels of managerial equity and increasing in managerial equity for high levels of managerial equity.
- Low prior managerial equity LBOs have a tendency either to return to public markets as public corporations or to be acquired by another company, while the high prior managerial equity LBOs tend to remain private companies.
- Managers in the high prior managerial equity LBOs tend to increase their proportional share of their post-LBO firm's stock, while decreasing their dollar investment in these same firms.

Each of the above results is consistent with the heterogeneity hypothesis's characterization of LBOs. Further, many of these results are either not explained by or are not consistent with the free cash flow hypothesis. Thus we conclude that the heterogeneity hypothesis describes the LBO population better than does the free cash flow hypothesis. Clearly this conclusion calls for a rethinking of prior research on the topic and suggests new lines for future research. In conducting this research it is important to recognize that one can derive very different empirical results from sample to sample, depending upon the mix of LBOs in one's sample.

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