Journal of Corporate Finance 15 (2009) 196–211

Contents lists available at ScienceDirect

Journal of Corporate Finance

journal homepage: www.elsevier.com/locate/jcorpfin

Financial leverage and bargaining power with suppliers: Evidence from leveraged buyouts ☆

David T. Brown [a], C. Edward Fee [b], Shawn E. Thomas [c,*]

[a] Department of Finance, Insurance and Real Estate, Warrington College of Business, University of Florida, Gainesville, FL 32611-7168, United States
[b] Department of Finance, Eli Broad College of Business, Michigan State University, East Lansing, MI 48824-1121, United States
[c] Katz Graduate School of Business, University of Pittsburgh, Pittsburgh, PA 15260, United States

ARTICLE INFO

Article history:
Received 7 February 2008
Received in revised form 27 October 2008
Accepted 27 October 2008
Available online 14 November 2008

JEL classification:
G32
G34

Keywords:
Bargaining power
Leveraged buyout
Suppliers

ABSTRACT

This paper investigates whether leveraged buyouts (LBOs) increase the bargaining power of firms with their suppliers. We find that suppliers to LBO firms experience significantly negative abnormal returns at the announcements of downstream LBOs. We also find that suppliers who have likely made substantial relationship-specific investments are more negatively affected, both in terms of abnormal stock returns and reduced profit margins, than suppliers of commodity products or transitory suppliers. Interestingly, leveraged recapitalization announcements are not associated with negative returns to suppliers, suggesting that increased leverage without an accompanying change in organizational form does not, on average, lead to price concessions from suppliers.

1. Introduction

The empirical literature on leveraged buyouts (LBOs) documents that these transactions are typically associated with significant improvements in corporate performance, e.g., see Kaplan (1989), Muscarella and Vetsuypens (1990), and Smith (1990). The observed changes in performance are generally attributed to the managerial discipline imposed by dramatic increases in leverage and the improved managerial incentives provided by accompanying changes in organizational form, e.g., see Jensen (1989, 1993). While the changes brought about by LBOs are expected to impact many areas of corporate performance, this paper investigates a somewhat unique aspect of LBOs. Specifically, we examine whether the changes in organizational form and leverage that accompany an LBO impact a firm's ability to bargain with its suppliers.

Theoretical models suggest that increased debt might be one mechanism through, which LBOs can affect bargaining between customers and suppliers. In these models, increased leverage typically serves a positive role in negotiations because it functions as a commitment device. For example, in Bronars and Deere (1991), the required interest payments that result from exchanging debt

☆ We thank Henrik Cronqvist, Charles Hadlock, Joel Houston, Kenneth Lehn, Holger Mueller, Michael Ryngaert, David Sappington, and seminar participants at the 2007 American Finance Association Meeting, Pennsylvania State University, and the Swedish Institute for Financial Research conference on the Economics of the Private Equity Market for helpful comments and suggestions. We thank Laxmikant Shukla, Hong-Yan Li, Mary Becker, Hoon-Taek Seo, and Jesse Ellis for excellent research assistance. Any errors remain our own.

* Corresponding author.
E-mail address: shthomas@katz.pitt.edu (S.E. Thomas).

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doi:10.1016/j.jcorpfin.2008.10.004

for equity allow a firm to limit the revenues that suppliers can extract without forcing the firm into costly bankruptcy. Similarly, increased leverage may enable a firm to credibly threaten to forgo an investment that would enhance a supplier's claim unless the supplier agrees to price concessions (Perotti and Spier, 1993; Subramaniam, 1996).

LBOs not only dramatically increase leverage, but typically also significantly alter corporate governance characteristics. For example, Denis (1994) describes how Safeway's LBO was accompanied by dramatic changes in managerial ownership, board composition, executive compensation, and outside investor monitoring. The accompanying changes in governance and incentives may prompt managers to take full advantage of the improved bargaining power conferred on their firms by high leverage. In other words, improved managerial incentives may serve as the carrot that prompts managers to press as hard as possible in negotiations and debt service commitments may serve as the stick that managers use to induce suppliers to grant price concessions. We refer to the idea that an LBO creates an opportunity for a firm to extract concessions from its suppliers as the *bargaining power hypothesis*.

There is anecdotal support for the bargaining power hypothesis. For example, Anders (1992) quotes Safeway's chief financial officer Harry Sunderland as commenting, "Only the radical surgery of the buyout and restructuring could give us the negotiating strength and resolve to rescue our core business from the insatiable appetite of the unions," following the company's 1986 LBO. Baker and Wruck (1989) describe how O.M. Scott & Sons Company extracted concessions from its corporate suppliers after its LBO. Scott managers felt that the increase in leverage strengthened their bargaining position with suppliers as the suppliers understood Scott might default if the suppliers did not capitulate on terms. Similarly, following an LBO, supermarket chain Buttrey Food & Drugs undertook a comprehensive review of its suppliers with a goal of "raising funds to help defray the costs of the LBO." According to Buttrey president Ed Agnew, "What we are doing is inviting each vendor in to update them on the circumstances of our LBO and to discuss his terms and conditions." (See Elliot Zwiebach, "Buttrey is Stressing Products that Come with better Terms; Supermarket Chain is Looking for Better Deals From Suppliers," Supermarket News, November 5, 1990.)

To determine whether these anecdotes are consistent with results from a larger sample, we identify 221 firms that were suppliers to 699 firms that proposed LBOs and leveraged recapitalizations (recaps), transactions that we jointly refer to as highly leveraged transactions (HLTs). Due to the lack of observable prices for transactions between suppliers and customers, we infer the effects of leverage changes on the terms of trade from the trading partners' stock returns around the LBO announcements and subsequent changes in reported profit margins. We document that suppliers to LBO firms experience an average abnormal return of −1.36% ($t=-2.40$) upon announcement of the downstream LBOs (results for suppliers to recap firms are described below). The negative returns to suppliers contrast with an average 18.58% ($t=24.56$) abnormal return to the LBO firms, suggesting that the market considers these deals good news for the shareholders of the companies undertaking them, but bad news for the shareholders of the companies' suppliers.

Under the bargaining power hypothesis, those suppliers that have made significant relationship-specific investments should be particularly susceptible to their customers adopting a tougher bargaining stance as in Klein et al. (1978). Thus, we develop an algorithm to characterize supplier relationships with the LBO firms as either "specific" or "nonspecific" using information disclosed in supplier firms' filings with the U.S. Securities and Exchange Commission (SEC) and media accounts of the supply relationships. We find that firms classified as specific suppliers have significantly more negative announcement period abnormal stock returns than firms classified as nonspecific. Stock returns are also more negative for suppliers identified as more dependent using a measure based on the fraction of a supplier's total sales that are made to a particular customer and the length of relationship with that customer.

Post-LBO changes in operating performance are also consistent with changes in relative bargaining power. LBO firms significantly reduce their costs of goods sold and increase their operating income margins. Supplier firms' operating margins generally decline following the completion of a downstream LBO and, perhaps not surprisingly, these declines are most apparent (in both a statistical and economic sense) for those suppliers that have likely made relationship-specific investments.

In addition to the bargaining power effect, an LBO firm's relationship with its suppliers could also change if the LBO firm reduces output or eliminates a line of business and, hence, reduces the derived demand for inputs, e.g., see Kovenock and Phillips (1995). Demand for inputs may also decrease in the event of financial distress at the LBO firm. We refer to these possibilities jointly as the *reduced demand hypothesis*. The reduced demand and bargaining power hypotheses are not mutually exclusive and both predict that an LBO will harm suppliers. However, we do not find any convincing evidence that the reported supplier-firm negative abnormal returns are driven by reduced demand.

In summary, our results suggest that LBOs enhance firms' bargaining power with their suppliers. These transactions result in significantly negative supplier announcement returns that do not appear to result from reduced demand for the supplier's product or service. The profit margins of suppliers who made relationship-specific investments shrink following their customers' LBOs. Finally, cost of goods sold decrease and profit margins increase for the LBO firms.

Contrasting the impact of LBOs and leveraged recapitalizations on suppliers can potentially allow us to gauge the relative importance of changes in organizational form on bargaining power. Recaps and LBOs substantially increase debt levels, but recaps are not typically associated with the extensive governance changes that accompany LBOs. By definition, recap firms continue to have publicly traded equity outstanding following the transactions, but this is only the most obvious difference. LBO-firm investors also generally take a very active role on the board of directors. Denis (1994) reports that following its 1988 recap Kroger did not initiate the dramatic governance changes seen with Safeway's LBO. Further, Denis and Denis (1993) report that median director and officer ownership increases from 1.7% pre-recap to 3.6% post-recap for a sample of completed leveraged recapitalizations whereas Kaplan (1989) reports that median director, officer, and buyout specialist ownership increases from 5.88% pre-LBO to 99.0% post-LBO for a sample of leveraged buyouts.

Interestingly, for our sample, the effects of LBOs and recaps on suppliers appear to be quite divergent. Suppliers to recap firms experience an average abnormal return of 0.73% ($t=0.92$) at announcement compared with the −1.36% average return for suppliers

to LBO firms and the difference of 2.09% in returns across subsamples is significant at the 5% level. We document a similar but weaker pattern in changes in operating income margins. These differences suggest that increases in leverage *combined with* changes in organizational form result in supplier price concessions whereas increasing leverage *alone* does not.

To the best of our knowledge, this paper is the first systematic examination of the effects of HLTs on corporate suppliers. This paper complements recent work by Kale and Shahrur (2006), who find that leverage ratios are negatively related to proxies for a firm's bargaining power with its customers and suppliers, i.e., firms appear to increase leverage to offset bargaining disadvantages with customers and suppliers.

Our paper also contributes to the literature on the sources of gains to LBOs. Kaplan (1989), Smith (1990), and Muscarella and Vetsuypens (1990) document significantly improved operating performance for LBO firms. However, Shleifer and Summers (1988) conjecture that the gains to LBOs could be the result of wealth transfers from stakeholders rather than improved efficiency. Several papers evaluate this conjecture by examining the effects of LBOs on various stakeholders, e.g., bondholders (Asquith and Wizman (1990)), banks (Kracaw and Zenner (1996)), and pension holders (Ippolito and James (1992)). Evidence from these papers is largely inconsistent with wealth transfers from these stakeholders being significant sources of gains to LBOs. In contrast, the results of our paper suggest that the gains to LBOs may represent, at least in part, wealth transfers from corporate suppliers. Our paper is also closely related to the literature examining the role of debt in product market relationships between firms and their competitors and customers, e.g., Phillips (1995), Chevalier (1995a,b).

The rest of the paper is organized as follows. Section 2 describes the sample of LBO firms and suppliers. Section 3 reports results, and Section 4 concludes.

2. Sample and methodology

2.1. HLT and supplier-firm samples

We draw our sample of HLT firms from the universe of HLTs proposed between January 1, 1980 and December 31, 2001 that were either included in Thomson Financial's Mergers & Acquisitions database or the sample of recaps in Denis and Denis (1993). The sample includes all HLTs that meet the following criteria:

1. The proposed transaction is flagged as an LBO or recap by Thomson or is listed as a recap in Denis and Denis (1993).
2. The announcement date of the proposed transaction can be determined from news stories archived in Factiva.[1]
3. The target is an entire firm rather than a subsidiary or division.
4. The firm is listed in the Compustat database.
5. The firm is listed in the CRSP database or we can find event window returns in the Standard & Poor's Daily Stock Price Record.
6. The firm is not in a regulated or financial industry, i.e., its historical Compustat Standard Industrial Classification (SIC) code is not 4900–4950 or 6000–6999.[2]

As reported in Table 1, 699 proposed HLTs meet each of these sample criteria, 641 of, which are proposed LBOs and 58 of, which are proposed recaps. For the sample of LBOs, there is considerable heterogeneity in the frequency of LBOs by year, with one wave concentrated in the late 1980s, and another wave starting in the late 1990s. Like LBOs, there were a number of recaps proposed in the late 1980's, but, unlike LBOs, there is no later resurgence of recaps. Of the 641 proposed LBOs, 355 were completed while 43 of the 58 proposed recaps were completed. Recap firms in our sample have, on average, much larger market capitalizations (in 2001 dollars) than LBO firms.

We identify suppliers to HLTs using two distinct methods: (1) using information disclosed in annual reports and (2) from news article searches. Method (1) relies on disclosure rules (FASB 14 pre-1998 and SFAS No. 131 post-1998) requiring firms to report both the identities of and total sales to any customer responsible for over 10% of annual sales. Also, some firms voluntarily disclose the names of other customers even when sales to these customers are below the reporting threshold. This information is included in the Compustat industry segment files, but not in immediately usable form. In particular, these customer names are frequently only given as abbreviations, e.g., "WLMRT" for Wal-Mart. We use the procedure of Fee and Thomas (2004) to match these abbreviations to CRSP/Compustat tracked firms. The first step of this procedure involves a computer algorithm that generates a list of potential matches based on the similarity of a firm's name in the historical CRSP database to the abbreviation. If we can be reasonably certain that one of these matches is the correct one (erring on the side of conservatism), we add this link to our database. For customer names for, which we find no match on CRSP, we search the *Directory of Corporate Affiliations* to determine if the customer is a subsidiary of a publicly traded firm. If it is, then we assign to the customer the CRSP identifier of the parent corporation. Finally, for our sample of HLT firms, we use the resulting database to identify as a supplier any firm that lists a HLT firm as a customer at either of the two fiscal year-ends prior to the announcement of the proposed deal.

[1] The search terms are "company name and (merg* or acqui* or bid or offer* or sell or sale or buy* or proxy or recap* or repur*)." To facilitate the calculation of announcement period abnormal returns, we exclude transactions for which the only public information about the deal is an article reporting that a buyout offer has been rejected.

[2] We exclude these industries as regulatory oversight might affect the nature of bargaining between customers and suppliers. Also, financial firms, such as banks, often operate with high leverage and are thus not natural targets for LBOs.

Table 1
Highly leveraged transaction firms and supplier firms

Year	Proposed HLTs	Proposed LBOs	Completed LBOs	Proposed recaps	Completed recaps	Suppliers to proposed LBOs	Suppliers to proposed recaps
1980	1	1	1	0	0	0	0
1981	4	4	2	0	0	1	0
1982	6	6	4	0	0	0	0
1983	16	16	11	0	0	1	0
1984	51	50	25	1	1	13	18
1985	54	50	23	4	4	21	10
1986	53	42	26	11	8	14	14
1987	65	55	30	10	7	7	1
1988	134	118	62	16	9	39	11
1989	72	62	24	10	10	18	7
1990	15	13	7	2	1	5	2
1991	9	8	3	1	0	0	0
1992	10	9	6	1	1	2	1
1993	8	7	4	1	1	0	0
1994	7	7	4	0	0	0	0
1995	11	11	3	0	0	0	0
1996	12	12	5	0	0	1	0
1997	17	16	13	1	1	4	0
1998	27	27	16	0	0	7	0
1999	48	48	33	0	0	11	0
2000	55	55	35	0	0	12	0
2001	24	24	18	0	0	1	0
Total	699	641	355	58	43	157	64
Average MVE ($ millions)	770.10	571.73	538.34	2962.43	2965.06	5623.57	5315.56

The highly leveraged transaction (HLT) sample includes all HLTs proposed between 1980 and 2001 that meet the following criteria: the proposed transaction is flagged as a leveraged buyout (LBO) or leveraged recapitalization (recap) in the Thomson Financial database or is listed as a recap in Denis and Denis (1993); the announcement date of the proposed transaction can be determined via a search of newswires and newspapers archived in Factiva; the target is an entire firm rather than a subsidiary or division; the firm is listed in the Compustat database; the firm is listed in the CRSP database or we can find event window returns in the Standard & Poor's Daily Stock Price Record; and, the firm is not in a financial or regulated industry, i.e., its historical Compustat Standard Industrial Classification code is not 4900–4950 or 6000–6999, respectively. Searches of Factiva determine if transactions were ultimately completed. Suppliers are the firms that either list one of our HLT sample firms as a customer in the Compustat Segment Files at either of the two fiscal year-ends prior to the proposed HLT being announced or that we identify as suppliers to the HLT firms via news searches of the two years prior to the announcement of the proposed HLT. MVE is market value of equity obtained from CRSP and is reported in 2001 dollars.

Supplier identification method (2) involves searching news articles archived in Factiva. We include firms in the supplier sample if news articles indicate the firms were suppliers to an HLT firm at some point in the two years prior to the transaction and the supplier also has data available from CRSP and Compustat. For both groups of suppliers, we require that suppliers not be in regulated or financial industries. Using the two methods we identify a total of 221 suppliers, 157 of, which were suppliers to an LBO firm and 64 of, which were suppliers to a recap firm. Of the 221 suppliers, 138, or about 62%, are identified via the Compustat industry segment files and 83, or about 38%, are identified through news searches.

The average market capitalization for all suppliers is in excess of $5 billion. However, the suppliers we identify through news searches tend to be much larger, with a mean market capitalization of $14.92 billion versus $145 million for suppliers identified through financial statements. The main reason the suppliers identified via financial statements tend to be smaller follows from the nature of the customer reporting requirements. If one customer represents more than 10% of a firm's sales, then that firm tends to be substantially smaller than the customer. Also, larger firms are more likely to be the subject of news articles than smaller ones.

To further investigate the implications of using two different supplier identification strategies, we examine the extent to, which the two samples overlap. To do so, we investigate whether the suppliers identified via financial statements might also have been identified via news articles. In short, we run additional searches of Factiva using the names of the customers and suppliers identified via financial statements. Of the 138 supply relationships identified via financial statements, 47, or a little more than one third, could also have been linked via news searches in the two years prior to the HLT. A logit model (results not reported) reveals that supplier firm size is significant determinant in predicting, which of the supplier relationships we could have identified in both financial statements and news stories. This is consistent with the univariate size differences discussed above. Also, while the articles occasionally mentioned long-standing supply relationships, the articles most frequently reported the establishment of new supply contracts, etc. Hence, it is possible that the effects of HLTs might differ across suppliers identified from the two respective sources. For this reason, we include the method of supplier identification as a control variable in all of our multivariate analyses.

We identify at least one supplier for 112 of the 699 targets of proposed HLTs. HLT firms with identified suppliers are generally much larger than the HLT firms for, which suppliers are not identified. Thus, while these 112 HLT firms represent 16.02% of the total number of sample firms, they comprise 51% of the total market capitalization of all HLT sample firms. The maximum number of suppliers identified for any one HLT is 18 and the minimum is zero. For LBOs with identified suppliers, the median number of suppliers per HLT is one. We do not require that a supplier firm have as a customer an HLT firm that both completes a buyout and also has post-HLT financial statements available.

2.2. Supplier and relationship characteristics

Table 2 reports additional summary statistics on supplier and relationship characteristics. As reported in Panel A, suppliers operate in a number of industries, as defined in Fama and French (1997). For the subsample of suppliers to LBOs, computer products and business services are the two industries most frequently represented. For the subsample of suppliers to recaps, petroleum and natural gas industry firms are most prominent followed by entertainment firms.

Table 2
Supplier and relationship characteristics

	Suppliers to HLTs		Suppliers to LBOs		Suppliers to recaps	
	Firms	Percentage	Firms	Percentage	Firms	Percentage
Panel A: supplier industry						
Business services	22	9.95	20	12.74	2	3.13
Computers	32	14.48	28	17.83	4	6.25
Petroleum and natural gas	20	9.05	1	0.64	19	29.69
Food products	16	7.24	12	7.64	4	6.25
Entertainment	17	7.69	9	5.73	8	12.50
Consumer goods	17	7.69	13	8.28	4	6.25
Other	92	43.90	69	47.14	23	35.93
All suppliers	221	100.00	157	100.00	64	100.00

	Suppliers to HLTs	Suppliers to LBOs	Suppliers to recaps	LBO suppliers-recap suppliers
Panel B: supplier and relationship characteristics				
Supplier from news search	37.56%	42.68%	25.00%	17.68%**
Supplier to completed HLT	63.35%	52.23%	90.63%	−38.40%***
Nonspecific relationship	29.41%	19.75%	53.13%	−33.38%***
Specific relationship	47.51%	52.87%	34.38%	18.49%**
Retailer relationship	23.08%	27.39%	12.50%	14.89%**
Supplier sales dependence	20.37%	21.49%	18.45%	3.04%
Relationship years	2.55	2.82	2.08	0.74**
Long & dependent relationship	12.24%	14.52%	8.33%	6.19%
Consistent supplier	29.91%	23.44%	39.53%	−16.10%*
Median # firms in supplier industry	23.00	18.00	37.50	−19.50**

	Relationship		
	Specific	Retailer	Nonspecific
Panel C: supplier firms by industry and relationship type			
Business services	19	0	3
Computers	29	0	3
Petroleum and natural gas	1	1	18
Food products	0	14	2
Entertainment	5	3	9
Consumer goods	2	11	4
Other	49	22	26
All suppliers	105	51	65

Suppliers are the firms that either list one of our highly leveraged transaction (HLT) sample firms as a customer in the Compustat Segment Files at either of the two fiscal year-ends prior to the proposed deal being announced or that we identify as suppliers to the HLT firms via news searches of the two years prior to the announcement of the proposed HLT. Industries in Panels A and C are defined as in Fama and French (1997). Supplier from news search takes a value of one if the supplier was identified from a search of news stories and a zero if the supplier was identified from the Compustat Segment files. Searches of Factiva determine if HLT transactions were ultimately completed. The relationship types are mutually exclusive categorical dummy variables created by reading news articles and financial statements describing the nature of the suppliers' relationships with the HLT firms. Nonspecific takes a value of one when the supplier sells a commodity good or there is a clear indication that the supplier sells the same product to all of its customers and zero otherwise. Retailer takes a value of one when a supplier sells a finished good to a retailer for resale and zero otherwise. Specific takes a value of one when the products or services provided by the supplier firm appear somewhat specialized for the HLT-firm customer and zero otherwise. Supplier sales dependence is the fraction of a supplier's total sales that are made to the HLT firm. Relationship years is the number of consecutive years that the supplier listed the HLT firm as a customer prior to the HLT. Relationship years is censored as customer relationships are not observable prior to 1978. Sales dependence and relationship years are only available for those supplier firms (n=98) identified via the Compustat Segment files that also have data on actual sales to the HLT firm available. Long & dependent relationship is a dummy variable equal to one if relationship years is greater than or equal to 3 (the sample 75th percentile) and sales dependence is greater than or equal to 0.25 (the sample 75th percentile). Long & dependent relationship is set to zero for all suppliers who do not have data on actual sales to the HLT firm. Consistent supplier is a dummy variable equal to one if the supplier continues to report the HLT firm as a customer in the year after the customer firm completes a HLT. The percentages reported in Panel B for this variable are calculated for only those supplier firms (n=107) who supply a firm that completed a HLT, report the HLT firm as a customer before the HLT, and continue to file financial statements after the downstream HLT. Median # firms in supplier industry is the median number of firms on Compustat with the same historical four-digit SIC code as our supplier firm in the year before the HLT is announced (three-digit level if less than five competitors at the four-digit level). The significance of differences in medians (means) across subsamples is assessed using Wilcoxon rank-sum tests (t-tests). ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

As reported in Panel B of Table 2, 63.35% or 140 firms are suppliers to customers that complete HLTs. Of the 140 suppliers to completed HLTs, 110 report sufficient financial information to calculate operating income margins for the fiscal year-end following the year the HLT is completed, i.e., year +1 relative to the year of completion.[3]

The nature of the relationship between the HLT firm and the supplier should influence how the HLT affects the supplier firm. In particular, suppliers with highly specific or particularly dependent relationships with HLT firms may be at a greater bargaining disadvantage than suppliers with less relationship-specific investments or more alternative outlets for their products. Thus, we construct a qualitative indicator of specificity in the supplier relationships based on information provided in the supplier firms' 10-K filings and news articles. From these sources, we first determine whether a supplier sells a finished good to a retailer for resale or whether it sells a good or service that is used by the HLT firm but not resold. We separate the second group of relationships (non-retailer) into those where the product is a commodity versus those where the relationship between the customer and supplier is more specific. We thereby create three mutually exclusive categories, which we refer to as retailer relationships, nonspecific relationships, and specific relationships.

We break out suppliers to retailers as a separate relationship category because the specificity of the relationship cannot be readily compared as with other supply relationships. A supply relationship is deemed nonspecific when there is clear language that the supplier sells the same product to all of its customers. In many cases the supplier obviously sells a commodity product, e.g., American Maize Products supplied corn syrup to Royal Crown, a soft-drink manufacturer. A less obvious case is Drew Industries, a firm that manufactures and markets building products including windows and doors for manufactured housing that were purchased by Redman Industries, an LBO firm. Since Drew Industries does not produce different windows and doors for different customers, rather it sells a line of products, we classify this firm's supply relationships as nonspecific.

Products and services in the specific category are specialized for individual customers. For example, Comtrex Systems is a sample supplier firm that designed, developed, assembled and marketed micro-processor based electronic cash registers and related hardware and software (point of sale terminals) to drug store chains, restaurants and fast-food outlets. Comtrex is in the supplier sample because it supplied Revco Drug Stores at the time of the Revco LBO. The relationship is deemed specific because of the following language in the Comtrex 10-K filing: “Simple changes to the memory can be made by the customer, the company's dealer or the company by programming individual machines. More sophisticated software has been designed by the company for Revco Drug Stores.” Another example is Fisher Transportation, a trucking firm, which is classified as having a specific relationship with its customer Service Merchandise based on the just-in-time inventory model developed for Service Merchandise. In cases where the 10-K does not mention the relationship explicitly, we use our judgment as to the nature of the product sold to categorize relationships as nonspecific or specific. As reported in Panel B of Table 2, 29.41% are classified as nonspecific, 47.51% are classified as specific, and 23.08% of the relationships in our sample are classified as retailer relationships. While space constraints precluded its inclusion in the paper, a complete list of supplier and customer firm identities and relationship types is available from the authors upon request.

We report in Panel C the frequency, which with we code relationships as specific, retailer, or nonspecific by supplier industry. In general, the correlation of relationship type and supplier industry fit with common-sense notions about what types of industries have more specific relationships. For example, we observe more specific relationships for suppliers of business services and computer systems and more nonspecific relationships for suppliers of petroleum and natural gas. Also, suppliers of food products and consumer goods are much more likely to sell their products to retailers for resale than suppliers in other industries.

For the suppliers identified via financial statements, we construct indicators of the size of the supply relationship. First, we calculate the fraction of a supplier's total sales that are accounted for by its sales to the HLT firm in the year before the HLT. As shown in Panel B of Table 2, supplier sales dependence averages about 20%. In order to indicate whether the supply relationship is a long- or short-term relationship, we calculate the number of consecutive years that a supplier listed the HLT firm as a customer prior to the HLT, a figure we refer to as relationship years. The mean (median) relationship length for our sample is 2.55 (2) years. Our relationship length variable is censored as customer relationships are not observable prior to 1978. Fee et al. (2006) report that the median length of observed customer-supplier relationships for virtually all firms on Compustat between 1978 and 2001 is three years. Thus, the duration of our sample of customer-supplier relationships appears to roughly approximate that of the population.

It seems a reasonable conjecture that the suppliers most vulnerable to changes in bargaining power are those who are both involved in long-term relationships and who sell a large fraction of their output to the HLT firm. While selling a large fraction of output to a particular customer does not necessarily require a significant relationship-specific investment from either party to the relationship, such an investment, either implicit or explicit, is more likely when one party is particularly dependent on the other party. Witness the number of manufacturers of consumer products that maintain offices near Bentonville, Arkansas to service their selling relationships with Wal-Mart (see Sarah Ellison, Ann Zimmerman, and Charles Forelle, “P&G's Gillette Edge: The Playbook it Honed at Wal-Mart,” The Wall Street Journal, January 31, 2005). Thus, we construct a dummy variable called long & dependent

[3] Thirty supplier firms fail to report sufficient financial information for calculating operating performance after the downstream LBO. Five firms are simply missing a necessary data item in Compustat. We search Factiva to determine the reasons the other firms stopped reporting financial information. Twenty-one firms were the targets of completed acquisitions and four firms filed for bankruptcy protection. Of the firms entering bankruptcy, one filing (Regina Inc.) was the result of a massive financial fraud and another (Osrow Products) was the result of not being able to pay a jury award in a patent infringement case. Tidwell Industries cited weakness in its mobile home division as the source of its distress and Xenerex cited low oil prices as the reason for its exit. In short, our search reveals no hint that any of the bankruptcy filings were the result of financial distress caused by the product market effects of a downstream LBO. Further, no mention of the downstream LBO was made in any of the acquisition announcements. While anecdotal in nature, this evidence suggests that neither reduced demand from LBO customers nor contagion effects of LBO-firm financial distress were significant factors in the outcomes of these suppliers.

relationship, which equals one if the relationship length is greater than or equal to 3 years (the sample 75th percentile) and sales dependence is greater than or equal to 25% (the sample 75th percentile). The 25% sales dependence cutoff means that the long & dependent relationship variable will equal zero for the suppliers who do not report the relationship in their financial statements, since the minimum reporting threshold is sales dependence of 10%. Finally, we also create a dummy variable called consistent supplier, which is equal to one if a supplier continues to report the sample HLT firm as a customer in its financial statements in the year after the customer firm completes a HLT.

The competitiveness of the supplier's industry may also affect the impact of an HLT on a supplier. In particular, suppliers in less competitive industries may be able to extract rents from their customers, including the HLT firms prior to the transactions. If this is the case, changes in bargaining power may impact these suppliers more than those suppliers that operate in highly competitive industries. As a simple measure of supplier industry competitiveness, we calculate the number of firms on Compustat that operated in the same industry (four-digit SIC code) as the supplier in the year prior to the HLT.

Panel B also reports some differences between the suppliers to LBOs and the suppliers to recaps. The suppliers to recaps are significantly more likely to be involved in nonspecific relationships than are the suppliers to LBOs. Suppliers to LBOs also tend to be involved in longer relationships and tend to operate in industries with fewer competitors. Finally, suppliers to LBOs are more often identified via news searches than are suppliers to recaps and are less often suppliers to completed deals than recap suppliers.

3. Results

3.1. Supplier-firm abnormal returns

3.1.1. Suppliers to LBOs vs. recaps

We use standard event study methodology to calculate abnormal returns at the announcement of the HLT, estimating the market model parameters over the 200-day trading period starting at day −240 relative to the announcement date. We require at least 100 trading days over the estimation window to calculate market model parameters. For eight suppliers without sufficient estimation window data, we calculate abnormal returns as simple net-of-market returns. Cumulative abnormal returns are calculated over the three-day window centered on the announcement date.

Panel A of Table 3 reports abnormal returns for all suppliers and for the subsamples of suppliers to LBOs and suppliers to recaps. Suppliers to firms that announce LBOs have average abnormal returns of −1.36%, which is significant at the 5% level. Significant negative supplier abnormal returns indicate that the market believes that the LBO will result in lower future supplier profits. This finding is consistent with both the bargaining power and reduced demand hypotheses. There is a marked difference in returns

Table 3
Supplier abnormal returns

	Suppliers to HLTs	Suppliers to LBOs	Suppliers to recaps	LBO suppliers-recap suppliers
Panel A: supplier abnormal returns				
Average abnormal return	−0.76%	−1.36%	0.73%	−2.09%
t-statistic	−1.62	−2.40**	0.92	−2.04**
Positive, negative	91,123**	59,93***	32,30	

	Relationship			Differences		
	Specific	Retailer	Nonspecific	Specific−nonspecific	Retailer−nonspecific	Specific−retailer
Panel B: Supplier Abnormal Returns by Relationship Type						
Average abnormal return	−2.01%	−0.65%	1.11%	−3.12%	−1.76%	−1.36%
t-statistic	−2.64***	−0.80	1.49	−2.78***	−1.60	−1.11
Positive, negative	34,66***	16,34**	41,23**			

	Long & Dependent=1	Long & Dependent=0	Difference
Panel C: supplier abnormal returns by long & dependent relationship indicator			
Average abnormal return	−3.28%	−0.02%	−3.26%
t-statistic	−2.73**	−0.02	−1.63
Positive, negative	2,10**	40,45	

Suppliers are the firms that either list one of our highly leveraged transaction (HLT) sample firms as a customer in the Compustat Segment Files at either of the two fiscal year-ends prior to the proposed deal being announced or that we identify as suppliers to the HLT firms via news searches of the two years prior to the announcement of the proposed HLT. Abnormal return is the abnormal return for a three-day window centered on the HLT announcement date and calculated from a market model estimated over the period from 240 to 41 days before the HLT announcement. The relationship types are mutually exclusive categorical dummy variables created by reading news articles and financial statements describing the nature of the suppliers' relationships with the HLT firms. Nonspecific takes a value of one when the supplier sells a commodity good or there is a clear indication that the supplier sells the same product to all of its customers and zero otherwise. Retailer takes a value of one when a supplier sells a finished good to a retailer for resale and zero otherwise. Specific takes a value of one when the products or services provided by the supplier firm appear somewhat specialized for the HLT-firm customer and zero otherwise. Long & dependent relationship is a dummy variable equal to one if relationship years is greater than or equal to 3 (the sample 75th percentile) and sales dependence is greater than or equal to 0.25 (the sample 75th percentile). Sales dependence and relationship years are only available for those supplier firms (n=98) identified via the Compustat Segment files that also have data on actual sales to the HLT firm available. The significance of the number of positive versus number of negative is calculated using a sign test. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

between suppliers to LBOs and suppliers to recaps. Suppliers to recaps experience average returns of 0.73%, which is indistinguishable from zero at conventional levels. The difference in returns between the suppliers to LBO and suppliers to recap susbamples is 2.09% and is significant at the 5% level.

One potential explanation of the differences in supplier abnormal returns across subsamples is that a change in leverage alone is not sufficient to significantly affect the bargaining relationship between customers and suppliers, but that other governance changes, which generally accompany LBOs are also necessary. While the usual caveats associated with making inferences from univariate comparisons are valid here, we should add that this conclusion is also subject to the previously documented differences between suppliers to recaps and LBOs in terms of relationship type.

Note, to facilitate examination of cross-sectional differences, we treat each supplier as one observation in the calculation of abnormal returns. However, the returns to suppliers for a given transaction could be correlated. To further investigate the statistical significance of the observed negative return to LBO suppliers, we regress the return to LBO suppliers against a constant, and adjust the White standard error estimates for clustering by transaction. The coefficient on this regression naturally equals the mean return of −1.36%, and the *t*-statistic is −2.38. Thus the univariate finding of negative abnormal returns for LBO suppliers is robust to potential correlations within returns for a given deal.

3.1.2. Relationship characteristics and returns

Panel B of Table 3 reports supplier abnormal returns by relationship type. The average abnormal return to suppliers with specific relationships is −2.01% ($t=-2.64$), which is 3.12% less than the average abnormal return to suppliers in nonspecific relationships and this difference is significant at the 1% level. This result is consistent with the predictions of the bargaining power hypothesis: the specific suppliers are the ones most susceptible to bargaining pressures. Average abnormal returns to suppliers of retailers are also negative, −0.65% ($t=-0.80$), with significantly more negative returns than positive returns. It is perhaps not unexpected to observe modest effects on suppliers to retailers as Chevalier (1995a) documents that the nature of product market competition in at least one particular retail industry, supermarkets, appears responsive to HLTs. The average return to retail suppliers is slightly more negative, −1.14% ($t=-1.30$), if we restrict our attention to LBOs only.

There are some cases in, which a single HLT firm has multiple suppliers with the same relationship type, e.g., a HLT firm has three suppliers and each relationship is categorized as specific. In analysis not reported in the tables, we explored the pattern of returns across suppliers in these cases. The results confirm the observed difference in reaction for specific vs. non-specific suppliers. In 47% of deals with more than one specific supplier, all of the specific suppliers had negative abnormal returns, and in 0% of the deals did all of the specific suppliers have positive abnormal returns. In contrast, in only 12.5% of the deals with more than one non-specific supplier did all the nonspecific suppliers have negative abnormal returns, while in 25% of these cases, all the non-specific suppliers had positive abnormal returns.

As reported in Panel C, suppliers in long and dependent relationships experience average abnormal returns of −3.28% ($t=-2.73$) at the announcement of a HLT whereas suppliers in relationships with shorter histories and less sales dependence experience an average abnormal return of essentially zero. Thus, supplier stock returns vary with ex-ante measures of supplier relationship specificity as suggested by the bargaining power hypothesis.

3.2. Regressions explaining supplier abnormal returns

Table 4 reports the results of regressions explaining supplier abnormal returns. The regressions account for potential correlation of returns between multiple suppliers for a given HLT by adjusting White standard error estimates for clustering. We start in column (1) by including the variables investigated in the univariate analyses of Table 3. In particular, we include a supplier to LBO dummy variable, which takes a value of one if the supplier's customer announces a proposed LBO and zero if the customer announces a recap. We also include indicator variables for specific relationships, retailer relationships (nonspecific is the omitted type), and long & dependent relationships. To control for differences in characteristics of the suppliers identified via financial statements vs. those identified via news searches, we include in all specifications a dummy variable indicating the group to, which a given supplier belongs.

As in the univariate results, suppliers to LBOs experience significantly more negative announcement returns than suppliers to recaps. The specific and long & dependent relationship variables are also negative and significant. The coefficients on the relationship variables are fairly large in magnitude as well. Thus, we conclude that the characteristics of the relationship between HLT firms and their suppliers are important determinants of the impact of the HLTs. Consistent with the bargaining power hypothesis, suppliers deemed ex-ante more vulnerable to negotiating pressure suffer larger value declines.

In column (2), we add a dummy variable, consistent supplier, which equals one for those suppliers who report their relationship with the HLT firms both before and after a proposed transaction. This variable equals one for those suppliers that continue to supply the HLT firm after the proposed transaction. The number of observations drops between columns (1) and (2) because the consistent supplier variable is only available for suppliers that report financial data both pre- and post-HLT. The coefficient on this variable is negative and significant, with a fairly sizeable coefficient of −2.565 ($t=-2.92$). If the negative returns to suppliers were driven by suppliers losing business as HLT firms scale back or exit industries as in the reduced demand hypothesis, then this coefficient would be positive. This finding can also be interpreted as additional evidence that suppliers in close relationships with HLT firms are more subject to bargaining pressure than transitory suppliers who would unconditionally be less likely to continue as suppliers.

In column (3), we add control variables reflecting HLT- and supplier-firm characteristics and industry competition. Because relative industry competition may affect the bargaining game between customers and suppliers, we include in the specification the

Table 4
Regressions explaining supplier abnormal returns

Specification	(1)	(2)	(3)	(4)
Supplier to LBO	−1.399**	−1.874***	−1.373*	
	(−2.37)	(−2.75)	(−1.71)	
Specific relationship	−2.617***	−2.589***	−2.322***	−2.181**
	(−3.46)	(−3.17)	(−3.10)	(−2.34)
Retailer relationship	−1.047	−0.954	−0.408	−0.598
	(−1.16)	(−1.05)	(−0.40)	(−0.46)
Long & dependent relationship	−2.572*	−2.883**	−3.249**	−1.761
	(−1.81)	(−2.03)	(−1.99)	(−1.01)
Supplier from news search	−0.061	−1.652	−1.037	−1.019
	(−0.06)	(−1.45)	(−0.89)	(−0.67)
Consistent supplier		−2.565***	−2.174**	−3.389**
		(−2.92)	(−2.02)	(−2.55)
Ln # firms in supplier industry			0.384	−0.006
			(0.70)	(−0.01)
Ln # firms in HLT-firm industry			−0.010	−0.192
			(−0.02)	(−0.35)
HLT-firm pre-deal inside ownership %			−3.970	−3.857
			(−0.78)	(−0.70)
HLT-firm pre-deal book leverage			3.329	2.418
			(0.74)	(0.45)
Pre-deal forecasted long-term growth of HLT-firm industry			−0.035	−0.012
			(−0.34)	(−0.09)
Footsteps			−1.304	−1.241
			(−1.39)	(−1.01)
Intercept	1.870***	3.485***	2.409	2.815
	(3.83)	(4.35)	(0.99)	(1.02)
R^2	0.053	0.082	0.102	0.094
Observations	214	178	163	115

The dependent variable is the abnormal return for supplier firms over a three-day window centered on the HLT announcement date. All coefficient estimates multiplied by 100 for presentation. The sample for columns (1) to (3) includes suppliers to both LBOs and recaps, while that of column (4) includes only suppliers to LBOs. Supplier to LBO is a dummy variable that takes a value of one if the supplier firm's customer announces an LBO and 0 if the customer announces a recapitalization. Relationship type and long & dependent relationship are as defined in Table 2. Supplier from news search takes a value of one if the supplier was identified from a search of news stories and zero if the supplier was identified from the Compustat Segment files. Consistent supplier is a dummy variable equal to one if the supplier continues to report the HLT firm as a customer in the year after the proposed HLT. Ln # firms in supplier (HLT) firm industry is the natural logarithm of number of firms operating in the same four-digit SIC code as the supplier (HLT) firm in the year the HLT is announced. HLT-firm pre-deal inside ownership % is defined as the percentage of common stock held by all officers and directors as a group in the most recent proxy statement prior to the announcement of the transaction. HLT pre-deal book leverage is calculated as debt in current liabilities (item 34) plus long-term debt (item 9) over total assets (item 6) in the year prior to the announcement of the transaction. Pre-deal forecasted long-term growth of HLT-firm industry is the median long-term earnings growth forecast from IBES for the HLT firm's industry (four-digit SIC code) at the fiscal year end immediately before the announcement of the proposed HLT. Footsteps is a dummy variable equal to one if the HLT firm was the subject of takeover speculation, an outright bid, an interfirm acquisition attempt, or a proxy fight in the six months prior to the HLT announcement date. *t*-statistics based on White standard errors clustered by HLT transaction are in parentheses. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

natural logs of the number of firms in the supplier and HLT firms' respective industries. Measures of pre-HLT inside ownership and book leverage are included since these are characteristics that typically change substantially in HLTs (ownership more so for LBOs). We use pre-deal levels of these variables as indications of the extent of potential changes since post-deal values are often unavailable for LBOs. We define HLT-firm pre-deal inside ownership % as the percentage of common stock held by all officers and directors as a group in the proxy statement immediately prior to the announcement of the HLT transaction (proxy statement data collected from Compact Disclosure CDs, Lexis–Nexis online, and SEC filing microfiche). We define HLT pre-deal book leverage as debt in current liabilities (Compustat item 34) plus long-term debt (item 9) over total assets (item 6) in the year prior to the announcement of the transaction.

As discussed in more detail in the following section, the reduced demand hypothesis suggests HLTs convey negative information about their industries' expected growth. One might expect this negative information to be a larger surprise for HLTs in industries, which anticipate high growth. Thus, we include the pre-HLT forecasted long-term growth rates of the HLT firms' industries from I/B/E/S International Inc. We also add a variable to control for the extent that the market might have anticipated the HLT transaction. A "footsteps" variable takes on a value of one if the HLT firm was the subject of takeover speculation, an outright bid, an interfirm acquisition attempt, or a proxy fight in the six months prior to the announcement date.

In summary, none of the additional control variables included in the column (3) specification is significant. Additionally, the regressors displaying significance in column (2) retain significance in column (3), though at slightly reduced levels. Because some of the additional variables are correlated with each other, we experimented with adding each of these variables, one at a time, to the specification in column (2).[4] In short, none of these variables is significant individually. Also, in general, the additional variables

[4] A correlation matrix is available from the authors upon request.

have little effect on the significance of the column (2) variables. The one exception is the coefficient on the supplier to LBO variable, which in a couple of cases drops to below 10% significance. Given that we also report significantly larger declines in operating income margins for suppliers to LBOs versus recaps in Section D below, the balance of the evidence suggests that LBOs have differential effects. That is, the unique organizational changes associated with LBOs appear to complement the leverage effects.

Given that there are some important differences between LBOs and recaps, we replicate the specification of column (3) for the sample of suppliers to LBOs only. The results of this regression are reported in column (4). In this specification, the specific relationship and consistent supplier dummy variables are negative and significant at the 5% level. The long & dependent relationship variable remains negative, but is no longer significant at conventional levels. In results not reported in the table, we also add a dummy variable that takes a value of zero when the LBO firm's pre-LBO management participates in the HLT in some capacity and a value of one for a pure third-party buyout where management does not participate in the buyout or continue with the firm. The coefficient on this variable is negative but is not quite significant at conventional levels ($t=-1.58$). This result hints that LBO suppliers might experience more negative abnormal returns when the motivation for the LBO appears to be largely to replace management, i.e., disciplinary.

3.3. Alternate explanations for stock return results

In Jensen (1986), changes in leverage and management incentives that occur with HLTs motivate managers to adopt strategies that are more consistent with shareholder wealth maximization. If firms shed excess capacity (Kovenock and Phillips, 1995) or discontinue inefficient lines of business following an HLT, then the demand for the supplier firm's output may be reduced. This reduced demand hypothesis is an alternative explanation for the negative abnormal returns experienced by the supplier firms.[5] Relatedly, Hertzel et al. (2008) present evidence suggesting that the negative effects of financial distress extend to customers and suppliers of the distressed firms. Thus, the negative supplier abnormal returns could reflect the HLT firms' increased likelihood of financial distress.

For several reasons, we conclude that reduced demand cannot solely explain the observed negative supplier stock price reactions. For example, consistent suppliers also list the HLT firm as a major customer in the year following the HLT. If the adverse market reaction around the HLT announcement occurs because the market anticipates that 1) suppliers will no longer sell to the HLT firm because the HLT eliminates a line of business, 2) sales to the HLT will fall below the major customer reporting threshold, or 3) relationships with inefficient suppliers will be terminated following the LBO, then consistent suppliers should fare better than those who do not continue to supply the HLT firms. This is not the case. In fact, as indicated in Table 4, the opposite is true— suppliers that report relationships both prior to and after completion of the HLT actually suffer significantly more negative abnormal returns. Thus, the negative abnormal returns to suppliers are apparently not driven by the firms that significantly reduce sales to the HLT firm.

As a direct test of the reduced demand hypotheses, we calculate supplier- and HLT-firm sales growth from year −1 to +1 around the HLT for suppliers to completed deals. The median growth rate in sales for both suppliers to LBOs and recaps is 20.31% and significantly more firms experience sales increases than decreases, as reported in Panel A of Table 5. The median sales growth net of the sales growth of similar firms over the same time period is 11.13%. For the subsample of 22 firms that report actual sales to the HLT firms both pre- and post-HLT, the median (mean) sales to the HLT firm actually increase from $3.5 ($25.2) million before the HLT to $5.1 ($35.0) million after the HLT. Thus, there is no evidence that supplier firms systematically suffered declines in sales around the customer's HLT. As reported in Table 7, industry adjusted sales growth for HLT firms is significantly positive and significantly more positive for the LBO firms versus recaps.

The early HLT studies examine data largely from the 1980s when LBO firm transactions emerged. According to Jensen (1993), LBO transactions in the 1980s were an important catalyst for eliminating excess capacity caused by adverse demand and productivity shocks. Kovenock and Phillips (1997) show that the output response to a HLT depends critically on the extent of excess capacity. Our sample extends well beyond that period and includes HLT transactions that do appear motivated by a desire to eliminate excess capacity.

Industry capacity utilization data available from the Surveys of Plant Capacity prepared by the U.S. Census Bureau for mining and manufacturing firms show that mining and manufacturing firms in our HLT sample operate in SIC codes that, on average, exhibit higher capacity utilization rates than the average capacity utilization rates for all mining and manufacturing firms. Specifically, we find that, in the year before announcing an HLT, the average capacity utilization rate, relative to full capacity, for industries (four-digit SIC codes) in, which HLT firms operated was 72%. In comparison, the average capacity utilization rate for all mining and manufacturing industries in the same periods was 69%. The difference in capacity utilization rates is significant at the 1% level ($t=2.87$). Our sample of HLTs is not largely confined to industries where eliminating excess capacity is likely the primary motivation for the HLTs.

We also examine order backlogs (Compustat item 98) reported by the HLT firms themselves pre- and post-transaction (since only 27 firms report nonzero order backlogs before and after completing an HLT, we choose not to report these results in the tables). In short, there is no significant change in the order backlog for firms completing HLTs (mean pre-HLT backlog is $440 million and mean post-HLT backlog is $396 million). In summary, we find no convincing evidence that the observed patterns of stock price performance are solely related to an increasing likelihood of supplier sales declines or financial distress.

We also examine the stock price response of the HLT firms' rivals, i.e., those firms operating in the same four-digit SIC code (at the time of the HLT) as our HLT firms. If the HLT announcement signals negative information about the industry, then other firms in

[5] It is important to note, however, that there is some theoretical dispute about the effect of leverage on industry output. For example, in Brander and Lewis's (1986) model, increases in financial leverage lead firms to choose more aggressive levels of output, contrary to the reduced demand hypothesis.

Table 5
Changes in supplier operating performance

	Suppliers to HLTs	Suppliers to LBOs	Suppliers to recaps	LBO suppliers-recap suppliers
Panel A: year−1 to year+1 change in median supplier sales				
Median year−1 sales	72.56	98.31	34.00	
Median year+1 sales	85.39	111.82	55.13	
Median year−1 to year+1 sales growth	20.31%***	19.71%***	22.08%***	−2.37%
Positive, negative	75,35***	45,21***	30,14**	
Median change in matching firm adj. sales growth	11.13%	8.53%	13.02%	−4.49%
Panel B: year−1 to year+1 changes in supplier operating performance				
Median year−1 cash flow to sales	10.26%	8.72%	14.35%	
Median year−1 matching firm adj. cash flow to sales	−0.01%	−0.02%	−0.01%	
Median year+1 cash flow to sales	9.57%	8.03%	13.28%	
Median year+1 matching firm adj. cash flow to sales	−0.26%	−1.05%	2.01%	
Median (mean) change in cash flow to sales	−0.45%	−0.90%	0.74%	−1.64%
	(−4.14%*)	(−3.09%)	(−5.72%)	(2.63%)
Median change # positive, negative	51,59	27,39	24,20	
Median (mean) change in matching firm adj. cash flow to sales	−0.36%	−0.95%	1.88%	−2.83%**
	(0.06%)	(−2.51%)	(3.92%)	(−6.43%)
Median change # positive, negative	53,57	27,39	26,18	

	Relationship			Differences		
	Specific	Retailer	Nonspecific	Specific−nonspecific	Retailer−nonspecific	Specific−retailer
Panel C: year−1 to year+1 changes in operating performance by relationship type						
Median (mean) change in cash flow to sales	0.96%	−0.39%	−2.24%	3.20%	1.85%	1.35%
	(−3.52%)	(−0.76%)	(−7.68%)	(4.16%)	(6.92)	(−2.76%)
Median (mean) change in matching firm	−0.75%	−0.53%	1.80%	−2.55%	−2.33%	−0.22%
adj. cash flow to sales	(−4.53%*)	(1.35%)	(6.33%)	(−10.86%**)	(−4.98%)	(−5.88%)

	Long & dependent=1	Long & dependent=0	Difference
Panel D: year−1 to year+1 changes in operating performance by long & dependent relationship indicator			
Median (mean) change in cash flow to sales	3.66%	−1.07%	4.73%
	(1.44%)	(−11.09%**)	(12.53%)
Median (mean) change in matching firm adj. cash flow to sales	5.47%	1.85%	3.62%
	(7.62%)	(−3.99%)	(11.61%)

In Panel A, sales growth is the median percentage change in sales (Compustat item 12). Changes in (matching firm adjusted) operating performance are calculated as year+1 (matching firm adjusted) operating performance minus year−1 (matching firm adjusted) operating performance, and are winsorized at the 5% and 95% level. Matching firms are chosen on their similarity to our sample firms in terms of industry, asset size, and pre-event operating performance. Cash flow to sales is defined as the ratio of operating income (item 13) to sales. Relationship type and long & dependent relationship are as defined in Table 2. Significance of the number of positive versus number of negative is calculated using a sign test. Significance of changes in median (mean) operating performance and median sales growth is assessed using Wilcoxon signed-rank tests (*t*-tests). The significance of differences in medians (means) across subsamples is assessed using Wilcoxon rank-sum tests (*t*-tests). ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

the industry should realize negative stock price reactions. The average abnormal return to equally weighted portfolios of rival firms is 0.25% and is significant at the 5% level, suggesting that the information revealed to the market about these firms' values by the HLT announcement is actually positive. The findings are almost identical for the subsample of rivals of firms announcing LBOs consistent with Slovin et al. (1991).

3.4. Changes in supplier operating performance

3.4.1. Univariate changes in supplier operating performance

In Panel B of Table 5, we report changes in supplier cash flow margins in the years surrounding completed downstream HLTs. Following the recommendation of Barber and Lyon (1996), we use a matching-firm approach to create industry-, size-, and prior performance-adjusted operating performance measures to control for mean reversion in operating performance. The specific matching algorithm is as follows. We first identify all firms on Compustat that are not in our sample and that have operating income before depreciation (item 13), sales (item 12) and asset size (item 6) data available for the same years around the HLT as our sample firms.[6] From these firms, we identify those with 1) the same historical two-digit SIC code as our sample firm, 2) asset size at the end of year −1 between 25% and 200% of the sample firm, and 3) an operating income to sales ratio between 90% and 110% of the sample firm. From these firms we choose as the matching firm the company with the operating income to sales ratio closest to our sample firm. If no firm meets these criteria, then we relax the industry screen and require only a match of the one-digit SIC code

[6] We deflate our operating performance measures by sales rather than assets because many LBO firms revise the book values of assets (inventories in particular) upward at the time of the LBO. Thus, asset book values are not reported on a comparable basis pre- and post-buyout. Reported sales volumes are not similarly affected by LBOs. Note that these asset write-ups are expensed in the periods immediately subsequent to the LBOs thereby inflating cost of goods sold and reducing operating cash flows reported by LBO firms post-buyout, e.g., see Kaplan (1989).

Table 6
Regressions explaining changes in supplier operating performance

Specification	(1)	(2)	(3)	(4)
Supplier to LBO	−5.077	−4.575	−7.873*	
	(−1.24)	(−1.13)	(−1.71)	
Specific relationship	−10.568**	−9.629**	−8.435**	−12.475*
	(−2.43)	(−2.25)	(−2.05)	(−1.98)
Retailer relationship	−3.920	−3.823	−4.124	−3.327
	(−0.83)	(−0.84)	(−0.87)	(−0.44)
Long & dependent relationship	9.739	8.386	5.263	−13.728
	(0.99)	(0.91)	(0.49)	(−0.83)
Supplier from news search	4.768	8.251	4.882	6.927
	(1.15)	(1.50)	(0.76)	(0.94)
Consistent supplier		8.911	6.574	1.17
		(1.33)	(0.84)	(0.13)
Ln # firms in supplier industry			0.697	1.628
			(0.58)	(1.09)
Ln # firms in HLT-firm industry			−2.935	−2.301
			(−1.61)	(−1.06)
HLT-firm pre-deal inside ownership %			12.841	6.749
			(1.05)	(0.61)
HLT-firm pre-deal book leverage			9.208	23.097*
			(0.71)	(1.83)
Pre-deal forecasted long-term growth of HLT-firm industry			0.626	0.169
			(1.38)	(0.34)
Intercept	6.427	1.972	0.297	−4.681
	(1.42)	(0.31)	(0.02)	(−0.39)
R^2	0.075	0.100	0.101	0.201
Observations	110	110	102	58

The dependent variable is the change in matching firm adjusted cash flow to sales. Changes in cash flow to sales are calculated as year+1 matching firm adjusted cash flow to sales minus year−1 matching firm adjusted cash flow to sales. Matching firms are chosen on their similarity to our sample firms in terms of industry, asset size, and pre-event operating performance. Cash flow to sales is defined as the ratio of operating income (Compustat item 13) to sales (item 12). All coefficient estimates multiplied by 100 for presentation. The sample for columns (1) to (3) includes suppliers to both LBOs and recaps, while that of column (4) includes only suppliers to LBOs. Supplier to LBO is a dummy variable that takes a value of one if the supplier firm's customer announces an LBO and 0 if the customer announces a recapitalization. Relationship type and long & dependent relationship are as defined in Table 2. Supplier from news search takes a value of one if the supplier was identified from a search of news stories and zero if the supplier was identified from the Compustat Segment files. Consistent supplier is a dummy variable equal to one if the supplier continues to report the HLT firm as a customer in the year after the customer firm completes a HLT. Ln # firms in supplier (HLT) firm industry is the natural logarithm of number of firms operating in the same four-digit SIC code as the supplier (HLT) firm in the year the HLT is announced. HLT-firm pre-deal inside ownership % is defined as the percentage of common stock held by all officers and directors as a group in the most recent proxy statement prior to the announcement of the transaction. HLT pre-deal book leverage is calculated as debt in current liabilities (item 34) plus long-term debt (item 9) over total assets (item 6) in the year prior to the announcement of the transaction. Pre-deal forecasted long-term growth of HLT-firm industry is the median long-term earnings growth forecast from IBES for the HLT firm's industry (four-digit SIC code) at the fiscal year end immediately before the announcement of the proposed HLT. *t*-statistics based on White standard errors clustered by HLT transaction are in parentheses. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

while keeping the other criteria as above. Although the initial screens are performed at the two-digit SIC code level, about two-thirds of the actual matching firms have the same three- or four-digit SIC code as the sample firm.[7] We discuss the sensitivity of our operating performance results to alternate benchmarks below.

We calculate the operating income to sales ratio for both our sample firms and the matching firms for the year prior to the HLT and the year after the HLT is completed. For each year, we define the matching firm adjusted measure as the sample firm's ratio minus the matching firm's ratio. The industry adjusted changes in profit margins we report are the post-HLT matching firm adjusted performance ratio minus the pre-HLT matching firm adjusted performance ratio. To diminish the influence of extreme observations on reported averages, we winsorize changes in cash flow to sales at the fifth and ninety-fifth percentiles.

In Panel B of Table 5, we report median and mean changes in matching firm adjusted cash flow to sales ratios. For completeness, we also report the median and mean change in unadjusted ratios as well. We report median cash flow to sales ratios for our sample firms and the matching firms in year −1 and year +1 to give a sense of the starting and ending performance levels.

Consistent with increased customer bargaining power following the HLTs, changes in supplier profit margins are generally negative. The median change in matching firm adjusted cash flow to sales for suppliers to LBOs is −0.95% and the corresponding figure for suppliers to recaps is 1.88%. The changes in profit margins are not significantly different from zero for either subsample, but the difference across subsamples is significant at the 5% level. The lack of significance in the operating performance changes may occur because accounting ratios are a noisy measure of the actual terms of trade between two firms. That is, accounting measures of operating margins do not perfectly capture changes in the gap between the sale price (including the terms) and the true economic cost of producing the good or service. An additional potential masking factor is that sales to the LBO firm represent on average only around 20% of the supplier firm's total sales.

[7] Of the 238 (110 suppliers and 128 HLT) firms with sufficient post-buyout financial data available, 51 have matches using performance, size, and the four-digit code, 110 using performance, size, and the three-digit code, 60 using performance, size and the two-digit code, and 17 using performance, size and the one-digit code.

Given the potential for noise to obscure small changes in operating performance, we are most likely to observe significant changes in operating margins for the suppliers that were most vulnerable to increases in HLT bargaining power. As shown in Panel C, the mean (but not median) change in matching firm adjusted cash flow to sales for specific suppliers is significantly different from zero at the 10% level. Further, the difference in mean matching firm adjusted changes in operating performance between suppliers in specific relationships and suppliers in nonspecific relationships is significant at the 5% level.

In Panel D, we report differences in margins for long & dependent suppliers vs. others. Here we find one result somewhat contradictory to the abnormal return results. While differences are not significant, the mean (but not median) change in cash flow to sales for transitory or less dependent suppliers is significantly negative. As we discuss below, however, in our multivariate regression models, the coefficient on the long & dependent variable is not significant, while the negative coefficient for specific relationship is so in all cases.

Perhaps because of noise, the operating performance results appear somewhat sensitive to the industry adjustment methodology. The industry adjustment in Barber and Lyon (1996) is fairly standard in event studies of operating performance, e.g., see Loughran and Ritter (1997), Hertzel et al. (2002), Fee and Thomas (2004), etc.; however, we experiment with two alternative benchmarking approaches. First, as an alternative to screening on size and industry, and then choosing a single matching firm based on performance, we use as a benchmark the median of all firms that meet the initial industry, size, and prior performance screens. Second, we also use the median of all firms on Compustat with the same four-digit SIC code as the supplier.[8] While the difference in cash flow margin changes between suppliers to LBOs and suppliers to recaps is still negative using both alternative approaches, it is significantly so using the median of all firms that meet the initial size, industry, and prior performance screens, but not using the median of all firms on Compustat with the same four-digit SIC code as the supplier.[9]

3.4.2. Regressions explaining changes in supplier operating performance

Table 6 reports the results of regressions explaining supplier changes in matching firm adjusted cash flow to sales. The regressions account for potential correlation of changes in operating income margins between multiple suppliers for a given HLT by adjusting White standard error estimates for clustering. The independent variables in the specifications in Table 6 are nearly identical to those in Table 4. We do not include the footsteps variable since it is a control for the extent to, which the HLT announcement is a surprise to the market, a factor largely irrelevant for changes in operating performance.

The regression results suggest that operating income margins, while perhaps noisy, do appear to follow generally similar cross-sectional patterns as stock returns. The supplier to LBO dummy variable is in all cases negative and is significantly so in column (3). We interpret this, as before, as evidence that there is something unique about LBOs, as compared to recaps, in their impact on suppliers. As in the abnormal returns regressions, the coefficient on the specific relationship variable is always negative and significant, confirming that these suppliers are particularly vulnerable to improved bargaining power on the part of their customers. This variable is significant both for the pooled LBO and recap supplier sample, as reported in columns (1) through (3) and the sample of suppliers to LBOs alone as reported in column (4).

In results not reported in the table, we add to column (4) a dummy variable that takes a value of one when the LBO firm's pre-LBO management does not participate in the HLT in some capacity. The coefficient on this variable is negative, but small and not close to significant. We additionally rerun specifications of Table 6 using the median of all firms that meet the initial industry, size, and prior performance screens rather than one best matching firm. The results are fairly similar in character to those in Table 6, but somewhat weaker for the pooled sample of LBO and recap suppliers. In particular, the coefficient on the specific relationship variable is negative in all specifications, but only significantly so in column (4) ($t=-1.83$). As with the results reported in Table 6, the coefficient on the LBO supplier dummy variable is negative in columns whenever it is included, and significantly so in column (3) ($t=-2.04$). Finally, to investigate possible correlations between stock returns and changes in operating income margins, we add supplier abnormal returns to the specifications in Table 6. The coefficient on this variable is small and insignificant in all specifications.

3.5. HLT-firm results

Table 7 reports abnormal returns and operating performance changes for our sample of HLT firms.[10] As reported in Panel A, HLT firms exhibit positive and highly significant average announcement period abnormal returns. However, there is also a large and

[8] If there are less than five firms in the supplier's four-digit SIC code on Compustat, then we calculate the industry median for this firm using all firms in the supplier's three-digit SIC code.

[9] In general, results using the median of all firms meeting the size, industry, and performance screens are much closer to those using the matching firm approach than are those using only industry medians, i.e. benchmarks with no size control in addition to no prior performance matching. One reason for this difference may be noise introduced by lack of screening. Statistics on how well the benchmarks compare to the sample firms in terms of year -1 performance are informative on this point. The median difference between the year -1 cash flow to sales ratio for the sample of supplier firms and the size/industry/performance matching firm is 0.01%, virtually zero, using our primary approach. The comparable difference using the median of all firms meeting the size and industry screens is about the same, but the standard deviation is a bit higher (1.5% compared to 1.1%, a factor of 1.36). The comparable difference using the median of all firms in the same four-digit industry is however, much higher, 1.96%, and the standard deviation is 27.1%.

[10] Of the 352 completed LBOs, 85 of these firms continued to file reports with the SEC after the buyouts. These 85 firms continue to report as a result of having publicly held debt or preferred stock outstanding. Note that these firms are generally large firms and collectively they represent approximately 67% of the total market capitalization of completed LBOs. Thus, while we can not observe post-LBO operating performance for all completed LBOs, we capture a disproportionately important segment of the LBO population in our analysis. Kaplan (1989) and Smith (1990) describe the availability of post-buyout financial data for samples of management-led leveraged buyouts.

Table 7
HLT-firm abnormal returns and changes in operating performance

	HLT firms	LBO firms	Recap firms	LBO firms-recap firms
Panel A: HLT-firm abnormal returns				
Average abnormal return	17.51%	18.58%	5.69%	12.89%
t-statistic	24.30***	24.56***	3.32***	5.02***
Positive, negative	622,77***	582,59***	40,18***	
Panel B: year−1 to year+1 changes in leverage, sales, and operating performance				
Median change in book leverage	42.43%***	44.22%***	36.34%***	7.88%
Positive, negative	119,8***	79,6***	40,2***	
Median year−1 to year+1 sales growth	7.67%***	8.72%***	0.09%	6.47%*
Positive, negative	82,51***	58,28***	21,21	
Median (mean) change in cash flow to sales	0.74%***	0.74%**	0.48%	0.26%
	(0.53%)	(0.50%)	(0.57%)	(−0.07%)
Median change # positive, negative	82,46***	56,30***	26,16	
Median (mean) change in matching firm adj. cash flow to sales	1.05%***	1.31%***	0.72%	0.61%
	(2.49%***)	(3.18%***)	(1.06%)	(2.12%)
Median change # positive, negative	83,45***	59,27***	24,18	
Median (mean) change in cost of goods sold to sales	−0.40%*	−0.39%*	−0.56%	0.17%
	(0.06%)	(−0.70%*)	(1.61%)	(−2.31%*)
Median change # positive, negative	53,75*	36,50	17,25	
Median (mean) change in matching firm adj. cost of goods sold to sales	−1.19%***	−1.83%***	−0.12%	−1.70%**
	(−1.67%***)	(−2.55%***)	(0.13%)	(−2.68**)
Median change # positive, negative	52,76**	31,55**	21,21	

Abnormal return is the abnormal return for a three-day window centered on the event announcement date. The leverage ratio is calculated as debt in current liabilities (item 34) plus long-term debt (item 9) over total assets (item 6). Changes in book leverage are calculated as year+1 leverage minus year−1 leverage. Sales growth is the median percentage change in sales (Compustat item 12) from year−1 to year+1. Changes in (matching firm adjusted) operating performance are calculated as year+1 (matching firm adjusted) operating performance minus year−1 (matching firm adjusted) operating performance. Matching firms are chosen on their similarity to our sample firms in terms of industry, asset size, and pre-event operating performance. Cash flow to sales is defined as the ratio of operating income (item 13) to sales. Cost of goods sold to sales is defined as the ratio of cost of goods sold (item 41) to sales. Significance of the number of positive versus number of negative is calculated using a sign test. Significance of changes in median (mean) operating performance and median sales growth is assessed using Wilcoxon signed-rank tests (*t*-tests). The significance of differences in medians (means) across subsamples is assessed using Wilcoxon rank-sum tests (*t*-tests). ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

highly significant difference between the 18.58% return to LBOs and the 5.69% return for recaps. Part of this difference is attributable to the relative differences in the market's ability to anticipate announcements of LBOs vs. recaps. Nearly 70% (34%) of recap (LBOs) announcements are preceded by footsteps, i.e., takeover speculation, an outright bid, an interfirm acquisition attempt, or a proxy fight in the six months prior to the announcement date. Relative anticipation, however, does not explain the entire difference as a regression (not reported) of HLT firm abnormal returns on indicator variables for LBOs and footsteps reveals a coefficient of 9.45 ($t=5.18$) on the LBO indicator. Thus, there are nontrivial differences in the market reactions to announcements of LBOs vs. recaps just as there are observed differences in market reactions to HLTs and recaps by their respective suppliers.

Panel B reports changes in leverage, sales growth, and operating performance. The median LBO (recap) firm increases its leverage ratio, defined as debt in current liabilities plus long-term debt to total assets, by more than 44% (36%) from the year prior to the transaction to the first year after the transaction.[11] The median sales growth for LBO (recap) firms in the years surrounding the transaction is 8.72% (0.09%), which is significant at the 1% level (insignificant) and the difference between the LBO and recap sales growth is significant at the 10% level. It is informative that while the recap firms experience lower sales growth than LBO firms, it is the suppliers to LBOs who appear most negatively affected by the downstream HLTs. This is contradictory to what one would expect if the observed negative effects on suppliers were strictly caused by reduced demand from the HLT firms.

LBO firms experience significant profit margin increases and significant decreases in the cost of goods sold (item 41) to sales ratio. While these changes are most pronounced for matching firm adjusted measures, changes are also apparent in unadjusted performance measures as well. These results are direct evidence consistent with improved bargaining power over suppliers. Profit margin change results should be more significant for LBO firms than their suppliers since, on average, only 20% of the suppliers' sales are to the LBO firm.

The operating performance results for LBO firms are quite robust to methodological choices. Using either of the two alternative benchmarking methodologies described previously, we still see significant increases in the cash flow to sales ratio and decreases in the cost of goods sold to sales ratio for LBO firms. Thus, we are fairly confident that the changes we observe represent real economic improvements. As in Kaplan (1989), improvements in operating income to sales and cost of good sold to sales between year −1 and year +1 are likely understated. Many LBO firms revise the book values of inventories upward at the time of the LBO. The expenses

[11] The reported change in leverage is simply the post-LBO leverage ratio minus the pre-LBO leverage ratio. As many LBO firms write up the book values of assets subsequent to an LBO, our reported leverage change is understated since we deflate by book value of assets. Six sample deals experience a decrease in leverage around the LBO. Five of these deals are financed with hybrid preferred stock with debt-like properties so we retain these deals in the sample. One firm (Calton Inc.) completed an LBO in 1985 and conducted a reverse LBO in 1986. The net effect of the two transactions was a reduction in leverage. We exclude this firm from the operating performance analysis.

associated with these write ups are taken in the reporting periods immediately following the LBO, which inflates cost of goods sold for this period.

Improved operating performance may also result from increased operating efficiency. However, if the LBO gains are driven primarily by efficiencies rather than price concessions, then one would expect other efficiency ratios to improve as well. To investigate this issue, we examine changes in matching firm adjusted selling, general, and administrative expenses to sales (results not reported in the tables). Interestingly, we find no significant change in this ratio for firms that undertake LBOs, suggesting that the gross margin improvements may be driven by price concessions rather than general improvements in efficiency.

The price concessions could reflect changes in the cost of labor inputs as well as material inputs. Since changes in reported labor expenses (item 42) are very infrequently reported on Compustat (we can only collect labor expense for two of our sample HLT firms) we calculated changes in the employees to sales ratios. Using both the matching firm benchmark and the median matching group benchmark, this ratio actually increases slightly more than the benchmark (insignificantly so). Only using the noisier industry median benchmark (see footnote 9), do we observe significant decreases in this ratio relative to the benchmark. Thus, the evidence that reductions in labor expenses are a big part of the fall in the costs of goods sold to sales ratio is rather inconclusive.

4. Conclusion

This paper investigates whether leveraged buyout transactions affect the bargaining power of firms with their suppliers. Our results suggest that LBO transactions enhance firms bargaining power with their suppliers. Leverage increasing transactions result in significant negative supplier announcement returns that do not appear to be the result of reduced demand for the supplier's product or service. Further, suppliers who have made specific investments in their relationships see their profit margins shrink following their customers' LBOs. Finally, cost of goods sold decrease and profit margins increase for the firm's undertaking LBOs.

Given LBOs frequently entail changes in governance as well as changes in leverage, our analysis for suppliers to LBOs is something of a joint test of whether increased leverage and the accompanying changes in governance result in improved bargaining power. In an effort to gauge the relative importance of changes in organizational form on bargaining power, we also examine the effects of leveraged recapitalizations on suppliers. Recaps are similar to LBOs in that debt levels increase substantially, but recaps are different in that they are not typically accompanied by the same types of governance changes associated with LBOs. Interestingly, the effects of LBOs and recaps on their suppliers appear to be quite divergent. We interpret the differences detailed above as evidence suggesting that combining increased leverage with a change in organizational form leads to improved bargaining outcomes (among other positive changes) whereas increasing leverage alone does not. Trends in the market for corporate control seem broadly consistent with this conclusion as well. LBO activity has persisted (albeit in waves) over time, whereas recap activity has essentially been dormant since the late 1980s.

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