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The Evolution of Leveraged Buyouts and Recent Overheated LBO Market

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This empirical study is believed to be the first study that comprehensively investigates the significant changes in deal characteristics and value sources of leveraged buyout (LBO) over an extended and recent period (1985-2005). Unlike previous studies that consider LBOs as homogenous irrespective of the type of initiator, this study separates leveraged management-led buyouts (LMBOs) from leveraged institution-led buyouts (LIBOs) and includes both LMBOs and LIBOs as two sub-samples. Using a sample of 177 completed U.S. LMBOs and 72 completed LIBOs in the U.S., this study finds that LIBOs and LMBOs became significantly different in terms of the deal characteristics and value sources in the 2000s. The overall LIBO deal characteristics and value sources remained unchanged over time, while LMBO deal characteristics and value sources had greatly changed over 1985-2005. More importantly, the findings of this study imply that LBO, especially LMBO market, in recent years has overheated like it did in the late 1980s. This study further provides practical insight into the potential impacts of the burst of debt bubble in the U.S. on the correct of LBO evaluation.

Field of research: Finance, LBO (Leveraged buyout)

1. Introduction

Leveraged buyouts (LBOs) became popular in the U.S. during the late 1980s, but went out of favor following the collapse of the junk bond market of the 1990s. The overheated market hypothesis explains this rise and decline, by indicating that LBO deals in the late 1980s were somewhat riskier and more overvalued than those in the early 1980s. In recent years, LBOs have re-emerged with significant increase in number of LBO transactions and deal size. Moreover, compared to the 1980s when most of the LBOs were led by management, the 2000s have seen a larger portion of LBOs led by institutions. Despite the resurgence of LBOs in recent years, the previous literature has mainly focused on the U.S. LBOs in the 1980s (See Appendix A for a summary of the existing key studies on LBOs). Due to the dated nature of the existing literature, the need for additional empirical research on recent U.S. LBOs has been suggested by many researchers to assess whether the insights of the previous studies can be more generally applicable across more recent time periods. Furthermore, researchers and practitioners have pointed to changing trends of the characteristics of U.S. LBOs as a topic for further research (Bae & Hoje, 2002; Kaplan & Stein, 1993; Jin & Wang, 2002; Eddey, Lee, & Taylor, 1996; Allen, 1996).

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Overall, observations about the increase in LBO activity and the changing related financial markets raise the following fundamental questions: Have deal characteristics of LBOs changed greatly since the late 1980s? Has the recent LBO market become overheated? This study thus mainly explores the changes in LIBO and LMBO deal characteristics over 1985-2005, and especially compare the LBO deal characteristics in the early 2000s to those in the late 1980s.

Unlike previous studies that consider LBOs as homogenous irrespective of the type of initiators, this study improves the testing of specific hypotheses by taking into account the hypothesized differences between LMBOs and LIBOs. The definitions of LBOs in the previous literature are vague and inconsistent: Some studies use public-to-private transaction and LBO interchangeably (Kaplan & Stein, 1993); Some studies use management-led LBO and LBO interchangeably (DeAngelo, et al, 1984; Green, 1992); Some studies indicate that LBO and management-led LBO are the two most commonly used terms for public-to-private transactions (Lehn & Poulsen, 1989; Weir, et al, 2005). Furthermore, previous studies fail to take debt financing as a requirement for a going-private transaction to be considered as an LBO, with exception to Halpern et al (1999).
Faced with the ambiguous LBO definitions, this study defines an LBO as a highly leveraged (more than 30% of debt) going-private transactions (100% of the company is acquired). More importantly, this study further separates leveraged management-led buyouts (LMBOs) from leveraged institution-led buyouts (LIBOs) and includes both LMBOs and LIBOs as two sub-samples. There are two main advantages of this segregation: 1) Theoretically, there is a lower degree of asymmetric information between vendors and purchasers in LMBOs than in LIBOs, since management, as an informed party, is assumed to have better information about the value of firm. 2) An initial data analysis of this study shows that the number of LIBOs has significantly increased since the mid 1990s, implying that institutions currently play a more vital role in initiating LBOs than before. However, compared with the level of empirical research on LMBOs, LIBOs have been almost completely ignored in academic literature.

2. Literature Review

2.1 Explanation of LBO Value Source Related Theories

Among the LBO value source related explanations, the results of this study can shed light on the following three theories.
Free Cash Flow Hypothesis: The free cash flow hypothesis (the FCF hypothesis), one of the three key working theories explored in this study, argues that the large debt-service payments incurred by LBO transactions force managers to find ways to generate cash and to disgorge the excess free cash flow that would otherwise be invested unwisely, resulting in reduction of the agency cost (Jensen, 1986). Most of the empirical research on LBOs is centered

on the FCF hypothesis and one of the main mixed empirical findings from the previous research focuses on the FCF hypothesis.

Heterogeneity Hypothesis*:* Halpern et al (1999) indicate that LBO populations are heterogeneous in managerial ownership, and there are two types of poorly performing firms that go private through LBOs: 1) A group of firms in which managers own an insignificant fraction of their firm's stock and are vulnerable to hostile takeover; 2) A group of firms in which managers own a significant fraction of their firm's stock and face little risk of hostile takeover. Note that this study extends Halpern et al (1999)'s idea of the heterogeneity hypothesis: Instead of arguing that LBOs are heterogeneous in managerial ownership, this study considers the heterogeneity of LBOs in the type of initiators. Particularly, this study tests whether LIBO differs from LMBO in terms of deal characteristics and value sources (1). The main reason for this extension is that compared to segmenting LBOs into two sub-groups based on the pre-buyout level of managerial ownership, this study provides more practical implications by separating LIBOs from LMBOs due to the potential differences between them.

Overheated Market Hypothesis*:* Kaplan and Stein (1993) define an overheated LBO market as a demand push from the public junk bond market resulting in LBOs to be more aggressively priced and more susceptible to costly financial distress. They further attribute the abrupt rise and decline of U.S. LBOs in the 1980s to the overheated market hypothesis. See Section 2.2 for a detailed review of the study by Kaplan and Stein (1993).

2.2 Literature Review on Changes in LBO Deal Characteristics and the Overheated Market Hypothesis

The central paper on the overheated market hypothesis, the work by Kaplan and Stein (1993), points out that LBO deal characteristics had greatly changed in the 1980s and the buyout market was overheated in the late 1980s. This is the only existing study identified relevant to the topic of changes in LBO deal characteristics.

Based on the analysis of 124 large MBOs completed over the period 1980-1989, Kaplan and Stein (1993) conclude that the LBO market in the late 1980s was overheated. They use nonparametric rank tests to compare the values of the firm-specific and deal-specific variables (see below) in three distinct sub periods: 1980 to 1982 (or the "early 1980s"), 1982 to 1985 (or the "mid-1980s"), and 1986 to 1989 (or the "late 1980s"). They use three categories of data to judge whether the LBO market is overheated:

1) The overall price paid to take the company private. They find that multipliers proxied by price/cash flow rose in the 1980s (2). Also, they find prices to be particularly high in deals financed with junk bonds.

2) Buyout capital structure and risk. They find that the MBOs in the late 1980s had significantly more risk than those in the mid-1980s and with somewhat

higher leverage ratios (3). They also find that public junk bond financing started to replace private subordinated debt in the mid 1980s. Moreover, prices for LBOs were particularly high in deals financed with these junk bonds.
3) Incentives of buyout investors. They find a significant upward trend in total deal fees-transaction value ratio in the 1980s. This finding implies that banks have more incentives to finance LBO deals in the late 1980s, as they were better compensated in LBO transactions.

3 Hypothesis Development and Research Methodology

3.1 Hypothesis Development

Hypotheses are developed to investigate whether LBO deal characteristics and value sources have greatly changed over the period 1985-2005.
Hypothesis 1: There are significant differences in overall deal characteristics of LMBOs among the three sub periods: 1985-1989, 1990-1999, and 2000-2005.
Hypothesis 2: There are significant differences in overall deal characteristics of LIBOs between the two sub-periods: 1995-1999 and 2000-2005 (4).
Hypothesis 3: There are significant differences in overall deal characteristics between LMBOs and LIBOs over the periods 1995-2005.

In order to test the overheated market hypothesis, this study includes most of the key variables examined by Kaplan and Stein (1993) such as multiplier, volatility of cash flow (risk), and ratio of total deal fees and total transaction value. This study also includes some key variables based on the value source related theories. For example, (i) pre-buyout level of free cash flow, (ii) investment opportunities (proxied by Tobin's Q), (iii) volatility of cash flow, and (iv) dividend payout ratio are selected based on the free cash flow (FCF) hypothesis. For another example, this study uses relative P/E ratio to proxy for stock undervaluation of LBO under the market undervaluation hypothesis.

The variables adopted by this study and their proxies are listed in Table 1.

Table 1 Variables and their Proxies

Variable	Proxy
Volatility of cash flow	Five years' standard deviation of the quarterly EBITDA/Sales of LBO prior to LBO announcement
Undistributed free cash flow (1 year prior to LBO announcement)	(EBITDA-Tax-Interest-Dividends)/Net Sales
	(EBITDA-Tax-Interest-Dividends-Capital Expenditures-Net Change in Working Capital) /Net Sales
Tax expenditures (1 year prior to LBO announcement)	(Tax expenditures - Deferred tax from the previous year to the current year) / Net Sales
Multiplier	Transaction value/EBITDA twelve months prior to LBO announcement
Ratio of total deal fees and total transaction value	Total deal fees/Total transaction value
Relative P/E	The ratio of the companies' P/E and an industry peer group's P/E

Deal size	Transaction value of LBO deal
Ratio of assumed liability and transaction value	Assumed debt/Transaction value
Investment opportunities	Tobin's Q (Total market value/Total asset value one year prior to LBO announcement)
LBO premiums	Premium of offer price to target closing stock price 1 week prior to the original announcement date, expressed as a percentage ((Offer Price – Stock Price 1 Week Prior to Announcement) / Stock Price 1 Week Prior to Announcement) * 100)
	Premium of offer price to target closing stock price 1 day prior to the original announcement date, expressed as a percentage ((Offer Price – Stock Price 1 Day Prior to Announcement) / Stock Price 1 Day Prior to Announcement) * 100)
	Premium of offer price to target closing stock price 4 weeks prior to the original announcement date, expressed as a percentage ((Offer Price – Stock Price 1 Day Prior to Announcement) / Stock Price 4 Weeks Prior to Announcement) * 100)
Dividend payout ratio	Three-year averaged dividend payout ratio immediately preceding the year of LIBO or LMBO announcement
Managerial ownership	The percentage of voting stock held by officers and directors of the company

3.2 Research Methodology

Hypothesis 1 is tested by 3-group (representing 1985-1989, 1990-1999, and 2000-2005), 1-way MANOVA. Multiple comparisons are also performed as follow-up analyses to identify specific variables contributing to the multivariate pairwise differences among the groups. For LIBOs, hypothesis 2 is tested using 2-group (representing 1995-1999 and 2000-2005) one-way MANOVA and follow-up t-tests. Regarding hypothesis 3, comparisons between LIBOs and LMBOs is performed separately over the two sub periods 1995-1999 and 2000-2005. In this case, 2-group (representing LIBOs and LMBOs) one-way MANOVA and follow-up t-tests are performed separately for the sub period 1995-1999 and 2000-2005.

4 Sample

This study considers all the completed U.S. LMBOs and LIBOs that occurred between 1985 and 2005. This study follows the following procedures to obtain the dataset: 1) Collect the completed U.S. "LBOs" that took place over the period 1985-2005 according to the SDC Thomas Financial Database (5). 2) Examine whether these firms satisfy the criterion that 100% of the public firms went private. This leads to the final list of LBO firms by excluding the division sales and the private firms that were bought out. 3) Exclude the deals whose information on the amount of debt financing is not disclosed or less than 30% of transaction value. 4) Identify LMBOs and LIBOs based on the initiator of each LBO using the searching criteria in the SDC Thomas Financial Database and their buyout statements.

The sample for this study is derived principally from SDC Thomas Financial Database, Compustat Database, SEC Filings & Forms (EDGAR), and Factiva Database (which includes Wall Street Journal).

The sample size for this study is presented in Table 2.

Table 2 Sample Size of This Study

In column 1&5, "# of potential LMBOs" and "# of potential LIBOs" were calculated based on the datasets obtained from Step 2 of the above sampling procedure. These deals meet all the requirements of being considered as LMBOs or LIBOs except the amount of debt incurred in the transactions. This study thus calls these deals "potential LMBOs (or LIBOs)". In column 2&6, "Potential LMBOs (or LIBOs) with debt information" represent potential LMBOs (or LIBOs) with debt information disclosed in their buyout statements. Column 3&7 list # of potential LMBOs (or LIBOs) with more than 30% of assumed liability to transaction value. Column 4&8 list # of potential LMBOs (or LIBOs) with more than 50% of assumed liability to transaction value. As discussed earlier, this study selects LMBOs (or LIBOs) with more than 30% of assumed liability to transaction value for the final dataset.

Year	1) # of potential LMBOs	2) Potential LMBOs with debt information		3) LMBOs with more than 30% assumed liability to transaction value		4) LMBOs with more than 50% assumed liability to transaction value		5) # of Potential LIBOs	6) Potential LIBOs with debt information		7) LIBOs with more than 30% assumed liability to transaction value		8) LIBOs with more than 50% assumed liability to transaction value	
		#	%	#	%	#	%		#	%	#	%	#	%
2005	1	1	100	1	100	1	100	14	12	86	12	100	11	92
2004	5	3	60	3	100	3	100	7	4	57	3	75	2	50
2003	24	14	58	14	100	10	71	7	2	29	2	100	2	100
2002	12	10	83	10	100	7	70	2	2	100	2	100	1	50
2001	16	10	63	10	100	8	80	7	2	29	2	100	2	100
2000	23	12	52	11	92	10	83	24	17	71	15	88	11	65
1999	29	10	34	10	100	9	90	25	17	68	17	100	13	76
1998	13	5	38	5	100	5	100	16	10	63	10	100	9	90
1997	14	8	57	7	88	4	50	12	5	42	5	100	2	40
1996	14	6	43	6	100	4	67	5	3	60	3	100	2	67
1995	9	1	11	1	100	0	0	3	0	0	0	0	0	0
1994	6	2	33	2	100	2	100	1	1	100	1	100	1	100
1993	6	1	17	1	100	1	100	4	0	0	0	0	0	0
1992	5	3	60	3	100	3	100	3	0	0	0	0	0	0
1991	8	2	25	2	100	1	50	1	0	0	0	0	0	0
1990	8	5	63	5	100	5	100	1	0	0	0	0	0	0
1989	25	13	52	13	100	10	77	0	0	0	0	0	0	0
1988	74	34	46	33	97	31	91	0	0	0	0	0	0	0
1987	43	18	42	18	100	15	83	0	0	0	0	0	0	0
1986	44	13	30	13	100	11	85	0	0	0	0	0	0	0
1985	29	10	34	9	90	8	80	0	0	0	0	0	0	0
Total	411	181	44	177	98	148	82	132	75	57	72	96	56	78

Table 2 shows that there are 411 potential LMBOs and 132 potential LIBOs obtained over the period 1985-2005 after Step 2 of LBO sampling procedure. Among these firms, there are 44% of potential LMBOs with debt information

disclosed and 57% of potential LIBOs with debt information disclosed. Finally, there are 177 LMBOs and 72 LIBOs obtained for the sample of this study, based on the requirement of 30% minimum assumed liability-transaction value ratio.

5. Empirical Results

5.1 Results: Changes in LMBO Deal Characteristics over Time

This section describes the results for the changing deal characteristics of LMBOs over the study period 1985-2005. The results using a three-group (representing 1985-1989, 1990-1999, and 2000-2005) 1-way MANOVA analysis are presented in Table 5.

Table 3: Three-group (representing 1985-1989, 1990-1999, and 2000-2005) 1-way MANOVA Analysis for LMBOs

Panel A: Three-group 1-way MANOVA Analysis

Hotelling's Trace	Value	F	Hypothesis df	Error df	Sig.
Intercept	6.72	122.56	8	146	0.000***
Time dummy	0.21	1.94	16	290	0.017***

*Note: *, **, and *** indicates statistical significance at 10%, 5%, and 1% levels respectively.*

Panel B: Multiple Comparisons

The probability levels are controlled to account for the multiple comparison tests and Bonferroni multiple comparison procedure is used.

	(1) Group3	(2) Group3	Mean Difference (1-2)	Std. Error	Sig.
Deal Size	1985-1989	1990-1999	286.10	161.68	0.236
	1985-1989	2000-2005	348.54*	155.32	0.079
	1990-1999	2000-2005	62.44	180.79	1.000
Multiplier (Transaction Value/EBITDA)	1985-1989	1990-1999	-0.69	2.03	1.000
	1985-1989	2000-2005	1.29	1.95	1.000
	1990-1999	2000-2005	1.98	2.27	1.000
Premiums 1 Week prior to LBO Announcement	1985-1989	1990-1999	14.10**	5.81	0.049
	1985-1989	2000-2005	-5.09	5.58	1.000
	1990-1999	2000-2005	-19.19**	6.49	0.011
Investment Opportunities (Tobin's Q)	1985-1989	1990-1999	0.63	0.71	1.000
	1985-1989	2000-2005	1.48*	0.68	0.093
	1990-1999	2000-2005	0.84	0.79	0.859
Assumed liability /Transaction Value	1985-1989	1990-1999	0.06	0.09	1.000
	1985-1989	2000-2005	0.04	0.09	1.000
	1990-1999	2000-2005	-0.02	0.11	1.000
Scaled Undistributed Free Cash Flow	1985-1989	1990-1999	-0.04	0.04	0.994
	1985-1989	2000-2005	-0.01	0.04	1.000
	1990-1999	2000-2005	0.03	0.05	1.000
Scaled Tax Expenditures	1985-1989	1990-1999	-0.04	0.02	0.267
	1985-1989	2000-2005	0.01	0.02	1.000
	1990-1999	2000-2005	0.05	0.02	0.124
3 Year Average Dividend Payout Ratio	1985-1989	1990-1999	-0.18	9.75	1.000
	1985-1989	2000-2005	12.39	9.36	0.563
	1990-1999	2000-2005	12.57	10.90	0.752
Total Deal Fess/Total Transaction Value	1985-1989	1990-1999	0.01**	0.00	0.050
	1985-1989	2000-2005	0.01	0.01	0.130
	1990-1999	2000-2005	0.00	0.01	1.000

*Note: *, **, and *** indicates statistical significance at 10%, 5%, and 1% levels respectively.*

Panel A of Table 3 shows that the coefficient for the time dummy variable is significant in the above MANOVA analysis. This finding suggests that there are statistically significant differences in overall deal characteristics of LMBOs among the three sub periods, namely, 1985-1989, 1990-1999, and 2000-2005. In other words, this implies that LMBO deal characteristics had greatly changed over the period 1985-2005. Hypothesis 1 is thus supported. Through multiple comparisons, this study further finds that deal size, LBO premiums, investment opportunities, and total deal fess/total transaction value mainly contribute to the overall differences in deal characteristics of LMBOs among the three sub periods (Results are presented in Panel B of Table 3). Interestingly, this study finds insignificant differences in LMBO premiums between 1985-1989 and 2000-2005. Moreover, the premiums paid for LMBOs over 1985-1989 and 2000-2005 are significantly higher than over the sub period 1990-1999. These findings imply that acquirers were willing to pay as high premiums for LMBO targets over 2000-2005 as in the late 1980s.

To further explore the possibility that the LBO market was overheated in 2000-2005, this study directly compares the deal characteristics of LMBOs between 1985-1989 and 2000-2005. Corresponding results are presented in Table 4.

Table 4 T-tests for Comparisons in Deal Characteristics between LMBOs over the 1985-1989 and LMBOs over the 2000-2005

	Mean Difference (1985-1989) – (2000-2005)	t-stat	Sig.
Deal Size	417.72**	2.40	0.02
Multiplier (Transaction Value/EBITDA)	1.63	0.83	0.41
Premiums 1 Week prior to LBO Announcement	-6.70	-1.17	0.24
Investment Opportunities (Tobin's Q)	0.76***	5.07	0.01
Assumed Liability / Transaction Value	-0.25	-1.18	0.24
Scaled Undistributed Free Cash Flow	-0.01	-0.49	0.62
Scaled Tax Expenditures	0.01**	2.69	0.02
3 Year Average Dividend Payout Ratio	11.45	0.89	0.37
Total Deal Fee/ Transaction Value	0.01**	2.03	0.05

*Note: *, **, and *** indicates statistical significance at 10%, 5%, and 1% levels respectively.*

Table 4 shows that there are no significant differences between 1985-1989 and 2000-2005 in the following LMBO deal characteristics variables: multiplier (transaction value/EBITDA), LBO premiums, assumed liability/transaction value, free cash flow, and dividend payout ratio. In addition, LMBO deals over the sub period 2000-2005 are found to have significantly smaller deal sizes, less investment opportunities, less tax expenditures, and less percentage of total deal fees than those in the late 1980s. Overall, these results imply that the key deal characteristics of LMBOs over the sub period 2000-2005 are not significantly

different from those in the late 1980s. Especially, there are great similarities in prices, financial conditions, and buyout capital structures of LMBOs between 2000-2005 and 1985-1989.

5.2 Results: Changes in LIBO deal characteristics over time

This section describes the results for changing deal characteristics of LIBOs over the period 1995-2005. The results using a two-group (representing the two sub periods 1995-1999 and 2000-2005) 1-way MANOVA analysis are presented in Table 7.

Table 5: 2-group (representing 1995-1999 and 2000-2005) 1-way MANOVA Analysis for LIBOs

Panel A: 2-group (representing 1995-1999 and 2000-2005) 1-way MANOVA on LIBOs over the period 1995-2005

Hotelling's Trace	Value	F	Hypothesis df	Error df	Sig.
Intercept	2.13	5.22	11	27	0.000***
Time dummy	0.48	1.18	11	27	0.346

*Note: *, **, and *** indicates statistical significance at 10%, 5%, and 1% levels respectively.*

Panel B: Univariate analysis for LIBOs between the sub period 2000-2005 and 1995-1999

	Mean Difference (1995-1999 -2000-2005)	t-stat	Sig.
Deal Size	-461.18**	-2.08	0.04
Multiplier (Transaction Value/EBITDA)	-0.18	-0.13	0.89
Premiums 1 Week prior to LBO Announcement	-8.63	-1.23	0.22
Investment Opportunities (Tobin's Q)	0.67	1.56	0.12
Assumed Liability / Transaction Value	0.16	1.39	0.17
Scaled Undistributed Free Cash Flow	-0.38	-1.14	0.26
Scaled Tax Expenditures	-0.01	-1.40	0.17
3 Year Average Dividend Payout Ratio	-3.06	-0.70	0.49
Managerial Ownership	2.08	0.39	0.69
Relative P/E	-3.81	-0.95	0.35
Volatility of Cash Flow	-1.28	-1.06	0.29
Total Deal Fee/ Transaction Value	0.00	1.71	0.11

*Note: *, **, and *** indicates statistical significance at 10%, 5%, and 1% levels respectively.*

Panel A of Table 5 shows that deal characteristics of LIBOs had not significantly changed over the period 1995-2005. This result fails to support Hypothesis 2. The follow-up t-tests (presented in Panel B of Table 5) further show that deal size of LIBOs is the only variable that differs between 1995-1999 and 2000-2005. Specifically, LIBOs over the sub period 2000-2005 are found to have significantly larger deal size than over the sub period 1995-1999.

5.3 Results: Differences in Deal Characteristics between LMBOs and LIBOs

This section describes the differences in deal characteristics between LMBOs and LIBOs over the two sub periods 1995-1999 and 2000-2005. 2-group 1-way MANOVA is performed to compare LIBOs with LMBOs over 1) the sub period 2000-2005 (Results are presented in Panel A of Table 6), and 2) the sub-period 1995-1999 (Results are presented in Panel B of Table 6).

Panel A of Table 6 shows that there are significant differences in overall deal characteristics between LIBOs and LMBOs over the sub period 2000-2005. On the contrary, Panel B of Table 6 shows that there are no significant differences in overall deal characteristics between LIBOs and LMBOs over the sub period 1995-1999. Thus, Hypothesis 3 is supported over the sub period 2000-2005, while it is rejected over the sub period 1995-1999.

To further explore the differences in deal characteristics between LIBOs and LMBOs over the sub period 2000-2005, this study performs follow-up t-tests (Results are presented in Panel C of Table 6). Compared to LIBOs, LMBOs over the sub period 2000-2005 are found to have significantly smaller deal sizes, higher premiums, less investment opportunities, lower levels of the free cash flows, less tax expenditures, higher levels of managerial ownership, and higher percentage of total deal fees. Overall, these findings imply that LMBOs over the sub period 2000-2005 were in worse financial conditions (i.e. lower levels of free cash flows and less potential tax savings) than LIBOs, but higher premiums were paid for them. This finding is consistent with the overheated market hypothesis. The finding that LMBOs had higher levels of managerial ownership than LIBOs is consistent with Halpern et al (1999)'s comment that compared to outsider-led LBOs, insider-led LBOs usually face little takeover speculation with managers owning a significant fraction of their firm's stock.

Table 6 MANOVA Analysis for the Differences in Deal Characteristics between LMBOs and LIBOs over the Period 1995-2005

Panel A: 2-group (representing LMBOs and LIBOs) 1-way MANOVA over the sub period 2000-2005

Hotelling's Trace	Value	F	Hypothesis df	Error df	Sig.
Intercept	14.10	56.40	11	44	0.000***
LBO type	0.75	3.01	11	44	0.005***

*Note: *, **, and *** indicates statistical significance at 10%, 5%, and 1% levels respectively.*

Panel B: 2-group (representing LMBOs and LIBOs) 1-way MANOVA over the sub period 1995-1999

Hotelling's Trace	Value	F	Hypothesis df	Error df	Sig.
Intercept	15.32	29.25	11	21	0.000***
LBO type	0.78	1.48	11	21	0.211

*Note : *, **, and *** indicates statistical significance at 10%, 5%, and 1% levels respectively.*

Panel C: Univariate analysis on the differences in deal characteristics between LMBOs and LIBOs over the sub period 2000-2005

	Mean Difference(LIBO-LMBO)	T-stat	Sig.
Deal Size	585.13***	2.67	0.01
Multiplier (Transaction Value/EBITDA)	2.07	1.27	0.21
Premiums 1 Week prior to LBO Announcement	-13.36*	-1.79	0.08
Investment Opportunities (Tobin's Q)	0.86***	4.12	0.00
Assumed Liability / Transaction Value	-0.38	-1.23	0.22
Scaled undistributed Free Cash Flow	0.05*	1.78	0.08
Scaled Tax Expenditures	0.02***	2.70	0.01
3 Year Average Dividend Payout Ratio	-29.47	-0.74	0.46
Managerial Ownership	-17.64***	-4.05	0.00
Relative P/E	26.35	1.43	0.16
Volatility of Cash Flow	-18.64	-1.18	0.24
Total Deal Fee/ Transaction Value	-0.01*	-1.61	0.10

*Note: *, **, and *** indicates statistical significance at 10%, 5%, and 1% levels respectively.*

6. Conclusions

A summary of the results for the research hypotheses on changes in LBO deal characteristics is presented in Table 7.

Table 7 Summary of Changes in LBO Deal Characteristics

Hypothesis	Period	Results
Hypothesis 1: There are significant differences in overall deal characteristics of LMBOs among the sub periods: 1985-1989, 1990-1999, and 2000-2005.	1985-2005	Supported
Hypothesis 2: There are significant differences in overall deal characteristics of LIBOs between the sub periods: 1995-1999 and 2000-2005.	1995-2005	Not Supported
Hypothesis 3: There are significant differences in overall deal characteristics between LMBOs and LIBOs over the period 1995-2005.	1995-1999	Not Supported
	2000-2005	Supported

This study has several interesting findings: 1) LMBO deal characteristics had significantly changed over the period 1985-2005. LMBO overall deal characteristics over the sub period 2000-2005 are greatly different from those in the 1990s, but they are similar to those in the late 1980s. 2) LIBO deal characteristics have remained unchanged over time, except that deal size of LIBOs over the sub period 2000-2005 is significantly larger than before. 3) The differences in deal characteristics between LIBOs and LMBOs are time specific. There are no significant differences in the overall deal characteristics between LIBOs and LMBOs in the 1990s. In contrast, LMBO targets are found to be in worse financial conditions than LIBOs over the sub period 2000-2005. Surprisingly, higher premiums are paid for these LMBOs with less attractive financial prospects.
In conclusion, all the above findings are consistent with the hypothesis that the LMBO market was overheated over the sub period 2000-2005. A possible explanation for how LBO market cycle affects the deal characteristics of LBOs is described as follows. When LBO market cooled off in the 1990s, LMBOs and LIBOs had similar deal characteristics. However, as LBO market was heating up over the sub period 2000-2005, LMBOs became more aggressively priced and, at the same time, they were in worse financial conditions than LIBOs. Interestingly, this overheated market condition in the post-2000 period does not greatly affect the deal characteristics of LIBOs, except that LIBOs were structured in significantly larger deal size.

6.1 Major Contributions of this Study

This is the first study that places LMBO and LIBO research within a significantly longer and more recent period, during which time the LBO market in the U.S. has changed. This empirical study is also the first one in LBO literature that provides strong evidence for the conclusion that LMBO market has become overheated in recent years (6).

Compared to the previous literature, this study makes an important improvement on unit of analysis. The previous studies not only adopt inconsistent definitions of LBOs but also mix the insider-led LBO with the outsider-led LBO as the unit of analysis. In contrast, this study examines LIBOs and LMBOs separately based on clearer definitions of LIBOs and LMBOs. This study finds different deal characteristics and value sources between LIBOs and LMBOs in 2000-2005. This implies that the LBO populations in the 1980s are wrongly considered as homogeneous by the previous research.

The results of this study shed additional light on some value source related theories. In terms of the heterogeneity hypothesis, this study not only confirms Halpern et al (1999)'s comment that insider-led LBOs have higher managerial ownership than outsider-led LBOs, but also identifies the differences in deal characteristics and value sources between LIBOs and LMBOs. The results of this study also provide support for the applicability of the overheated market

hypothesis to the recent LMBOs.

6.2 Implications for Market Participants and Researchers

The conclusion that the LBO market has become overheated in recent years undoubtedly provides great implications for market participants and policy markers. According to the overheated market hypothesis, when there is too much money chasing a limited number of good deals then the market will overheat, leading to an increase in the number of failures (Kaplan & Stein, 1993). The overheated LBO market over the sub period 2000-2005 could be mainly fuelled by availability of too much debt financing and a relaxation of lenders' terms and conditions on debt financing in a low interest rate environment. In terms of the causes behind the recent overheated market phenomenon, some practitioners have made similar comments: The chief executive of the private equity firm TA Associates, Kevin Landry said "Borrowed money is the real fuel driving an overheated market. I think of this as a debt bubble, not a private equity bubble."[1] Thus, ready access to a seemingly bottomless source of funds encouraged private equity firms to make ever bigger and bolder bids. However, as subprime mortgage crisis continues spreading, the recent rising defaults in the subprime mortgage market and the related growing credit crunch started having great impacts on the U.S. LBO market. The LBO market is now facing severe liquidity, serious refinancing problems, and severe credit problems.

In addition to the deterioration in the leveraged debt market, the recent U.S. economic market conditions can further negatively impact the LBO market, as economy in the U.S. is going into recession. For the current LBO deals, the problem with structuring large deals in bad economy is that large deals may have trouble finding lenders on terms recently available, thus having risk of not being completed. For the firms that have already gone private via LBOs, if the economy slows further, or companies hit cyclical downturns, they may find themselves struggling to meet their debt obligations.

Generally, the results of this study suggest that for market participants, more time be taken to assess a target firm's profitability when managements plan to take their firms private via LMBOs. Although some argue that times have changed and value sources of LBOs should have greatly changed as well, the results of this study show that the traditional incentives of LBOs (i.e. reduction of agency costs) can still be seen in most of the LBOs when buyout market was not overheated. Even though the results of this study show that LBO market cycle did not affect the value sources of LIBOs over the sub period 2000-2005, institutions need to weight the downsides of large LIBO deals especially after credit crunch began in debt market in a weaker economy.

For researchers, this study finds that LMBO deal characteristics have greatly changed over time, thus it is likely that the insights of previous literature based on

[1] http://www.boston.com/business/articles/2007/05/01/private_equity_debt_bubble

LBOs in the 1980s can not be generalized across recent years. It is important for researchers to take into account boom-bust cycle in LBO market when examining the free cash flow hypothesis and be cautious comparing the results based on LBOs over different study periods. The results of this study also imply that LBO populations were heterogeneous in the initiators only over the sub period 2000-2005 when the LBO market was overheated. Thus, researchers need to not only take into account buyout market conditions but also avoid mixing LIBOs with LMBOs when examining value sources of LBOs.

End-notes

1. In practice, the acquirers of LBOs can include outside individuals, institutions, non-financial firms, the incumbent managements, employees, and so on. Instead of segmenting LBOs into outsider-led LBOs and insider-led LBOs, this study only investigates LIBOs and LMBOs. This segmentation avoids the subjective judgment of the nature of initiators of LBOs, but it still accounts for most of the outsider-led LBOs and insider-led LBOs.
2. In their study, buyout price is measured as sum of the market value paid for the firm's equity, the value of the firm's outstanding debt, and the fees paid in the transaction, less any cash removed from the firm to finance the buyout. Cash flow is measured as EBITDA less capital expenditures.
3. Risk is measured as the standard deviation of the growth rate of operating margins calculated from at least six years and up to ten years of pre-buyout financial data.
4. The data of this study shows that LIBOs did not take place until the middle 1990s.
5. The definition of LBOs in the SDC Thomas Financial Database is slightly different than the definition of LBOs used in this study: Some of the LBOs in the SDC Thomas Financial Database do not satisfy the requirement of LBO definition for this study, which is that 100% of the public company has to be taken private. In addition, the amount of debt incurred in LBO transaction is not clearly specified in the SDC Thomas Financial Database, and this study finds some of the deals use less amount of debt financing than required.
6. Unfortunately, most of the previous studies based on LBOs in the 1980s do not distinguish the LBOs completed in the early 1980s from those in late 1980s (when the LBO market was overheated). Their ignorance of the overheated market conditions in the late 1980s may affect the accuracy of their conclusions on the free cash flow hypothesis or the heterogeneity hypothesis.

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APPENDIX A: SAMPLE SIZE AND SAMPLE PERIOD OF THE EXISTING KEY STUDIES

A summary of sample size and sample period of the key studies on U.S. LBOs (not limited to the topic of changes in LBO deal characteristics) is provided as follows.

Table A1: Sample Size and Sample Period of the Key Studies on U.S LBOs

Article category	Literature	Sample period	Sample size
Stock performance around LBO announcement	Travlos and Cornett (1993)	1975-1983	56
	Madden, Marples, and Chugh (1990)	1973-1978	36 MBOs
	Carow and Roden (1998)	1981-1990	88
	DeAngelo, DeAngelo, and Rice (1984)	1973-1980	72
	Torabzadeh and Bertin (1987)	1982-1985	48
	Marais, Schipper, and Smith (1989)	1974-1985	79
	Lehn and Poulsen (1989)	1980-1987	244 going-private transactions
	Kieschnick (1998)	1980-1987	244 going-private transactions
	Bae and Simet (1998)	1985-1990	21
	Amihud (1989)	1983-1986	15
	Torabzadeh and Bertin (1987)	1982-1985	48
	Travlos and Millon (1987)	1975-1983	56
	Eastwood (1998)	1982–1989	41
	Kaplan and Stein (1990)	1985-1988	12
	Bruton, Keels, and Scifres (2002)	1980-1988	39
	Kosedag and Lane (2002)	1980-1996	21
	Holthausen, and Larcker (1996)	1985-1986	90 reversed LBOs
	Kaplan (1989)	1980-1985	48
Premiums paid to shareholders of LBOs	Lehn and Poulsen (1989)	1980-1987	244 going-private transactions
	Halpern, et al (1999)	1981-1986	126
	Kieschinick (1989)	1980-1987	244 going-private transactions
Post-buyout operating performance of LBOs	Lichtenberg and Siegel (1990)	1981-1986	131
	Mian and Rosenfeld (1993)	1983-1988	85 reversed LBOs
	Muscarella and Vetsuypens (1990)	1976-1987	72 reversed LBOs
	Noronha and Yung (1997)	1984-1990	120 reversed LBOs
	Opler (1992)	1985-1989	44
	Roden and Lewellen (1995)	1981-1990	107
	Phan and Hill (1995)	1986-1989	214 (Survey)
	Smith (1990)	1977-1986	58
	Chatfield and Newbould (1996)	1989	13
	Chevalier (1995)	1981-1990	N/A
	DeAngelo and DeAngelo (1985)	1973-1982	33
	Opler and Titman (1993)	1980-1990	180

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Overheated market hypothesis	Kaplan and Stein (1993)	1980-1989	124
Characteristics of firms going private via LBO	Kieschinick (1989)	1980-1987	244
	Halpern, et al (1999)	1981-1986	126
	Kaplan and Stein (1993)	1980-1989	126
Others	Kaplan (1991)	1979-1986	183
	Roden and Lewellen (1995)	1981-1990	107
	Jandik and Makhija (2005)	1981-1995	250 takeovers