



Working Paper

The Performance of Leveraged Buyout-Backed Initial Public Offerings in the UK

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Abstract

This paper investigates the long-term stock price performance of initial public offering (IPO) firms in the United Kingdom that were previously owned by leveraged buyout (LBO) funds. A sample of 128 LBO-backed IPOs and 1,121 non-LBO-backed IPOs between 1990 and 2006 is analysed for the long-term performance of these offerings. The analysis suggests that LBO-backed IPOs beat the stock market and outperform non-LBO-backed IPOs. The analysis identifies factors driving outperformance, most significantly the percentage of share capital held by the buyout group after the offering.

Table of Contents

The Performance of Leveraged Buyout-Backed Initial Public Offerings in the UK.....	i
Abstract	ii
Table of Contents	iii
List of Tables.....	iv
Introduction	1
Public Debate	1
Literature	3
Summary of Findings	5
The Market	6
Leveraged Buyout Background.....	6
Leveraged Buyouts in the UK	7
The Theory	8
Behavioural Finance.....	8
Efficient Markets	10
The Data	11
Identifying the IPO Samples	11
Supplemental Data	14
Forming Portfolios on Size and Value	14
The Analysis.....	16
Event Time Results	16
Raw-, Market-Adjusted-, and Risk-Adjusted Returns.....	16
Wealth Relatives.....	18
Yearly Cohorts	20
Calendar Time Portfolios	21
Wealth Relatives.....	21
Risk-Adjusted Results	22
Cross-Sectional Differences Across LBO-Backed IPOs.....	23
Conclusions	25
References	26
Tables	29

List of Tables

Table 1: Distribution of LBOs, LBO-Backed- and Non-LBO-Backed IPOs by Year	29
Table 2: Event-Time Performance for LBO- and Non-LBO-Backed IPOs (Total Sample) ...	30
Table 3: Event-Time Performance for LBO- and Non-LBO-Backed IPOs (Survivors)	32
Table 4: Three-Year Performance of IPOs Versus Various Benchmarks	34
Table 5: Five-Year Performance of IPOs Versus Various Benchmarks	35
Table 6: Three-Year Performance by Cohort Year Versus FTSE All Share Index.....	36
Table 7: Three-Year Calendar Time Portfolio Performance Versus FTSE All Share Index ..	38
Table 8: CAPM, FF Two- and Three-Factor Regressions on Three-Year Calendar-Time Portfolio Returns	40
Table 9: Summary Statistics for LBO-Backed IPOs	42
Table 10: Multivariate Regression Analysis of LBO-Backed IPOs	43

Introduction

Public Debate

Leveraged buyout (LBO) funds have been criticized for their focus on maximizing short-term returns. Their increasing influence has sparked a lot of discussion about the value they create for investors and society at large. Although quite controversial views have emerged in the debate, the amount of economic research on LBO funds has been very limited. This paper analyzes the stock performance of IPO firms that were previously owned by professional buyout organizations in order to understand to what extent long-term value was created.

In the UK, the investor debate started after several IPOs backed by LBO funds failed and caused serious losses for investors. For example, the share price of Jessops and Debenhams fell considerably after their IPO amid buoyant stock markets.

The Debenhams IPO is an illustrative example of post-issuance underperformance. In October 2003, a consortium formed by buyout funds Texas Pacific Group, CVC Capital and Merrill Lynch PE invested £520 million of equity in the £1.9 billion LBO and de-listing of Debenhams from the London Stock Exchange. In May 2006, the company was re-floated in an £950 million IPO. With the proceeds, special dividends, and the value of the 38% stake still held, the consortium made approx. 3.3 times its original investment. Public shareholders did much worse: In the 18 months after the IPO, Debenhams's stock lost more than half of its value.

A wider political debate started when unions demanded increased public scrutiny of private equity. In 2007, a parliamentary select committee was appointed to investigate the role of private equity in general and buyout organizations in particular. The committee investigated disclosure, corporate governance, tax regulations and private equity's impact on the UK economy. Based on the committee's report, the UK government felt compelled to eliminate certain income tax privileges for private equity funds and to call for an increase of transparency.

Such concerns are not restricted to the UK. In Germany, the public debate started when a leading Social Democrat compared LBO funds with “swarms of locusts”¹ and criticized, among others, Blackstone’s “quick flip” of Celanese, a German chemicals company:

In December 2003, the buyout group invested \$650 million of equity in the \$3.8 billion in the LBO and de-listing of Celanese from the Frankfurt Stock Exchange. In January 2005, the company re-emerged in an IPO on the New York Stock Exchange with a 50% higher enterprise value. In only 13 months, Blackstone made 4.6 times its original investment². IPO investors did not do so well: From a \$16 issue price, the stock fell to a low of \$13.54, underperforming the market.

More broadly, market observers complain that buyout funds often put too much debt on companies and push them too rapidly into an IPO. For example, Lisa Gerwitz comments:

“It’s debatable how many things within a corporation can get turned around in less than a year, but one thing is certain among the recent spate of quick flips: Bottom-line financial performance hasn’t improved, because the companies are returning to market loaded with debt from their short-lived private buyouts. The IPO proceeds are often being used to pay down the debt incurred from going private, and in every case ... to pay millions of dollars in special dividends to the private-equity firms.”³

Amid this anecdotal evidence, one has to wonder if private equity managers find such strategy beneficial in the longer-term. Private equity funds usually have controlling stakes in firms prior to the IPOs, and continue to keep sizeable stakes after the offering. Therefore, the long-run stock performance of their IPOs has a substantial impact on their funds’ performance. More importantly, they tend to be repeat issuers in the equity markets, may suffer a serious loss of reputation if private-equity-backed IPOs turn out to systematically underperform, and ultimately get lower prices for their new issues.

¹ Franz Müntefering, 17. April 2005, *Bild am Sonntag*.

² Lisa Gerwitz, 2 November 2005, *The Deal*.

³ Lisa Gerwitz, 22 August 2005, *The Deal*.

Literature

There are three areas of research relevant for the discussion of long-run performance of IPOs backed by private equity funds: (i) IPO performance in general, (ii) the role of venture capital funds, and (iii) the impact of leveraged buyout-funds.

There is much research on long-term IPO underperformance, suggesting that investors may systematically be too optimistic about the prospects of new issues. For example, Ritter (1991) and Loughran & Ritter (1995) find strong underperformance in US IPOs between 1970 and 1990 and Levis (1993) shows underperformance during 1980 to 1988 in the U.K. (Barber & Lyon (1997) and Mitchell (2000) propose improved test designs and statistics for long-term event studies).

Venture capital has attracted significant research and addresses many of the issues relevant for leveraged buyout funds. Fazzari, Hubbard, & Petersen (1988) and Hoshi, Kashyap, & Scharfstein (1991) demonstrate that many companies are prone to asymmetric information and potential capital constraints. Since venture capitalists provide access to top-tier investment and commercial banks and can overcome informational asymmetries associated with start-up companies, venture-backed firms are less dependent on internally generated cash flows. Barry, Muscarella, Peavy, & Vetsuypens (1990) and Megginson & Weiss (1991) find evidence that markets react favourably to the presence of private equity financing at the time of an IPO. There is also evidence that private equity investors put management structures in place that help the firm perform better in the long run.

Jain & Kini (1995) examine 136 venture-backed IPOs between 1976 and 1988 in the US. They show that venture-backed IPOs have higher valuations at the time of the offering and display superior post-issue operating performance. Brav & Gompers (1997) analyze 934 venture backed IPOs between 1972 and 1992 in the US. They demonstrate that these stocks outperform non-venture-backed IPOs in the long term. Gompers (1996) shows that reputational concerns affect the decisions private equity funds make when they take firms public.

The boom in leveraged buyouts in the late 1980s has inspired research on buyout-backed IPOs (also known as “Reverse Leveraged Buy-Outs”) in the US. Muscarella & Vetsuypens (1990) scrutinize 72 RLBOs between 1983 and 1987, and discover

substantial increases in profitability and in leverage. DeGeorge & Zeckhauser (1993) analysed 62 RLBOs between 1983 and 1987 and show that the accounting ratios of these firms outperform their peers' prior to the IPO, but deteriorate afterwards. Mian & Rosenfeld (1993) examined the long-run investment performance of 85 RLBOs from 1983 to 1988, finding significant positive abnormal return over the first three years. The outperformance is largely driven by takeover activity. Holthausen & Larcker (1996) analyse 90 RLBOs between 1983 and 1988. Although they find significantly better accounting performance at the time of the IPO there is no evidence of stock outperformance after the IPO.

The collapse of the junk bond market in the early 1990s and the subsequent decline in leveraged buyout activity has reduced research in the field. However, the current re-emergence of leveraged buyouts has re-ignited academic research. Hogas, Olson, & Kish (2001) analyze 232 RLBOs between 1987 and 1998 and find that the time a buyout was held privately, issue size, insider ownership, over-allotment option, and gross spread, influence IPO investor returns. They also show a lower level of underpricing than in other IPOs. Finally, Cao & Lerner (2006) analyse 496 RLBOs between 1980 and 2002 and find consistent long-term outperformance over the US market as a whole and other IPOs. Their research has inspired this paper.

Summary of Findings

This paper analyses a sample of 128 leveraged buyout fund-backed IPOs that listed in the UK between 1990 and 2006 and compares the performance with a sample of 1,121 non-LBO-backed IPOs on various measures of market return.

The analysis suggests the following conclusions:

- Overall, leveraged buyout-backed IPOs outperform the market and other IPOs. The returns are economically and statistically significant.
- LBO-backed IPOs dating from various years have beaten the market. The performance in the 2000s has improved over the 1990s.
- There are indications that average returns of LBO-backed IPOs tail-off over time. But on a risk-adjusted basis, they remain positive over the first five years post-IPO.
- The three biggest drivers of LBO-backed IPO performance are the post-IPO stake held by the LBO fund, the size of assets under management, and the holding period between LBO and IPO

The paper is organized as follows: Section 1 briefly reviews the leveraged buyout sector. In Section 2, the theoretical underpinnings for abnormal returns are discussed. Section 3 explains the construction of the data-set used in the study. Section 4 provides the central analyses of long-run IPO performance. Section 5 uses a cross-sectional analysis to explain long-term returns. The final section closes the paper.

The Market

Leveraged Buyout Background

In this paper, the term private equity is used broadly to describe all forms of equity corporate financing outside public stock markets. Private equity includes venture capital funds financing early stage firms and leveraged buyout funds providing equity in connection with third-party debt to mature businesses.

LBO firms are generally experts in corporate finance and focus on late stage companies in certain industry sectors and countries. They usually take a controlling interest and actively influence management and strategy of their investments. Private equity firms are typically organized as limited partnerships and manage multiple investments over the finite life of their funds.

The compensation of private equity fund managers is tied to investment performance and provides a strong incentive to maximize the value of their investments and to realize them as soon as possible. Exits are usually within three to five years of the acquisition by way of a private or public sale. The exit proceeds are shared between fund investors that get back their capital and the largest part of the profits, and private equity managers that receive a smaller share of the profits⁴.

The LBO fund partnership critically depends on good investment performance in order to be able to raise its next fund from fund investors. As repeat players who regularly have to raise new funds, LBO fund managers face significant reputational risks. An LBO partnership unable to raise a new fund effectively goes out of business when its existing fund comes to the end of its normal life.

A similar argument can be made about the exit record of LBO funds. If firms backed by a fund repeatedly performed better than the market, then the reputation of such LBO funds should increase and permit higher prices in future exits. Conversely, systematic underperformance would tarnish a fund's reputation and reduce future exit prices.

⁴ Buyout fund managers usually receive profit share or "carried interest" of 20% (subject to hurdle rates) and an annual management fee of 1-2% of the assets under management.

Beyond individual funds an important question is, if LBO groups generally produce firms that outperform others long-term. In this was the case, the LBO industry could demand higher exit valuations and improve its investment performance. But more importantly, it would also be evidence of value-added accruing to buyout funds, buyers and society at large.

Leveraged Buyouts in the UK

Over the past twenty years, the UK private equity industry has been one of the fastest growing segments of the financial services industry. The growth has accelerated in the recent low-interest rate environment and assets under management of UK-based private equity funds have trebled between 2003 and 2006.

Currently, the UK is the largest market for private equity outside the US and the largest and most developed in Europe, accounting for more than 50 % of all European private equity investments. UK-based private equity funds raised over £33 billion in 2006, representing 15 % of the global total.

In the first half of 2007, completed leveraged buyouts were over £25 billion, close to the full-year total in 2006 of £26.5 billion. The Alliance Boots deal was the first buyout of a FTSE 100 company and accounted for over £11 billion alone. The total value of UK public-to-private buyouts was a record £14 billion in the first half of 2007, compared with £6 billion for the full year 2006.

The leveraged buyout sector in the UK has changed profoundly over the years. Competition for buyout transactions has increased significantly, putting returns under pressure. The average LBO size has increased substantially and is now four times that of 1990. A need for scale also fuelled more cross-borders and public-to-private transactions. UK buyout organizations have moved abroad but they also saw the arrival of the global buyout powerhouses in their home market. The emergence of the secondary buyouts has created higher liquidity and more specialization in the market.

No doubt the challenges for buyout organizations have increased. It is therefore legitimate to ask, if market performance of LBO-backed IPOs has suffered as competitive pressures are mounting and possibly the quality of the transactions decreased.

The Theory

If private equity-backed IPOs perform better on average than non-private equity-backed IPOs, the market should incorporate these expectations into the price of the offering and long-run stock price performance should be similar for both groups.

If the market underestimates the importance of private equity backing in the pricing of IPOs, long-run stock price performance may differ. Conversely, the market may not discount the shares of non-private equity-backed IPOs enough.

Such an underestimation may result because individuals, who hold a larger percentage of shares in IPOs of non-private equity-backed firms (Megginson & Weiss (1991)), are potentially more susceptible to fads and sentiment. It is therefore useful to analyze the findings from a behavioural finance and rational asset pricing perspective.

Behavioural Finance

Behavioural economics demonstrates that individuals often violate Bayes' Rule and rational choice theories when making decisions under uncertainty in experimental settings as demonstrated, for example, by Kahneman & Tversky (1982). Financial economists discovered long-run pricing anomalies attributable to investor sentiment. Behavioural theories find that investors weight recent results too heavily or extrapolate recent trends too much. Eventually, overly optimistic investors are disappointed and subsequent returns decline.

DeBondt & Thaler (1987) demonstrate that buying past losers and selling past winners is a profitable trading strategy. Risk, as measured by beta or the standard deviation of stock returns, does not explain the results. Lakonishok, Shleifer, & Vishny (1994) find that value strategies also show abnormally high returns. They form portfolios based on earnings-to-price ratios, cash flow-to-price, sales growth, and earnings growth, and demonstrate that value stocks outperform glamour stocks without affecting the risk taken. La Porta (1996) finds that selling stocks with high forecasted earnings growth and buying low projected earnings growth stocks produces excess returns.

Effectively, behavioural research implies that investors are too optimistic about stocks that have had good performance in the recent past and too pessimistic about stocks that have performed poorly.

In addition to stock market- and accounting-based trading strategies, researchers have looked at financing events as source for potential trading strategies. Ross (1977) and Myers & Majluf (1984) show that the choice of financing strategy can send a signal to the market about company valuation. Event studies on equity and debt issuance (Asquith & Mullins (1986), Mikkelson & Partch (1986)) find that corporate managers have superior information about future company returns and use this information to the benefit current of shareholders, and that the market under-reacts to the informational content of such financing events.

Ritter (1991) and Loughran & Ritter (1995) show that nominal five-year buy-and-hold returns are lower for IPOs than they are for comparable size-matched firms. Teoh, Welch, and Wong (1998) show that IPO underperformance is positively related to the size of discretionary accruals in the fiscal year of the IPO. Larger accruals in the IPO year are associated with more negative performance. Teoh *et al.* find that the level of discretionary accruals is a proxy for earnings management and that boosted earnings systematically fool investors.

If investor sentiment is an important factor in the underperformance of IPOs, small IPOs may be more affected. Individuals are more likely to hold the shares of small IPO firms. Many institutions like pension funds and insurance companies refrain from holding shares of very small companies. Taking a meaningful position in a small firm may make an institution a large block holder in the company. Because the Securities and Exchange Commission (SEC) restricts trading by 5 percent shareholders, institutions may want to avoid this level of ownership.

Individual investors are more subject to fads (Lee, Shleifer, & Thaler (1991)) or are more likely to suffer from asymmetric information. Lee *et al.* use the discount on closed-end funds as a measure of investor sentiment. If investor sentiment affects returns and closed-end fund discounts are a good measure of investor sentiment, then returns on small IPOs are correlated with the change in the average closed-end fund discount. Decreases in the average discount imply that investors are more optimistic and should be correlated with higher returns for small issuers.

Efficient Markets

Supporters of the efficient markets hypothesis claim, that multifactor asset pricing models explain many pricing anomalies in the financial economics literature. In particular, Fama & French (1996) argue that the value strategies in Lakonishok *et al.* and the buying losers-selling winners strategy of DeBondt & Thaler (1987) can be explained with their multi-factor asset-pricing model.

Fama & French (1996) show that their three-factor pricing model is consistent with Merton's (1973) I-CAPM and may explain the cross-section of stock returns. While the choice of factor-mimicking portfolios is not unique, sensitivities to Fama and French's three factors have economic interpretations. Their three factors are: RMRF, the excess return on the value weighted market portfolio; SMB, the return on a zero investment portfolio formed by subtracting the return on a large capitalization portfolio from the return on a small capitalization portfolio; and HML, the return on a zero investment portfolio calculated as the return on a portfolio of high book-to-market stocks (i.e. value stocks) minus the return on a portfolio of low book-to-market stock (i.e. growth stocks).

Fama & French claim that anomalous performance is explained by not completely controlling for risk factors. Tests of underperformance, however, suffer from the joint hypothesis problem discussed by Fama (1976). The assumption of a particular asset-pricing model means that tests of performance are conditional on that model's correctly predicting stock price behaviour. If the null hypothesis is rejected, then either the pricing model is incorrect or investors are irrational. Similarly, if factors like book-to-market explain underperformance, it does not necessarily verify the model. The results may just reflect that investor sentiment is correlated with measures like book-to-market.

Whether factors like book-to-market reflect rational market risk measures or investor sentiment is still hotly debated. However, this paper generally finds outperformance of LBO-backed IPOs, an indication for market inefficiency in new issues and thus support of behavioural finance theory.

The Data

A large sample of LBO-backed IPOs was used to ensure statistical significance. The observation period used was from January 1990 to December 2006. The starting point was chosen because prior to the 1990, coverage on LBO transactions was fairly limited in Europe. The latest offerings in our sample have a shorter time series of performance data than the three-year period used by Cao & Lerner (2006). Therefore, sample size varies with the time frame used in our different analyses.

Identifying the IPO Samples

A comprehensive sample of UK IPOs was collected and then divided into LBO-backed and non-LBO-backed companies.

The overall IPO sample includes a total of 1,249 stocks listed between January 1990 and December 2006, fulfilling the following criteria:

- Initial public offering of at least £5 million,
- Primary listing in the UK,
- Prospectus filed with a UK exchange,
- No asset management firms, investment trusts, and REITs,
- Stock price data available on Datastream.

The overall IPO sample was collected from several sources. The London Stock Exchange (LSE) provided a summary of new listings. The SDC Platinum Corporate New Issues database and Dealogic New Issues database were used to check the sample.

Identifying the LBO-backed IPO sample proved more difficult because there is a general lack of detailed publicly available information on transactions and funds backing them.

These issues arose mainly for the following reasons:

- Private equity funds operate as private partnerships and are subject to less stringent disclosure requirements than public companies. Many operate through offshore holdings and ultimate ownership is often difficult to establish,
- UK stock exchange rules have traditionally required less complete prospectus information and ongoing disclosure than SEC regulations in the US. In particular, details on the initial buyout are not usually part of UK IPO prospectuses,
- News coverage in the early 1990s was considerably less comprehensive than today. The major news archives and specialist databases have only in the past decade begun to track private equity more systematically,
- The delineation between buyouts and venture capital investments has become increasingly blurred. Venture capital funds have moved into buyouts and vice versa. Therefore, the investor name alone doesn't necessarily point to the type of transaction.

The LBO-backed IPO sample has 128 stocks that listed between January 1990 and December 2006 and satisfied the following conditions:

- IPO backed by at least one private equity organization which is either a member of an equity association (e.g. BVCA, EVCA, and NVCA) or can otherwise be classified as a professional private equity investor,
- Private equity organizations exert significant influence on the firm's management and hold at least 25 percent of the pre-IPO equity,
- Original investment involved the use of debt.

The sample of LBO-backed IPOs was identified from different sources. Membership information for national and international venture capital and private equity associations was obtained from their websites. Ownership information was collected from news searches (e.g. Factiva), specialist databases (e.g. Capital IQ, Venture Xpert), and by reviewing IPO prospectuses (e.g. Perfect Information). Information on acquisition debt in the original investments was collected from various online resources. Mergers & Acquisitions databases (e.g. SDC M&A and Capital IQ) provided information on leveraged buyouts. Classification involved a detailed case-by-case analysis and exerting a certain degree of judgment. If the above criteria were

not fulfilled or there was not sufficient information, in particular about debt levels in the original investment, the IPO was excluded from the LBO-backed sample.

In order to be as comprehensive as possible, the samples may be subject to a selection bias. Large and visible LBO-backed IPOs are generally more likely to be included because they attract more news coverage and become quite visible.

Three different “sanity checks” were carried out: First, the equity capital markets department of Citibank was asked to provide a comprehensive list of IPOs and to classify the type of shareholders. Second, the CMBOR (Centre of Management Buyout Research) transaction database was used to validate our classification. Third, the samples were checked for consistency with those used in the existing literature. If any discrepancies could not be resolved, the IPOs were excluded from the sample.

The final sample includes 128 LBO- and 1,121 non-LBO-backed IPOs. Five years after the IPO, 54 LBO- and 464 non-LBO-backed stocks were still listed. The balance either de-listed due to bankruptcy, mergers or acquisitions (32 LBO-backed- and 209 non-LBO-backed IPOs) or did not reach its fifth anniversary yet.

For some analyses additional information on market value, price-to-book value, price-to-earnings, price-to-cash flows and dividend yield is required. Where such information is unavailable on Datastream or Worldscope, the IPO was excluded from the sample.

Table 1 presents the distribution of the IPO samples by cohort year. It shows a healthy number of LBO-backed IPOs in 1993-94. The surge in technology-related stocks in 1996 and 2000 led to record level non-LBO-backed IPO-activity. Since 2004 new equity issuance recovered from the post-bubble correction. Between 2004 and 2006, approx. 10% of all IPOs (approx. 30% by market capitalization) were LBO-backed.

Although about 40 buyout groups were involved in LBO-backed-IPOs, most of these offerings were carried-out by well-established private equity investors like 3i, Barclays Private Equity, Bridgepoint, Candover, Charterhouse, Cinven, CVC, Electra Fleming, Montagu Private Equity, and Permira.

Supplemental Data

The principal source for stock price information is Datastream. The analysis uses Datastream's stock specific daily total return indices, which include gross dividends. The analysis was carried out with a sample of approx. 2.2 million daily stock prices for the two IPO samples.

Datastream also provides daily information on market capitalization and key valuation benchmarks like price-to-book, price-to-earnings, price-to-cash and dividend yield, which are used for a size- and value-matched portfolio analysis. Worldscope provides the underlying accounting information.

Datastream is also source for the market indices – FTSE 100, FTSE 350, FTSE All Shares⁵ – and the risk free rate (three month UK Treasury bill).

Detailed information on IPOs is collected from a variety of sources, including the London Stock Exchange, CMBOR (Centre of Management Buyout Research), SDC Corporate New Issues database, Dealogic database, stock exchange prospectus information, and press articles. The quality of the IPO databases, especially for the early 1990s, is variable and therefore it was often necessary to resort to collected prospectus information manually.

Benchmark returns for HML-portfolios based on book-to-market, earnings-to-price, cash-to-price, and dividend yield are taken from Kenneth French's website⁶ and used to calculate the Fama-French two-factor regressions.

Forming Portfolios on Size and Value

Unfortunately, Kenneth French does not provide data for international SMB-portfolio returns. Therefore benchmark returns for portfolios, based on size and book-to-market,

⁵ FTSE 100 - includes the 100 most highly capitalised blue chip companies, representing approximately 81% of the UK market.

FTSE 350 – comprises 18 highly tradable sector indices that are derived from companies in the FTSE 100 and FTSE 250 indices.

FTSE All Shares - represents 98% of the UK market capitalization and aggregates the FTSE 100, FTSE 250 and FTSE Small Cap Index.

⁶ <http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html>

earnings-to-price, cash-to-price, and dividend yield, had to be calculated⁷ by the authors with information provided by Datastream and Worldscope. The data is used to determine size- and value-matched benchmark portfolio returns and to carry out Fama-French three-factor regressions.

The analysis required approx. 590,000 monthly prices for the overall stock market, covering the period from January 1990 to September 2007. We used the methods as described by Fama & French to form the portfolios and to determine monthly portfolio returns.

The calculated RMRF and HML time series are consistent with data provided by Kenneth French. However, the SMB returns differ from observations for the US in that they show a negative size premium for the UK between 1990 and 2007. However, the reversal does not affect the validity of the analysis because it is a market-derived benchmark.

⁷ The statistical software package *Stata 8.2. for Windows* was used for the analysis.

The Analysis

If private equity-fund managers took advantage of an informational asymmetry and hyped the listing of their investments to achieve an inflated offering price, significant negative returns should be the consequence after the IPO. Such an explanation would be inconsistent with positive excess returns after the IPO, provided the market has sufficient time to determine the true prospects of the firms. (If IPO markets were efficient, then there should be no significant excess return over the longer term.)

Loughran & Ritter (1995) find that the stock price performance of a broad sample of IPOs and seasoned equity offerings in the 1970-1990 period underperforms the US market during the first five years of the IPO. Similar findings in the UK LBO-backed sample would be consistent with the observation that buyout-fund managers profited from an informational asymmetry to the detriment of IPO investors.

The analysis focuses on the performance of UK LBO-backed IPOs and compares it to a control group of non-LBO-backed IPOs. Several measures including raw-, market-adjusted-, and risk-adjusted returns as well as wealth relative ratios are used to assess IPO-performance in event and calendar time.

Event Time Results

Raw-, Market-Adjusted-, and Risk-Adjusted Returns

In order to ensure comparability with similar work in the US, we employ the format used by Holthausen & Larcker (1996) and Cao & Lerner (2006).

In Table 2, IPO performance is analyzed using five different measures: Total buy-and-hold returns, total buy-and-hold returns in excess of the buy-and-hold returns for the stock market index, Jensen alphas, Fama-French two-factor alphas, and Fama-French three-factor alphas.

The Jensen alpha for each IPO is the intercept from estimating a stock-specific time series regression of monthly excess returns (the stock's return in excess of the three-month UK risk-free rate) on the FTSE All Share excess returns (the FTSE All Share index return in excess of the three-month UK risk-free rate). The Fama-French two-factor alphas are similar intercepts, estimated with FTSE All Share excess returns (RMRF) and the returns of a portfolio of value stocks in excess of a portfolio of

growth stocks (HML) as independent variables. Fama-French three-factor alphas are estimated with RMRF, HML, and the returns of a portfolio of small-capitalization stocks in excess of a portfolio of large-capitalization stocks (SMB).

The five stock metrics are determined for a 12-, 24-, 36-, 48- and 60-month holding period, beginning with the first closing price after the IPO. The regressions use stocks for which monthly observations are available at least up the number of months in the reported holding period. The statistical test of significance for the mean portfolio returns is the (one-tailed) one-sample t-test and for the median is the (two-tailed) Wilcoxon test.

In Table 2 the analysis assumes that, if a firm de-lists, the subsequent raw returns, market-adjusted returns, and alphas are set to zero. Therefore, the portfolio strategy implicit in the raw return analysis is to keep any payouts from de-listed stocks in cash. For the market-adjusted return, the portfolio strategy implicit in the calculation is that any payout is invested in the market. For the different alphas, the implicit portfolio strategy is that any payout earns the equilibrium rate of return given its aggregate systematic risk.

Panel A in Table 2 shows that the sample of 124 UK LBO-backed IPOs produces a mean raw buy-and-hold return of 30.96% in the first year after the IPO, which increases to 99.63% after five years. When these returns are adjusted by (value-weighted) market returns, the means stay positive (except in year four), but are statistically different from zero only in the first two years. The mean risk-adjusted returns (alphas) of the three different regression models⁸ are positive and statistically significant for the first five years post-IPO. The alphas suggest that LBO-backed IPOs outperform the market on average by about 0.3% per month over the five-year period after the offering.

In Panel B, the sample of 1,106 UK non-LBO-backed IPOs yields a mean raw buy-and-hold return of 20.04% for year one, growing to 48.17% for the full five years. Market-adjusting the control group reduces the means, so they remain positive and

⁸ For the FF-2-Factor analysis the HML time series provided on Kenneth French's website was used. For the FF-3-Factor analysis the HML and SMB time series were calculated with the method described by Fama & French using a broad sample of monthly UK stock price data from 1990 to 2007.

statistically significant only in year one and three. The mean risk-adjusted returns (alphas) of the three different regression models are positive and statistically significant for all periods (except for Jensen and FF 2 Factor in year two). The alphas suggest that non-LBO-backed IPOs outperform the market on average by 0.2 - 0.5 % per month over the five-year time frame.

On most metrics the mean IPO performance is higher than the median, pointing to a wide distribution of monthly returns with a few very high returns.

In Table 3 the results are provided for “survivor” IPOs that are still listed after 60 months. The difference to Table 2 is due to stocks that are either de-listed (after a merger, acquisition, or bankruptcy) or have not experienced a sufficiently long stock price history. It addresses the concerns in the literature (e.g. Mian and Rosenfeld (1993)) that LBO-backed IPO performance is driven by take-over premiums paid subsequently to the offerings. However, there is no evidence that returns become negative, if de-listed stocks are excluded.

Thus, UK LBO-backed IPOs have a statistically significant positive performance. Holthausen & Larcker (1996) and Cao & Lerner (2006) make similar observations for US buyout-backed IPOs. However, the positive performance of non-LBO-backed IPOs in the UK is surprising and inconsistent with US research, where IPOs generally do not beat the market long-term (see Loughran & Ritter (1995)).

Wealth Relatives

Following Loughran & Ritter (1995), Brav & Gompers (1997) and Cao & Lerner (2006), we measure IPO performance with alternative index benchmarks. First, the performance of IPOs is compared to three market indices: the value-weighted index of the largest 100 UK stocks by market capitalization (FTSE 100), the value-weighted index of the top 350 UK stocks by market capitalization (FTSE 350), and the value-weighted composite index of (almost) all stocks listed in the UK (FTSE All Share).

IPO performance is also benchmarked with size- and value- matched portfolios. Comparing stock performance to matched portfolios is useful to account for the effects documented by Fama and French (1996). They demonstrate that size and book-to-market (or alternative measures of value) are important drivers of the cross

section of stock returns. Therefore, a comprehensive sample⁹ of UK stocks was collected and divided into 25 (5 x 5) value-weighted portfolios on the basis of size and the ratio of book equity to market equity (or cash flow-to-price)¹⁰. Each IPO stock was then matched on a monthly basis on these two dimensions to the corresponding portfolio.

Table 4 and Table 5 present the buy-and-hold performance for the IPO samples measured against market indices and matched portfolios for a period of three and five years, respectively. In Panel A, returns are equally weighted for each IPO and its benchmark. In Panel B, each stock return is weighted by the issuing firm's market value at the IPO date.

As in Loughran & Ritter (1995), Brav & Gompers (1997) and Cao & Lerner (2006), buy-and-hold returns are calculated without periodic rebalancing. The first monthly returns are calculated for the closing prices between the first day of trading and the first calendar month-end, while subsequent returns are based on calendar month-end returns.

The performance measure used for the three IPO samples is the wealth relative, which is defined as:

$$\text{Wealth Relative} = \sum (1 + R_{i,T}) / \sum (1 + R_{\text{Bench}_{i,T}}),$$

where $R_{i,T}$ is the buy-and-hold return on IPO i for period T and $R_{\text{Bench}_{i,T}}$ is the buy-and-hold return on the benchmark portfolio over the same period.

This measure compares the return of a buy-and-hold portfolio relative to the return of a benchmark. Wealth relatives of less than one indicate that the IPO sample has underperformed relative to its benchmark, and vice versa.

⁹ The sample includes 4,430 stocks, which were listed at any time between January 1990 until September 2007 on a UK exchange and where information on market value from Datastream/Worldscope was available. The sample totals 4,147 (3,628) stocks when information on book-to-market (cash flow-to-price) is considered. For book-to-market (cash flow-to-price), stocks with positive and negative ratios were included.

¹⁰ The cut-off points for size and value were recalculated annually at the end of June and the stocks were then reassigned to new portfolios. Both equal and value weighted returns were calculated for each of the 25 portfolios.

Panel A in Table 4 shows the performance of equal-weighted IPO portfolios over the three-year time frame. LBO-backed IPOs outperform all index benchmarks and beat non-LBO-backed offerings on most measures (except size and cash-flow-to-price-matched portfolios). The wealth relatives of both IPO samples increase when matched benchmarks are used, indicating that UK IPOs typically seem to have a lower return profile than the index portfolio.

Panel B of Table 4 illustrates the performance of value-weighted IPO portfolios for the first three years. LBO-backed-IPOs continue to outperform on all index benchmarks.

Over the three-year time frame, the results for LBO-backed IPOs are consistent with Cao & Lerner's findings, where US LBOs outperform the market and non-LBO-backed IPOs.

Table 5 depicts the performance of IPO portfolios five years after the IPO. A comparison with Table 4 shows, that the performance of all IPOs deteriorated on most measures.

Yearly Cohorts

A natural question is to what extent IPO performance has changed over time. Loughran & Ritter (1995) show clear patterns in the underperformance of IPOs. In the US, years of high IPO activity have been connected with stock price underperformance.

Panel A in Table 6 shows the three-year, equal-weighted, buy-and-hold cohort returns versus the FTSE All Share index. The long-run returns show variation over time but wealth relatives for many yearly cohorts are higher than one, indicating IPO outperformance. Since 2000, LBO-backed IPO activity was moderate but outperformed the market in all five cohort years. Conversely, non-LBO-backed IPOs issuance was high but beat the index only once.

Although the observation periods differ, these results are largely consistent with the results of Loughran & Ritter (1995) and Brav & Gompers (1997) for the US, who find similar time series patterns of underperformance.

Calendar Time Portfolios

The event time results presented above may be misleading about the pervasiveness of underperformance. Barber & Lyon (1996) show that such long-term performance tests often suffer from potential biases arising from the non-standard distribution of long-run returns.

The yearly cohort results in Table 6 may overstate the actual number of years in which IPOs underperform because the returns of recent IPOs may be correlated. If firms, that have recently gone public, are similar in terms of size, industry, or other characteristics, then their returns are often highly correlated in calendar time. For example, the shock to the economy in 2003 substantially decreased the value of firms that issued equity previously. It lets the cohort years prior to 2003 underperform, even though all the underperformance is concentrated in one year.

The problem of correlation can be addressed by calculating the return for a portfolio strategy that invests in recent IPOs. Such a calendar time analysis has been shown to be more robust against biases in long-run stock performance measurement.

Wealth Relatives

Panel A in Table 7 displays the annual returns for an investment strategy that holds an equal proportion of a portfolio in each IPO stock that went public within the previous three years. The portfolio is rebalanced daily and annual returns are starting in January and ending in December of each year. These calendar time returns are compounded over time and benchmarked with calendar time returns of the FTSE All Share index. The cumulative wealth relative index shows that a strategy based on LBO-backed IPOs not only outperforms the market by a wide margin but also beats non-LBO-backed IPOs.

In Panel B, buying value-weighted stakes in IPO stocks constitutes the calendar time portfolio strategy. Value weighting the calendar time portfolios reduces the final wealth relative for both IPO portfolios but the findings remain robust.

Risk-Adjusted Results

If individual IPOs outperform consistently on a risk-adjusted basis in event time, then portfolios of IPOs should also outperform relative to an explicit asset-pricing model in calendar time.

Extending the analysis of Brav & Gompers (1997) and Cao & Lerner (2006), Table 8 presents the regression results of the calendar time portfolio for three models. IPO portfolio excess returns were regressed on RMRF (CAPM) alone, on RMRF and HML (Fama-French-Two-Factor), and on RMRF, HML, and SMB (Fama-French-Three-Factor).

The equal- and value-weighted LBO-backed IPO portfolios are presented in Panel A in Table 8. For equal-weighted portfolios, all three models show statistically significant alphas from 0.7 - 1.2 % per month. The equal-weighted Fama-French-Three-Factor model has an alpha of 1.19 % per month (significant at 1% level) and an adjusted- R^2 of 0.50. The value-weighted Fama-French-Three-Factor model shows an alpha of 0.72 % (significant at 5% level) and an adjusted- R^2 of 0.55.

The results for LBO-backed IPOs are consistent with Cao & Lerner (2006), who find statistically significant alphas of 1.0% per month for value-weighted calendar time IPO portfolios in the US.

Panel B in Table 8 shows the results for non-LBO-backed IPOs. The equal-weighted Fama-French-Three-Factor model displays an alpha of 0.89 % per month (significant at 1% level) and an adjusted- R^2 of 0.63 (all other alphas are statistically insignificant).

The outperformance of the non-LBO-backed IPO portfolio differs from US findings. Brav & Gompers (1997) and Cao & Lerner (2006) find that non-LBO-backed US IPOs underperform by between -0.3 and -0.5 % per month.

A possible explanation for the high UK regression results could be that monthly returns have a higher standard deviation and deviate from the normal distribution. As Barber & Lyon (1997) have demonstrated, this could bias the regression analysis in favour of high volatility stocks like non-LBO-backed IPOs.

Cross-Sectional Differences Across LBO-Backed IPOs

The previous section demonstrated that LBO-backed IPOs generally outperform the market and non-LBO-backed IPOs. Turning now to the differences across offerings it's worth addressing the following questions: Why do certain LBO-backed IPOs perform better than others? What roles do characteristics of the buyout group play? Does the length of the holding period matter? What effect has the financial market environment? Which incentive structure works best? Does leverage make a difference?

These questions are addressed with multivariate regression analyses, explaining the performance of LBO-backed IPOs three years after going public. The analysis shows that the performance of LBO-backed IPOs is cross-sectionally correlated with ownership, holding period and size of the buyout group.

We analyse ten variables (Table 9) that are frequently mentioned in the literature as factors driving stock price performance. These independent variables can be grouped in three clusters: Three buyout group-, three financial market-, and four structural transaction variables.

The LBO fund-related factors are the number of years since the first fundraising of the buyout group, the natural logarithm of the assets under management at the time of the LBO, and the holding period between the LBO and the IPO.

The financial market-related measures are market momentum (12 month index return prior to IPO), firm size (market capitalization shortly after the IPO), and value (book-to-market ratio).

The structural transaction variables are the percentage of IPO proceeds transferred to the company (ratio of new shares to total shares offered), management and buyout group ownership of the post-IPO share capital, and leverage (net debt to EBITDA ratio) after the IPO.

Table 10 shows the multivariate regression results for LBO-backed IPOs. The dependent variable is the natural logarithm of the three-year wealth relative using the FTSE All Share index.

The basic regressions (Table 10, Panel A), show that individually only buyout group ownership after the IPO has a statistically significant positive impact on performance. If we control for year-fixed effects (Table 10, Panel B), three individual factors have a statistically significant positive influence: Buyout group ownership after the IPO, the natural logarithm of assets under management at the time of the LBO, and the length of the holding period between LBO and IPO. However, the percentage buyout group ownership in the company after the IPO is the most significant driver of post-IPO stock performance.

All other seven factors investigated, including leverage and management share ownership, do not seem to have a statistically significant impact on the long-term performance of LBO-backed IPOs. When performing multiple regression analyses with all variables simultaneously, the explanatory power of the analysis falls. This could be caused by mutli-colinearity or non-linear relationships between independent variables and long-term performance.

The analysis suggests that economically meaningful post-IPO involvement of the buyout fund is positively correlated with IPO performance. However, the direction of causality is unclear: Do LBO-backed IPOs perform well because LBO-funds are incentivised with economically meaningful stakes and have a positive impact on corporate governance. Or, conversely, do buyout groups keep a high stake because they have better knowledge about the firms prospects and future share price development? This question is open and calls for further research.

In the US, Cao & Lerner (2006) find that only the reputation of a buyout group, measured by age and assets under management, has a positive impact on post-IPO performance.

Conclusions

This paper presents a comprehensive analysis of UK IPOs backed by leveraged buyout funds. The growing significance of the LBO industry, the current political debate and some disappointing stock offerings, altogether highlight the need for a better general understanding of the after-market performance of LBO-backed IPOs.

The analysis of 128 LBO-backed IPOs between 1990 and 2006, offers the following conclusions:

- Leveraged buyout-backed IPOs deliver a mean raw-return of 65.86 percent over the first three years post-offering. They outperform on a market-adjusted basis during the first three years (statistically significant for the first two years). Moreover, they beat the market on a risk-adjusted basis (for market risk, size, and value) over a five-year horizon with statistical significance (see Table 2).
- When compared to size- and value-matched benchmarks, LBO-backed IPOs outperform the market and non-LBO-backed IPOs (see Table 4 and Table 5).
- The superior performance of LBO-backed IPOs is not limited to single periods. Nine of the 15 cohort years beat the market three years post-IPO (see Table 6).
- LBO-backed IPOs create wealth for equity holders in the long run. A three-year calendar time portfolio investment strategy in LBO-backed IPOs beats the market and outperforms non-LBO-backed IPOs (see Table 7).
- On a risk-adjusted basis, such a portfolio strategy produces abnormal returns (alphas) between 0.7 and 1.2 percent per month. The results are statistically significant and robust for different models (see Panel A in Table 8).
- The three factors found to positively influence the performance of LBO-backed IPOs, are (i) the percentage of share capital held by the buyout group after the offering, (ii) the logarithm of the buyout group's assets under management, and (iii) the holding period between LBO and IPO (see Table 10).

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Tables

Table 1: Distribution of LBOs, LBO-Backed- and Non-LBO-Backed IPOs by Year

The analysis focuses on a comprehensive sample of 128 Leveraged Buyout Fund-Backed and 1,121 Non-Leveraged Buyout Fund-Backed IPOs in the UK from January 1990 to December 2006 . Column 2 presents the number of Leveraged Buyouts (LBOs) for each year. Column 3 shows the number of Initial Public Offerings (IPOs) which were floated by Leveraged Buyout Funds. Column 4 calculates LBO-backed IPOs as percentage of the number of LBOs for each year. Columns 5 computes LBO-backed IPOs as percentage of the total number of IPOs. Column 6 displays the number of all other (non-LBO-backed) IPOs. Columns 7 calculates Non-LBO-backed IPOs as percentage of the total number of IPOs. Column 8 presents the total number of IPOs in the UK. The sample includes IPOs with a primary listing in the UK, a minimum offering size of £ 5 million, and excludes asset managers and investment trusts.

Year	LBOs	LBO-Backed IPOs			Non-LBO-Backed IPOs		IPOs
	Number	Number	Share of LBOs	Share of IPOs	Number	Share of IPOs	Total Number
1990	57	1	2%	17%	5	83%	6
1991	46	1	2%	33%	2	67%	3
1992	55	4	7%	36%	7	64%	11
1993	46	12	26%	46%	14	54%	26
1994	73	22	30%	26%	63	74%	85
1995	90	9	10%	19%	39	81%	48
1996	81	10	12%	8%	114	92%	124
1997	106	6	6%	6%	90	94%	96
1998	142	4	3%	10%	36	90%	40
1999	168	5	3%	19%	22	81%	27
2000	156	4	3%	2%	162	98%	166
2001	126	2	2%	3%	69	97%	71
2002	102	6	6%	9%	60	91%	66
2003	132	3	2%	5%	52	95%	55
2004	134	17	13%	9%	162	91%	179
2005	142	13	9%	10%	120	90%	133
2006	128	9	7%	8%	104	92%	113
Total/Average	1,784	128	7%	10%	1,121	90%	1,249

Table 2: Event-Time Performance for LBO- and Non-LBO-Backed IPOs (Total Sample)

The sample consists of 128 LBO-Backed- and 1,121 Non-LBO-Backed IPOs between January 1990 and December 2006. The raw returns are the buy-and-hold returns starting the day after the IPO and ending 12, 24, 36, 48, and 60 months later. The market-adjusted returns are the buy-and-hold raw returns minus the buy-and-hold FTSE All Share Index returns over the same period. Jensen alphas are the intercepts estimated by running firm-specific time-series regressions of monthly firm excess returns on FTSE All Share Index excess returns for 12, 24, 36, 48, and 60 months after the IPO. FF 2 factor alphas are similar intercepts, estimated using the two Fama-French factors RMRF and HML as independent variables. FF 3 factor alphas use the three Fama-French factors RMRF, HML and SMB instead. The two-tailed significance levels reported in parentheses below the means are based on the one-sample t-test and the two-tailed significance levels reported below the median are based on the one-sample Wilcoxon test. If the sample firm de-lists, the raw return, market-adjusted return, Jensen's alpha, FF 2 factor alpha, and FF3 factor alpha are set equal to zero after the delisting date. All five stock return measures are expressed in percent. The stock prices are throughout 30 September 2007.

	12 Months		24 Months		36 Months		48 Months		60 Months	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Panel A: Total Sample of LBO-Backed IPOs										
N	124		116		99		88		86	
Raw Returns	30.96 (0.00)	24.63 (0.00)	58.97 (0.00)	34.54 (0.00)	65.86 (0.00)	33.18 (0.00)	61.42 (0.00)	44.84 (0.00)	99.63 (0.03)	31.44 (0.00)
Mkt.-Adj. Returns	19.95 (0.00)	14.83 (0.00)	30.17 (0.01)	5.33 (0.07)	21.50 (0.13)	-10.46 (0.14)	-3.44 (0.43)	-23.37 (0.01)	22.15 (0.34)	-48.29 (0.01)
Jensen Alpha	1.20 (0.00)	1.29 (0.00)	0.73 (0.00)	0.54 (0.00)	0.40 (0.03)	0.28 (0.04)	0.36 (0.02)	0.47 (0.02)	0.26 (0.06)	0.14 (0.15)
FF 2 Factor Alpha	1.05 (0.00)	1.06 (0.00)	0.72 (0.01)	0.59 (0.00)	0.42 (0.03)	0.26 (0.04)	0.40 (0.01)	0.44 (0.01)	0.29 (0.05)	0.30 (0.10)
FF 3 Factor Alpha	1.90 (0.00)	1.49 (0.00)	0.98 (0.00)	0.89 (0.00)	0.64 (0.00)	0.44 (0.01)	0.68 (0.00)	0.48 (0.00)	0.26 (0.07)	0.28 (0.03)

Panel B: Total Sample of Non-LBO-Backed IPOs										
N	1,106		980		843		708		673	
Raw Returns	20.04 (0.00)	1.28 (0.01)	23.35 (0.00)	-12.21 (0.14)	40.29 (0.00)	-15.05 (0.34)	52.83 (0.00)	-23.72 (0.02)	48.17 (0.00)	-33.32 (0.27)
Mkt.-Adj. Returns	10.35 (0.00)	-8.89 (0.00)	1.89 (0.33)	-31.49 (0.00)	9.07 (0.01)	-43.71 (0.00)	14.81 (0.05)	-54.51 (0.00)	6.36 (0.24)	-66.19 (0.00)
Jensen Alpha	0.65 (0.00)	0.15 (0.09)	-0.08 (0.29)	-0.18 (0.09)	0.17 (0.01)	0.03 (0.32)	0.40 (0.00)	0.28 (0.01)	0.22 (0.02)	0.20 (0.14)
FF 2 Factor Alpha	0.63 (0.00)	0.24 (0.04)	-0.09 (0.27)	-0.20 (0.09)	0.17 (0.09)	0.06 (0.39)	0.42 (0.00)	0.29 (0.00)	0.25 (0.01)	0.21 (0.06)
FF 3 Factor Alpha	1.99 (0.00)	1.02 (0.00)	1.01 (0.00)	0.51 (0.00)	1.03 (0.00)	0.65 (0.00)	1.15 (0.00)	0.77 (0.00)	0.46 (0.00)	0.26 (0.00)

Table 3: Event-Time Performance for LBO- and Non-LBO-Backed IPOs (Survivors)

The sample consists of 128 LBO-Backed- and 1,121 Non-LBO-Backed IPOs between January 1990 and December 2006 and shows stock returns for firms which were listed for at least 60 months. The raw returns are the buy-and-hold returns starting the day after the IPO and ending 12, 24, 36, 48, and 60 months later (throughout September 2007). The market-adjusted returns are the buy-and-hold raw returns minus the buy-and-hold FTSE All Share Index returns over the same period. Jensen alphas are the intercepts estimated by running firm-specific time-series regressions of monthly firm excess returns on FTSE All Share Index excess returns for 12, 24, 36, 48, and 60 months after the IPO. FF 2 factor alphas are similar intercepts, estimated using the two Fama-French factors RMRF and HML as independent variables. FF 3 factor alphas use the three Fama-French factors RMRF, HML and SMB instead. The two-tailed significance levels reported in parentheses below the means are based on the one-sample t-test and the two-tailed significance levels reported below the median are based on the one-sample Wilcoxon test. All five stock return measures are expressed in percent. The stock prices are throughout 30 September 2007.

	12 Months		24 Months		36 Months		48 Months		60 Months	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Panel A: LBO-Backed IPO Survivors Only										
N	54		54		54		54		54	
Raw Returns	32.48 (0.01)	24.19 (0.00)	62.24 (0.01)	28.08 (0.00)	80.34 (0.00)	30.08 (0.00)	74.05 (0.01)	46.17 (0.00)	135.98 (0.06)	26.05 (0.01)
Mkt.-Adj. Returns	26.26 (0.02)	14.83 (0.01)	40.55 (0.06)	5.89 (0.00)	43.01 (0.00)	-0.96 (0.47)	14.16 (0.31)	-19.39 (0.18)	59.78 (0.24)	-57.20 (0.12)
Jensen Alpha	1.42 (0.01)	1.71 (0.00)	0.92 (0.02)	0.67 (0.01)	0.68 (0.02)	0.63 (0.03)	0.41 (0.05)	0.47 (0.13)	0.24 (0.16)	-0.11 (0.42)
FF 2 Factor Alpha	1.23 (0.04)	1.05 (0.03)	0.94 (0.02)	0.60 (0.03)	0.71 (0.02)	0.58 (0.03)	0.45 (0.04)	0.45 (0.11)	0.28 (0.14)	-0.17 (0.31)
FF 3 Factor Alpha	1.53 (0.02)	1.28 (0.03)	0.98 (0.02)	1.20 (0.01)	1.01 (0.00)	1.17 (0.01)	0.79 (0.00)	0.61 (0.02)	0.57 (0.03)	0.29 (0.11)

Panel B: Non-LBO IPO Survivors Only										
N	464		464		464		464		464	
Raw Returns	23.08 (0.00)	-0.90 (0.25)	36.96 (0.00)	-8.91 (0.00)	67.76 (0.00)	-4.16 (0.01)	83.04 (0.00)	-7.03 (0.00)	71.72 (0.00)	-28.55 (0.28)
Mkt.-Adj. Returns	19.00 (0.00)	-6.06 (0.09)	24.88 (0.00)	-19.25 (0.00)	45.26 (0.00)	-28.40 (0.40)	47.56 (0.00)	-37.40 (0.18)	28.92 (0.01)	-55.53 (0.00)
Jensen Alpha	1.09 (0.00)	0.40 (0.01)	0.47 (0.02)	0.35 (0.07)	0.91 (0.00)	0.66 (0.00)	1.05 (0.00)	0.79 (0.00)	0.68 (0.00)	0.57 (0.00)
FF 2 Factor Alpha	0.96 (0.01)	0.50 (0.02)	0.48 (0.02)	0.52 (0.05)	0.92 (0.00)	0.74 (0.00)	1.08 (0.00)	0.89 (0.00)	0.71 (0.00)	0.57 (0.00)
FF 3 Factor Alpha	1.97 (0.00)	1.01 (0.00)	1.36 (0.00)	0.96 (0.00)	1.68 (0.00)	1.25 (0.00)	1.84 (0.00)	1.53 (0.00)	1.81 (0.00)	1.43 (0.00)

Table 4: Three-Year Performance of IPOs Versus Various Benchmarks

The sample consists of 99 LBO-Backed and 843 Non-LBO-Backed IPOs between January 1990 and September 2004. Three-year equal- and value-weighted returns for IPOs are computed using alternative benchmarks. The value-weighted returns in Panels B are formed using the market value of the firm at the first day of trading after the IPO. For each stock, the cumulative three-year return after the IPO is calculated. If a stock is de-listed before the 36th month, the return is calculated until the delisting date and set to zero afterwards. Wealth relatives are calculated as $W = \sum(1+R_{i,T}) / \sum(1+RBench_{i,T})$, where $R_{i,T}$ is the buy-and-hold return on IPO i for period T and $RBench_{i,T}$ is the buy-and-hold return on the benchmark portfolio over the same period. The stock prices are throughout 30 September 2007.

Benchmarks	LBO-backed IPOs				Non-LBO-backed IPOs			
	Number	IPO Return	Index Return	Wealth Relative	Number	IPO Return	Index Return	Wealth Relative
Panel A: Three-Year Equal-Weighted Buy-and-Hold Return								
FTSE 100	99	65.9	46.5	1.13	843	40.3	31.6	1.07
FTSE 350	99	65.9	45.4	1.14	843	40.3	31.8	1.06
FTSE All Share	99	65.9	44.4	1.15	843	40.3	31.2	1.07
Size and Book-to-Market (5x5)	73	77.0	36.0	1.30	647	44.7	20.2	1.20
Size and CF-to-Price (5x5)	73	77.0	44.1	1.23	642	44.4	15.0	1.26
Panel B: Three-Year Value-Weighted Buy-and-Hold Return								
FTSE 100	99	56.8	38.9	1.13	843	31.8	22.2	1.08
FTSE 350	99	56.8	39.7	1.12	843	31.8	22.2	1.08
FTSE All Share	99	56.8	39.3	1.13	843	31.8	21.6	1.08
Size and Book-to-Market (5x5)	73	63.3	34.9	1.21	647	31.4	25.6	1.05
Size and CF-to-Price (5x5)	73	63.3	39.2	1.17	642	31.6	7.8	1.22

Table 5: Five-Year Performance of IPOs Versus Various Benchmarks

The sample consists of 86 LBO-Backed and 673 Non-LBO-Backed IPOs between January 1990 and September 2002. Five-year equal- and value-weighted returns for IPOs are computed using alternative benchmarks. The value-weighted returns in Panels B are formed using the market value of the firm at the first day of trading after the IPO. For each stock, the cumulative three-year return after the IPO is calculated. In Panel A and B, if a stock is de-listed before the 60th month, the return is calculated until the delisting date and set to zero afterwards. Wealth relatives are calculated as $W = \sum (1+R_{i,T}) / \sum (1+RBench_{i,T})$, where $R_{i,T}$ is the buy-and-hold return on IPO i for period T and $RBench_{i,T}$ is the buy-and-hold return on the benchmark portfolio over the same period. The stock prices are throughout 30 September 2007.

Benchmarks	LBO-backed IPOs				Non-LBO-backed IPOs			
	Number	IPO Return	Index Return	Wealth Relative	Number	IPO Return	Index Return	Wealth Relative
Panel A: Five-Year Equal-Weighted Buy-and-Hold Return								
FTSE 100	86	99.6	84.3	1.08	673	48.0	41.8	1.04
FTSE 350	86	99.6	80.1	1.11	673	48.0	42.6	1.04
FTSE All Share	86	99.6	77.5	1.12	673	48.0	41.7	1.04
Size and Book-to-Market (5x5)	60	126.6	39.9	1.62	507	44.5	25.7	1.15
Size and CF-to-Price (5x5)	60	126.6	73.3	1.31	502	45.1	24.9	1.16
Panel B: Five-Year Value-Weighted Buy-and-Hold Return								
FTSE 100	86	66.8	67.1	1.00	673	44.2	37.7	1.05
FTSE 350	86	66.8	66.5	1.00	673	44.2	38.9	1.04
FTSE All Share	86	66.8	65.0	1.01	673	44.2	38.1	1.04
Size and Book-to-Market (5x5)	60	77.9	40.8	1.26	507	43.3	49.9	0.96
Size and CF-to-Price (5x5)	60	77.9	59.1	1.12	502	43.7	20.1	1.20

Table 6: Three-Year Performance by Cohort Year Versus FTSE All Share Index

The sample consists of 99 LBO-Backed, and 843 Non-LBO-Backed IPOs listed between January 1990 and September 2004. The value-weighted returns in Panel B are formed using the market value of the firm at the first day of trading after the IPO. For each cohort of IPOs that went public in a given year, the returns are calculated by compounding monthly returns for 36 months. Wealth relatives are calculated as $W = \sum(1+R_{i,T}) / \sum(1+RBench_{i,T})$, where $R_{i,T}$ is the buy-and-hold return on IPO i for period T and $RBench_{i,T}$ is the buy-and-hold return on the benchmark portfolio over the same period. The stock prices are throughout 30 September 2007.

Year	LBO-backed IPOs				Non-LBO-backed IPOs			
	Number	IPO Return	FT All Share Index	Wealth Relative	Number	IPO Return	FT All Share Index	Wealth Relative
Panel A: Three-Year Equal-Weighted Buy-and-Hold Return								
1990	1	-16.1	43.6	0.58	5	150.7	65.8	1.51
1991	1	35.4	42.2	0.95	2	165.9	48.7	1.79
1992	4	9.9	61.5	0.68	7	70.5	46.2	1.17
1993	12	48.3	48.1	1.00	14	95.3	36.0	1.44
1994	22	27.5	49.9	0.85	63	89.4	57.9	1.20
1995	9	244.2	52.4	2.26	39	60.2	65.3	0.97
1996	10	22.6	51.2	0.81	114	59.0	56.3	1.02
1997	6	12.4	12.0	1.00	90	203.8	39.5	2.18
1998	4	44.0	8.0	1.33	36	74.8	5.5	1.66
1999	5	-43.4	-17.0	0.68	22	-33.9	-18.2	0.81
2000	4	66.5	-19.5	2.07	162	-45.1	-23.0	0.71
2001	2	1.1	-4.3	1.06	69	-10.2	-5.8	0.95
2002	6	137.6	11.0	2.14	60	56.6	24.0	1.26
2003	3	93.3	40.3	1.38	52	21.5	63.2	0.74
2004	10	113.7	70.3	1.25	109	27.7	48.1	0.86
Total	99	65.9	44.4	1.15	843	40.3	31.2	1.07

Panel B: Three-Year Value-Weighted Buy-and-Hold Return								
1990	1	-16.1	43.6	0.58	5	229.6	75.1	1.88
1991	1	35.4	42.2	0.95	2	238.6	53.5	2.21
1992	4	13.3	60.9	0.70	7	-44.3	54.4	0.36
1993	12	57.0	47.6	1.06	14	72.6	27.5	1.35
1994	22	32.2	51.9	0.87	63	61.4	68.9	0.96
1995	9	45.5	60.6	0.91	39	59.3	51.9	1.05
1996	10	8.3	61.3	0.67	114	128.1	65.6	1.38
1997	6	-1.0	8.3	0.91	90	110.7	43.9	1.46
1998	4	12.8	7.9	1.05	36	28.1	4.1	1.23
1999	5	-56.3	-13.4	0.50	22	-35.2	-16.1	0.77
2000	4	83.5	-21.2	2.33	162	-39.4	-17.5	0.73
2001	2	2.1	-7.7	1.11	69	-22.4	-8.9	0.85
2002	6	118.1	13.0	1.93	60	49.5	22.5	1.22
2003	3	84.2	53.7	1.20	52	151.7	58.9	1.58
2004	10	134.5	68.7	1.39	109	29.7	43.5	0.90
Total	99	56.8	39.3	1.13	843	31.8	21.6	1.08

Table 7: Three-Year Calendar Time Portfolio Performance Versus FTSE All Share Index

The sample consists of 128 LBO-Backed and 1,122 Non-LBO-backed IPOs between January 1990 and December 2006. The calendar-time portfolios are formed and rebalanced daily for firms whose IPO occurred within the last 36 months. Average excess returns are calculated for each Calendar year, adjusted by FTSE All Share Index returns. The returns are average annual geometric returns. The stock prices are throughout 30 September 2007.

Period- End	LBO-backed IPOs				Non-LBO-backed IPOs			
	Number	IPO Return	FT All Share Index	Wealth Index	Number	IPO Return	FT All Share Index	Wealth Index
Panel A: Three-Year Equal-Weighted Buy-and-Hold Return								
1990	1			1.00	5			1.00
1991	2	27.8	20.4	1.06	7	-0.7	20.7	0.82
1992	6	33.0	20.7	1.17	14	40.6	20.2	0.96
1993	18	42.6	28.5	1.30	27	61.6	28.5	1.21
1994	38	-1.4	-5.7	1.36	82	5.5	-5.8	1.35
1995	41	17.6	23.8	1.29	110	35.7	23.9	1.48
1996	38	16.4	16.8	1.29	207	20.3	16.7	1.53
1997	23	5.0	23.7	1.09	232	4.3	23.5	1.29
1998	16	-0.4	13.9	0.96	223	-4.2	13.8	1.09
1999	12	62.9	24.2	1.25	133	97.6	24.2	1.73
2000	13	-8.2	-5.9	1.22	210	30.5	-5.9	2.40
2001	11	7.1	-13.1	1.51	239	-45.3	-13.2	1.51
2002	11	-20.2	-22.8	1.56	265	-35.8	-22.7	1.26
2003	10	62.0	21.0	2.08	173	52.1	20.9	1.58
2004	26	47.5	12.7	2.73	266	21.6	12.8	1.70
2005	32	28.5	22.0	2.87	328	0.3	22.0	1.40
2006	37	43.6	16.7	3.54	367	2.7	16.7	1.23
IX. 2007	22	-1.5	5.6	3.30	105	-6.2	5.7	1.09

Panel B: Three-Year Value-Weighted Buy-and-Hold Return								
1990	1			1.00	5			1.00
1991	2	33.9	20.2	1.11	7	40.0	20.4	1.16
1992	6	39.2	20.6	1.29	14	24.8	20.1	1.21
1993	18	28.1	28.4	1.28	27	47.3	28.4	1.39
1994	38	-8.9	-5.8	1.24	82	-13.7	-5.7	1.27
1995	41	28.7	23.8	1.29	110	32.4	23.9	1.36
1996	38	12.1	16.8	1.24	207	28.8	16.6	1.50
1997	23	12.2	23.7	1.12	232	22.0	23.5	1.48
1998	16	3.0	13.9	1.01	223	26.6	13.8	1.65
1999	12	88.2	24.2	1.54	133	38.6	24.2	1.84
2000	13	-29.8	-5.9	1.15	210	-14.8	-5.9	1.67
2001	11	-13.0	-13.0	1.15	239	-42.5	-13.2	1.10
2002	11	-12.7	-22.6	1.29	265	-34.9	-22.3	0.93
2003	10	52.4	21.0	1.63	173	23.3	20.9	0.94
2004	26	44.6	12.8	2.09	266	25.8	12.8	1.05
2005	32	24.1	22.0	2.13	328	29.1	21.9	1.11
2006	37	39.8	16.8	2.55	367	21.0	16.7	1.15
IX. 2007	22	-1.8	5.6	2.37	105	-3.0	5.7	1.06

Table 8: CAPM, FF Two- and Three-Factor Regressions on Three-Year Calendar-Time Portfolio Returns

$$R_{pt} - R_{ft} = \alpha + \beta (R_{mt} - R_{ft}) + h HML_t + s SMB_t + \varepsilon_t$$

The sample consists of 128 LBO-Backed, 1,122 Non-LBO-Backed IPOs between January 1990 and December 2006. Portfolios of both samples are formed by including all new issues that were done within three years. RMRF is the FTSE All Share Index (R_m) minus the risk free rate (R_f) that is the three-month treasury bill rate. HML (high minus low) is the difference each month between the return on a portfolio of high book-to-market stocks and the return on a portfolio of low book-to-market stocks. SMB (small minus big) is the difference each month between the return on small- and large-capitalization firms. Equal- and value-weighted IPO portfolios are formed monthly. Absolute robust t-statistics are reported in parentheses. One, two and three asterisks indicate significance at the 10%, 5% and 1% level, respectively.

	CAPM		Fama-French-2 Factor		Fama-French-3 Factor	
	Equal-Weighted	Value-Weighted	Equal-Weighted	Value-Weighted	Equal-Weighted	Value-Weighted
Panel A: LBO-Backed IPOs						
Alpha	0.70 * (1.88)	0.56 (1.43)	0.78 ** (2.01)	0.64 (1.59)	1.19 *** (2.96)	0.72 ** (2.14)
RMRF	1.09 *** (10.21)	1.05 *** (9.58)	1.13 *** (10.56)	1.10 *** (10.14)	1.12 *** (9.97)	1.22 *** (12.38)
HML			-0.18 * (1.65)	-0.28 ** (2.21)	-0.58 *** (3.56)	-0.12 (.71)
SMB					0.32 (1.50)	0.71 *** (5.28)
Observations	201	201	192	192	201	201
Adj. R ²	0.40	0.36	0.41	0.38	0.50	0.55

Panel B: Non-LBO-Backed IPOs						
Alpha	0.21 (0.60)	0.08 (0.26)	0.28 (0.77)	0.13 (0.43)	0.89 *** (3.22)	0.38 (1.35)
RMRF	0.84 *** (7.24)	1.12 *** (12.48)	0.85 *** (6.87)	1.14 *** (11.58)	0.93 *** (9.55)	1.17 *** (13.75)
HML			0.00 (0.00)	-0.13 (1.09)	-0.82 *** (7.33)	-0.34 ** (2.53)
SMB					0.61 *** (3.82)	0.33 *** (3.50)
Observations	201	201	192	192	201	201
Adj. R ²	0.31	0.53	0.31	0.53	0.63	0.64

Table 9: Summary Statistics for LBO-Backed IPOs

The sample includes 128 LBO-backed IPOs, which were listed from January 1990 to December 2006. The table displays summary statistics for the buyout funds backing the IPOs and the IPOs themselves. The variables include the age of the buyout fund and the value of assets under management before the LBO, the number of years between LBO and IPO, the stock market return prior to the IPO, the short-term interest rate at the time of the IPO, the market capitalization of the firm after the IPO, the ratio of book equity to market capitalization at the time of the IPO, the fraction of new shares in the IPO, the proportion of publicly held shares after the IPO, the ratios of net indebtedness to enterprise value and to EBITDA, the proportion of shares held by (unaffiliated) directors and management, and the proportion of shares held by the LBO fund after the IPO.

	Mean	Median	Standard Deviation	Min	Max
Buyout Group Age Before LBO (Years)	15.4	11.8	14.0	0.1	59.3
Buyout Group Assets Under Management Before LBO (£ m)	1,457	478	2,221	3	10,678
Period Between LBO and IPO (Years)	3.1	2.9	1.6	0.5	8.0
1 Year FTSE All Share Index Return prior to IPO	15.2%	16.9%	10.4%	-16.5%	46.1%
3 Month Interest Rate at IPO	5.4%	4.9%	1.4%	4.9%	14.5%
Market Capitalization 3 Months After IPO (£ m)	228	117	305	18	2,119
Ratio Book/Market at IPO	0.29	0.22	0.29	-0.27	1.35
Ratio New Shares/Total Shares Offered in IPO	65.9%	68.0%	27.8%	0.0%	100.0%
Public Float After IPO	55.6%	53.4%	18.3%	8.5%	100.0%
Director/Management Ownership After IPO	11.1%	7.0%	11.3%	0.0%	60.9%
Buyout Group Ownership After IPO	33.2%	32.9%	18.7%	0.0%	90.5%
Ratio Net Debt/EBITDA Ratio After IPO	0.97	0.96	5.90	-49.04	20.49

Table 10: Multivariate Regression Analysis of LBO-Backed IPOs

The sample consists of 99 LBO-Backed IPOs between January 1990 and September 2004. The dependent variable is the natural logarithm of the three-year wealth relative ($W_{i,T} = \sum(1+R_{i,T}) / \sum(1+RBench_{i,T})$, where the benchmark is the FTSE All Share Index). The independent variables include the buyout firm's age and the natural logarithm of the capital under management at the LBO date, the LBO funds' equity ownership after the firm's IPO, the holding period between the LBO and the IPO, the annual return of the FTSE All Share Index immediately prior to the offering, the market capitalization after the IPO, the ratio of book equity to market capitalization, the ratio of new shares to total shares offered, the percentage of the shares held by directors/management and by existing shareholders including the buyout group, and the net debt to EBITDA ratio after the IPO. The second set of regressions uses year fixed effects. Absolute t-statistics are in parentheses. Absolute robust t-statistics are reported in parenthesis. One, two and three asterisks indicate significance at the 10%, 5% and 1% level, respectively.

Panel A: Without Year Fixed Effects											
	1	2	3	4	5	6	7	8	9	10	11
Buyout Group Age prior to LBO	0.001 (0.23)										0.003 (0.38)
Logarithm of Assets Under Management		0.016 (0.41)									0.014 (0.17)
Period Between LBO and IPO			0.052 (1.19)								0.073 (1.10)
FTSE All Share Index 1 Year Return prior to IPO				-0.006 (0.99)							-0.006 (0.76)
Market Capitalization after IPO					0.000 (0.62)						0.000 (0.53)
Ratio Book/Market shortly after IPO						0.341 (1.20)					0.392 (1.07)
Ratio New Shares/Total Shares Offered							-0.019 (0.07)				-0.414 (1.01)
Director/Management Ownership after IPO								-0.903 (1.27)			-0.361 (0.31)
Buyout Group Ownership after IPO									0.711 * (1.87)		0.788 (1.33)
Ratio Net Debt/EBITDA after IPO										0.021 (0.88)	0.018 (0.66)
Intercept	0.099 (0.97)	0.025 (0.11)	-0.042 (0.28)	0.206 (1.84)	0.084 (0.98)	0.038 (0.34)	0.129 (0.68)	0.210 (2.08)	-0.137 (0.91)	0.113 (1.31)	-0.171 (0.26)
Observations	99	99	99	98	99	80	99	99	99	79	71
R ²	0.00	0.00	0.01	0.01	0.00	0.02	0.00	0.02	0.03	0.01	0.12

Panel B: With Year Fixed Effects											
	12	13	14	15	16	17	18	19	20	21	22
Buyout Group Age prior to LBO	0.007 (1.51)										0.009 (1.00)
Logarithm of Assets Under Management		0.044 * (1.96)									-0.008 (0.12)
Period Between LBO and IPO			0.068 * (1.88)								0.066 (1.05)
FTSE All Share Index 1 Year Return prior to IPO				0.004 (0.48)							-0.008 (0.66)
Market Capitalization after IPO					0.000 (1.38)						0.000 (0.41)
Ratio Book/Market shortly after IPO						0.426 (1.58)					0.432 (1.16)
Ratio New Shares/Total Shares Offered							0.212 (1.01)				-0.504 (1.24)
Director/Management Ownership after IPO								0.255 (0.33)			0.977 (0.87)
Buyout Group Ownership after IPO									1.119 *** (3.10)		1.376 (1.85)
Ratio Net Debt/EBITDA after IPO										0.026 (1.05)	0.013 (0.49)
Intercept											
Observations	99	99	99	98	99	80	99	99	99	79	71
R ²	0.08	0.10	0.09	0.06	0.08	0.09	0.07	0.06	0.15	0.09	0.25

