Leverage and Pricing in Buyouts: An Empirical Analysis*

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Abstract

This paper provides an empirical analysis of the financial structure of large recent buyouts. We collect detailed information of the financings of 153 large buyouts (averaging over $1 billion in enterprise value). We document the manner in which these important transactions are financed. Buyout leverage is cross-sectionally unrelated to the leverage of matched public firms, and is largely driven by other factors than what explains leverage in public firms. In particular, the economy-wide cost of borrowing seems to drive both leverage and pricing in buyouts. These results are consistent with a view in which the availability of financing impacts booms and busts in the private equity market.

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I. Introduction

Acquisition by a private equity firm is an increasingly common transaction, with total transaction values reaching around $400 billion worldwide in 2006. It is estimated that private equity deals now account for around 20% of worldwide M&A, up from 3.1% in 2000.[1] These transactions create new, private organizations that are financed through a combination of equity from private equity sponsors, as well as debt from a number of sources. Although temporary almost by definition, since the private equity sponsor has a fiduciary responsibility to exit the investment in a relatively short period of time, these transactions nonetheless account for an increasingly large fraction of corporate finance. Hence, understanding buyouts is important, both because of the number and dollar value of transactions, and also because they can teach us much about corporate finance more generally. In particular, one feature that is common to all buyouts is the use of leverage in their financial structure; hence the transactions are commonly referred to as leveraged buyouts (LBO). This paper studies the financial structure of firms that have been acquired by private equity funds.

In doing so, we have three main goals. First, we describe the way leverage is used in financing buyouts. We do so both to document the way in which these important transactions are financed, as well as to evaluate the extent to which they can be explained by existing capital structure theories.

Second, we compare the firms acquired by private equity funds to comparable firms that are publicly traded. Buyouts are executed by knowledgeable professionals (the general partners (GPs) of the private equity funds) with strong incentives, who utilize sophisticated financial structures designed to maximize value by optimizing on a number of margins. If we presume that GPs optimize capital structure at the time of the acquisition, then this capital structure provides a benchmark for understanding optimal capital structure in public firms.[2] We provide comparisons of both the level, and the cross-sectional distribution of capital structures of public and private companies, and discuss possible reasons for observed differences.

Third, practitioners often claim that leverage 'drives' pricing in buyouts, and that buyout activity largely depends on the liquidity of the market for corporate debt. Consistent with this,

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[1] As reported by the *Financial Times*, January 25, 2007, p. 5.

[2] A similar argument was made to motivate the studies of Gertner and Kaplan (1996) and Kaplan and Strömberg (2003).

Kaplan and Stein (1993) provide evidence that the booming junk bond markets of the late 1980s contributed to higher transaction prices in the buyout market.[3] We build on their work and consider the relation between leverage and transaction multiples, and try to estimate the extent to which the ability of debt markets to provide financing impacts the pricing of deals.

We begin by presenting statistics documenting the growth of the private equity industry, both in the US and in Europe. These deals have grown both in number and size. As recently as 2000-02, total deal value averaged around $30 billion per annum in both the US and Europe. Since then deal volume has grown hugely: in 2006 buyout transactions totalled around $233 billion in the US and $151 billion in Europe. It appears likely that this growth will continue in the future, since funds in 2007 have an 'overhang' of approximately $250 billion of committed but uninvested capital, and most private equity houses are currently raising even larger funds than they currently have.

To understand the financial structure of these transactions in more detail, we construct a new dataset of private equity sponsored buyouts. We start with a list of the deals sponsored by some of the largest private equity houses, Bain Capital, Blackstone, CVC, KKR, Madison Dearborn, and Permira.[4] Unlike most previous work, our sample does not only focus on buyouts of public companies, so called "public-to-private" transactions, but also contains buyouts of private companies, such as family firms, corporate divisions, and companies already owned by other private equity firms.[5] Moreover, almost all previous studies only consider the 1980's U.S. buyout wave, while the bulk of our sample considers international buyout transactions from 1985 through

[3] More recently, Ljungqvist, Richardson, and Wolfenzon (2007) find that buyout funds accelerate their investment flows when credit market conditions loosen. They do not address how the leverage or pricing of individual deals vary with credit market conditions, however.

[4] Our focus on the largest sponsors is at least somewhat representative given the increasing concentration in the market. In 2006, it is estimated that more than half of the buyout transactions by value were conducted by the top 5 global Private Equity houses: TPG, Blackstone, KKR, Bain Capital and Carlyle. In future drafts, we plan to expand the sample to include deals from other private equity houses as well.

[5] One exception is Muscarella and Vetsuypens (1990), who look at the operating performance of LBOs that subsequently went public, including divisional buyouts as well as public-to-private transactions. Unlike their sample, we do not require that our LBOs subsequently exited through a public offering, however.

2006.[6] We obtain detailed information about the financial structure of the transactions from the Loan Pricing Corporation (LPC) and Capital IQ databases, which provide details on the securities issued in various tranches of senior and subordinated debt, including information on pricing. We end up with a sample of 153 buyouts, 75 of which were in the US and 78 outside the US, mainly in Europe.

Not surprisingly, our sample firms were highly leveraged as a result of the buyout transaction. On average, equity accounted for only 25 percent of the purchase price, with debt providing the remainder. What is perhaps more surprising is the plethora of sources that provide this financing. At the time of the transaction the majority of the debt is provided by the syndicated loan market. In the past it was quite common for this to be essentially bridge financing to facilitate a public (often high-yield) bond issue. However, in recent years the huge amount of liquidity in the syndicated loan market – in part fuelled by the appetite from hedge funds and other investors to hold the debt, either in its native form or in collateralised loan obligations – has resulted in relatively little refinancing of the bank debt. The bank debt is typically divided into a number of tranches, some of which are contingent. Some of this debt is amortizing, but the majority tends to be structured as interest-only with a final "bullet" repayment of the principal (this is particularly true in the US where the trend has been towards all-bullet loan structures). As well as the bank debt, there are often multiple layers of subordinated debt, in the form of mezzanine debt, 2nd lien debt etc. The variety of kinds of debt used in these transactions emphasizes the importance of the choice of debt instrument and not just the quantity of debt in capital structure decisions.

The financial structure that private equity firms choose for their portfolio companies is, therefore, radically different from that observed for comparably firms quoted on public equity markets. Indeed, a reasonably summary of the differences we observe would be to view them as the inverse of each other. For instance, equivalent (market value) estimates of leverage for public equity financed companies, produced for various countries by Rajan and Zingales (1995), show *debt* comprising, on average, around 20-30% of total capital, which is a similar range that we find for *equity* in our sample of private equity buyouts.

[6] One exception is the contemporaneous study of Guo, Hotchkiss, and Song (2007) which analyzes U.S. public-to-private transactions from 1990 through 2006.

In the aggregate time series, leverage was extremely high in the late 1980s, with debt contributing, on average, about four-fifths of the capital structure.[7] This proportion fell back in the 1990s and early 2000s, but has been steadily rising in recent years. By 2006, at the end of our sample period, debt ratios are again nearing all-time highs. We find quite similar levels of overall debt employed in US and European deals. However, we find that US deals employ a greater proportion of bonds and subordinated debt, and greater use of bullet debt in the syndicated loans.

After describing aggregate patterns in leverage, we go on to examine what drives cross-sectional variation in leverage across buyouts and compare this to what we know about the cross-section in public firms. The first thing we do is to ask whether leverage tends to be higher in buyouts whenever leverage is higher in similar public firms. Very surprisingly (at least to us), there appears to be absolutely no relation, whether we measure leverage as the ratio of debt to enterprise value or by debt as a multiple of cash flow – as proxied by earnings before interest, taxes, depreciation and amortization (EBITDA). There are two possible explanations for this. The first one is that the choice of leverage in buyouts is driven by completely different considerations than the choice of leverage in an otherwise identical public firm. The second one is that our matching of buyouts to public firms is not accurate, for example because buyouts tend to be targeted at firms within the industry that have very unrepresentative characteristics.

To at least partially rule out the second explanation, we examine the subsample of our buyouts (28 deals at present) in which we have information about pre-LBO financials. For this limited sample we find no relationship between buyout leverage and pre-LBO leverage. However, we find that the pre-LBO leverage does line up cross-sectionally with our matched industry medians. Comparisons on other characteristics of pre-LBO firms with matched industry medians, such as on profitability, also show that the firms targeted for buyouts within an industry do not appear to be unrepresentative. This strengthens our belief that it is not selection bias or bad matching that drives our results.

Having established that buyout and public firm leverage have little relation, we try to establish what actually drives the choice of leverage. We run regressions of leverage on firm characteristics, aggregate financial market conditions, and buyout fund characteristics. For

[7] These numbers are somewhat lower than those found in Kaplan (1989a, 1989b), who finds median (mean) leverage of 88% (86%). One possible explanation for this difference could be that Kaplan's sample only includes public-to-private transactions, which are on average more highly levered than other buyouts, as we show in Table 6.

comparison reasons, we first explore the determinants of leverage in our set of matched public firms, and largely confirm findings of previous studies. More profitable firms have lower leverage, firms with more variable cash flows have lower leverage, and firms with more growth opportunities (proxied by R&D to Sales or Market to Book ratios) have lower leverage. Corporate tax rates also seem to increase public firm leverage in some specifications. Financial market conditions as measured by aggregate stock return over the past year and prevailing interest- and inflation-rates do not appear to affect leverage much for our matched public firms.

In contrast, none of the firm-specific characteristics are consistently related to LBO leverage levels. However, conditions in debt markets have a strong influence. In particular, the higher the real interest cost of leveraged loans, measured as the local real interest rate plus the market leveraged loan spread, the lower the leverage. This is especially true when we measure leverage by debt as a multiple of EBITDA, which is the preferred metric among practitioners. One explanation is that when rates are lower, firms can pay interest on a higher principal with the same cash flows. But this would be true for public firms as well, and they do not respond with higher leverage in a low interest rate environment.

After examining leverage, we turn to the question of how pricing in buyouts is determined. Our measure of price is the total enterprise value at the time of the deal as a multiple of EBITDA of the firm. We start by documenting the substantial variation that buyout prices have had over time, and over types of deals. We then perform the same type of investigation as we did with leverage, checking whether pricing in buyouts is at all related to the pricing of public firms.

First, we simply match the price of a buyout with the median price of a public firm within the same industry, time-period, and geographic area. In contrast to the lack of relationship we found for leverage, there is a significant positive relationship for pricing.

We then confirm this finding in our first set of pricing regressions, where prevailing price multiples in public markets always are significant variables in explaining buyout pricing. However, pricing of buyouts is also strongly negatively related to current market interest rates on leveraged loans, after controlling for price multiples in public markets. In contrast, the pricing of public firms has no (or even a weakly positive) relation to interest rate levels. Thus, higher interest rates have a negative impact on both leverage and prices in buyouts, but little impact on leverage and prices in public firms.

This suggests that there may be a relation between leverage and pricing. A simple examination of the bi-variate aggregate time-series suggests that leverage and pricing in buyouts are positively related. Unfortunately, it is hard to conclusively address this issue because leverage and pricing may be driven by common, unobserved factors. In addition there are likely to be measurement error issues when our proxies for pricing (enterprise value) and leverage (total debt) are both normalised by EBITDA.

Still, we present some suggestive evidence regressing pricing on leverage, using leverage loan rates as an instrument in the first stage. In this regression, we get a very strong relationship between instrumented leverage and pricing in buyouts. This relation remains after controlling for pricing multiples prevailing in public markets. Although instrumenting takes care of the measurement problem in EBITDA, one can question whether it deals with endogeneity, since average loan rates may directly affect the value of the firm. If this were the case, however, one would expect loan rates to affect public firm valuations as well, which we show is not the case.

There are at least two stories, with very different implications, that can explain the relation between leverage and pricing in buyouts. One story is that when a firm is expected to have strong future cash flows relative to current EBITDA, it can sustain higher leverage as measured by debt to current EBITDA. Since cash flows are expected to grow, the firm will also warrant a higher price relative to current EBITDA. Another, more sinister, story is that the relationship is driven by an agency problem in the private equity market. General partners in a buyout fund have an incentive to lever up each deal as much as possible, since they hold an option-like stake in the fund. The typical contract between general partners and limited partners in a buyout fund is that general partners get a "carry" of 20% of all excess returns, but nothing if the fund does not earn back the invested capital. When conditions in debt markets are favourable, such as when interest rates are low, they can lever up the deals more. Since this increases the value of their option, they are also willing to pay more, *ceteris paribus*, even if this is not warranted by firm fundamentals.

We do not have enough evidence yet to judge conclusively between these stories, or to rule out that leverage and pricing are determined by unobserved common factors. However, the fact that we control for a proxy of fundamentals by including public market pricing multiples in the regression and still obtain a very strong effect of leverage on pricing points in the direction of the agency story. On the other hand, the fund-level variables that we expected to be positively related to pricing if the agency story is important, such as how late in the fund life a deal is made and how

experienced the general partners are, do not have much explanatory power. This may be because we are currently including only very successful LBO sponsors with a proven track-record in our sample. In future versions of the paper, we aim to enlarge the sample substantially. Hopefully, this will help us to give a more definitive answer to what drives the relationship between leverage and pricing in LBOs.

The remainder of the paper is structured as follows. In the next section we describe how a typical buyout is structured, and present evidence on recent trends in private equity buyouts. In section 3 we describe our sample. In section 4 we consider the theoretical models of capital structure and establish some testable hypotheses. Section 5 contains our empirical analysis, and section 6 concludes.

II. How are Private Equity Transactions Structured?

Private equity transactions can take three main different forms. First, a private equity fund might find a potential target and work on an exclusive basis with the potential vendor. Such "proprietary" deals are increasingly rare, although they do still exist, particularly for smaller deals. The second type of transaction, which represents the norm, involves multiple private equity houses competing in an auction – often conducted by an investment bank – to purchase the target company. In some cases, particularly in larger deals, groups of private equity funds might combine in "club deals", and rival consortia would bid against each other. In a significant proportion of such transactions the purchaser and the vendor might be private equity funds. The third class of transactions are public-to-private deals, where a private equity fund bids to takeover a publicly quoted company. In these cases a critical requirement is, in most cases, to obtain the agreement of the management to "open the books" to the private equity house so that they can undertake due diligence investigations. The management attempt to extract the greatest return from the bidder (or bidders, if rivals emerge) in a way analogous to any other takeover, and shareholders eventually decide whether to accept the deal.

In all cases, however, the private equity firm will form a new company ("newco") to bid for a controlling stake in – and often majority ownership of – the existing company. The newco is established specifically for the purposes of the transaction and is usually just a shell company with nominal capital and temporary directors. If a particular private equity house is unsuccessful in its bid, their newco will not be activated. However, these bidding vehicles have credibility due to the

fact that they are "sponsored" by one or more private equity firms. These private equity sponsors present the potential buyouts to banks with a view to obtaining debt finance for newco, which will be used, along with equity from the private equity sponsor, to purchase the target company. In this section we will first describe how PE transactions are structured and will then present some evidence on the overall buyout market drawn from secondary sources.

A. The Capital Structure of a Typical Buyout Transaction

In principle, a private equity sponsor might finance a transaction entirely using the equity raised from investors in its own fund(s). This is usually the way early-stage venture capital investments are conducted, not least because many such investments are years away from generating cash flow to service debt. However, the private equity buyouts that we focus on in this paper are not financed entirely using equity. A critical part is played by providers of debt finance who commit to lend to newco using the target company's assets as security. This debt financing is typically provided through the syndicated loan market.[8] Given the form of the transactions – where each bidder will need to have secured sufficient funds to complete the transaction within a few days if they are successful – bond financing, involving a prospectus and various regulatory hurdles, is simply not feasible.[9]

The nature of the debt financing is interesting, typically involving several different tranches. The complex financial structure of private equity buyouts has largely been ignored in previous academic work, so we provide a reasonably detailed description in this section.[10] In Table 1 we present an example of a recent private equity transaction – the purchase of the tyre and exhaust fitting company Kwik-Fit in 2005. This is a very typical structure which illustrates the main features of the data we analyse in later sections.

Kwik-Fit was bought by private equity house PAI for an enterprise value of £773.5m. The purchase was financed using £191m of equity (provided by funds advised by PAI) and £582.5m of

[8] Reflecting a rather curious use of terminology, this market is increasingly known as the "leveraged loan" market.

[9] In some cases, however, syndicated loans might be re-financed at a later stage using a public bond issue. This would not necessarily alter the leverage observed in the company.

[10] One notable exception is Cotter and Peck (2001), who provide a detailed description of the debt structure of 64 U.S. public-to-private buyout transactions completed from 1984 to 1989.

debt. The initial capital structure of the newco was therefore 75% debt and 25% equity – which is exactly the average that we observe in our sample. The debt was structured into senior and subordinated tranches. Barclays Capital and Deutsche Bank were appointed as Mandated Lead Arrangers and Joint Bookrunners to arrange and underwrite the debt financing. The senior debt was divided into three separate term loans of roughly equal sizes but with different maturities, payment schedules and seniorities. The most senior, the Term Loan A, had a 7-year maturity and was amortizing (i.e. principal repayments were made during the life of the loan). Term loans B and C are not amortizing, with the principal being repaid in a final "bullet" payment at the end of the term (or at redemption if earlier). The B and C tranches were split between sterling and euro denomination. In addition to the term loans, the company obtained a revolving credit facility and a capex facility both of which, if drawn, would rank as senior debt.

In addition to the senior debt and facilities, newco was financed with two tranches of subordinated debt: a 2nd lien tranche of £75m which was senior to a mezzanine tranche of £97.5m. 2nd lien tranches started to appear in buyouts during 2004, and are now a very common feature of the capital structure. The interest payments on mezzanine debt are interesting: cash interest of 4.5% is paid along with so-called "pay-in-kind" interest of representing an additional 5%. This does not mean that PAI and their investors can obtain free tyres from Kwik-Fit, but rather that the holders of the mezzanine debt are issued with additional notes, to the value of 5% of the outstanding principal each year.

B. Market Trends for Private Equity Sponsored Buyouts

Kwik-fit was a very typical recent European transaction. Obtaining data on private equity buyouts is challenging as the main sources tend to be ratings agencies, who are not allowed to release the underlying data on the individual deals. It is difficult to be certain as to whether such published data is a representative sample, nor whether the various methodological issues encountered in measuring the capital structure have been appropriately and consistently addressed. Indeed, this is why we believe that the data gathered for this paper is so valuable.

However, with these caveats in mind, in Table 2 we present evidence on the overall buyout market gathered from secondary sources. As can be seen, the average multiple of senior (total) debt to EBITDA in 2005 was just over 4 (5.3) across all European transactions, and the average debt to enterprise value was 64.1%. On this basis, Kwik-Fit was slightly more leveraged than average, but

the structure and proportions of the various debt financing are ubiquitous. Private equity transactions completed in the US have a very similar structure but often exclude the amortizing term loan A. These all-bullet repayment structures for loans started being used in some European deals in 2006. By combining various data sources – including specialised data on the syndicated loan market – our sample includes detailed information on the capital structure of the form presented in Table 1, along with information about comparable companies operating in public markets.

Table 2 also provides information on the recent aggregate market trends in capital structure. As can be seen, on average the "inverted" capital structure – relative to the public companies – is a persistent phenomenon. But there are interesting variations over time in the capital structure of private equity transactions. In particular, the proportion of equity employed by private equity owners has very noticeable trends, with a tendency towards more leveraged structures in recent years, in both the US and Europe.

Similar differences emerge when leverage is measured by comparing debt with cash flow (as measured by earnings before interest, tax, depreciation and amortisation - EBITDA). Private equity deals exhibit very high ratios of debt to EBITDA, as can be seen from Table 2. Senior debt averages around 4x EBITDA in private equity transactions, with subordinated debt contributing on average another 1x EBITDA. Furthermore, the recent trend towards greater leverage observed in equity contributions is confirmed, with the most recent data showing the highest ratios of debt to earnings.

A final, and possibly related, observation about the private equity market is that valuation multiples have also been increasing in recent years. At first sight, the increase in valuation appears correlated with the amount of senior debt employed and with the reduced proportion of equity. Furthermore, as these absolute levels, and proportions, of debt have increased in recent years, it is interesting to note that interest rate spreads on loans have stayed roughly constant.

The trends we report in this section all relay upon secondary figures, which provide no detail on the underlying deals. For research purposes they are tantalising but not enough. To understand the various factors that could be driving capital structure decisions we need much more information about the individual deals. However, as we explain in the next section, this is challenging data to assemble.

III. Data and Sample

To construct our sample of buyouts we started by assembling the transactions of the 50 largest buyout funds in US and Europe. We did not put constraints on when these transactions took place, but since the private equity industry only really started to become established in the mid-1980s, we defined our initial sample of funds by using a 1997 ranking (from Buyout Magazine), which falls approximately midway through the period of existence of private equity funds. For these 50 funds we used CapitalIQ to search for their deals, and found approximately 6000 buyout transactions. In this version, we are using a subset of 5 of the largest funds (Bain, Blackstone, CVC, KKR, and Permira). This pilot sample will be increased several fold as additional funds are included in the analysis.

CapitalIQ has information on the details of the transaction, such as the buyers and sellers, the target company identity, transaction size, and for a subset there is financial information such as EBITDA (primarily for public-to-private transactions and LBOs involving public bond issues).

We then matched this list of transactions with data on syndicated bank loans from LPC/Dealscan. Since Dealscan coverage improves substantially in the late 1990's, we were able to match a larger fraction of the recent deals of these funds. In addition, there is likely to be a bias in our sample towards larger deals, which are more likely to use syndicated debt. We are able to find a match of 44% of all deals in CapitalIQ (77% of deals undertaken 2000 or later). In a future version of the paper we will characterize this selection bias more carefully.

Dealscan primarily gives us information on the bank loans. Using the deal descriptions from Dealscan and CapitalIQ we also find information on other types of debt such as vendor financing, assumed debt, bonds, as well as equity used in the deal. We then use CapitalIQ, SDC, and Edgar filings to track down the terms of public bond issues.

Where information does not exist in CapitalIQ – for instance on accounting variables – for some firms we are able to obtain such information using Bureau Van Dyke's Amadeus data base. Finally, we use web searches on company web sites, newspapers and magazines, and other sources to complete missing pieces of information.

An important part of our analysis is to match these private equity buyouts with comparable publicly quoted companies. For public company financial information, we use the Worldscope data base. We use this to calculate matched continent-year-industry median leverage and performance

numbers for corresponding public companies. Our industry definition follows the Fama and French (1997) classification into 48 industries.

We also gather information about interest rates and spreads on various types of debt, as well as other macro variables. For interest rates we use LIBOR rates obtained from the British Bankers' Association. Data on spreads on syndicated loans and subordinated debt was obtained from Standard and Poor's. Inflation and exchange rates are taken from the IMF.

As can be seen, constructing a detailed sample of private equity buyouts is not a straightforward process, and requires the stitching together of multiple sources of data. Indeed, given that there is generally no requirement for the private equity sponsors to reveal information about the purchase price or (often pro-forma) earnings figures for the company (or division of a company) they are buying, there is inevitably attrition at various stages of the data gathering process. However, as will be seen from Tables 3-11, we are able to construct a sizeable sample of transactions with detailed information on various aspects of the capital structure of the companies. To our knowledge, no comparable data set has previously been constructed.

We return to the data and our initial results in section V, but in the next section we review and discuss the relevant theoretical considerations about financial structure, drawing on the existing literature.

IV. The Financial Structure and Pricing of LBO's: Theory

This section outlines the theoretical arguments regarding the factors that should determine leverage and pricing, as proxied by our leverage measures (debt to enterprise value and debt to EBITDA) and our pricing measure (enterprise value to EBITDA). We are particularly interested in any differences we might expect to find between buyouts and public firms in the determinants of leverage and pricing, and any potential relation between leverage and pricing.

We start by describing the frictionless perfect market benchmark, in which leverage is irrelevant and pricing simply reflects the fundamental asset value. We then discuss the case where leverage matters because of deviations from the assumptions behind the Modigliani-Miller irrelevance theorem, but pricing in both public firms and buyouts is explained by the adjusted present value rule. Finally, we discuss the case where the pricing in buyouts reflects conditions in the private equity market unrelated to fundamentals, such as conflicts of interest between general

partners and limited partners in the buyout funds or the level of competition between buyout sponsors.

A. Perfect Markets Benchmark

As a benchmark, if capital markets are efficient and the assumptions behind the Modigliani-Miller theorem hold, the capital structure should be irrelevant to the value of a firm for both buyouts and public firms. The pricing should then be driven completely by the fundamental asset value. Empirically, there should be no particular factor that explains leverage, while pricing could well be related to factors like real interest rates and inflation. These factors should affect pricing similarly for buyouts and public firms with the same characteristics.

B. The Tradeoff Theory and Adjusted Present Value

Suppose instead that capital markets are not perfect, so leverage can affect the value of the firm. Perhaps the most commonly used explanation for leverage is the tradeoff theory, in which capital structure is chosen so that the tax and incentive advantages of debt exactly offset bankruptcy costs at the margin. This is usually augmented with some version of the pecking order theory of Myers and Majluf (1984), in which the issuance of securities is costly due to information asymmetries, so that firms stray from the optimal target leverage suggested by the pure tradeoff theory. As long as investors are rational and price firms correctly, the pricing should then be given by the adjusted present value rule (APV), in which the fundamental value of the assets is adjusted for financial side-effects such as tax benefits of debt.

The arguments apply to buyouts and public firms alike, but there are good reasons to believe that the impact of taxes, bankruptcy costs, and information asymmetries can differ for the two sets of firms. We give a very brief overview of the most commonly discussed factors affecting leverage below, and how we expect them to impact leverage and pricing.

B.1. Taxes

Since interest is tax deductible at the corporate level in most countries, leverage can provide a valuable tax shield. The value of the tax shield, and thus the value of leverage, is expected to be higher when the corporate tax rate is high and when a firm has high and steady taxable cash-flows. We include a measure of profitability, return on invested capital (ROIC), as well as the standard deviation of ROIC in our leverage regressions, where the tax argument would suggest that higher

profitability and lower standard deviation should lead to higher leverage. In future versions of the paper, we plan to include statutory tax rates as an explanatory variable in our leverage regressions. Miller (1977) identifies an important complication in applying tradeoff theory to public firms. In addition to corporate tax rates, personal tax rates will affect the total tax effect of leverage. Since personal taxes typically vary between equity and debt, and since it is often difficult to know either the identity of the owners of the firms' securities or their tax rates, it can be difficult to apply the tradeoff theory directly. However, LBOs' equity is typically held by tax-exempt institutions, so that this complication should not directly affect LBOs' capital structures. Therefore, it is potentially easier to identify tax effects for LBO capital structures, since the relevant marginal rate is likely to be the statutory corporate rate

B.2. Bankruptcy Costs

Bankruptcy costs, or costs of financial distress, are likely to be higher for firms with more investment opportunities and more intangible assets, and for firms with more risky cashflows. We include enterprise value to book value of assets as a proxy for investment opportunities, as well as R&D to sales. We also include sales to property, plant and equipment as a measure of intangible assets. We expect all of these variables, as well as the standard deviation of ROIC, to be negatively related to leverage.

We expect that bankruptcy costs are potentially smaller for buyouts than for public companies. There are two reasons for this. First, the private equity house can inject additional equity into a deal that becomes undercapitalised. Thus, if there are unforeseen difficulties, an LBO may be able to rely on its financial sponsor, where a public firm would have to do a potentially very dilutive SEO under comparable circumstances. Second, the LBO sponsor usually has a long-term relationship with the firm's lenders, which can facilitate renegotiation of debt contracts should such a renegotiation become optimal. As Gertner and Scharfstein (1991) emphasize, the ability to renegotiate with creditors can be an important consideration in distress costs. Thus, while the tradeoff arguments usually applied to public firms are equally valid for LBOs, the relevant taxes and distress costs are different, leading to a potentially larger 'optimal' leverage level.

B.3. Pecking Order / Asymmetric Information

The pecking order theory of Myers and Majluf (1984) implies that it is costly for firms to issue information sensitive securities such as equity to outside capital markets. If possible, they will

therefore prefer to use retained earnings to finance new investments. This leads to the prediction that firms that have been more profitable (proxied by ROIC), so that they do not need to issue securities to finance investments, will end up with lower leverage, even if the pure tradeoff theory would suggest that more profitable firms should take advantage of debt tax shields.

The pecking order argument is less likely to explain leverage in buyouts, however. We measure leverage in buyouts at the point when the firm is taken over, so there will have been no time for the firm to drift away from the target capital structure. Therefore, we would not expect past profitability to lead to lower leverage in buyouts, at least not based on the pecking order theory.

B.4. Pricing

Since the choice of leverage is no longer irrelevant when the assumptions behind the Modigliani Miller theorem are violated, there can also be a relation between leverage and pricing. In particular, a firm that is capable of sustaining a higher debt ratio because tax shield benefits are high, bankruptcy costs are low, and asymmetric information problems are small, can also be expected to be worth more. This is especially true for our empirical proxies that are multiples of current EBITDA, since a firm which is expected to have higher cash-flows in the future should be able to sustain higher debt to current EBITDA and simultaneously be worth more as a multiple of current EBITDA. This should be true for buyouts and public firms alike. Macro-variables such as inflation rates and real interest rates should also affect the fundamental value of buyouts and matched public firms in the same way.

C. Market Timing / Debt and Equity Market Conditions

Baker and Wurgler (2002) put forth the argument that managers attempt to take advantage of mis-pricing in equity markets when issuing securities. Thus, they issue stocks after stock price increases because the stock is overvalued, and investors fail to incorporate this in their valuation of the newly issued stock. This would lead to the prediction that leverage should go down after high stock market returns. Another theory with the same prediction is developed by Lucas and MacDonald (1990). In their theory, asymmetric information problems are smaller after stock price increases, making it easier to issue information sensitive securities such as equity. We include the local return on the stock market over the last 12 months in our leverage regressions to capture such timing behaviour.

Similarly, it is possible that debt markets periodically become "overheated", so that investors do not demand the full interest rate corresponding to the fundamental underlying risk of a firm. This should lead firms to issue more debt when the debt is more overvalued.[11] We use the local real LIBOR plus the market average credit spread for leveraged loans as a possible proxy for the "ease" of getting financing. The market timing hypothesis would suggest that firms take more leverage when interest rates are lower. Although this would be true for public and buyout firms alike, the pricing implications may be different. If the price of a public firm is set by a marginal equity market investor who is subject to the same bias as debt market investors, there would be no pricing effect on public firms. In buyouts, if we presume that the LBO sponsors are rational, they would be expected to be willing to pay a higher price, and take on more leverage, when debt financing is "cheap".

D. GP-LP conflicts of interests

Axelson, Stromberg, and Weisbach (2007) provide a model of intermediation in which the optimal contract between the general partner and the limited partners in a private equity firm involves the general partner having to raise debt which is sufficiently risky so that the providers of debt capital refuse financing in times when the investment is most likely to be bad. The theory predicts that the contract between LPs and GPs will stipulate an upper bound on the amount of fund equity capital that can be put into any given deal and that funds with a lot of uninvested capital late in the fund life, are more likely to invest in "too expensive" deals when debt market conditions allow it. Although they do not formally consider GP reputation, an extension of their model would also imply that GPs with less reputational capital at stake should be more prone to overinvestment.[12] In our pricing regressions, we include the number of previous funds as a proxy for GP reputational capital, and days since the last fund was raised as a proxy for the stage of the fund life.

At a more general level, we might expect that GPs in a buyout fund have an incentive to lever up each deal as much as possible, since they hold an option-like stake in the fund. (The typical contract between general partners and limited partners in a buyout fund is that general partners get a "carry" of 20% of all excess returns, but nothing if the fund does not earn back the invested capital.)

[11] Related to this argument, the results in Baker, Greenwood, and Wurgler (2003) suggest that public firms use debt market conditions in an effort to determine the lowest-cost maturity at which to borrow.

[12] The model in Ljungqvist, Richardson, and Wolfenzon (2007) also has this prediction.

When conditions in debt markets are favourable, such as when interest rates are low, they can lever up the deals more. Since this increases the value of their option, they are also willing to pay more, *ceteris paribus*, even if this is not warranted by firm fundamentals. If such an agency theory is true, we would expect leverage to explain pricing in LBOs, but not in public firms. Even if the manager of a public firm could have a similar incentive to lever up, the price of the equity is not set by him but by public market investors.

E. Summary of Theoretical Arguments.

Clearly, there are many arguments for why both public and LBO firms choose their capital structure. While the arguments for public firms are the topic of a voluminous literature and can be applied to LBO firms as well, there are some new arguments that apply specifically to LBO firms. While the results we present below are very preliminary and certainly not definitive, we intend in future versions of the paper to distinguish to the extent possible between the alternative theories.

V. Results

A. Sample Characteristics

Table 3 provides descriptive statistics on our sample. This table indicates that our sample is well-represented across different types of LBOs, countries, and time periods. In contrast to previous papers that have focused on U.S. public-to-private deals, our sample is more representative of the universe of all buyouts. Our sample contains 25 (16%) public-to-private deals, but also 32 (21%) buyouts of independent companies, 76 (50%) divisional buyouts, and 20 (13%) secondary buyouts (a buyout of a firm owned by another private group). Roughly 1/3 (48) of our sample are 'club deals' (a buyout involving more than one LBO fund sponsor), and the sample is approximately evenly split between US/Canada and the rest of the world. In addition, the industry mix is also quite diverse, as is illustrated in panel C.

Table 4 examines the deals' size. Our sample clearly contains very large deals; the average LBO enterprise value is just over $1 billion, while the median is $682 million. Public to private deals are the largest, averaging slightly over $2 billion enterprise value, and include the sample's largest deal, KKR's buyout of Beatrice (enterprise value of $12.4 billion). In contrast, independent private and secondaries are the smallest type of deal in our sample, but still average over $600m in enterprise value.

B. Leverage

B.1. Characteristics of Leverage in our Buyout Firms.

Table 5 characterizes the multiple sources of debt used in our sample deals. Most deals used bank debt for the majority of their bank financing; it provides an average of 81.3% of total non-equity financing. It typically is broken into tranches, with the average deal containing 3.8 tranches. Senior bank debt provides over half (52.0%) of the debt financing, with junior bank debt just 4.7%, and "contingent" debt almost a quarter (24.6%). The typical sort of contingent debt is a revolving credit facility, which is undrawn at the time of the transaction, but can be drawn on to finance working capital needs or other cash requirements. Sometimes the contingency may relate to particular capital expenditure (typically referred to as a capex facility) or identified acquisitions. For the purposes of estimating the financial structure at the time of the LBO, we will typically focus in the econometric analysis on the non-contingent debt. In addition to bank debt, buyouts sometimes raise financing from bonds (13.6%), as well as smaller quantities from vendor loans (for instance, when a company sells off a division via an LBO and the vendor accepts a loan note in partial consideration), off-balance sheet financing, and the assumption of the existing debt of the business (although typically most debt is refinanced at the time of the buyout).

There are noticeable differences between US and European deals. US deals rely much more heavily on bonds than do European deals, for which a higher fraction of the debt (89%) is from banks. The European bank debt is much more heavily tranched than the US bank debt, averaging 4.7 tranches for the European debt compared to 2.9 for the US debt. In addition, it is much more common in Europe to assume debt from targets, with assumed debt accounting for 3.7% of total debt in Europe compared to only 0.7% in the US.

Table 6 compares leverage across types of deals and over sub period. We present statistics on debt measured relative to both enterprise value, and to EBITDA, using total debt as well as 'non-contingent' debt. Public to private deals are more levered than other deals, both in terms of D/EV and D/EBITDA. There are no noticeable differences in the leverage of club and single-fund deals, nor between deals in the US and Europe. Leverage has increased in the last few years for both leverage measures (although the increase is only significant for D/EBITDA). Finally, larger deals (in terms of EV) are more levered (again, only significant for D/EBITDA) and use a higher fraction of junior debt (subordinated, mezzanine, and 2nd lien).

Table 7 provides information on the interest rates paid on the debt. The typical spread for senior bank debt is 264 basis points, compared to 826 basis points for subordinated debt. Contingent bank debt is priced more like senior debt, with a spread of only 242 basis points. If we compute an interest coverage ratio as the reciprocal of the average cash interest over EBITDA, the average coverage ratio is a bit above 2, as its inverse is 0.42 (excluding contingent debt, which may or may not be used in the future). Spreads are higher and interest coverage lower for US deals, consistent with the higher leverage, and a similar trend can be seen for deals in the last few years.

Table 8 documents the speed of debt repayment for our sample firms. This table indicates that for the median firm, 5% of the loan amount is supposed to be paid down the first year, and this is fairly constant for the first few years, roughly 25% over 5 years. European deals have more aggressive amortization schedules compared to U.S., but the total debt service coverage is not significantly different.

B.2. Comparisons with Public Firms:

As noted earlier, the finance literature has spent much effort on the reasons for financing choices, but almost always in the context of publicly-traded corporations. We noted in the previous section that many of the same potential determinants of capital structure are probably relevant to LBOs as well. Yet, other theories such as Axelson et al. (2007) suggest that LBOs make leverage choices for different reasons than public firms. Indeed, if one asks practitioners how they make leverage choices, the typical answers will differ substantially. When asked about capital structure policy, a typical CFO of a public firm will discuss the need for financial flexibility and concern about distress costs (see Graham and Harvey (2001)), while a partner of a buyout firm will often say that they borrow as much as the banks will lend them.

To evaluate the extent to which common theories explain leverage in public and LBO firms, we compare leverage choices between the two types of firms. If the same theories explain leverage in both types of organizations, we should expect to observe common factors predicting leverage in both. Alternatively, if different factors explain leverage choices, then it is likely that the two types of firms make leverage decisions for different reasons.

To perform this comparison, we matched our buyout firms to the median characteristics of public companies in Worldscope in the same year, same continent, and same Fama-French industry. Figure 2 presents plots of leverage of our sample firms against the leverage with the comparable public firms. We measure leverage in two ways. The traditional approach in the academic literature

is to measure leverage as debt over total enterprise value. Practitioners in private equity tend to focus more on debt relative to measures of cash flow – the most widely used measure being EBITDA. We present the leverage of the matched private equity-backed companies and public companies according to both measures. From the plots, it appears that there is not a strong relation between these two. The first two columns of Table 9, panel A, test this hypothesis more formally through a regression of LBO leverage on the leverage of the matched public firm industry medians (scaled both by EBITDA as well as enterprise value). In neither regression is there any relation at all between the leverage used in the buyout and the leverage of the public comparables.

There are two possible explanations for this. The first possibility is that the choice of leverage in buyouts is driven by completely different considerations than the choice of leverage in an otherwise identical public firm. The second possible explanation is that our matching of buyouts to public firms is not accurate, for example because buyouts tend to be targeted at firms within the industry that have very unrepresentative characteristics.

To at least partially rule out the second explanation, we examine the sub-sample of our buyouts (28 deals at present) in which we have information about pre-LBO financials. Panel A of Figure 4 plots buyout leverage against pre-LBO leverage, and again, there is no relationship. Furthermore, Panel B of Figure 4 shows that the pre-LBO leverage does line up cross-sectionally with our matched industry medians. Comparisons on other characteristics of pre-LBO firms with matched industry medians, such as on profitability, also show that the firms targeted for buyouts within an industry do not appear to be unrepresentative. This strengthens our belief that it is not selection bias or bad matching that drives our results.

The remaining columns of Table 9, panel A, present regressions explaining leverage in both the sample of comparable public firms and our buyout firms. The results in the third and fourth columns are fairly standard regressions of leverage on industry characteristics for the public company industry median comparators. More profitable industries (as measured by return on invested capital, ROIC) have lower leverage, industries with more variable cash flows (as measured by the standard deviation of ROIC) have lower leverage, and industries with more growth opportunities (proxied by R&D to Sales and Market to Book ratios) have lower leverage. Financial market conditions as measured by aggregate stock return over the past year and prevailing interest rates and inflation rates do not appear to affect leverage much in our public firms at the industry level.

The fifth and sixth columns present comparable regressions for our sample of buyout firms. Here, we match each LBO to the median characteristic of public companies in the same industry, continent, and year as the buyout. In contrast to the result for public firm leverage, none of the firm characteristics have any significant relationship with leverage. The one exception is the matched industry Market-to-book ratio, which is in fact *positively* related to leverage debt to EBITDA, although the coefficient is not highly significant. However, when we scale leverage by EBITDA, conditions in debt markets have a strong influence. In particular, the higher the local real interest rate on leveraged loans (measured as LIBOR minus expected inflation plus the market leveraged loan spread), the lower the leverage. One explanation is that when rates are lower, firms can pay interest on a higher principal with the same cash flows. But this would be true for public firms as well, and they do not respond with higher leverage in a low interest rate environment. The prevailing level of inflation seems to be positively related to leverage, although this is a less robust result (in the reported specifications it is never significant).

Overall, it appears that different explanations apply for leverage in public firms and leverage in buyout firms. There is no relation between leverage in our sample of buyouts and comparable public firms. In addition, different factors explain variation within each sample. These findings suggest that buyout firms choose leverage for different reasons than do public firms.

C. Pricing of Deals

After examining leverage, we turn to the question of how pricing in buyouts is determined. Our measure of price is the total enterprise value divided by EBITDA of the firm. We first document the substantial variation that buyout prices have had over time, and over type of deal. We then perform the same type of investigation as we did with leverage, checking whether pricing in buyouts is at all related to the pricing of public firms

Table 10 presents statistics on the pricing of these deals. A few patterns emerge. First public-to-private deals and independent private deals have the highest valuations, relative to EBITDA, with average multiples of around 9.3. Club deals, which are currently a source of controversy, turn out to be priced significantly higher than single-fund deals. This finding casts doubt on commonly stated arguments that one motivation for these club deals is to collude to obtain lower prices. We also find that US deals are on average priced higher than European (and ROW) transactions. In addition, our findings confirm the common wisdom that prices have been

increasing recently, with 2004-2006 EBITDA multiples substantially higher than in the 1996-2000 and 2001-2003 periods.[13]

We then go on to study the relation between pricing in buyouts and in public firms. First, we simply match the price of a buyout with the median price of a public firm within the same industry, time-period, and geographic area (Figure 3). In contrast to the lack of relationship we found for leverage, there is a strong positive relationship for pricing (in particular when we remove an outlier continent-industry-year with extremely low EV/EBITDA).

We confirm this finding in our first set of pricing regressions in Table 11, where prevailing price multiples in public markets are always strongly significant variables in explaining buyout pricing. However, pricing of buyouts is also strongly negatively related to current market interest rates on leveraged loans, after controlling for price multiples in public markets. In contrast, the pricing of public firms has no relation to interest rate levels. Thus, higher loan rates have a negative impact on both leverage and prices in buyouts, but little impact on leverage and prices in public firms.

This leads us to what we think is potentially the most interesting question in the paper, namely, is there a relation between leverage and pricing, and if so, what drives it? Figure 1 suggests that, at least in a time-series aggregate, leverage and pricing in buyouts do go hand in hand. We try to examine the relationship more closely in our sample. A simple examination of the bi-variate aggregate time-series evidence suggests that leverage and pricing in buyouts are positively related. Unfortunately, it is hard to conclusively address this issue because of the endogeneity of leverage to pricing, since these may be driven by common, unobserved factors. In addition there are likely to be measurement error issues when our proxies for pricing (enterprise value) and leverage (total debt) are both normalised by EBITDA.

Still, we present some suggestive evidence regressing pricing on leverage, using leverage loan rates as an instrument in the first stage. Although this takes care of the measurement problem in EBITDA, one can question whether it deals with endogeneity, since it may be related to the cost of capital of the firm. Still, one can motivate the instrument by noting that if this had been the case,

[13] The 1990-1995 period had a higher EBITDA multiple than the 2004-2006 period. However, we have pricing information only 6 deals in this period, and sales multiples are for this early period are actually the lowest of all 4 periods.

we would have expected to see a negative relation of leveraged loan rates to public firm valuations as well, which we do not (as seen in the last regression of Table 11, panel A). Panel B of Table 11 shows the results from this exercise. We get a very strong relationship between instrumented leverage and pricing in buyouts. This relation remains after controlling for pricing multiples prevailing in public markets.

There are at least two stories, with very different implications, that can explain the relation between leverage and pricing in buyouts. One story is that when a firm is expected to have strong future cash flows relative to current EBITDA, it can sustain higher leverage as measured by debt to current EBITDA. Since cash flows are expected to grow, the firm will also warrant a higher price relative to current EBITDA. The second, LBO-specific, story is that mentioned in section 4 regarding conflicts of interest between the investors and managers of the private equity fund. The typical structure of remuneration gives general partners option-like stake in the fund, who then have an incentive to lever up each deal as much as possible. When liquidity in debt markets is high and/or when interest rates are low, they can lever up the deals more and this increases the value of their option.

We do not have enough evidence yet to conclusively judge between these stories. However, the fact that we control for a proxy of fundamentals by including public market pricing multiples in the regression and still obtain a very strong effect of leverage on pricing points in the direction of the agency story. On the other hand, the fund-level variables that we expected to be positively related to pricing if the agency story is important, such as how late in the fund life a deal is made and how experienced the general partners are, do not have much explanatory power. This may be because we are currently including only very successful LBO sponsors with a proven track-record in our sample. In future versions of the paper, we aim to enlarge the sample substantially. Hopefully, this will help us to give a more definitive answer to what drives the relationship between leverage and pricing in LBOs.

VI Conclusions

Private equity firms have become increasingly important players in world financial markets. They raise equity capital from limited partners, and then supplement this equity with additional deal-level financing, usually debt when the investment is a buyout and syndicated equity when it is a venture deal. Practitioners often claim that the availability of deal-level financing is an important

driver of investment decisions. Academics are often puzzled by this claim, as it appears to contradict standard Modigliani Miller analysis.

To study this issue, we gather a sample containing detailed data on the financings of 153 large recent buyouts. Later drafts will benefit from a much larger dataset. We first document the way in which they are financed, typically using about 75% debt, which comes from a number of different sources, in multiple tranches. We then compare financings of this sample of buyout firms to a matched sample of public firms. Perhaps surprisingly, there is no relation whatsoever between the financings of buyouts and the matched public firms. In addition, cross-sectionally, the factors that predict capital structure in public firms have no explanatory power to explain capital structure in buyout firms. Finally, we try to estimate the effect of leverage on the pricing of deals, although controlling for the endogeneity of leverage is difficult. Still, we find that leverage has a strong impact on the prices of deals, controlling for other factors that potentially affect pricing.

These results suggest that capital structure in buyouts requires a different explanation than in public firms. In particular, the availability of deal-level financing appears to impacts the investment process in buyouts in ways unlike public firms. The results are consistent with a view in which partners in buyout firms borrow as much as they can for each deal, and the capital market provides discipline by limiting how much it will lend in different times. This idea is consistent with practitioners' statements, and has been formalized by Axelson, Stromberg, and Weisbach (2007).

Nonetheless, there is much more research to be done on the financial behavior of private equity firms. Our results suggest there is a link between the availability of financing and private equity firms' investments. Yet, the basic question of why the availability of financing varies so much over time remains unanswered. One factor explaining the recent increase in capital available to provide financing for buyouts is the development of syndicated loan market. But the market's existence begs the question of why so much capital is being provided in the first place. One possibility is that the capital comes from hedge funds which, for agency reasons, have incentives to invest their capital at promised yields higher than the riskless rate. Another possibility is that the capital inflows to finance buyouts could represent an efficient allocation. Understanding the nature of this market is clearly an important topic for future research.

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Figure 1: Market Trends in Private Equity Buyouts

This figure shows market trends in the US using data from Panel B, Table 2. Total value of deals, and purchase price multiples, measure the total enterprise values, and so include both equity and debt financing. Multiples are expressed relative to pro-forma trailing EBITDA. Purchase price multiples include fees and expenses of the transactions – which average around 0.4x EBITDA. Sources: S&P Leveraged Buyout Review, 2006 Q4, and own calculations.

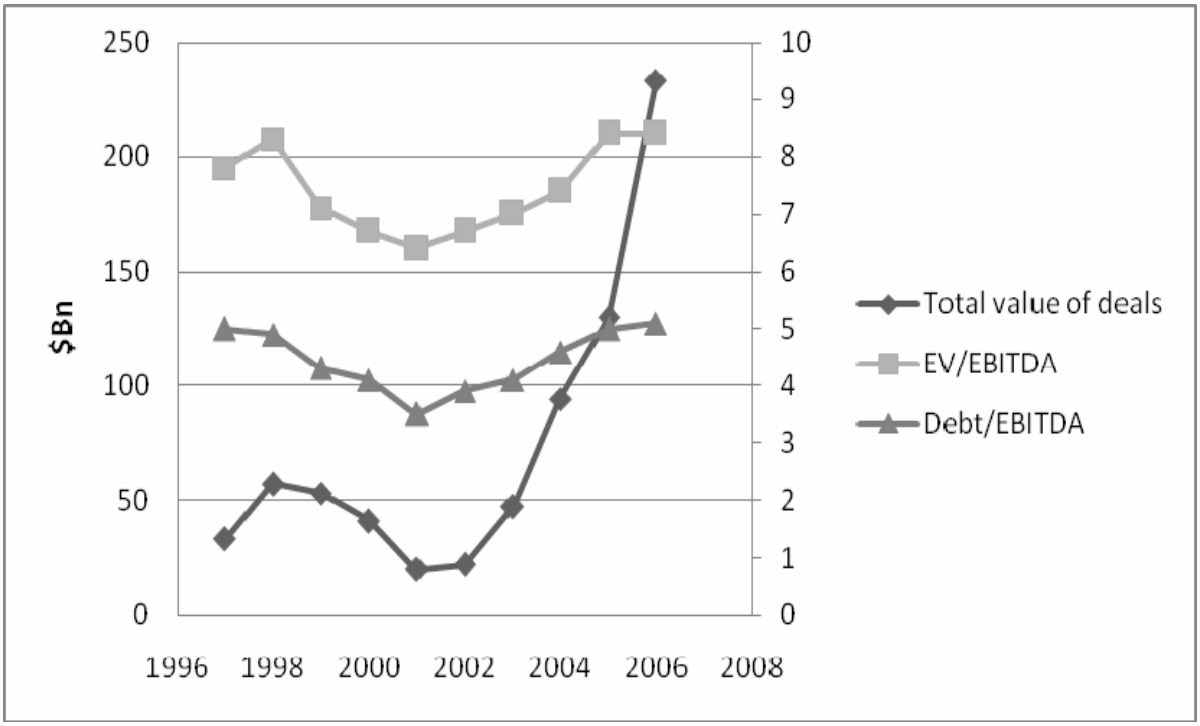
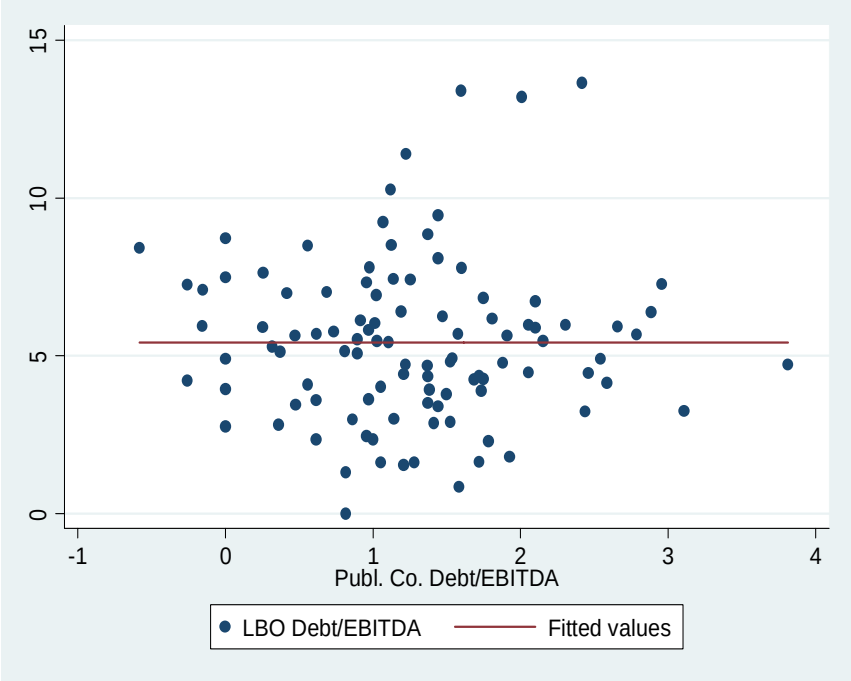


Figure 2: LBO Versus Public Market Leverage

This figure shows LBO leverage for the sample plotted against the median public company leverage in the same industry, continent, and year as the LBO. Leverage is measured as debt to enterprise value in Panel A, and as the log of debt to EBITDA in Panel B.

Panel A

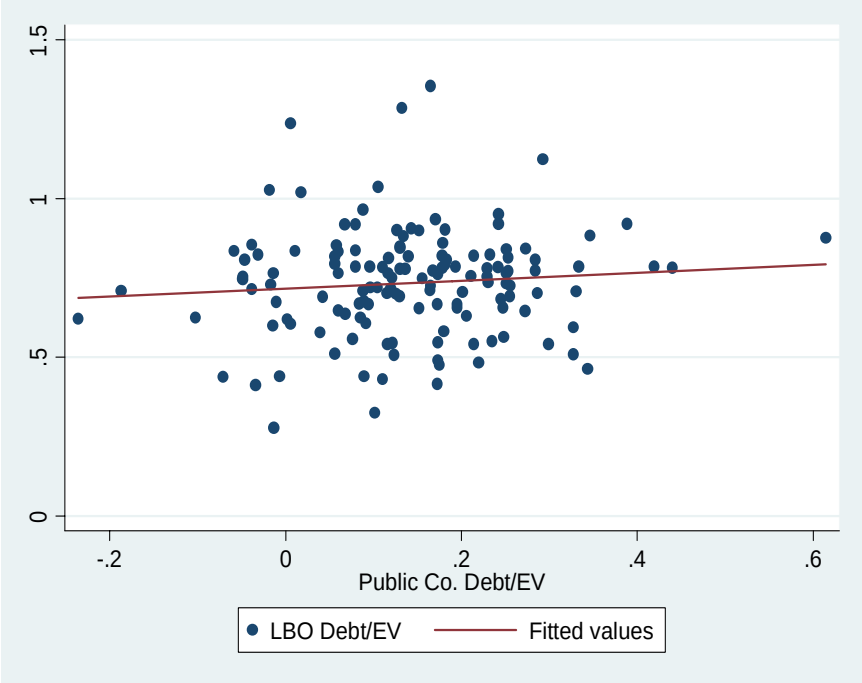


D/EBITDA:

Slope=-0.002

T=-0.01

Panel B



D/EV:

Slope=0.18

T=1.50

Figure 3: LBO Versus Public Market Pricing

This figure shows LBO pricing measured as the log of Enterprise Value to EBITDA plotted against the median public company pricing in the same industry, continent, and year as the LBO.

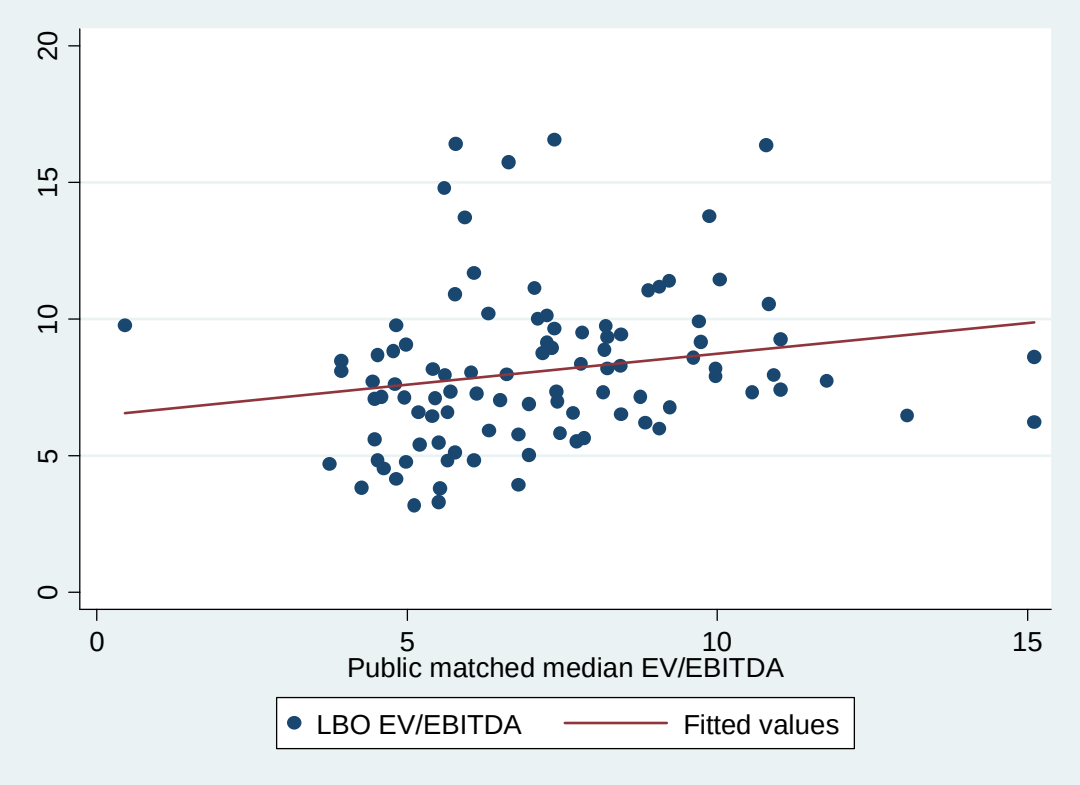
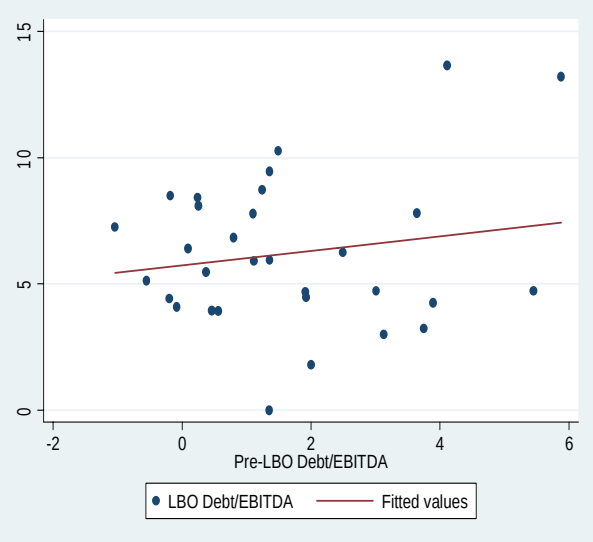


Figure 4: LBO Versus Pre-LBO Leverage

This figure shows LBO leverage plotted against Pre-LBO leverage (Panel A), and Pre-LBO leverage plotted against the median public company pricing in the same industry, continent, and year as the LBO. Leverage is measured as log of debt to EBITDA. The sample consists of LBOs where a pre-LBO financial statement was available, a total of 28 observations.

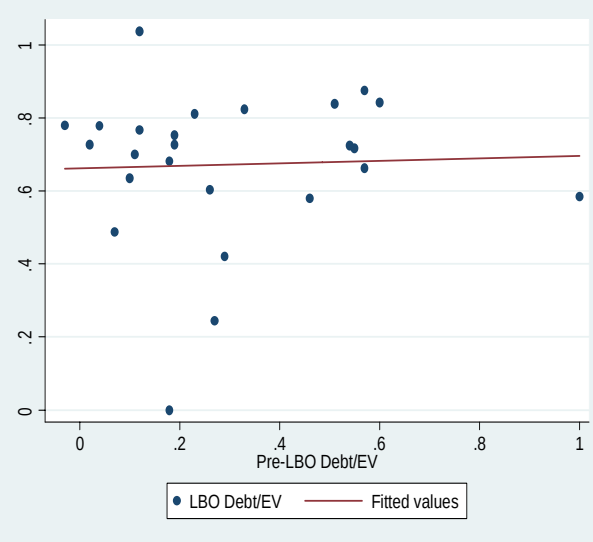
Panel A



D/EBITDA:

Slope=0.29

T=0.73

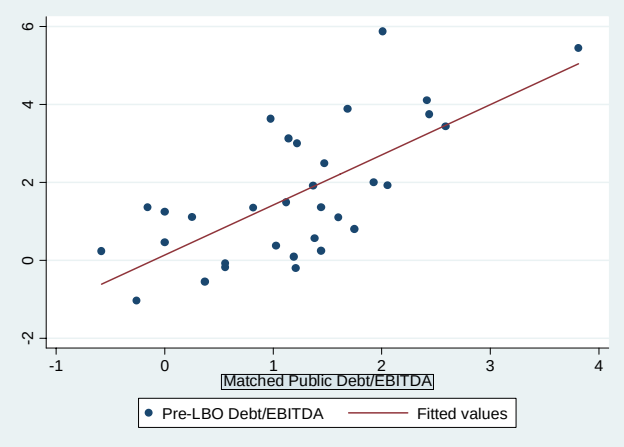


D/EV:

Slope=0.03

T=0.27

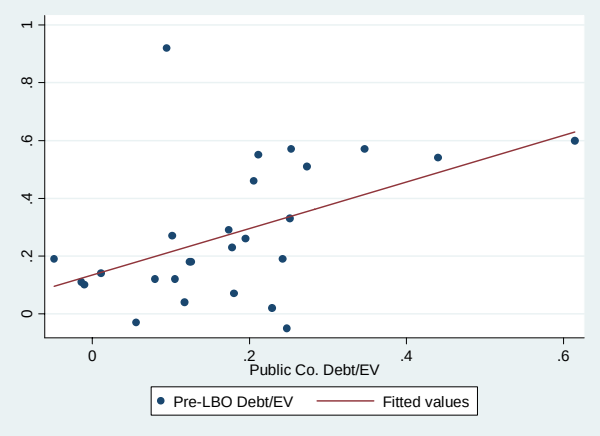
Panel B



D/EBITDA:

Slope=1.28

T=7.0



D/EV:

Slope=0.91

T=6.2

Table 1: A Typical Private Equity Buyout: the August 2005 Purchase of Kwik-Fit

Kwik-Fit is a leading tyre and exhaust fitting company, operating in the UK, Netherlands, France and Germany. Private equity funds were both the buyer and the seller: PAI bought KwiK-Fit from CVC. In private equity transactions the purchase price and level of debt are typically expressed in terms of multiples of earnings before interest, tax, depreciation and amortization (EBITDA), as shown in the last column. In this example, the estimated EBITDA for 2005 of £95.9m is the reference point. Pricing of the debt is expressed relative to the London Inter-bank Offered Rate (LIBOR). For the mezzanine debt, the return is split between cash interest payments and "payments in kind" (PIK). Source: Goldman Sachs European LBO Market Update (issues 52 and 53, August/September 2005).

	Amount (£m)	**Terms**	**Pricing (spread over LIBOR)**	**Multiple of EBITDA**
Enterprise Value	**773.5**			**8.1 x**
Equity	**191.0 (25%)**			**2.0 x**
Debt				
Term Loan A	140	7 year amortizing	2.25%	
Term Loan B	135	8 year bullet	2.50%	
Term Loan C	135	9 year bullet	3.00%	
Total Senior Debt	*410.0*			*4.3 x*
2nd Lien	75	9.5 year	5.00%	
Mezzanine	97.5	10 year	4.5% + 5% PIK	
Total Debt	**582.5 (75%)**			**6.1 x**
Revolving credit facility	40	7 year	2.25%	
Capex facility	50	7 year	2.25%	

Table 2: Market Trends in Private Equity Buyouts

This table reports market trend in Europe and the US. Total value of deals, and purchase price multiples, measure the total enterprise values, and so include both equity and debt financing. Multiples are expressed relative to pro-forma trailing EBITDA. Purchase price multiples include fees and expenses of the transactions – which average around 0.4x EBITDA. Equity contribution includes retained earnings and any vendor financing. Sources: for the US, S&P Leveraged Buyout Review, 2006 Q4, and own calculations. Goldman Sachs (2006) and, for the purchase price multiples, S&P LCD European LBO Review, January 2007.

Panel A: Europe

	Total value of deals ($bn)	Purchase Price / EBITDA	Equity contribution	Senior Debt /EBITDA	Total Debt /EBITDA
1998		7.7	29.6%	3.8	4.7
1999		8.0	35.6%	3.7	4.7
2000	22	7.3	35.9%	3.6	4.4
2001	32	6.8	37.4%	3.5	4.3
2002	35	7.0	37.6%	3.5	4.3
2003	38	6.9	38.6%	3.6	4.5
2004	57	7.3	37.3%	3.7	4.7
2005	135	8.3	35.9%	4.2	5.3
2006	151	8.9	33.7%	4.4	5.5

Panel B: US

	Total value of deals ($bn)	Purchase Price / EBITDA	Equity contribution	Senior debt/EBITDA	Total debt/EBITDA
1997	33	7.8	30.0%	3.6	5.0
1998	57	8.3	31.7%	3.5	4.9
1999	53	7.1	35.7%	3.4	4.3
2000	41	6.7	37.8%	3.2	4.1
2001	20	6.4	40.6%	2.7	3.5
2002	22	6.7	40.0%	2.9	3.9
2003	47	7.0	39.5%	2.9	4.1
2004	94	7.4	35.1%	3.4	4.6
2005	130	8.4	32.1%	4.1	5.0
2006	233	8.4	33.6%	4.4	5.1

Table 3: Sample

This table shows the distribution of our sample companies according to their status prior to the LBO, region and year (Panel A), specific country (Panel B), industry (Panel C) and leading private equity sponsor (Panel D). LBOs are classified according to whether the transaction involved a public company (public-to-private), an independent private firm, a division of a larger company, or a secondary transaction where the vendor was a private equity sponsor. We also classify transactions according to whether they involved single or multiple private equity sponsors (the latter are classified as club deals).

Panel A: Distribution across time, buyout type, and continent

		Type of LBO					Location of LBO		
Year of LBO announcement	Number of LBOs	Public-to-private	Independent private company	Divisional buyout or privatization	Secondary buyout	"Club deal"	USA or Canada	Europe	ROW
1985-1989	5	3	1	1	0	1	5	0	0
1990-1994	7	0	4	3	0	3	7	0	0
1995	5	1	0	3	1	0	5	0	0
1996	2	1	1	0	0	1	2	0	0
1997	14	2	4	7	1	2	9	5	0
1998	23	2	11	8	2	8	16	7	0
1999	11	1	2	7	1	5	6	5	0
2000	10	2	0	8	0	3	1	7	2
2001	3	0	0	3	0	1	0	3	0
2002	19	2	1	16	0	5	6	13	0
2003	12	3	3	5	1	6	4	7	1
2004	22	4	4	6	8	6	8	14	0
2005	16	2	1	7	6	6	6	10	0
2006	4	2	0	2	0	1	3	1	0
Total	153 (100%)	25 (16%)	32 (21%)	76 (50%)	20 (13%)	48 (31%)	78 (51%)	72 (47%)	3 (2%)

Panel B: Country where LBO Target is Located

Australia	1	Netherlands	11
Belgium	1	Philippines	1
Canada	3	S. Korea	1
Denmark	2	Spain	7
France	9	Switzerland	3
Germany	18	UK	15
Italy	5	US	75
Luxembourg	1	**Total**	**153**

Panel C: Industries of LBO targets

Agricultural products	2	Hotels	2
Automotive suppliers and services	11	Industrial services	6
Chemical and plastics	14	Insurance	2
Computer / telecom hardware	12	Media and publishing	6
Computer software	5	Other non-consumer products	16
Construction materials	5	Pharmaceutical / medical	6
Consumer products	13	Retail and restaurants	20
Education	2	Telecom services	5
Entertainment	7	Transportation	2
Healthcare services	10	Utilities and infrastructure	7

Panel D: Main LBO Sponsor

	USA	Europe & ROW	Total
Bain Capital Partners	38	6	44
Blackstone Group	18	10	28
CVC Capital Partners	4	36	40
Kohlberg Kravis Roberts & Co	17	5	22
Madison Dearborn Partners	1	0	1
Permira Advisers (FKA Schroeders)	0	18	18

Table 4: Size of LBOs

This table provides descriptive statistics on the size of the LBOs in our sample, according to Enterprise Value (EV), sales, and earnings before interest, taxes, depreciation and amortization (EBITDA). The numbers of observations differ since data is not available for all measures for all companies. LBOs are classified according to whether the transaction involved a public company (public-to-private), an independent private firm, a division of a larger company, or a secondary transaction where the vendor was a private equity sponsor. We also classify transactions according to whether they involved single or multiple private equity sponsors (the latter are classified as club deals). In terms of geography, the portfolio companies are classified according to whether their head office is located in the US, Europe or Rest of the World. All values are in million (year 2000) USD.

	EV at buyout					**Sales**					**EBITDA**				
	Mean	Median	Min	Max	Num obs.	Mean	Median	Min	Max	Num obs.	Mean	Median	Min	Max	Num obs.
All LBOs	1082	682	15	12378	140	1135	687	34	11152	84	151	111	4	1086	102
Public-to-private	2095	1572	232	12378	24	1389	911	144	4798	22	184	129	36	661	22
Indep. private	635	424	29	2111	26	688	563	125	1949	8	80	58	13	228	13
Divisional	1003	638	15	4946	74	1264	737	34	11152	40	170	125	4	1086	53
Secondary	654	624	171	1619	16	621	411	95	1831	14	97	86	21	221	14
KW test p-val.	0.000***					0.223					0.029**				
Club deals	1348	1072	42	4946	46	1161	1029	146	2992	30	186	178	13	661	36
Single-fund deals	952	619	15	12378	94	1120	541	34	11152	54	133	93	4	1086	66
Ranksum -val.	0.005***					0.041**					0.040**				
U.S.	1209	592	29	12378	72	1127	517	101	11152	40	145	82	13	1086	49
European	963	755	55	4946	65	1167	905	95	4798	43	162	138	16	458	51
ROW	605	328	15	1472	3	34	-	-	-	1	29	28	4	54	2
KW test p-val	0.562					0.070*					0.013**				
1985-1989	4509	2390	421	12377	5	-	-	-	-	0	-	-	-	-	0
1990-1995	523	389	29	1624	10	836	304	101	2636	4	59	35	13	165	7
1996-2000	527	421	15	1766	53	599	350	34	2992	26	89	75	4	203	34
2001-2003	1378	936	174	4946	33	1835	1059	290	11152	20	224	139	56	1086	28
2004-2006	1288	1119	175	3595	39	1167	946	95	3763	34	174	159	21	661	33
KW test p-val.	0.000***					0.005***					0.000***				

Table 5: Structure of LBO Debt – the U.S. vs. the European Model

This table shows the structure of debt employed in LBOs. The main categorization is between senior secured bank debt, and subordinated (or junior) debt. The latter can take a variety of forms including mezzanine or 2nd lien debt. Both senior and junior debt is often split into separate tranches, with differing seniority, amortization, and interest rates (and sometimes currencies). Contingent debt refers to facilities that are put in place at the time of the LBO to fund working capital, capex, acquisitions etc., which are not drawn down at the time of the transaction. In most LBOs the existing debt is paid off as part of the transactions, but in a minority of cases the new owners take on some of the existing debt. We refer to this as assumed debt. Vendor loans refer to transactions where the vendor is prepared to accept some part of the total price as a loan note secured on the target company. In a few cases we also observe some explicit off-balance sheet financing which we categorize separately.

	All LBOs							**U.S.**				**Europe**			
	Million (year 2000) USD		Percent of firms	% of total non-eq. funding		No. of tranches		% of total non-eq. funding		No. of tranches		% of total non-eq. funding		No. of tranches	
	Mean	Med.	%	Mean	Med.	Mean	Med.	Mean	Med.	Mean	Med.	Mean	Med.	Mean	Med.
Bank debt	701.5	407.8	99.3%	81.3%	98.0%	3.8	4.0	73.6%	71.9%	2.9	3.0	89.0%	100.0%	4.7	5.0
- senior	*451.2*	*274.8*	*90.8%*	*52.0%*	*56.5%*	*2.4*	*2.0*	*45.0%*	*47.1%*	*1.9*	*2.0*	*58.2%*	*61.9%*	*2.8*	*3.0*
- junior	*65.8*	*0.0*	*23.5%*	*4.7%*	*0.0%*	*1.3*	*1.0*	*1.4%*	*0.0%*	*1*	*1*	*8.4%*	*0.0%*	*1.3*	*1.0*
- contingent	*184.4*	*78.4*	*92.2%*	*24.6%*	*17.8%*	*1.4*	*1.0*	*27.2%*	*17.9%*	*1.4*	*1.0*	*22.3%*	*17.5%*	*1.5*	*1.0*
Bonds	149.8	0.0	37.3%	13.6%	0.0%	1.4	1.0	23.6%	23.3%	1.4	1.0	3.3%	0.0%	1.4	1.0
- senior	*51.7*	*0.0*	*10.5%*	*3.5%*	*0.0%*	*1.3*	*1.0*	*5.9%*	*0.0%*	*1.4*	*1.0*	*1.0%*	*0.0%*	*1.0*	*1.0*
-subordinated	*97.7*	*0.0*	*32.0%*	*10.2%*	*0.0%*	*1.2*	*1.0*	*17.7%*	*10.4%*	*1.2*	*1.0*	*2.3%*	*0.0%*	*1.3*	*1.0*
Assumed debt	45.0	0.0	8.5%	2.1%	0.0%			0.7%	0.0%			3.7%	0.0%		
Vendor loans	10.8	0.0	9.8%	1.7%	0.0%			1.6%	0.0%			1.8%	0.0%		
Off-BS funding	21.1	0.0	5.2%	1.3%	0.0%			0.4%	0.0%			2.3%	0.0%		
All exc. off-BS & cont.	726.1	408.4	95.4%	74.1%	81.6%			72.4%	82.0%			75.3%	80.8%		
All debt	932.8	560.6	100.0%	100.0%	100.0%			100.0%	100.0%			100.0%	100.0%		
Sample Size	153		153		152				77				72		

Table 6: Leverage of LBOs

This table presents information on the leverage of the LBO targets at the time of the transactions. For explanations of the categorization of the deals, and the different definitions of debt and leverage, see the notes to Tables 4 and 5.

	Non-cont debt / EV		**Total debt / (EV+Cont debt)**			**Non-cont. debt / EBITDA**		**Total debt / EBITDA**		
	Mean	Median	Mean	Median	Num obs.	Mean	Median	Mean	Median	Num obs.
All LBOs	66.9%	69.4%	75.0%	75.0%	139	5.4	5.5	6.9	7.0	103
Public-to-private	72.6%	74.0%	78.2%	81.5%	24	6.4	5.7	8.3	7.9	22
Indep. private	55.2%	54.8%	66.2%	67.6%	26	4.7	5.3	6.8	7.8	14
Divisional	68.3%	69.2%	77.0%	74.8%	73	5.2	5.7	6.5	6.0	53
Secondary	71.6%	73.2%	75.0%	76.4%	16	5.0	5.1	6.1	6.4	14
KW p-value	0.043***		0.070***			0.527		0.092*		
Club deals	69.3%	69.7%	73.7%	72.4%	45	5.9	5.7	7.2	7.0	36
Single-fund deals	65.8%	67.8%	75.6%	77.2%	94	5.1	5.1	6.7	6.7	67
Ranksum p-value	0.63		0.43			0.16		0.51		
U.S.	65.8%	67.8%	73.7%	73.2%	71	5.8	5.7	7.4	7.3	49
European	68.0%	70.0%	76.5%	77.3%	65	5.1	5.0	6.5	5.9	52
KW p-value	0.69		0.66			0.49		0.12		
1985-1989	76.6%	81.0%	81.0%	81.9%	5	na	na	na	na	-
1990-1995	65.8%	64.2%	79.3%	74.1%	10	6.7	5.8	8.8	7.8	7
1996-2000	62.9%	65.5%	74.4%	72.6%	52	4.5	4.2	6.3	6.1	34
2001-2003	65.0%	69.2%	71.8%	71.9%	33	4.6	4.5	5.9	5.9	29
2004-2006	73.1%	73.8%	76.6%	78.0%	39	6.7	7.0	8.0	7.9	33
KW p-value	0.30		0.66			0.002***		0.009***		
EV quartiles:										
1st (15-356)	61.3%	61.4%	74.1%	72.4%	34	4.4	3.9	6.4	5.8	16
2nd (356-682)	66.7%	69.5%	72.4%	76.4%	35	4.4	4.2	6.0	5.8	25
3rd (682-1476)	67.8%	65.5%	76.9%	75.0%	35	6.5	6.7	7.9	7.8	28
4th (1476-12377)	71.9%	73.8%	76.4%	78.2%	35	6.4	5.9	7.9	7.3	28
KW p-value	0.37		0.67			0.002***		0.020**		
EV/EBITDA quartiles:										
1st (<6.2)	71.6%	68.1%	78.8%	78.4%	24	3.6	3.5	4.8	4.5	24
2nd (6.2-7.9)	73.9%	73.6%	79.0%	78.6%	24	5.2	5.4	6.7	6.7	24
3rd (7.9-9.7)	73.3%	71.2%	79.7%	73.6%	24	6.3	6.1	8.2	7.5	24
4th (>9.7)	61.8%	65.1%	67.8%	71.1%	23	7.5	7.8	9.1	8.5	23
KW p-value	0.43		0.26			0.000***		0.000***		

Table 7: Interest Rates on LBO Debt Funding

This table shows the average interest rate spreads, measured in basis points (hundredths of a percent). The reference rates used in calculating the spreads are the interest rates in the home region. Most loans are priced in terms of spreads over LIBOR. For information on categorization of debt, see the notes to Table 5.

	Average spread over reference rate			**Average interest (spread + reference rate)**			**Total Interest / EBITDA(T-1)**			**Cash Interest / EBITDA(T-1)**		
	Mean	Med.	N	Mean	Med.	N	Mean	Med.	N	Mean	Med.	N
Bank debt												
Senior	264.4	262.0	118	687.6	669.5	118	0.23	0.21	81	0.23	0.20	80
Junior	826.3	937.2	18	1,115.6	1,173.6	18	0.17	0.14	12	0.12	0.11	12
Contingent	241.9	225.0	128	671.9	670.2	128	0.09	0.06	88	0.09	0.06	88
Bonds												
Senior	789.4	916.3	12	1,154.5	1,188.4	12	0.31	0.19	8	0.30	0.19	8
Subordinated	1,053.2	1,048.5	38	1,477.9	1,537.8	38	0.41	0.34	31	0.32	0.30	31
All non-cont. bank loans and bonds	438.0	381.4	101	876.1	804.0	101	0.48	0.42	68	0.44	0.42	67
All bank loans and bonds	390.0	348.3	103	830.1	782.9	103	0.57	0.45	67	0.52	0.45	66

Table 8: Debt Service on LBO Debt Funding

This table shows the average speed with which LBO debt has to be repaid and estimates the total debt servicing relative to trailing year cash flow (as measured by EBITDA). For information on categorization of debt, see the notes to Table 5.

	% of principal due in one year			(Principal + cash interest T+1) / EBITDA(T-1)			% of principal due in five years			(5-yr. Principal + cash interest) / (5*EBITDA(T-1))		
	Mean	Med.	N	Mean	Med.	N	Mean	Med.	N	Mean	Med.	N
Bank debt												
Senior	9%	7%	128	55%	39%	75	42%	35%	128	48%	40%	75
Junior	10%	0%	32	16%	16%	11	23%	0%	32	15%	14%	11
Contingent	1%	0%	129	12%	7%	81	14%	0%	129	13%	9%	81
Bonds												
Senior	0%	0%	16	30%	19%	8	0%	0%	16	30%	19%	8
Subordinated	0%	0%	46	32%	30%	30	0%	0%	46	32%	30%	30
All non-cont. bank loans and bonds	7%	5%	134	54%	47%	102	30%	24%	134	49%	46%	102
All bank loans and bonds	6%	3%	138	64%	54%	102	27%	21%	138	59%	55%	102

Table 9: Determinants of LBO and Public Company Median Leverage

This table reports regressions of LBO and public company leverage on explanatory variables. Leverage is measured either as non-contingent debt to enterprise value, or as the natural logarithm of non-contingent debt to EBITDA. In regressions 1 and 2 of panel A, leverage in LBOs is regressed on the median leverage of public companies in the same Fama-French industry, the same year, and the same continent as that in which the LBO took place. In regressions 3 and 4, median public company leverage for an industry, continent, and year is regressed on median characteristics of the companies as well as overall market conditions. The characteristics are median return on invested capital over the previous year, standard deviation of return on invested capital, median R&D to sales, median enterprise value to book value, and median sales to property, plant, and equipment (PPE). Market conditions are the previous 12-month return on local stock markets, the local real LIBOR plus the average spread in the U.S. leveraged loan market the concurrent month, the statuatory corporate local tax rate in the firm's home country, and the local inflation over the coming year. In regressions 5,and 6 of panel A, LBO leverage is regressed on the same matched public company characteristics, and market condition variables. In panel B, the LBO leverage regressions add LBO deal and fund specific variables. Deal specific variables are dummies for whether the deal is a public-to-private transaction, divisional buyout, secondary transaction, or independent private to private transaction (the left out category), and whether there are multiple buyers in the consortium (clubdeal) or not. Fund specific variables are the number of previous funds the buyout sponsor has raised, and the number of days since the last fund was raised. Aggregate LBO fund overhang measures how much uninvested capital there is in the buyout sector by taking the aggregate funds raised minus the aggregate funds invested. Robust White (1980) standard errors are in brackets. ***, **, * indicate that coefficients are statistically significantly different from zero at the 1%, 5%, and 10% levels, respectively.

Panel A

	LBO D/EV	LBO Log D/EBITDA	Public Match D/EV	Public Match Log D/EBITDA	LBO D/EV	LBO Log D/EBITDA
Public Co. Debt/EV	0.19					
	[0.13]					
Public Co. Ln Debt/EBITDA		0.01				
		[0.07]				
Industry-Continent-Year matched median ROIC			-0.39***	-8.02***	-0.56	-1.9
			[0.13]	[1.02]	[0.40]	[1.41]
ICY EV/BV			-0.05***	-0.36***	-0.01	0.18*
			[0.01]	[0.12]	[0.04]	[0.10]
Industry stdev ROIC			-0.46***	-3.34***	-0.05	-0.16
			[0.09]	[0.74]	[0.24]	[0.58]
ICY R&D/Sales			-1.05***	-24.89***	-0.5	-0.05
			[0.32]	[4.29]	[0.84]	[1.76]
Corp. tax rate			0.002	0.02***	0.00	-0.02*
			[0.001]	[0.01]	[0.01]	[0.01]
Local stock market TTM return			0.019	0.12	-0.03	0.17
			[0.036]	[0.16]	[0.09]	[0.20]
Libor + Lev. Loan spread			0.00	0.02	-0.007	-0.07***
			[0.00]	[0.02]	[0.013]	[0.03]
Inflation rate			0.01	0.00	0.04	0.03
			[0.01]	[0.05]	[0.03]	[0.06]
Constant	0.63***	1.56***	0.38***	2.48***	0.70**	2.66***
	[0.03]	[0.06]	[0.06]	[0.37]	[0.28]	[0.51]
Observations	139	92	133	116	122	93
R-squared	0.01	0	0.61	0.65	0.08	0.2

Panel B.

	LBO D/EV	LBO Log D/EBITDA	LBO D/EV	LBO Log D/EBITDA
ICY matched median ROIC	-0.52			
	[0.34]			
ICY EV/BV		0.09	-0.01	0.1
		[0.06]	[0.03]	[0.07]
Libor + Lev. Loan spread	-0.007	-0.07***	-0.01	-0.08**
	[0.010]	[0.02]	[0.01]	[0.03]
Inflation rate	0.03	0.06	0.02	0.07
	[0.02]	[0.05]	[0.03]	[0.06]
Public to Private	0.12*	0.12		
	[0.06]	[0.14]		
Divisional	0.10*	-0.06		
	[0.06]	[0.11]		
Secondary	0.09	-0.04		
	[0.06]	[0.13]		
Club deal	-0.01	0.03		
	[0.04]	[0.10]		
Aggregate LBO fund overhang			-0.33*	-0.06
			[0.19]	[0.51]
Number of prev. funds			0.01	0.04*
			[0.01]	[0.02]
Years since last fund			0.02	0
			[0.02]	[0.05]
Constant	0.65***	1.61***	0.61***	1.32***
	[0.11]	[0.18]	[0.15]	[0.34]
Observations	124	94	114	86
R-squared	0.1	0.17	0.07	0.17

Table 10: Pricing of LBOs

This table provides evidence on the pricing of the LBO transactions in our sample. The first set of columns measure the price as the enterprise value (EV) relative to a proxy for cash flow (EBITDA). The second set of columns measure EV relative to sales. For information on the categorization of deals, see the notes to Table 4.

	EV/EBITDA					EV/Sales				
	Mean	Median	Min	Max	Num obs.	Mean	Median	Min	Max	Num obs.
All LBOs	8.12	7.88	3.17	16.57	95	1.58	1.12	0.12	5.75	79
Public-to-private	9.33	8.30	5.64	16.57	21	2.12	1.53	0.12	5.75	21
Indep. private	9.30	8.96	4.84	16.36	12	1.87	1.29	0.71	5.06	7
Divisional	7.41	7.32	3.17	16.42	51	1.18	1.02	0.20	5.30	39
Secondary	7.81	8.20	4.14	10.20	11	1.74	1.45	0.62	3.72	12
KW test p-value	0.052*					0.111				
Club deals	8.69	8.62	3.91	16.42	34	1.59	1.41	0.12	5.75	29
Single-fund deals	7.80	7.33	3.17	16.57	61	1.57	1.04	0.20	5.63	50
Ranksum p-value	0.047**					0.234				
U.S.	8.79	8.39	4.51	16.57	46	1.81	1.39	0.42	5.75	39
European	7.59	7.26	3.17	16.42	47	1.37	0.90	0.12	5.63	39
ROW	5.01	5.01	3.83	6.20	2	0.44	-	-	-	1
KW test p-value	0.009***					0.123				
1985-1989	-	-	-	-	0	-	-	-	-	0
1990-1995	9.78	10.04	7.33	11.38	6	0.77	0.76	0.46	1.12	4
1996-2000	6.98	6.50	3.17	16.57	30	1.56	1.08	0.12	5.47	23
2001-2003	7.59	7.41	3.30	14.79	27	0.99	0.78	0.40	2.57	20
2004-2006	9.33	9.44	4.14	16.42	32	2.06	1.55	0.20	5.75	32
KW test p-value	0.001***					0.008***				
EV quartiles:										
1st (15-356)	6.11	6.12	3.30	9.42	15	0.82	0.75	0.12	2.28	14
2nd (356-682)	7.51	6.93	3.17	16.36	24	1.28	1.08	0.20	3.27	19
3rd (682-1476)	8.82	8.28	3.91	16.57	28	1.96	1.57	0.32	5.47	25
4th (1476-12377)	9.02	9.06	4.51	15.74	28	1.89	1.53	0.44	5.75	21
KW test p-value	0.002***					0.012**				

Table 11: Determinants of LBO Pricing

This table reports OLS regressions with LBO and public company pricing (measured as the natural logarithm of enterprise value to EBITDA) as dependendent variables. In regressions 1 thorugh 4 of panel A, pricing in LBOs is regressed on the natural logarithm of the enterprise value to EBITDA of public companies in the same Fama-French industry, the same year, and the same continent as that in which the LBO took place, market condition variables, and LBO deal and fund specific variables. Market condition variables are the previous 12-month return on local stock markets, the sum of local real LIBOR and the average spread in the U.S. leveraged loan market the concurrent month, and realized local inflation over the twelve months after the transaction. Deal specific variables are dummies for whether the deal is a public-to-private transaction, divisional buyout, secondary transaction, or independent private to private transaction (the left out category), and whether there are multiple buyers in the consortium (clubdeal) or not. Fund specific variables are the number of previous funds the buyout sponsor has raised, and the number of days since the last fund was raised. Aggregate LBO fund overhang measures how much uninvested capital there is in the buyout sector by taking the aggregate funds raised minus the aggregate funds invested. In regression 3, pricing in public companies is regressed on the same market condition variables. Regression 5 of panel A shows a regression of the median of natural logarithm of the enterprise value to EBITDA of industry-continent-year-matched public companies on market condition variables. Panel B shows the results of a two stage least squares regression where in the first stage leverage in LBOs is regressed on , the sum of local LIBOR and the average spread in the U.S. leveraged loan market the concurrent month, and the local inflation rate one year ahead. Robust White (1980) standard errors are in brackets. ***, **, * indicate that coefficients are statistically significantly different from zero at the 1%, 5%, and 10% levels, respectively.

Panel A

	LBO Log EV/EBITDA	LBO Log EV/EBITDA	LBO Log EV/EBITDA	LBO Log EV/EBITDA	Public Log EV/EBITDA
Public Co. Ln EV/EBITDA	0.35***	0.36***	0.33***	0.31**	
	[0.10]	[0.09]	[0.10]	[0.14]	
Local stock market TTM return		0.09	0.01	0.06	0.20*
		[0.14]	[0.15]	[0.16]	[0.11]
Libor + Lev. Loan spread		-0.07***	-0.06***	-0.06**	0.03*
		[0.02]	[0.01]	[0.02]	[0.02]
Inflation rate		0.01	0	0.03	0.05
		[0.04]	[0.04]	[0.05]	[0.04]
Public to Private			0.04		
			[0.11]		
Aggregate LBO fund overhang				0.07	
				[0.46]	
Number of prev. funds				0.02	
				[0.02]	
Years since last fund				-0.005	
				[0.038]	
Divisional			-0.14		
			[0.09]		
Secondary			-0.037		
			[0.113]		
Club deal			0.00		
			[0.08]		
Constant	1.36***	1.60***	1.74***	1.512***	1.66***
	[0.21]	[0.21]	[0.24]	[0.312]	[0.14]
Observations	97	90	90	81	134
R-squared	0.1	0.25	0.3	0.23	0.06

Panel B.

	IV	First Stage
	LBO Log EV/EBITDA	LBO Log D/EBITDA
LBO Ln Debt/EBITDA	0.89***	
	[0.16]	
Public Co. Ln EV/EBITDA	0.03	
	[0.11]	
Libor + Lev. Loan spread		-0.06***
		[0.02]
Inflation rate		0.0838*
		[0.0428]
Constant	0.54***	1.68***
	[0.20]	[0.15]
Observations	89	93
R-squared	0.56	0.11
Robust standard errors in brackets		
*** p<0.01, ** p<0.05, * p<0.1		