Long Goodbyes: Why do Private Equity Funds hold onto Public Equity?

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Abstract

We analyze how private equity funds manage the sell-down of their stakes in companies they have taken public in an IPO. The average duration of post-IPO investments is around 3 years, whereas lock-ups usually expire after only 6 months. During this additional period, the funds charge management fees and carried interest on their holdings. We analyze 564 fund investments in 330 U.S. companies that went public between 1995 and 2014, using detailed SEC filings to track sales, distributions, dividends, and GP board involvement post-IPO. We find that, on a buy-and-hold basis, these private equity-backed companies perform at least as well as public markets after IPO. However, we find no evidence that GPs add value for investors through the timing or speed of their sell-down strategies, but they are subject to behavioral biases associated with not selling losers. We estimate that the long goodbyes we observe cost LPs an extra 20% in management fees and carried interest, which equates to at least $10 billion for our sample. This research suggests that LPs should put pressure on GPs to have fast sell-down policies following the lock-up expiry, rather than holding onto the companies for years.

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I. Introduction

Public markets are an important exit route for private equity, but one which can take a surprisingly long time to complete. It is extremely rare for private equity funds to achieve total exit in an initial public offering (IPO), as public market investors are wary of buying shares from shareholders selling out completely. Furthermore, as they usually hold controlling stakes, private equity funds are subject to lock-up periods – typically of six months – following an initial public offering, which can delay further sales. Thereafter, however, they have discretion over the sale of their remaining holdings, and the wide variety of sell-down patterns they employ suggests that they exercise this discretion actively. This raises an important question. Do the general partners (GPs) of private equity funds add enough value by their active management of public shares to compensate the limited partners (LPs) for the annual management fees (usually 1–2%) and profit share (typically 20%) they pay them for doing so? The question is particularly pertinent because LPs could own the same shares directly or could delegate the job to public equity fund managers for a fraction of the cost. Our research takes advantage of the transparency of public markets to examine in detail how GPs act as the agents of LPs in private equity funds, and sheds light on a relationship which is otherwise not directly observable.

We analyze U.S. IPOs of portfolio companies that had been acquired in a leveraged buyout (LBO) by a private equity (PE) fund. Cao and Lerner (2009) refer to such IPOs as 'reverse LBOs' and we call them 'PE-backed IPOs'. Our main data source for share sales is the Securities and Exchange Commission (SEC) Edgar database, and the launch of that service defines our data sample, along with a requirement that we allow up to 5 years to track the post-IPO sell-down. We find 330 PE-backed IPOs over the period 1995–2014 which had fully exited by the end of 2017. There were 564 holdings by private equity funds in these companies, reflecting the fact that, for the larger LBO transactions that we study, GPs often club together when acquiring the company. We then track subsequent share sales, dividends, and any recapitalizations until final exit. On average we find that GPs take 2.5 years after the end of the lock-up period to exit fully. However, behind this average lies a significant range. In around 25% of deals, GPs have barely changed their holdings after 5 years. And some GPs hold onto stakes for over 10 years.

As GPs say their long goodbyes to the shares they still own in public listed companies, they typically remain on the board of these firms. As insiders with long experience of and insight into the portfolio companies, GPs may be able to time disposals skillfully and enhance the value of the fund for themselves and for the LPs. If so, they are acting paternalistically towards the LPs, doing a better job of managing public equity than the LPs, or a public equity manager, could do.

However, there may be less benign explanations. The decisions by GPs whether or not to sell down their listed holdings may be colored by behavioral biases, either their own, or those which they impute to other parties to whom they wish to appeal, notably potential investors in follow-on funds. Or GPs may be motivated by their own option-like compensation structure to pursue a disposal (or non-disposal) strategy that fails to maximize the value of the fund as a whole and is therefore at odds with the interests of the LPs.

We translate these ideas into three hypotheses, the first of which is a 'paternalism' hypothesis. Since LPs could own the public holdings of the funds themselves, we test whether the disposals of listed holdings by GPs add value to the fund beyond what the fund would be worth under two straightforward alternatives: (i) if the fund kept its entire post-IPO stake – that is, without making any disposals – until the date on which it did finally exit the company; or (ii) if the fund invested an amount equivalent to its entire post-IPO stake in a suitable market index for the same period. These are both buy-and-hold strategies, one for the shares themselves and the other for an index. For GPs to add value by their disposals, any outperformance would then have to exceed the difference between private equity and public equity fees. If the paternalism hypothesis is upheld, GPs would be using their skill and their inside knowledge of the listed company to enhance the value of the fund beyond what the LPs could do themselves.

Second, we test a 'behavioral' hypothesis, according to which the timing and volume of disposals by GPs are a function of the level of the share price of the listed company, even if this is economically irrelevant. For example, if disposals (after the end of the lock-up period) are more likely when the share price is above the IPO price, this might result from one or both of two effects: first, the disposition effect, whereby GPs are more willing to realize profits than losses (see Shefrin and Statman 1985), and, second, the anchoring effect, whereby the original IPO price serves as the dividing-line between profits and losses, even though this is only one disposal price among many in GPs' ownership of the portfolio company in question (see Tversky and Kahneman 1974). Any behavioral bias could be in the GPs themselves, or one which they impute to other parties, notably would-be investors in a follow-on fund who might construe a sale below the IPO price as a negative signal.

Finally, we test a 'conflicts of interest' hypothesis. The remuneration to GPs comes in two forms. First, there is an annual management fee, typically around 1–2% of the capital committed by the LPs for the first half of the fund's life and of the capital actually invested for the second half. Second, GPs earn 20% of any gains made by the fund, subject (in most, but not all, cases) to the fund beating an internal rate of return (IRR) hurdle (normally 8%). It is, perhaps, surprising that GPs can continue to charge management fees on public holdings, and this presents an incentive

to milk these fees by selling slowly. LPs might be more accepting of such behavior if fund-level performance is better. On the other hand, GPs whose performance has been poor, and who may not be able to raise a subsequent fund, will have clear incentives to eke out the existing stream of management fees. Regarding carried interest, by delaying the sell-down of their positions, the GP takes on market, as well as idiosyncratic, risk. This could be attractive if the overall fund is narrowly below the hurdle, as the payoff to the GPs is similar to that of a long position in a call option which is just out of the money. For funds that are in the carry, that is, above their hurdle, there will be a trade-off between keeping the market risk and banking the gains. We therefore test whether overall fund performance affects the time taken to exit these holdings.

Our main results are as follows. First, we document how PE firms actually achieve exit when they take their portfolio companies public. Only 3% of GPs achieve a full exit at the IPO. It is true that in around one-half of transactions, the GP does sell some shares at the IPO, but the median sell-down is less than 15% of their holding. For nearly three-quarters of transactions, the exit route continues with periodic block sales. On average GPs make 5.5 sales after the IPO, but the pattern and timing of the sell-down vary considerably. In most of the remaining transactions, the company was acquired before the PE fund achieved a full market exit. Finally, 22 of the 330 companies entered Chapter 11 before a full PE exit had occurred. We find that the average duration of PE fund holdings, calculated using the time-weighted cash flows, is 2 years following the IPO. The sale of the final stake occurs, on average, nearly 3 years after the IPO.

Second, we find that, on average the performance of these PE-backed IPOs is broadly in line with public market returns and we find no significant alpha using asset pricing models. There is no evidence, therefore, that PE funds squeeze the juice out of their portfolio companies which then perform poorly after the IPO. Performing in line with public markets would, over this sample period, have produced buy-and-hold returns of about 16% (21%) if the shares had been held for 2 (3) years after the IPO. Therefore, the carried interest payments on these retained stakes were significant. Recall that, had the GPs sold quickly and returned the proceeds to the LPs, the latter could have bought the shares and enjoyed such returns without paying any fees or carried interest.

Third, even though these PE-backed IPOs perform, on average, in line with the market, it could be that the GPs are able to add value for LPs by the timing or speed of their sell-down program. Using SEC data, we track the exact volume, price and date of each share sale, and calculate the actual returns earned by each GP following the IPO. We take as our starting point the end of the first day of trading to avoid including any IPO underpricing. This is necessary, as IPO underpricing is a cost to the fund, not a measure of the performance of the GP. On this basis,

the average investment multiple[1], from IPO to exit, is 1.13 and the IRR is 6.3%. However, the Kaplan-Schoar (2005) public market equivalent (PME) return has a mean (median) of 1.00 (0.96) relative to the Russell 2000 – which is probably the most appropriate market index given the size of reverse LBOs – and of 1.04 (0.99) relative to the S&P 500. None of these returns is significantly different from 1.00, and so there is no evidence that GPs added value on average through their sell-down strategy.

Fourth, we explore how returns would have differed if the public stakes had been sold differently. In order to ensure that all our counterfactual sell-down strategies are feasible we base them on strategies observed elsewhere in our sample. For instance, we base our 'quick sale' strategy on the pattern observed in the fastest quartile of sales. We also construct portfolios on the basis of naïve sales strategies of equal sell-downs at equal intervals. The most striking result is that, on average, GPs would have produced higher returns for their LPs had they adopted a 'quick sale' approach: investment multiples average 1.16, IRRs rise to 35% (in part reflecting the speed of the cash distributions to LPs), and PMEs are 1.11. Therefore, the long goodbyes of PE funds are costly for LPs.

Fifth, we take account of the fees and carried interest payments paid to GPs from IPO to final exit. As carried interest is earned at a fund level, we draw on reported fund returns to estimate whether carry is likely to accrue on each deal. We find that, after fees and carry, the post-IPO investment multiple across all deals has a mean (median) of 0.94 (0.88). Given that, gross of fees and carry, these PE-backed IPOs performed in line with public markets, it is to be expected that net PMEs are less than one: in fact the mean (median) relative to the Russell 2000 is 0.87 (0.83) with similar results found using the S&P 500. The cost to investors comes mainly from paying carried interest on the post-IPO gains. We find, on average, per deal payments of $83m to GPs, of which $74m is associated with carried interest. Had GPs adopted a 'quick sale' approach, total payments would have been $66m, saving $17m, or 20% of fees, per transaction. Since our unit of analysis is the 564 GP-portfolio company holdings, this suggests that around $10bn of fees could have been saved if PE funds had not chosen to hold onto their stakes so long. And recall that the quick sale gross returns were significantly higher as well. An alternative approach would be for GPs to distribute the shares to LPs immediately after the IPO. Although such an approach is largely hypothetical at present, as such *in specie* distributions are prohibited in many limited partnership agreements, our analysis suggests that the savings to LPs would have been even higher at around 24% of total fees, or $11bn across the sample of deals. While this would involve

[1] Investment multiples for private equity deals are the ratio of total value (cash received plus any residual net asset value) to amount invested. For this calculation, we treat the IPO issue price as the amount invested.

crystallizing carried interest payments at the share price on the day the stock was distributed (we assume at the end of the first trading day) rather than waiting until the shares were sold (by the GP) and the cash returned to investors, on average this approach would have served LPs well.

Our final analysis explores the factors that explain the duration of GPs holdings and the timing of share sales. We find, perhaps surprisingly, that long goodbyes are positively related to strong fund performance, rather than to poorly performing funds that are keen to retain management fee flows for longer. This hints at an explanation that GPs of funds that are performing well can 'get away' with slow disposals of the stakes in public companies. However, we also find strong support for a behavioral explanation: share sales are much less likely if the share price is below the IPO price, irrespective of how the market has moved in the interim. In principle, the IPO price should be irrelevant for sales occurring many months or years after the firm goes public. But GPs seem to anchor on the IPO price and hang on to their stakes if the price has fallen below this level. This sort of gambling for redemption generally does not work, as reflected in the poor returns for the longest of goodbyes.

Our paper makes a number of contributions to the literature. Previous research into private equity performance has analyzed the post IPO performance of PE-backed firms, but none has measured the value added by the disposal strategy. Cao and Lerner (2009) study a sample of 526 companies floated by PE firms between 1981 and 2003 and find evidence of neutral to positive performance from a portfolio of PE-backed IPOs using a buy-and-hold strategy. Cao (2011) finds that PE funds are more likely to retain post IPO holdings in firms which have high cash flow, and more likely to reduce duration or sell stakes in companies with high stock valuations. However, while post-IPO buy-and-hold performance is a measure of GPs' skill in stock selection, it does not in itself measure the post-IPO value added by GPs, which is also a function of their ability to manage down their holdings. We separate these two skill sets and find, in line with Cao and Lerner (2009), that GPs' stock selection adds modest value to LPs, but that this is more than wiped out by the GPs' actual disposals, which make the overall exit strategy costly for LPs.

More generally, our findings complement studies which have identified agency problems in private equity. Axelson, Stromberg, and Weisbach (2009) consider the incentives for GPs to put excessive leverage into portfolio companies, and Axelson et al. (2013) find evidence that GPs exhibit such behavior particularly when credit is cheap, exploiting their option-like contract at the expense of LPs. Phalippou (2009) highlights ways in which the compensation contracts between GPs and LPs theoretically give rise to conflicts of interest; for example, GPs may accelerate disposals to massage the fund's IRR in order to qualify for carried interest. We identify a previously

unidentified potential conflict of interest between GPs and LPs and benefit from the transparency of the public markets to analyze how GPs exercise the discretion afforded them by LPs.

Our findings on behavioral biases are, if anything, stronger than those on conflicts of interest. GPs' marked reluctance to sell below the IPO price is consistent with both the disposition and anchoring effects. In particular, our findings are in keeping with recent work by Akepanidtaworn et al. (2019) who analyze decisions by institutional managers of public-equity portfolios. They find that managers apply more skill to their buying than their selling decisions and they argue that this reflects either different psychological processes, with buying decisions being more belief-driven and forward-looking (compare Barber and Odean (2013) on the behavior of individual investors), or it reflects the selective allocation of limited cognitive resources. In our setting, as GPs' attention is dominated by investing in and adding value to new companies, they may overlook the holdings they still have in portfolio companies which are on the way out, or they may apply simple heuristics to disposing of them, most notably that of selling above the IPO price.

One obvious response to the findings of this paper would be to revise the limited partnership agreements (LPAs) that govern PE funds. While LPAs usually contain a clause that restricts the GP's ability to invest in public equity, such documents rarely govern the GPs' behavior with respect to (remaining) public stock holdings following the IPO of a portfolio company. Nor do they reduce, or remove entirely, management fees on holdings once they are publicly quoted. The inclusion of such provisions would go some way towards mitigating or obviating this conflict. More controversially, the results in this paper suggest that the tendency not to use *in specie* distributions of shares to LPs as soon as the stock starts trading, should be revisited. For our sample of deals, LPs who sold down such stakes rapidly (even if they were subject to a lock-up) would have gained significantly, by crystalizing carry at the initial trading price.

The remainder of this paper is organized as follows. In section II we describe our data sources and sample. Section III analyzes the performance of the portfolio companies after the IPO, and the performance of the GPs in managing the sell-down process. We produce gross and net (of fees and carried interest) returns and quantify the costs of the actual sell-downs we observe relative to feasible counterfactuals. Section IV explores the factors that determine GP sell-downs, and section V concludes.

II. Data and sample description

A. Private equity backed IPOs

For our analysis we require a comprehensive sample of private equity LBOs which led to an IPO in the United States and for which we can track subsequent share sales. The SEC EDGAR database provides this level of detail but only for IPOs that took place after 1995. We also require a period after the IPO to track the subsequent sell-down, and so we limit our sample to IPOs that occurred by the end of 2014, which were the exit routes for LBOs that had taken place between 1990 and 2013. We identify these LBOs using CapitalIQ and merge this with data on IPOs from SDC Platinum and CapitalIQ.

We gather information on, among other things, the date, enterprise value, and equity invested by the PE funds at the time of the LBO. We also track cash-flows between the LBO and IPO, such as dividends paid and shares redeemed, enabling us to produce information on the full life-cycle of these PE-backed IPOs. Details on the equity invested are needed to calculate the management fees that are charged after the investment period of the fund.[2]

In total there are 330 LBO/IPOs for which all the required data are available. For these transactions, there are 605 PE fund-deal pairs, reflecting the fact that funds frequently join forces to conduct an LBO. We exclude 41 that were still active as of January 2018. Our final sample therefore consists of 564 PE fund-deal pairs, involving 238 separate GPs and 330 IPOs that took place over the period 1995–2014, which had fully exited by 2017.[3]

Table 1 gives details of this sample. We track the companies after they go public, and in most cases the exit occurs via a series of share sales. We designate these cases the 'regular' sample. In addition, some companies are acquired before the PE fund has fully exited; we refer to this as the "M&A" sample. Finally, for 22 of the sample the exit was via Chapter 11.

On average the stake held by all private equity funds in each company is about 80% of the total shares. In a few cases in which the private equity funds hold less than 50%, control over the company is exercised via voting rights granted by other investors. The great majority of shares

[2] The typical fund partnership agreement defines an investment period of 4-5 years during which the GP charges management fees on the LPs' committed capital. After the investment period, management fees are usually charged on the basis of the remaining invested capital, and so the fee basis gradually reduces as investments are realized and the proceeds are returned to LPs.

[3] We identify a total of 10,790 LBOs between 1990 and 2013. The criteria for LBOs within that period to make our sample are (1) availability of Total Enterprise Value (TEV) and GP Equity invested at LBO, and (2) an IPO between 1995 and 2014. 851 PE fund-deal pairs satisfy these criteria. Excluding non-U.S. issuers and unit offerings leaves us with 676 PE-deal pairs. From these, we have to drop an additional 71 due to other missing data (financials, incomplete sales data etc.). 605 PE-deal pairs satisfy all criteria with full data availability. Of those, 41 PE-deal pairs were still actively invested after our sample period cutoff point of Dec. 31, 2017. Our core sample are therefore 564 fully exited PE-deal pairs.

floated in an LBO-backed IPO are primary shares, raising new capital that is mainly used to repay existing debt, as well as to redeem preference shares.[4]

We also track the board seats held by GPs on portfolio companies following the IPO. In around 85% of cases, the private equity fund(s) will have a board presence at the IPO and, as we shall show, this normally continues until – and sometimes well beyond – the sale of their final stake in the company. The distribution of our sample by date of LBO, IPO and final exit is presented in Table 2.

B. The exit process

Tracking ownership changes as the PE owners sell down their stakes in the companies is a time-consuming and challenging task. For our sample this has involved hand-collecting data from several thousand SEC filings, in particular Form 4, Form SC-13 and Form DEF14A. Full details of the data that we extract from the various SEC filings is presented in Appendix 1. In addition, Appendix 2 discusses the precision of the data that is available, in particular around the exact dates of sale transactions, which is important given the analysis we perform later.

Table 3 includes details of the deals from LBO to final exit. It should be recalled that our sample will contain a high proportion of successful deals, and so the summary statistics of this sample may well differ from the average deal in a fund. With that caveat in mind, the average period from initial LBO to IPO is 3–3.5 years. It is intriguing that the small set of companies that ultimately became bankrupt had noticeably quicker IPOs. The focus of our attention is on the post-IPO holding period which averages 2.7 years for those that continued as independent listed entities, and 3.2 years for those where the final exit for the PE fund occurred via an acquisition of their remaining stake. For the Chapter 11 sample, the post IPO holding period of the PE funds was much longer, averaging 4.8 years. This is the first indication, which will be confirmed in more detailed analysis later, that GPs find it hard to sell their losers.

The exit process for GPs can start with selling a stake at the IPO. As Table 3 shows, we observe such sales in under half of our sample and, on average, these involve the GP selling around 20% of their holding. Thereafter, the remaining stake may be sold down in a succession of transactions, culminating either in a final 'exit sale' or in a distribution of the remaining stock to the LPs. On average, and including any sale at the IPO, we observe 5.5 sales for our regular sample, and 3.1 sales where the ultimate exit is an acquisition. For the regular sample, each transaction is on average for about 18% of the GP's holding, although the final 'exit' sale tends to

[4] There are a few exceptions to these rules, and in 17 cases a full exit was achieved at the IPO. These are unusual cases and are not the subject of our analysis.

be around twice as large. For those companies that are acquired, the exit transactions are much larger, hinting that the PE funds may hold on to their stakes in anticipation of a potential takeover. The gaps between share sales are, on average, lengthy: 259 (681) days for the regular (M&A) sample.

Other interesting findings, also reported in Table 3, include the surprisingly negotiable nature of lock-up periods, as GPs manage to convince the underwriters to allow sales before the end of the lock-up period in 62 of the 564 GP-firm pairs. Such permission is only granted when the shares have performed strongly after the IPO. We also find that in around 20% of club deals involving more than one GP, the share sales are clearly coordinated, in the sense that all invested GPs sell shares on the same date and for the same fraction of their holding. Furthermore, we find that *in specie* distributions of shares play no important role in exit processes. 15.5% of all deals in the regular exit sample have an *in specie* distribution, and only 3.1% in the M&A sample (7.1% for Chapter 11). The total number of share distributions is even lower. As already shown in Table 1, of 2,726 separate share sale transactions across the full sample, only 200 (or 7.3%) are *in specie* distributions. As Table 3 shows, the average percentage of shares sold per transaction is at 9.9% for the regular exit sample. These numbers are much lower than those reported by Gompers and Lerner (1998) for the venture capital industry; however, this is perhaps unsurprising as *in specie* distributions are frequently prohibited in the private equity industry and generally were a much more common phenomenon in the 1980s and 1990s, the sample period covered by Gompers and Lerner (1998).

Table 3 reports sample averages which hide the considerable variation in how quickly sales occur post-IPO. This can be seen clearly in Figure 1, where we present how ownership evolves for the deals[5] with the fastest and slowest exits. The differences between the fastest and slowest quartiles are dramatic: GPs clearly can exit their stakes within about a year of the IPO if they choose to. On the other hand, many GPs opt to retain significant stakes many years after the IPO. Whether the GP is acting in the interests of LPs in holding onto stakes for so long is a key question that we shall answer. We also summarize, for the different sub-samples, the evolution of the shareholdings of GPs in the years after the IPO in Table 4. It is remarkable that over half of all deals in the 'regular' subsample have not exited within the first two years after the IPO, and for one-quarter of these deals exit has not occurred within 4 years of the IPO. Some GPs still hold onto stakes for more than a decade after the firm goes public. As already shown by the longer overall exit processes, even fewer deals fully exit within the first years after the IPO in the M&A

[5] When we refer to deals we always mean GP-portfolio company pairs. Therefore, when there are two or more GPs at the time of the IPO, we will treat them as separate deals, as they often have different sell-down strategies.

and Chapter 11 subsamples. It is also notable that those GPs that stay invested retain a significant stake, with ownership levels between 20 and 25 percent for the 'regular' exits and around 30 percent for the M&A subsample.

To provide further color on the types of exit strategy we observe in our sample, we include some case study examples in Appendix 4. These are representative of the range of strategies we observe, from a fast exit via a couple of large transactions, through systematic regular sales, to cases where there is no sell-down after the IPO for several years. We superimpose the share price onto these case studies, as our later analysis focuses on the returns to LPs, who could re-invest their money in other investments (such as the overall stock market) were the GPs to sell down their stakes and distribute the proceeds to the LPs. These examples also hint at the answer to our later analysis regarding the reasons that GPs may, in some cases, be reluctant to sell.

C. Board seats

The involvement of the PE funds is not limited to the role of shareholders, for they typically retain board seats after the portfolio company goes public. Again drawing on SEC data, as detailed in Appendix Table 1, in Table 5 we show typical board sizes of 7–8, with around half the seats being occupied by GPs of the fund(s).[6] On average we find that GPs remain on the board for 2–3 years after the IPO. In the case where the final exit is an acquisition, this invariably results in any remaining GP directors resigning at the same time. However, the same is not true for those companies that remain independently listed: in 42% of the GP director involvements, the exit occurs after the last share sale. This might hint at some personal attachment to the company, and might indeed raise questions with LPs about potential future conflicts of interest. The continued board involvement of GPs will make them insiders in the firm and so limit the periods during which they can trade (and mainly sell) shares. We analyze whether continued board participation by a GP influences the speed of sell-down in our econometric analysis.

Having described our data we now focus the remainder of the paper on performance – both of the portfolio companies post-IPO and of the GPs in their sell-down strategies.

III. The performance of PE-backed IPOs and of GPs in managing the exit process

In this section we focus on two questions. First, we analyze how the companies that GPs take public perform. By tracking the transactions back to the original LBO acquisition, we are able to measure the overall return that was earned on the deal – from start to ultimate exit. However,

[6] See Appendix 1 and 2 for details on the sources, and precision, of the information regarding boards of directors.

our focus is mainly on incremental performance after the IPO. Second, by tracking each individual share sale after the IPO, we test whether the GP added value for LPs by its sell-down strategy. We will also take account of the fees and carried interest that GPs earn while managing these public equities for the LPs.

A. The performance of PE-backed IPOs

In many countries, concerns have been raised about the performance of companies that PE owners bring to the public markets. There are certainly cases where portfolio companies perform very poorly after their IPO, and we observe some of these in our data. However, with our large sample we can analyze systematically how PE-backed IPOs perform. In many respects the analysis in this section mimics, albeit with an updated and expanded sample, that of Cao and Lerner (2009).

We take as our starting point the share price at the end of the first trading day. As has been well documented, IPOs are, on average, underpriced.[7] This underpricing is a cost to LPs (and GPs) and the focus of this paper is not on how well the GPs, in their negotiations with the underwriters, manage to keep IPO discounts to a minimum. Rather, we focus on the performance of the portfolio companies once they are traded on the public markets. In common with prior literature on IPOs, we use the end of the first trading day as our reference point, reflecting the fact that this level reflects the jump which IPO shares typically experience immediately after the start of trading.[8]

Table 6 presents various measures of performance over different periods. Starting in each case at the end of the first trading day, we divide the time following the IPO into the period from the end of the first trading day to the end of the lock-up period, and into the periods to the 1st, 2nd, and 3rd anniversaries of the IPO. In almost all cases the formal lock-up period is 180 days, but, as noted earlier, we see a significant number of cases where the underwriters use their discretion over the lock-up to allow GPs to sell earlier. This only happens if the share price rose strongly since IPO. For the moment, we take no account of the timing of GP sales over these periods; we simply track the performance of the 330 companies in our sample. If they cease to be listed the final return will be the final stock price on the day of delisting; therefore, the samples gradually shrink as the post-IPO period gets longer. In the last two columns of Table 6 we take account of the actual final exit date for the 564 GP-portfolio company pairs.

[7] For up-to-data details on the underpricing of U.S. IPOs, see Jay Ritter's website at https://site.warrington.ufl.edu/ritter/ipo-data/
[8] See, for example, Loughran and Ritter (2002).

We start with simple average raw monthly returns. These are positive, on average, over all periods, but it is noticeable that performance tends to be strongest during the lock-up period. This may point to skepticism about the value of companies that are taken public by PE funds, as reflected in their initial trading price, followed over the subsequent few months by increasing valuations. In any case, returns normalize at about 7–8% per year thereafter. Buy and hold returns, with dividends reinvested, present a similar picture.[9]

These raw returns largely reflect the fact that U.S. stock markets were rising over the sample period. Therefore, in the next blocks of Table 6 we re-calculate these performance measures relative to the S&P 500 and the Russell 2000. Arguably, the latter (which includes the smallest 2000 firms in the broad Russell 3000 index) provides a better benchmark against which to judge the performance of PE-backed IPOs, at least in terms of the typical mid-cap firm that PE funds acquire (as discussed by Harris, Jenkinson and Kaplan (2016)). We also calculate Jensen's alphas and Fama-French 3-factor alphas.

We find, on average, that PE-backed IPOs outperform public markets but mainly during the lock-up period. Thereafter the out-performance generally drops away and median monthly excess returns become insignificant. Mean PE-backed IPO returns continue significantly to beat market indices, reflecting the skewed distribution of returns. As for the returns earned until final exit for the company-GP pairs, median returns are not significantly different from the indices, marginally outperforming the S&P 500 but marginally underperforming the Russell 2000. A similar pattern is found for buy-and-hold excess returns, with initial impressive gains during the lock-up period, which then fall away. Median excess buy-and-hold returns turn negative by 2 years after the IPO.

Alphas tell the same story, whether we use a single factor or three-factor model. So the evidence is that PE-backed IPOs do not, on average, underperform. There is intriguing evidence that markets initially undervalue such companies, as witnessed by the strong run-up in prices during the lock-up period. Over longer periods the average returns are generally positive and significant, reflecting some very strong performers, and median performance is broadly in line with public market indices.

B. How well do GPs manage the sell-down process?

The results in the previous section track the performance of the companies after they IPO. In the months, and years, after (and sometimes before) the end of the lock-up period, the GPs have to sell-down their stakes and return the proceeds to the LPs. We now focus on how well they

[9] We are not aware that previous studies of post-IPO performance have documented superior performance between the IPO and the expiry of the lock-up; see Carter et al. (2011).

manage this process. Ultimately, we are interested in whether GPs are able to deliver returns in excess of the management fees and carried interest charged to LPs. If they are particularly good at choosing the right time to sell, then their 'paternalism' in holding onto stakes longer than strictly required may pay off for LPs.

We construct metrics that mimic the way private equity performance is measured. However, for our purposes, we measure returns not from the initial investment by the fund, but rather from the end of the first trading day after the IPO. For this sell-down period we construct the total value to paid in (TVPI), which is often referred to as the investment multiple. The value of the shares held by the fund at the end of the first trading day is the paid-in capital in this calculation, and we then track all subsequent cash-flows from sales until the final exit. Using these values and cash flows, we also construct an internal rate of return (IRR) for each deal.[10] Finally, we measure returns relative to public markets using the Kaplan-Schoar (2005) public market equivalent (PME) measure, for both the S&P500 and the Russell 2000.

The results are presented in Panel A of Table 7. Across all deals the investment multiple for the post-IPO holdings is 1.13, which is consistent with the evidence on the performance of the portfolio companies once they go public. For the companies whose ultimate exit is by an acquisition, the overall investment multiple is slightly higher (at 1.20) than for those where the company remains independent and listed (1.17). Not surprisingly, those companies that enter Chapter 11 deliver disappointing returns, losing 84 cents on the dollar. The fact that the full dollar is not lost reflects sell-downs before the companies enter Chapter 11.

The overall IRR over the period after the IPO is 6.3%. Interestingly, for the regular sample the returns are significantly higher (at 11.8%) than the M&A sample (7.4%). This suggests that the latter group may be held onto for longer, and may initially perform poorly before being acquired, with the PE fund holding on for such an exit. We shed more light on this pattern later.

Neither investment multiples nor IRRs control for movements in public markets, which were generally rising through our sample period. Since the LPs could have reinvested any proceeds from sales of the stakes in these PE-backed IPOs in public markets, it is particularly relevant to benchmark the post-IPO performance against public market indices. The Kaplan-Schoar (KS) PMEs do this, taking account of the precise dates of the cash-flows, where performance in line with public markets is reflected in a PME of 1.0. The results in Table 7 show that, on average, following the IPO, the sell-down process resulted in returns that are a little above 1 for the regular sample (1.1) and the M&A samples (1.05), when measured relative to the S&P 500. Including the

[10] This post-IPO IRR is not to be confused with the actual deal-level IRR we calculate based on all pre- and post-IPO cash flows, as is used later for deal fee calculations.

companies that became bankrupt results in an overall return that is very close to 1. When measured relative to the Russell 2000 slightly lower PMEs are observed: mean (median) PMEs of 1.04 (0.99) for the regular sample and 1.03 (0.96) for the acquired sample.[11]

In general, these average PMEs are not significantly different from 1.0, except of course for the bankrupt sample. This suggests that, before any consideration of the costs that PE funds charge for managing these public investments, investors earned returns that were in line with the market over the sell-down period. There is, therefore, no evidence of GPs adding value from knowing when and how quickly to sell their stakes.

C. What are the returns to investors after GP fees and carried interest payments?

One of the main motivations for this study is to understand why private equity funds continue to hold onto their public shareholdings for so long. One potential reason is the fee structure mentioned in the introduction. In this section, we produce estimates of the net returns that investors receive, after fees and carried interest payments. The arrangements are complex, and so we start by going into the relevant details.

The management fee is typically 1–2% per annum and is calculated as a fraction of the committed capital (i.e. the amount the LPs agree to invest in the fund, rather than the amount actually invested) during the defined 'investment period' of the fund (typically the first five or six years) and as a fraction of the net invested capital thereafter. It is challenging to track the net invested capital figure for LBOs, and we start by obtaining the initial equity invested in the deal. An example of the sort of disclosure we rely upon is presented in Appendix 3. Then we adjust the initial amount invested over time (proportionately) for share sales as they occur. Thus, if the initial invested amount was $100, and the fund sold 20% of its stake at the IPO, the post-IPO opening basis for the fees would be $80. If they sold their remaining stakes in 4 equal tranches, the fee basis would step down to $60, $40, $20, and then 0. We compute management fees over time on this reducing net invested capital basis. Management fees are themselves not generally revealed, but we use data on fund terms from Preqin to estimate appropriate fee levels. The data provided by Preqin is anonymized, but we are able to impute average management fees by fund size and vintage year and use these to approximate the fees charged by the funds in our sample.

[11] Previous evidence on absolute and relative performance numbers mostly exists based on buyout fund-level cash flow data. Robinson and Sensoy (2016) measure a TVPI of 1.51, S&P-PME of 1.19 and IRR of 9% for a proprietary data set of 542 buyout funds (85% U.S.) over 1984-2010. Harris, Jenkinson and Kaplan (2014) report a TVPI of 1.55 (2.02), S&P-PME of 1.27 (1.27) and IRR of 10.1% (17.5%) for the 2000s (1990s) using Burgiss data on 598 U.S. buyout funds. For a sample of 169 buyout funds in the Venture Economics database between 1980-2001, Kaplan and Schoar (2005) report a TVPI of 1.83, IRR of 18%, and S&P-PME of 0.97. Given that we measure deal- and not fund-level TVPIs, IRRs and PMEs using post-IPO cash flows only (thereby excluding all pre-IPO cash flows), our numbers are not directly comparable.

Carried interest is the GPs' share in the appreciation of the fund. It should be noted that carry is paid on the basis of the performance of the overall fund rather than any particular investment. We use the anonymized Preqin data on fund terms to estimate the carried interest payments and hurdle rate for each fund. Typically the GPs are paid 20% of the total appreciation in the fund's value (after management fees) as long as an IRR 'hurdle' of 8% is cleared. Figure 2 shows how the GPs' share in the appreciation of the fund depends on the fund IRR relative to the hurdle rate. We assume a 'full' catch-up between 8% and 10%, that is, one in which the GPs earn 100% of the appreciation in fund value when the IRR stands between 8% and 10%, and 20% of its appreciation when the IRR is above that level. The monetary value of the fund's appreciation is measured in terms of the investment multiple (TVPI). Therefore, while the IRR determines whether carried interest is paid at all, the TVPI defines how much.

Although carry is paid on a 'whole fund' basis we start our analysis by analyzing the post-IPO net returns on a deal-by-deal basis, assuming that the hurdle rate has to be achieved from the end of the first trading day (which is the starting point of our analysis). Using this lens will introduce a positive bias (as not all funds will be in the carry) and a negative bias (as deals may, from their inception, have exceeded the hurdle rate, even if they do not do so in the post-IPO period). However, the advantage of this approach is that we do not require the actual fund performance information, which is only available for a sub-sample of our deals.

Using this approach, we calculate the extent of the fees that are charged by private equity funds on these public company holdings in Panel B of Table 7. The results are striking. The average management fee and carried interest payments per deal for the period after the IPO total over $83m. Across our 564 GP-deal involvements post-IPO management fees therefore total $5bn and carry payments total $42bn. To be clear, this figure does not include any fees or carried interest earned prior to the first trading day. Relative to the total fees and carried interest payments that were associated with each deal, from LBO to exit, the post-IPO period contributes, on average around 17% of these fees. As we discuss below, not all of these fees could have been avoided – since GPs are subject to the lock-up period, and there are practical limitations to how quickly they could sell down their stakes – but the sums involved are clearly significant.

As a robustness check we estimate the fees and carried interest payments for the subset of 368 deal involvements where Preqin report performance data[12]. The gross and net returns for this sample are presented in Appendix 5, and are similar to those presented in Table 7. We then, in Appendix 6, re-estimate our 'deal-by-deal' management fee and carried interest payments for this sub-sample, and find average fees are somewhat higher at $102m per deal (recall that in the

[12] Preqin is one of the few private equity databases to reveal the names of the funds, rather than reporting on an anonymized basis.

overall sample the average was $83m). This suggests that Preqin may have a bias in its performance data towards the larger funds, since these will do larger deals which pay higher fees and carry in $ terms. With this caveat in mind, we then compute the incremental (post-IPO) carried interest payments for only those deals where the fund is, at the end of its life, in the carry. Management fees and 'whole fund' carry total $120m per deal, which is noticeably higher than our deal-by-deal estimates (of $102m per deal). This suggests our estimate of $42bn in carry payments for the whole sample is conservative.

To understand the scale of the carried interest payments, which constitute the vast majority of the payments to GPs, it is worth recalling that over this period the public equity tide was coming in, and all boats were rising. GPs received, by virtue of their limited partnership agreements with LPs, 20% of the profits arising from the general upward drift in markets. As we have already shown, there is no evidence that GPs add value when disposing of stakes. But the incentives produced by carried interest provisions provide a powerful incentive to hold onto stakes and benefit from the general tendency for markets to rise. We return to these incentives in section 4.

Using the information we gather on IRRs, hurdle rates, fund performance, and deal-level returns, we simulate the net returns to investors (i.e. after fees and carry). These results, also in Panel A of Table 7 are striking. None of the net investment multiples is above 1, meaning that any gains were more than absorbed by payments to the GPs. All the post-IPO IRRs are negative, with the overall sample average being -10%. The PMEs are also well below 1, whichever index is used as a benchmark. Therefore, investors would have been much better off if the GPs had sold the shares immediately after the IPO and distributed the proceeds to investors, so that they could re-invest them directly in the market (or indeed, the company that had gone public) without paying private equity fees.

Of course, selling the entire stake in a company immediately after the IPO is not feasible for two main reasons. First, the GP stakes are subject to a lock-up period. Second, for most stocks there would be limited capacity to absorb a very large stake, and so it can make sense to dispose in several blocks (as we see in the examples in Appendix 4). Therefore, we need a fair counterfactual to define the 'discretionary' retained holdings of GPs, which we develop next.

D. Post-IPO performance using feasible sell-down strategies

There are clearly complexities in selling a controlling stake in a company into a market with limited liquidity. The examples we document in Appendix 4 demonstrate a variety of different approaches, from a few quick block sales to a drip-feed approach. In this section, we produce simulations for the performance that could have been achieved using 3 feasible disposal

strategies. This may help to inform investors about the strategies likely to produce the best net returns. However, it is obvious that the interests of the LP and GP may not be aligned in this respect, as an important potential driver of higher net returns will be lower fee and carry payments.

We base our hypothetical exit strategies on those we observe in the data. We start by simulating a naïve sales strategy in which 5 blocks of equal sizes are sold at equal intervals over a total holding period of 1,079 days. This total holding period and number of sales mimic the averages in our sample. We then apply this sell-down strategy to every GP-company pair in our sample and calculate the returns. As would be expected, the results are reasonably similar to those observed in Table 7 (which are based on the actual sell-down strategy of each deal) and act as a benchmark against which to judge our other simulated strategies.

We then split the sample into quartiles according to the speed of exit. For the fastest quartile of deals full exit was achieved, on average, within 266 days of the IPO. In contrast, for the slowest quartile full exit did not occur until 2,268 days (over 6 years) after the IPO. We again make assumptions about the size and frequency of sales during the disposal period based on the patterns we observe in our sample. By basing our hypothetical exit patterns on the data, there should be few remaining doubts about the feasibility of executing such strategies. One obvious potential limiting factor is liquidity of the particular stock, and we explore whether this explains the sell down patterns in our econometric analysis in Section 4.

We then simulate what the returns would have been, gross and net, if each IPO in our sample had followed these strategies. The results are presented in Table 8. The clear conclusion is that quick exits produce higher returns – for the PE fund – across all our metrics. Starting with gross returns, the investment multiples of 1.16, IRRs of 35% and PMEs of 1.12 obtained by simulating the fastest quartile of sell-downs are all higher than the corresponding returns for the overall sample in Table 7. It is therefore obvious that the same must be true on a net basis, as quicker exits reduce on-going management fees. The net returns for exits based on the fastest quartile of sell-downs are close to neutral for investors: investment multiples of 1.0, IRRs of 6% and PMEs of around 0.95. Therefore, had all GPs, in the event, sold down their stakes as quickly as the fastest GPs actually did, the investors would have had few reasons to complain.

In contrast, the long goodbye strategy, mimicking the slowest 25% of sales, produces noticeably lower returns. In gross terms IRRs are negative, investment multiples are around 1, and PMEs are consistently below 1. The net returns show significant value destruction for LPs, with investment multiples of 0.9, IRRs of -11% and PMEs around 0.75.

In Panel B of Table 8 we calculate the total fees and carried interest payments that would have been associated with the various sell-down strategies. Each of these is feasible. In

particular, the fast exit strategy generates total fees of around $66m per deal. Since our unit of analysis is the 564 GP-portfolio company holdings, this suggests that around $10bn of fees could have been saved if PE funds had not chosen to hold onto their stakes so long.

As a final analysis, we consider how LPs would have fared if GPs had distributed the shares in the companies *in specie* at the end of the first trading day. Over time, limited partnership agreements have increasingly ruled out such distributions, on the grounds that it is part of the GPs' role to manage disposals and that carried interest payments should be paid on a cash-to-cash basis. However, the analysis to date suggests that it might actually be in LPs' interests to receive the shares immediately after the IPO, rather than allow the GPs to manage the process on their behalf. The increasing trend for investors to manage portfolios on a factor-basis (Ang 2014), and so not to make sharp distinctions between private and public equity reinforces this point. Therefore, in Appendix 7 Panel B, we simulate the effect of GPs distributing the shares in full to LPs on the day after the IPO, and paying carry on the basis of the closing share price on that day. For the sub-sample of funds for which we have fund level returns we find total average carry payments (there will be no incremental management fees) of $91m. This is around 24% lower than the actual fees and carried interest payments on this sub-sample and if applied to the whole sample of deals would result in even higher savings of just over $11bn.[13] This reflects the fact that GPs earned carried interest payments on the general upward movement in share prices during the lock-up period.

The results in this section have shown that (a) PE-backed IPOs perform, on average, in line with public markets with some out-performance during the lock-up period, (b) GPs do not, on average, add any value through the timing of their sell-down strategies, (c) management fee and carried interest payments to GPs total around $47 bn in our sample, and (d) fast, algorithmic sell-down strategies, based upon those observed in our sample, would have produced the highest gross and net returns for investors, and reduced fees by around $10 billion, and would have produced higher gross and net returns for LPs, (e) the thought experiment of a full in specie distribution of shares from GPs to LPs at the end of the first trading day produces an extra billion dollars of savings for LPs.

The main unanswered question at this point is, what explains the sell-down strategies of GPs? Is there evidence that they are responding to the fee and carried interest incentives? If so, we might expect to see somewhat different behavior depending on the performance of the fund

[13] The average actual fee and carried interest payments in the full sample are $83.43m. A 24% saving on this sum for the 564 deals would have been $11.29 bn.

(as some poorly performing funds will not pay carried interest). Or, as we discuss in the introduction, are GPs subject to behavioral or other biases? These issues are discussed next.

IV. What explains how quickly GPs sell-down their stakes after IPO?

The previous section presented evidence that allows us to reject the 'paternalism' hypothesis: the sell-downs of listed holdings by GPs in PE funds do not add significant value to the LPs in the fund. In this section we explore the factors that determine when GPs sell their stakes after the lock-up period. Specifically, we test the 'behavioral' and 'conflicts of interest' hypotheses to see whether sell-downs are motivated by factors other than performance.

For the behavioral hypothesis we test whether the timing of sell-downs depends on where the share price of the listed company is in relation to its IPO price. The null hypothesis here is that the price relative to the IPO price has no bearing on the timing of sales. The relationship between the IPO price and the disposal price, unadjusted for relative performance or risk, should be accidental, and should not determine the timing of disposals. If, by contrast, we find that disposals are more likely when the share price is above the IPO price, this would be consistent with behavioral explanations, in particular the disposition effect (reflecting a greater readiness to take profits than losses – see Shefrin and Statman (1985)), and the anchoring effect (in which the anchor here is the IPO price – see Tversky and Kahneman (1974)). Any behavioral biases could be in the GPs themselves, or there could be biases that they rationally impute to other parties, notably would-be investors in a follow-on fund who might construe a sale below the IPO price as a negative signal.[14]

For the conflict of interest hypothesis we test whether sell-downs are a function of the performance of the fund at the time of the sale. In particular, we test whether the likelihood of a sale is higher when the fund is reporting an IRR that is above the hurdle rate required for the payment of carried interest. Here the null hypothesis is that the current fund IRR has no bearing on disposals, as we should expect if GPs were focused solely on the interests of the LPs. Alternatively, GPs may be more reluctant to sell down their listed holdings when the fund IRR is below the hurdle, because this would destroy the potential for that holding to take the IRR back above that level into carried interest territory. The conflict of interest hypothesis, if upheld, is consistent with an agency problem, namely, that the timing of disposals reflects the structure of

[14] It may be that GPs are aware of the irrelevance of the IPO price to the timing of disposals, but impute to other parties a belief in its importance. The other parties could include potential investors in a follow-on fund to whom the GPs wish to present positive information about the old fund. In this case, behavioral and agency effects are combined.

the GPs' own compensation from the fund rather than the maximization of the performance of the fund itself.

We test these hypotheses in two ways. First, we use a regression model to explain the duration of the disposal program as whole for each deal-GP. Second, we use monthly data and a probit model that allows us to analyze the timing of each individual transaction. We consider these in turn.

A. Modeling the overall post-lockup sale program

A summary measure of the speed of disposal, as presented in Table 3, is the post-IPO deal duration. For each deal-GP this measures the time-weighted cash flows from share sales. There are clearly many potential explanations of post-IPO duration.

First, there are fund-level factors, such as the current performance of the fund, whether it is above the hurdle rate, and whether it is outside the investment period at the time of the IPO (which impacts on the incremental management fees after the IPO).

Second, GP-level variables could explain behavior: whether the GP is experienced, and whether it is fundraising at the time of the IPO. In the case of the latter, for example, it might help fundraising to have fully exited the deal when trying to raise a follow-on fund.

Third, the share price performance of the company may influence duration. This is particularly relevant to test the behavioral hypothesis: are GPs influenced in any way by how the company performs relative to the IPO issue price. In principle, bygones should be bygones, but we can test whether this is the case for GPs.

Fourth, there are potential portfolio company factors, such as how well the company had performed – for instance in terms of the investment multiple – in the period until the IPO. It might be that, for example, if an investment had already produced a handsome return by the time of the IPO, that GPs may be tempted to cash their gains in quickly. Also, the liquidity of the stock once it starts trading could clearly impact on the disposal pattern.

Fifth, it could be that features of the IPO affect holding periods. Underpricing at the IPO, or whether the GP sold any shares at the IPO, and therefore achieved a partial exit, could potentially influence post-IPO behavior.

The combination of variables we choose for each of the five categories is rooted in the previous private equity literature. For example, a GP's reputation as e.g. proxied by its historical fundraising volume can impact its deal activity (Demiroglu and James (2010)) and therefore perhaps also affect the exit strategy. It is also established that fundraising activity impacts a GP's behavior in a variety of ways, for example by causing GPs to actively adjust reported return

numbers (Brown, Gredil and Kaplan (2019)). Additionally, fundraising activities, which are also tied to fund performance, can create strong incentives for GPs to realize investments via exits (Barber and Yasuda (2017)). Post-IPO exit decisions might therefore be driven by these factors. On portfolio company-level, there is evidence that GPs seek to add value by restructuring the operations of their portfolio companies and that the exit strategy is linked to the successful implementation of these restructuring activities (Gompers, Kaplan, Mukharlyamov (2016)). Additionally, there is evidence of a relationship between operational performance and the decision to go public (Degeorge and Zeckhauser (1993), Holthausen and Larcker (1996)), so the relationship between operational performance and post-IPO exit needs to be controlled for as well. To capture this effect, we control for the financial and operational success of the company through the EBIT Margin and post-IPO dividend payments. The third 'success' indicator are pre-IPO cash flows from the portfolio company to the GP, as they might influence the post-IPO exit strategy (Fuerth and Rauch (2015)).

Besides that, we control for a number of additional factors covering various deal features which might influence the exit decision of a GP. We include the number of board seats held by a GP, whether the board seats are retained until after the exit, the absolute size of the LBO represented by the company TEV at LBO, the total GP equity ownership at LBO, and the complexity of the LBO's funding structure represented by the total deal leverage and the number of different debt facilities. Finally, we include a proxy for the U.S. LBO market at the time of the IPO to capture potential market-side effects impacting the exit decision. For example, a GP might be inclined to sell shares quickly in order to free up resources which could be used to create deal flow in a 'hot' LBO market. Full details on the sources and definitions of all these cross-sectional variables are given in Appendix 7, and summary statistics for the variables are presented in Appendix 8.

We run various regressions, each at the GP-deal level and using duration as the dependent variable. The results are in Table 9. We start, in column 1, by including only a measure of the share price performance after the IPO. Since we have a cross-sectional regression, we compute the proportion of days the share price was above the IPO price. The hypothesis is that GPs may hang onto deals if the performance is weaker. And in particular, they may 'anchor' on the IPO price. We also include a full set of control variables. We find a strong, and highly significant negative relationship between trading price and duration. This means that the higher the proportion of days when the trading price exceeds the IPO price, the shorter the deal duration. In other words, GPs sell their winners and hold onto their losers.

We construct different measures of share price performance in columns 2 and 3 – the absolute stock return from IPO to exit, and the share price performance relative to the market. These are clearly different types of variables, and do not capture any time series features of the share price performance after the IPO. In the case of the absolute return, the relationship is again negative and significant. However, the performance relative to the market, while negative, is insignificant. It seems that GPs may be more influenced by absolute performance ("is the share price higher than the price we set at IPO") than relative performance, which again is consistent with behavioral biases.

In column 4 we add fund and GP variables to the first model. We are not able to source data on fund performance for all funds, and so our sample size drops to 325. We find a significant positive coefficient on a dummy variable that equals 1 if the fund performance, around the time of the sell-down, was above the hurdle rate (which we take to be 8%). This suggests that funds that are performing relatively well are more likely to sell-down slowly. It could be that LPs are prepared to tolerate such behavior – which, as we have shown, is generally against their interests – if the performance of the fund has been good. In other words, permitting slow sell-downs is akin to an additional discretionary fee. However, since, as far as we are aware, this is the first paper to document the extent of the incremental fees, and poor net performance, associated with long goodbyes, it may simply be that the LPs did not actively monitor or comment on such practices.

Similar results are found in columns 5 and 6 when we replace the fund-in-carry dummy variable with continuous variables, capturing the IRR of the fund and the extent to which the fund IRR exceeded the hurdle. These variables are also significant, but marginally so, and suggest that the incentive to hold onto stakes does not necessarily increase linearly with the performance of the fund.

We perform a series of robustness tests which are presented in Appendix Table 9. First, we replace the exit duration with the exit length (in years) and the post-IPO lockup duration as dependent variables. Even though we see a few cases in which GPs sell shares during the lockup period, an argument can be made that the 'true' sales process starts after the lockup period ends. Additionally, we replace our duration variable with the actual calendar time until the final exit. These alternate dependent variables do not change our results.

Second, we explore whether sampling issues bias our results. When including the PE fund-level variables, our sample is restricted to deals for which Preqin data is available. We therefore re-run our original regression model (1) from Table 9 using only the sample deals for which Preqin fund-level data is available to confirm that sampling restrictions do not seem to be an issue.

Third, we run a Cox Proportional Hazard model (following Cox (1972)) using the time between IPO and exit as the 'time to failure' and the actual exit as 'failure event', with the same set of independent variables as in our main models from Table 9. In doing so, we are able to include the 41 PE-deal pairs that were still active as of December 2017 and therefore excluded from our main 564 sample. All our results are confirmed.

Finally, we re-run our regression model with a slightly different set of independent variables. This allows us to show that our results hold when we replace the (control) variables of our main regression model with different proxies. We replace GP historical fundraising as a proxy for reputation and size with GP age, the EBIT Margin as a proxy for the operating performance of a company with Return on Assets, the length between LBO and IPO with a 'Quick Flip Dummy' (as proposed by Cao (2011)), and the leverage indicators with the cost of debt. We also replace the U.S. LBO market volume with the M&A market volume and introduce an average EBITDA valuation multiple across all LBOs in the IPO quarter. The multiple is especially relevant as the existing literature shows that valuation levels can strongly contribute to value creation in portfolio companies (Guo, Hotchkiss, Song (2011)) which in turn might affect the exit strategy (Gompers, Kaplan, Mukharlyamov (2016)). All our results are confirmed. A detailed description of all variables and their summary statistics can be found in Appendix 7 and 8, respectively.

B. Modeling individual sales

Our final analysis explores whether we can explain the occurrence of individual share sales and the volume of any such sales. Therefore, the unit of observation becomes each month from IPO to exit in each GP-company pair. We use a probit model to test whether we can explain the occurrence of a share sale in a particular month, and a tobit model to explain the volume of such sales. We use similar, time series variants of, the explanatory and control variables. Full details of the time series variable can be found in Appendix 10 along with summary statistics in Appendix 11.

The probit results are reported in Table 10. The model in column 1 focuses on the behavioral hypothesis, where we find that the probability of a share sale is significantly higher when the trading price exceeds the IPO price. In this time series framework we can also test whether liquidity has an impact on sales, and we find weak evidence that it does. When (lagged) trading volume is high relative to recent history, the probability of a sale increases. We also find a strong correlation, as would be expected, between sales and board exits. When we add fund performance measures, which reduces the sample by more than a half, the significance of the share price being above the IPO price remains constant. There is again evidence that share sales

are less likely to occur when the performance of the fund is strong, although the economic importance, and statistical significance of, this effect are dwarfed by the price effect.

The multivariate tobit regressions in Table 11, explaining the volume of sales in a given month, tell a similar story. The amount of stock sold in a given month is driven mainly by whether the share price is above the IPO issue price, with some weak evidence that sales are more likely after share price run-ups (over the prior month). There is again no evidence that market-adjusted performance is a significant driver of sales volumes. In the tobit regressions, fund performance measures are generally insignificant.

V. Conclusions

This paper documents a surprising feature of IPOs conducted by private equity funds: many GPs sell down their holdings slowly, and, in extreme cases still hold stakes a decade after the IPO. In this paper we investigate the impact of this on LPs. Whilst there are some obvious constraints on when, and how quickly, the GP can sell-down the holding – in particular lock-up periods, and market liquidity – we use this public environment, where evidence can be sourced from the SEC and market data, to test three hypotheses about the behavior of private equity GPs.

First, we test whether GPs are acting 'paternalistically' towards LPs and, by their sell-down strategies, do better for LPs than LPs could have done for themselves. After all, if GPs had sold the fund holding in the firms quickly after the IPO, the LPs could have decided whether to re-invest the proceeds in those firms. By holding onto stakes long after the IPO, the GPs are essentially imposing continued ownership on the LPs. To address this we first examine the performance of these PE-backed IPOs and find that, on average, it is broadly in line with the market, and better than the market during the lock-up period. Since markets have been rising over our sample period, this resulted in significant absolute returns during the post-IPO period. Therefore, there is no evidence that GPs have squeezed the juice out of their portfolio companies before dumping them onto public investors. We then test whether GPs add value through their (often protracted) sell-down strategies. We find, on the contrary, evidence that LPs would have been better off, in terms of gross returns, had GPs adopted a quick-sale approach after the end of the lock up period. Therefore, we find no evidence to support the paternalism hypothesis.

The second hypothesis we test relates to conflicts of interest. The generally positive absolute returns earned over the post-IPO period produce significant incremental carried interest payments for GPs, along with continuing management fees. We estimate these at $47 billion over our sample, a figure which covers only the fees and carried interest payments *after* the IPO. Net of

these payments to the GPs, the returns to LPs are, on average, negative during the sell-down period. By adopting a fast-sale approach, GPs could have saved LPs about 20% of the combined management fees and carried interest payments for the post-IPO period, or some $10 billion for our sample. Therefore, there is evidence that GPs exploit the conflict of interest associated with the carried interest and management fee provisions to the detriment of the LPs.

Finally, we explore whether we can explain the cross-sectional duration of post-IPO holdings and the time series occurrence and volume of share sales. We are particularly interested in whether there is evidence for behavioral biases influencing GP sell-down strategies. We find persistent, and highly significant, evidence that share sales are more likely when the current trading price is above the original IPO issue price, even several years after the IPO. This is consistent with both the disposition effect, whereby GPs are more willing to realize profits than losses, and the anchoring effect, whereby the IPO price serves as the threshold between profits and losses, even though it is only one disposal price among many in the life of the GPs' ownership of a portfolio company and is economically irrelevant. When we analyze the impact of overall fund performance on these patterns we find that high performers hold onto their stakes for longer, which might signal that LPs are more tolerant of long holding periods when the fund has performed well.

The obvious question that this research raises is: should GPs continue to earn carried interest and management fees on holdings of public equity? After all, mutual fund managers that include the same companies in their portfolios do not take home 20% of any absolute returns, and generally would earn far lower management fees. While there are problems in re-casting limited partnership agreements to deal with these issues (for instance, at what point should carried interest be struck?) this research suggests a quick win for LPs would be to insist that the long goodbyes should be replaced by immediate separation.

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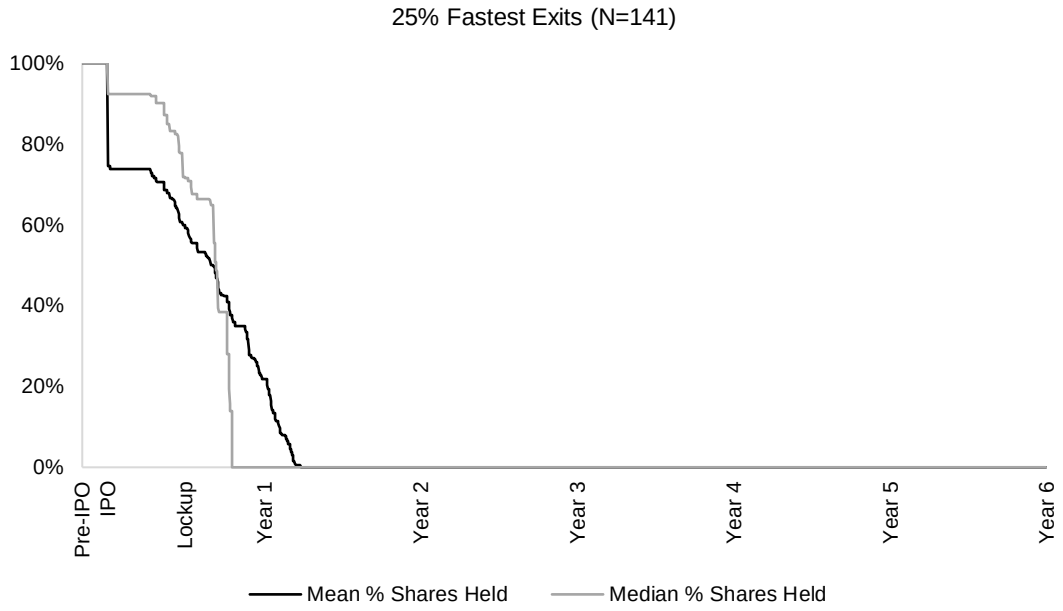
Figure 1. Exit Processes

The displayed graphs show exit processes for the 25% fastest and slowest exited deals in the sample of all fully exited deals (N=564). 'Fast' and 'slow' is measured as the time from IPO to last share sale. The graphs display over time the mean and median %-ownership of shares the GPs hold in their respective portfolio companies in relation to the total number of shares they held at the IPO (i.e. not the GPs' total %-ownership of the portfolio company as a whole). The total number of shares held by a GP pre-IPO is defined as 100%.



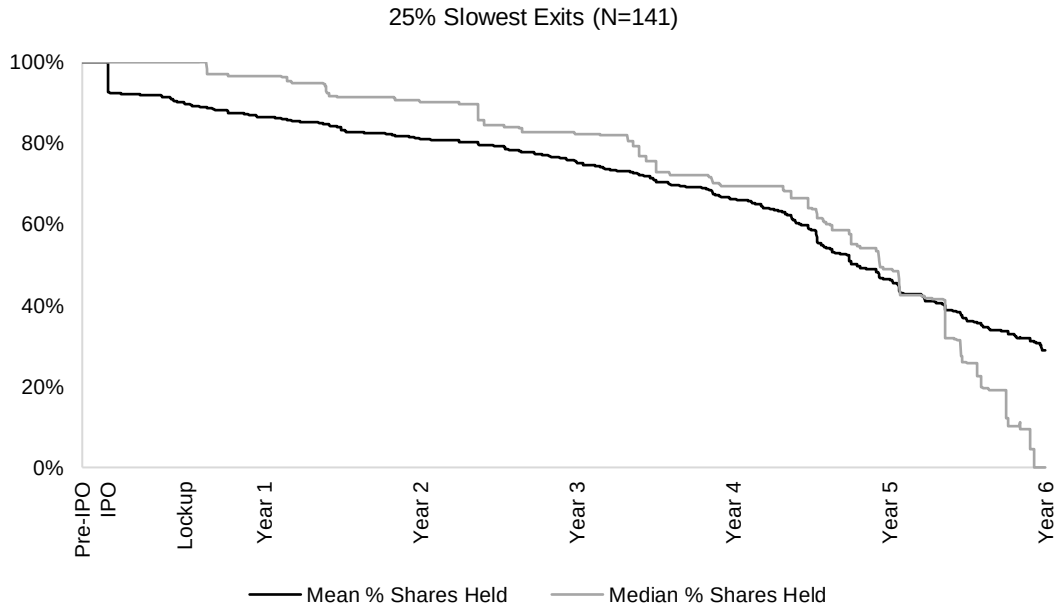


Figure 2. Carried Interest Provisions

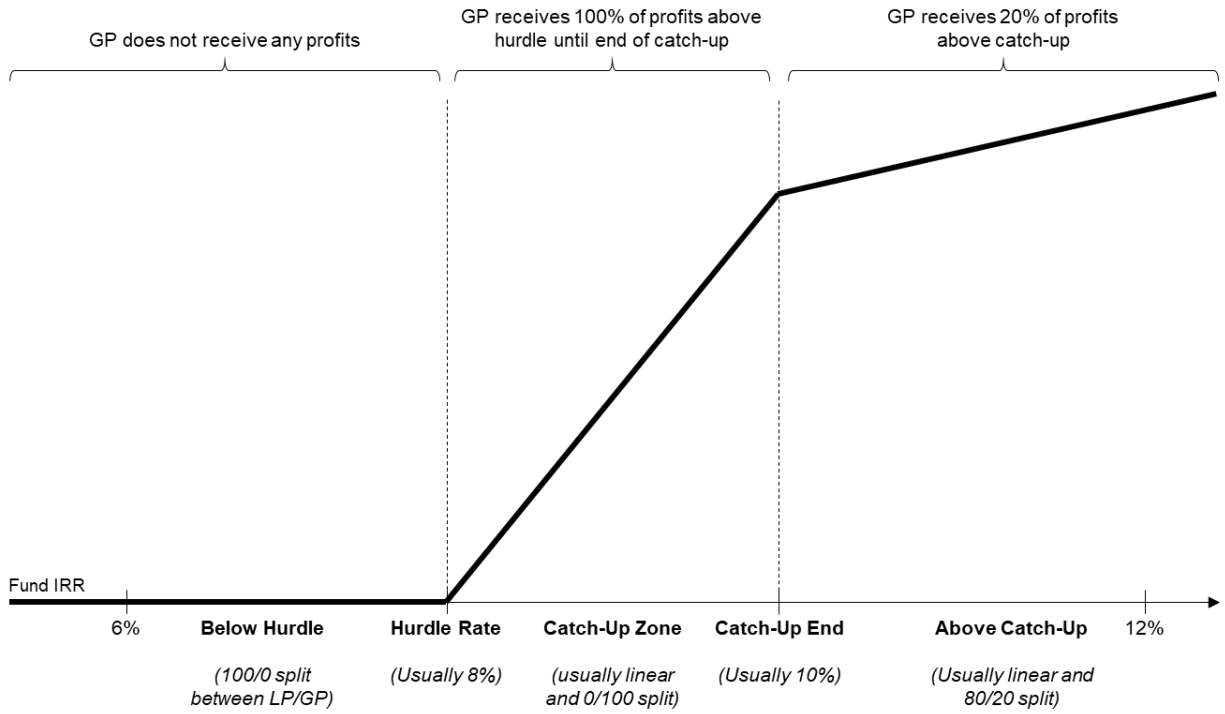


Table 1. Sample Description and Levels of Observation

This table provides an overview of our sample, especially numbers and levels of observations. The full sample contains 359 companies bought out in LBO transactions and subsequently taken public by their Private Equity owners through IPOs. Our main unit of observation are GP-Portfolio Company pairs. On average, each LBO has 1.7 participating GPs, and we obtain 605 pairs of GPs and portfolio companies ('deals'). One LBO with three participating GPs would therefore count as three observations/deals. The 252 GPs invested in the 359 portfolio companies hold an average of 46.9% of outstanding shares each. Jointly, all invested GPs own 79.4% of the shares in each portfolio company. We create subsamples by splitting the full sample according to the post-IPO exit process. In 407 deals, the GPs exit their investments through 'regular' share sales into public equity markets. GPs in 129 deals sell all or parts of their shareholdings through post-IPO M&A transactions, and 28 deals file for Chapter 11 before their exit is completed. 41 deals are still active as of January 2018. Across all 605 deals, we record 2,900 separate share sale and -distribution transactions, fully tracking each GPs' exit from the IPO to the last share sale. Also, we track all Board Members who are employees of the portfolio companies' GP owners from the moment they join the board until they leave the Board at or after the IPO. There are a total 1,219 GP Board Members across 508 deals. 97 deals do not have a Director who is employed by its GP owner. 117 GP Directors are still active on the Boards of their portfolio companies as of January 2018.

Numbers, unless otherwise noted	**All Fully Exited Deals**	**'Regular' Exit Sub-Sample**	**M&A Exit Sub-Sample**	**Chapter 11 Sub-Sample**	**Active Deals** (as of Jan. 2018, not in sample)
Units of Observation					
Portfolio Companies[1]	330	246	94	22	29
GP-Portfolio Company Pairs	564	407	129	28	41
GPs					
Total Number of GPs in Sample	238	203	80	27	34
Number of GPs per Deal (Avg.)	1.6	1.7	1.5	1.4	1.5
GP Ownership (Avg.)	46.3%	42.4%	54.7%	63.4%	55.6%
All GPs Ownership per Deal (Avg.)	79.2%	78.3%	81.4%	83.3%	81.6%
Share Sale Transactions					
At IPO Share Sales	276	212	52	12	13
Post-IPO Share Sale Transactions	1,686	1,430	199	57	124
Post-IPO Share Distributions	200	172	13	15	37
Exit at IPO	17	17	0	0	0
Exit Sales/Distributions	547	390	129	28	0
Total	*2,726*	*2,221*	*393*	*112*	*174*
Board Seat/Exit Sample					
GP-Portfolio Company Pairs with…					
…at least one GP Director	467	319	121	27	41
…no GP Director	97	88	8	1	0
Total Number of GP Directors	1,116	740	307	69	103
GP Directors Still Active (Jan. 2018)	53	50	0	3[2]	64

[1] The number of portfolio companies per exit category does not sum up to 359 because the same portfolio company could be subject to multiple GP exit types.
[2] 3 directors stayed on the Boards of portfolio companies as they underwent restructuring processes that are not fully resolved as of Jan. 2018.

Table 2. LBOs, IPOs and Exits over Time

This table shows our sample LBOs, IPOs and Final Exits over time. The 41 deals that are still active are not included in this table.

	LBOs	IPOs	Final Exits
1990	3	-	-
1991	1	-	-
1992	0	-	-
1993	3	-	-
1994	3	-	-
1995	17	3	-
1996	38	12	1
1997	36	16	3
1998	45	10	11
1999	49	27	8
2000	39	30	11
2001	22	29	17
2002	47	24	23
2003	30	23	20
2004	65	56	34
2005	46	92	35
2006	34	63	58
2007	55	34	59
2008	5	8	28
2009	3	18	23
2010	12	23	37
2011	9	32	30
2012	1	22	32
2013	1	27	46
2014	-	15	31
2015	-	-	28
2016	-	-	19
2017	-	-	10
Total	564	564	564

Table 3. Descriptive Statistics: GP Exit Process

This table provides summary statistics on GPs' exit processes in their portfolio companies at and following IPOs. The top part of the table shows the lengths between LBO, IPO and Exit. The Duration is calculated as the sum of the time-weighted deal cash flows (from share sales), much like the Macaulay Duration of a bond. The post-IPO duration is calculated identically but starts with the IPO instead of the LBO. The middle part of the table displays the average share sale size across different sales transactions, measured as % of the original number of shares owned at IPO. We separately report the numbers across all transactions, for IPO sales only, for post-IPO sales only, for share distributions only, and for the final exit sales only. Note that we report the final Exit Sale separately (1) for all deals, and (2) for deals which do not sell 100% of their shares in one singular transaction ('Exit with Prior Sales'). The bottom part of the table displays indicators of Exit Timing. We report the lengths from the IPO to a deal's first and single largest (in terms of %-sold) share sale transactions. Additionally, we report the average number of days between share sales. This is calculated not from the IPO but once the exit process starts, i.e. with the first share sale. The length of the period between a deal's first share and exit is reported in the last row of the Exit Timing section, expressed as percent of the length between IPO and Exit. A deal that has its first share sale 800 days after the IPO and is exited in a second share sale 1,000 days after the IPO would therefore have a 20% sale period length and an average of 200 days between sales. The last section of the table displays number and percentages of deals which exhibit a certain exit feature such as share sales or a full exit at IPO or uses a combination of sales and distributions in its exit process. We define deals as having 'coordinated' exit processes if two or more GPs in the same portfolio company sell shares on the same dates on more than one occasion.

	'Regular' Exit Sample			**M&A Exit Sample**			**Chapter 11 Sample**		
	Obs	Mean	Median	Obs	Mean	Median	Obs	Mean	Median
Deal Length (In Years)									
Total Deal Length	407	6.2	6.1	129	6.4	5.9	28	7.4	6.9
LBO to IPO	407	3.5	2.9	129	3.2	2.7	28	2.6	2.0
IPO to Exit	407	2.7	2.1	129	3.2	2.7	28	4.8	4.0
Total Deal Duration	407	5.0	4.9	129	5.3	4.5	28	3.0	2.1
Post-IPO Duration	407	1.9	1.4	129	2.5	2.3	28	1.4	1.3
Lockup Period *(in Days)*	407	180	180	125	178	180	28	178	180
Share Sale Details									
Number of Sales per Deal	407	5.5	4.0	129	3.1	2.0	28	4.0	2.0
%-Ownership Sold…									
…per Transaction	2,221	18.3	11.0	393	32.8	17.5	112	25.0	3.0
…in IPO Sales only	212	18.9	14.9	52	20.2	14.4	12	11.4	13.8
…in Post-IPO Sales only	1,430	11.6	6.1	199	8.0	0.5	57	4.2	0.2
…in Distributions only	172	9.9	9.2	13	19.6	16.0	15	4.0	0.6
…in Exit Sales only	390	42.8	33.7	129	77.5	86.7	28	84.4	95.0
…in Exits with Prior Sales	339	34.2	26.3	80	63.7	64.9	18	75.7	84.9
Exit Timing									
Time (in years) from IPO to…									
…First Share Sale (excl. IPO)	390	1.4	0.9	129	2.3	1.7	28	3.2	2.7
…Largest Sale (incl. Exit)	407	2.0	1.3	129	3.1	2.6	28	4.6	4.1
Days between Share Sales	338	259.0	164.5	80	681.6	493.3	18	784.2	650.3
Sale Period as % of Deal Length	407	44.3	47.4	129	22.7	0	28	23.6	0
Exit Patterns									
Deals with…									
…Sales at IPO	197 of 407 (48.4%)			50 of 129 (38.8%)			11 of 28 (39.3%)		
…Exits at IPO	17 of 407 (4.2%)			0 of 129 (0%)			0 of 28 (0%)		
…Sales in Lockup Period	53 of 407 (13.0%)			9 of 129 (7.0%)			1 of 28 (3.6%)		
…'Coordinated' Sales	33 of 139 (23.7%)			3 of 44 (6.8%)			0 of 7 (0%)		
…Sales and Distributions	63 of 407 (15.5%)			4 of 129 (3.1%)			2 of 28 (7.1%)		

Table 4. Descriptive Statistics: Annual Shareholdings and Exits

This table provides summary statistics on GP shareholdings in their portfolio companies at/around the IPO and in the years thereafter. The table shows the total percent ownership per GP in their respective portfolio companies in the years following the companies' IPOs. This number is not calculated based on actual share sale transactions but taken from annual DEF-14A proxy statements filed by the portfolio companies after the IPO. The mean and median percent shareholdings are therefore the fraction of the total shares outstanding in the portfolio companies. The table also displays the (cumulative) percent of deals fully exited within each given year following the IPO.

% Ownership in Portfolio Company	**'Regular' Exit Sample**				**M&A Exit Sample**				**Chapter 11 Sample**			
	Obs.	Mean	Median	% Exited	Obs.	Mean	Median	% Exited	Obs.	Mean	Median	% Exited
Pre-IPO	407	42.1	36.2	-	129	54.4	53.7	-	28	62.6	70.1	-
After IPO Sales	390	29.1	25.5	4.2	129	37.5	36.7	-	28	45.1	50.5	-
Within (Full) 1st Year post IPO	317	29.6	25.2	21.5	122	34.8	31.2	5.4	27	42.1	49.3	3.6
Within 2nd Year post IPO	215	26.5	21.0	46.8	96	30.7	25.9	25.6	27	40.4	41.9	3.6
Within 3rd Year post IPO	151	25.2	18.7	62.6	67	30.8	25.8	48.1	22	36.1	35.5	21.4
Within 4th Year post IPO	101	25.3	19.5	75.0	45	26.6	19.2	65.1	17	39.4	39.5	39.3
Within 5th Year post IPO	68	26.4	20.1	83.2	24	28.7	27.2	81.4	11	41.0	39.6	60.7
Within 6th Year post IPO	48	23.2	16.5	88.1	15	29.3	31.1	88.4	9	39.8	43.2	67.9
Within 7th Year post IPO	27	21.9	15.9	93.3	4	33.5	36.6	96.9	8	33.7	39.3	71.4
Within 8th Year post IPO	15	22.4	16.7	96.3	3	32.3	37.0	97.7	5	32.0	44.1	82.1
Within 9th Year post IPO	10	18.4	13.7	97.5	2	28.9	28.9	98.4	1	48.5	48.5	96.4
Year 10 post IPO and following	7	8.4	7.8	98.3	2	30.6	37.6	98.4	0	-	-	100.0

Table 5. Descriptive Statistics: GP Board Seats and Board Exit Behavior

This table shows summary statistics of portfolio companies' Board Members who are employed by their GP owners. The upper part of the table shows total Board sizes per portfolio company and the number of Board Seats held by the invested GPs. The middle part of the table displays summary statistics of the time GP employees spend on the Boards of their portfolio companies. We report the average time spent on Boards from LBO/IPO to each GP-director's exit and the time from IPO to the first Board exit and the last Board exit on deal-level. The bottom part of the table contains information on Board exits around various events in the lifecycle of an LBO. We report the number of GP-Directors resigning from Boards at or before their portfolio companies' IPOs, the number of GP-Directors resigning from Boards at or around their GP employers' last share sale, and those Directors who remain on Boards after the share exit of their GP employers.

	'Regular' Exit Sample			**M&A Exit Sample**			**Chapter 11 Sample**		
	Obs.	Mean	Median	Obs.	Mean	Median	Obs.	Mean	Median
Board Size Portfolio Company	246	7.7	7.0	94	7.6	7.0	22	6.9	7.0
Board Seats Held by Single GP per Deal at LBO	319	2.3	2.0	121	2.5	2.0	27	2.6	2.0
Board Seats Held by all GPs per Deal at LBO	407	3.7	3.0	129	3.8	4.0	28	3.4	3.0
Time Spent on Board (In Years)									
Time on Board (Per Director) from LBO to Exit	690	5.8	5.7	307	6.2	5.7	66	6.5	6.2
Time on Board (Per Director) from IPO to Exit	690	2.4	1.9	307	2.9	2.5	66	3.8	3.4
Time on Board (Per Director) Post-Exit for Active Deals[1]	50	5.9	4.9	0	-	-	3	1.8	0.8
Time IPO to First Board Exit	319	1.8	1.4	121	2.4	2.1	27	3.1	2.8
Time IPO to Last Board Exit	319	2.9	2.4	121	3.2	2.7	27	4.3	3.7
Board Exit Timing									
Board Exits at or pre IPO[2]	23 of 740 (3.1%)			6 of 307 (2.0%)			0 of 69 (0%)		
Board Exits at GP (Share) Exit[3]	136 of 740 (18.4%)			257 of 307 (83.7%)			41 of 69 (59.4%)		
Board Exits after Last Share Sale[4]	311 of 740 (42.0%)[5]			5 of 307 (1.6%)			11 of 69 (15.9%)		

[1] As of January 2018
[2] Exits from LBO to 45 days post IPO
[3] (in 3 months around Exit, so 45 days pre to 45 days post)
[4] Exit>45 days post last sale, including active directors of fully exited deals (as of Jan 2018)
[5] Median length until final board exit: 1.2 years after last sale

Table 6. Absolute and Relative Stock Performance post IPO

This table shows summary statistics of absolute and relative stock price performances of our in-sample LBOs following their IPOs. We report the performance for the lockup period as well as the 12, 24 and 36 months following the IPO. The unit of observation is a single portfolio company (N=330). The last two columns report the stock price performance from IPO to final exit of the GP. The unit of observation is, as in all previous analyses, a GP-portfolio company pair (N=564). All stock performances are relative to the portfolio company's stock price at the end of the first post-IPO trading day (i.e. excluding underpricing). Jensen Alphas are the intercepts of firm-specific time-series regressions of monthly firm excess returns and index excess returns. Fama-French 3 Factor Alphas are intercepts estimated using Fama and French three factor regression models. Firms that delist after their IPO drop out of the sample at the time of delisting. Numbers in brackets are p-values indicating statistical significance of differences of means (t-tests) and medians (Wilcoxon) from zero.

All numbers in %	**Lockup**		**12 Months**		**24 Months**		**36 Months**		**Exit (N=564)**	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Avg. Monthly Raw Return	1.69	0.94	1.28	0.76	0.83	0.66	0.78	0.59	0.88	0.43
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Buy-and-Hold Raw Return	8.15	8.11	14.85	12.78	16.40	6.09	20.63	0.87	30.43	19.34
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.23]	[0.00]	[0.81]	[0.00]	[0.00]
Avg. Monthly Excess Return										
w/ S&P	1.33	0.78	0.87	0.27	0.51	0.19	0.53	0.15	0.52	0.11
	[0.00]	[0.00]	[0.00]	[0.17]	[0.00]	[0.18]	[0.00]	[0.20]	[0.00]	[0.17]
w/ Russell 2000	1.22	0.66	0.69	0.26	0.32	0.07	0.32	0.01	0.27	-0.09
	[0.00]	[0.02]	[0.00]	[0.20]	[0.06]	[0.61]	[0.03]	[0.95]	[0.06]	[0.24]
Buy-and-Hold Excess Return										
w/ S&P	5.78	4.55	9.74	5.94	8.01	-5.35	11.12	-5.91	17.09	10.79
	[0.00]	[0.04]	[0.00]	[0.07]	[0.05]	[0.32]	[0.03]	[0.34]	[0.00]	[0.00]
w/ Russell 2000	5.39	4.28	8.43	4.98	6.35	-4.13	6.77	-10.45	10.09	6.84
	[0.00]	[0.05]	[0.00]	[0.13]	[0.12]	[0.41]	[0.18]	[0.11]	[0.00]	[0.02]
Alphas										
Jensen's Alpha w/ S&P	1.21	1.20	0.75	0.68	0.49	0.65	0.31	0.21	0.43	0.51
	[0.00]	[0.00]	[0.00]	[0.00]	[0.03]	[0.00]	[0.09]	[0.18]	[0.00]	[0.00]
Jensen's Alpha w/ Russell 2000	1.80	1.25	0.86	0.89	0.35	0.54	0.19	0.06	0.35	0.27
	[0.00]	[0.00]	[0.00]	[0.00]	[0.05]	[0.01]	[0.25]	[0.80]	[0.06]	[0.16]
Fama-French 3 Factor Alpha	1.64	1.48	0.70	0.98	0.37	0.45	0.27	-0.07	0.37	0.05
	[0.00]	[0.00]	[0.04]	[0.00]	[0.10]	[0.00]	[0.15]	[0.45]	[0.18]	[0.80]

Table 7. Absolute and Relative Post-IPO Performance

Panel A of this table shows summary statistics of absolute and relative deal-level performance benchmarks: Total Value to Paid-in Multiple ('TVPI'), Internal Rate of Return ('IRR'), and the Public Market Equivalent according to Kaplan and Schoar (2005, 'KS-PME'), using both the S&P 500 and the Russell 2000 stock index as PME benchmarks. We calculate all performance numbers based on deal-level cash flows from each portfolio company's IPO until the GPs' final exit. We count the US-$ volume of all dividends, share distributions and share sales as cash flows to the GP-investor, i.e. positive cash flows. The US-$ volume of all share acquisitions at or after the IPO is counted as cash flows from the GP-investor, i.e. negative cash flows. The implied GP investment volume is calculated by multiplying the number of shares held by each GP immediately before the IPO with the respective portfolio company's share price at the end of the first trading day. We report all numbers gross (i.e. pre-fees) and net of management fees and carried interest. We calculate management fees by applying contractual annual management fees to the invested capital by the GP in each company. To account for industry-typical 'cost basis' calculations of management fees, we adjust the invested capital downward by the percentage of shares sold post-IPO to lower the effective management fee payments. To determine deal-level carried interest payments, we calculate rolling deal IRRs using all actual deal cash in- and outflows, including the GP initial LBO equity investment, all pre-IPO dividends, distributions and follow-on investments, as well as all at-IPO and post-IPO cash flows from share sales, share acquisitions and pro-rata dividend payments. Once deal-IRR surpasses the fund hurdle rate, we deduct the (fund) carried interest off each distribution. We obtain all fund-specific fee data from Preqin's 'Terms & Conditions' database, and match it to the GP's lead investment fund in each GP-portfolio company pair. Modes for management fee, hurdle rate and carried interest are 1.5%, 8% and 20%, respectively. Numbers in brackets are p-values indicating the statistical significance of differences of means (t-tests) and medians (Wilcoxon) from 1 for TVPI and KS-PMEs and 0 for IRRs. Panel B shows the actual paid fee volumes in $-mn. per deal. Total fee payments across all 564 deals sum to $47.05bn., of which $42.01bn. are Carry and $5.04bn. are management fees.

Panel A	**All Deals**		**'Regular' Exit**		**M&A Exit**		**Chapter 11**	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Gross Returns (Pre-Fees)								
TVPI	1.13	1.06	1.17	1.08	1.20	1.06	0.16	0.04
	[0.00]	[0.01]	[0.00]	[0.00]	[0.00]	[0.38]	[0.00]	[0.00]
IRR *(in %)*	6.32	5.70	11.84	7.65	7.38	4.50	-78.5	-88.3
	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]	[0.00]	[0.00]	[0.00]
KS-PME w/ S&P 500	1.04	0.99	1.10	1.01	1.05	1.03	0.16	0.03
	[0.09]	[0.55]	[0.00]	[0.75]	[0.36]	[0.69]	[0.00]	[0.00]
KS-PME w/ Russell 2000	1.00	0.96	1.04	0.99	1.03	0.96	0.15	0.04
	[0.81]	[0.04]	[0.05]	[0.46]	[0.56]	[0.55]	[0.00]	[0.00]
Net Returns (Post-Fees: Mgmt. Fee + Carried Interest)								
TVPI	0.94	0.88	0.98	0.90	0.99	0.90	0.13	0.03
	[0.00]	[0.00]	[0.27]	[0.00]	[0.97]	[0.11]	[0.00]	[0.00]
IRR *(in %)*	-9.94	-6.50	-6.77	-5.20	-4.18	-3.70	-82.54	-98.15
	[0.00]	[0.00]	[0.00]	[0.00]	[0.07]	[0.20]	[0.00]	[0.00]
KS-PME w/ S&P 500	0.87	0.83	0.92	0.85	0.87	0.86	0.13	0.02
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
KS-PME w/ Russell 2000	0.83	0.81	0.87	0.82	0.85	0.82	0.13	0.03
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]

Panel B	**All Deals**		**'Regular' Exit**		**M&A Exit**		**Chapter 11**	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Total Fees per Deal ($mn.)								
Management Fees	8.95	2.72	7.51	2.02	12.28	5.03	14.67	4.56
Carried Interest	74.48	30.35	78.07	30.96	78.23	43.68	5.06	0.00
Total Fees per Deal	83.43	37.28	85.57	35.26	90.51	53.91	19.72	9.78
Total Fees as % of Total Deal Distributions (%)								
Management Fees	2.59	0.96	1.90	0.85	4.76	1.29	373.1	19.03
Carried Interest	14.30	18.02	14.46	18.14	13.78	17.72	3.77	0.00
Total Fees per Deal	16.89	19.07	16.37	18.96	18.55	19.56	376.8	19.49

Table 8. Post-IPO Performance and Exit Patterns

Panel A of this table shows summary statistics of the performance of three hypothetical post-IPO exit patterns which we apply to the sample of all 564 fully exited deals. The explanations for the calculations of each pattern are given in the table. As in Table 7, we report TVPIs, IRRs and Kaplan Schoar PME's to measure post-IPO performance, both pre- and net of fees. All calculations are done in the exact same way as reported and described in Table 7. Numbers in brackets are p-values indicating the statistical significance of the differences in means (t-tests) and medians (Wilcoxon) of the performance metrics between the hypothetical exit patterns and the actual exits, as shown in Table 7. Panel B of the table displays the deal fee volumes in $-mn. paid under each hypothetical post-IPO exit pattern. Total fees across all deals are in pattern (1) – 25% Fastest $37.17bn., in pattern (2) – Naïve $43.70bn., and in pattern (3) – 25% Slowest $43.03bn.

Panel A	**(1) Replicating 25% Fastest Exits**		**(2) 'Naïve' Sales Scenario**		**(3) Replicating 25% Slowest Exits**	
	Shares are sold in 3 transactions, 4% at IPO and 48% each at 233 and 266 days after the IPO. This replicates the avg. sales process of the 25% of deals with the fastest exit process.		Shares are sold in 5 equally large transactions, equally distributed between the IPO and 1,079 days after the IPO. The first sale is at IPO. This replicates the avg. sales process in our sample.		Shares are sold in 7 transactions: at IPO (6%), 1,502 (25%), 1,655 (21%), 1,808 (17%), 1,961 (13%), 2,114 (9%) and 2,268 (9%) days after the IPO. This replicates the avg. sales process of the 25% of deals with the slowest exit process.	
	Mean	Med.	Mean	Med.	Mean	Med.
Gross Returns (Pre-Fees)						
TVPI	1.16	1.14	1.14	1.10	1.05	0.91
	[0.30]	[0.16]	[0.21]	[0.17]	[0.03]	[0.00]
IRR *(in %)*	35.1	21.8	6.17	7.05	-7.44	-.2.00
	[0.00]	[0.00]	[0.99]	[0.78]	[0.00]	[0.00]
KS-PME w/ S&P 500	1.12	1.06	1.07	1.03	0.96	0.81
	[0.00]	[0.00]	[0.07]	[0.01]	[0.00]	[0.00]
KS-PME w/ Russell 2000	1.11	1.05	1.04	1.01	0.87	0.77
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Net Returns (Post-Fees: Incl. Management Fee + Carry)						
TVPI	1.00	0.95	0.97	0.94	0.88	0.78
	[0.02]	[0.00]	[0.01]	[0.00]	[0.05]	[0.04]
IRR *(in %)*	5.73	-7.6	-4.79	-2.85	-10.9	-5.2
	[0.00]	[0.10]	[0.00]	[0.02]	[0.89]	[0.20]
KS-PME w/ S&P 500	0.96	0.90	0.91	0.88	0.80	0.70
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
KS-PME w/ Russell 2000	0.95	0.89	0.89	0.87	0.73	0.67
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]

Panel B	**(1) Replicating 25% Fastest Exits**		**(2) 'Naïve' Sales Scenario**		**(3) Replicating 25% Slowest Exits**	
	Mean	Med.	Mean	Med.	Mean	Med.
Total Fees per Deal ($mn.)						
Management Fees	1.57	0.70	4.95	2.19	15.28	6.85
	[0.00]	[0.00]	[0.00]	[0.01]	[0.00]	[0.00]
Carried Interest	64.33	31.80	72.53	32.04	61.01	11.51
	[0.00]	[0.08]	[0.20]	[0.04]	[0.02]	[0.00]
Total Fees per Deal	65.90	32.82	77.48	36.97	76.29	27.14
	[0.00]	[0.00]	[0.00]	[0.45]	[0.24]	[0.00]
Total Fees as % of Total Deal Distributions (%)						
Management Fees	0.39	0.30	1.21	0.92	7.65	3.33
	[0.00]	[0.00]	[0.00]	[0.66]	[0.00]	[0.00]
Carried Interest	13.45	17.27	13.34	15.36	10.48	12.31
	[0.00]	[0.00]	[0.05]	[0.00]	[0.00]	[0.00]
Total Fees per Deal	13.84	17.50	14.55	16.26	18.12	16.41
	[0.00]	[0.00]	[0.00]	[0.00]	[0.08]	[0.57]

Table 9. Cross-Sectional Post-IPO Duration Regressions

This table shows results of cross-sectional OLS regression models. The unit of observation is a GP-portfolio company pair. The full sample is N=564 but we exclude 17 deals which fully exited at IPO for the purposes of these regressions. The main dependent variable is the Exit Duration, calculated from IPO to Exit for each GP investment in a portfolio company. Numbers in parentheses are t-values, asterisks indicate statistical significance at 1% (***), 5% (**) and 10% (*) levels. Detailed descriptions and summary statistics of all variables are given in Appendix Table 4a and 4b, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Fund Variables						
Fund in Carry (Yes=1, No=0)				.486***		
				[3.05]		
Fund IRR at IPO (%)					1.05**	
					[2.03]	
Difference IRR-Hurdle Rate (%)						.980**
						[2.19]
Fund Outside Inv. Period at IPO (Yes=1, No=0)				-.303	-.285	-.285
				[-1.64]	[-1.57]	[-1.57]
Fund Size (ln $mn.)				.019	.038	.033
				[0.19]	[0.36]	[0.32]
GP Variables						
Historic Fundraising (ln $mn.)				.029	.022	.023
				[0.82]	[0.63]	[0.65]
Fundraising at Time of IPO (Yes=1, No=0)				-.042	-.035	-.033
				[-0.16]	[-0.14]	[-0.13]
Stock Performance Variables						
%-Days Stock Price>IPO Price (IPO to Exit)	-1.59***			-1.91***	-1.91***	-1.92***
	[-7.73]			[-7.05]	[-6.91]	[-6.95]
Absolute Stock Return IPO-Exit (%)		-.391***				
		[-2.95]				
Market Corrected Stock Return IPO-Exit (%)			-.176			
			[-1.49]			
Post-IPO Dividend Payments (ln $mn.)	.354***	.334***	.330***	.249***	.231**	.231**
	[6.33]	[5.48]	[5.59]	[2.77]	[2.38]	[2.38]
Portfolio Company Variables						
EBIT Margin at IPO (%)	-1.18**	-1.26**	-1.27**	-1.96***	-1.94***	-1.95
	[-2.02]	[-2.03]	[-2.03]	[-2.85]	[-2.79]	[-2.79]
Pre-IPO TVPI	-.145***	-.171***	-.166***	-.248***	-.259***	-.259***
	[-2.67]	[-3.09]	[-3.03]	[-2.84]	[-2.79]	[-2.78]
IPO Variables						
Underpricing (%)	-.918***	-.917***	-.763***	-1.13***	-1.13***	-1.12***
	[-3.54]	[-3.42]	[-2.73]	[-4.09]	[-3.97]	[-3.97]
Shares sold by GP in IPO (% of GP Holdings)	-2.96***	-3.18***	-3.11***	-3.55***	-3.50***	-3.49***
	[-8.78]	[-9.11]	[-8.94]	[-7.67]	[-7.48]	[-7.48]
Shares sold by Issuer (Yes=1, No=0)	.428***	.401**	.426**	.631	.585*	.579*
	[2.65]	[2.38]	[2.53]	[2.13]	[1.84]	[1.83]
Length LBO to IPO (in Years)	-.031	-.048	-.052	.058	.062	.062
	[-1.00]	[-1.46]	[-1.57]	[1.22]	[1.30]	[1.29]
Board Variables						
Board Seats GP (% of total Board Seats)	.671	.642	.709	.532	.560	.555
	[1.53]	[1.36]	[1.49]	[0.93]	[0.96]	[0.95]
Board Seats GP Held post Exit (Yes=1, No=0)	.097	.050	-.001	-.059	-.026	-.025
	[0.48]	[0.23]	[-0.01]	[-0.22]	[-0.09]	[-0.09]
Deal Variables						
Deal TEV (ln $bn.)	.078	.073	.054	.052	.059	.060
	[1.33]	[1.20]	[0.89]	[0.64]	[0.76]	[0.77]
Club Deal (Yes=1, No=0)	.052	.107	.096	-.008	-.000	-.001
	[0.26]	[0.48]	[0.44]	[-0.03]	[-0.00]	[-0.01]
Deal Leverage (% Debt of TEV)	-.126	-.073	-.036	-.133	-.133	-.129
	[-0.40]	[-0.23]	[-0.11]	[-0.31]	[-0.32]	[-0.31]
No. Debt Facilities of LBO Debt	.030	.017	.020	.021	.015	.015
	[1.01]	[0.53]	[0.62]	[0.62]	[0.46]	[0.45]
GP Ownership (% of Shares Held)	.629*	.899**	.877**	.406	.273	.282
	[1.70]	[2.27]	[2.23]	[0.80]	[0.55]	[0.57]
Market Variables						
U.S. LBO Volume in IPO Quarter (ln $bn.)	.062*	.068**	.071**	.080**	.073*	.073*
	[1.94]	[2.06]	[2.16]	[2.01]	[1.69]	[1.69]
Number of Observations	547	547	547	325	325	325
Exit Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-Squared	0.346	0.270	0.258	0.384	0.379	0.378

Table 10. Probit Regression Models Explaining Share Sales

This table shows results of multivariate probit regression models. The unit of observation is each month from IPO to exit in each GP-portfolio company pair. The dependent variable is a dummy taking the value of 1 in months in which GPs sell shares in their portfolio companies and 0 in which they do not. The IPO month and all IPO share sales are excluded, all 17 deals that fully exit at the IPO are therefore excluded. We report marginal effects at the means, numbers in parentheses are z-values, and asterisks indicate statistical significance at 1% (***), 5% (**) and 10% (*) levels. Descriptions and summary statistics of all variables are given in Appendix Tables 4a and 4b, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Fund Variables						
Difference IRR-Hurdle Rate (%)		-.0534**			-.0529**	-.0577*
		[-2.14]			[-2.12]	[-1.77]
Fund IRR (%)			-.0545**			
			[-2.14]			
Deal in Carry (Yes=1, No=0)				.0111		
				[1.19]		
GP Variables						
GP Fundraising Period (Yes=1, No=0)		.0037	.0035	.0038	.0040	-.0087
		[0.52]	[0.49]	[0.53]	[0.56]	[-0.99]
Stock Performance Variables						
Stock Price > IPO Price (Yes = 1, No=0)	.1107***	.1118***	.1118***	.1108***	.1126***	.0680***
	[14.14]	[13.46]	[13.46]	[13.30]	[13.51]	[6.70]
Absolute Monthly Stock Return (%, 1-Month Lagged)	.0353	.0414	.0413	.0386		.0059
	[1.11]	[1.22]	[1.21]	[1.14]		[0.14]
Market-Corrected Monthly Stock Return (%, 1-Month Lagged)					.0159	
					[0.40]	
Stock Trading Volume						
Trading Volume > Avg. Trading Volume (Yes=1, No=0,	.0173**	.0153**	.0153**	.0146*	.0150*	.0095
1-Month Lagged)	[2.33]	[1.96]	[1.96]	[1.86]	[1.91]	[0.99]
Monthly Change in Trading Volume (%, 1-Month Lagged)	-.0065	-.0058	-.0058	-.0057	-.0057	-.0081
	[-1.36]	[-1.17]	[-1.17]	[-1.15]	[-1.16]	[-1.48]
Deal Financial Variables						
EBIT Margin (%)	.0581**	.0632**	.0633**	.0603**	.0635**	.0602*
	[2.12]	[2.19]	[2.19]	[2.09]	[2.19]	[1.74]
Dividend Payments ($mn.)	-.0382	-.0448	-.0455	-.0444	-.0456	.0069
	[-0.79]	[-0.88]	[-0.89]	[-0.86]	[-0.89]	[0.12]
Board Variable						
Board Exit (Yes=1, No=0)	.1799***	.1932***	.1933***	.1925***	.1935***	.1487***
	[11.07]	[11.16]	[11.16]	[11.12]	[11.17]	[6.87]
Market Variable						
Monthly U.S. LBO Volume (ln $bn.)	-.0024	-.0008	-.0008	-.0025	-.0009	.0052
	[-0.61]	[-0.20]	[-0.18]	[-0.58]	[-0.21]	[0.93]
Club Deal Variable						
Share Sale by Co-Investor in Month (Yes=1, No=0)						.2173***
						[14.87]
Total Number of Observations	20,234	7,262	7,262	7,262	7,262	4,687
Months with Share Sales	1,633	684	684	684	684	520
Prob > Chi2	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R-Squared	0.093	0.101	0.101	0.101	0.101	0.203

Table 11. Tobit Regression Models: Explaining Share Sale Volumes

This table shows results of multivariate tobit regression models. The unit of observation is each month from IPO to exit in each GP-portfolio company pair. The dependent variable in all models is the $mn.-volume of shares sold by GPs in their portfolio companies (calculated as number of shares sold*sale price per share) in each month post-IPO. The model is left-censored, with a minimum value of 0. The IPO month and all IPO share sales are excluded, all 17 deals that fully exit at the IPO are therefore excluded. Reported are marginal effects, values in brackets are t-values, and asterisks indicate statistical significance at 1% (***), 5% (**) and 10% (*) levels. Descriptions and summary statistics of all variables are given in Appendix Tables 5a and 5b, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Fund Variables						
Difference IRR-Hurdle Rate (%)		-6.75			-6.63	-6.56
		[-1.10]			[-1.08]	[-1.08]
Fund IRR (%)			-7.37			
			[-1.17]			
Deal in Carry (Yes=1, No=0)				2.43		
				[1.19]		
GP Variables						
GP Fundraising Period (Yes=1, No=0)		1.82	1.78	1.82	1.88	.250
		[1.10]	[1.07]	[1.09]	[1.13]	[0.15]
Stock Performance Variables						
Stock Price > IPO Price (Yes = 1, No=0)	27.46***	28.42***	28.42***	28.21***	28.62***	14.81***
	[11.60]	[11.29]	[11.29]	[11.15]	[11.32]	[6.61]
Absolute Monthly Stock Return (%, 1-Month Lagged)	10.63*	11.90*	11.90*	11.26		8.69
	[1.65]	[1.69]	[1.69]	[1.61]		[1.18]
Market-Corrected Monthly Stock Return (%, 1-Month Lagged)					6.20	
					[0.75]	
Stock Trading Volume						
Trading Volume > Avg. Trading Volume (Yes=1, No=0,	3.12*	2.82	2.82	2.62	2.76	1.39
1-Month Lagged)	[1.87]	[1.57]	[1.57]	[1.47]	[1.54]	[0.77]
Monthly Change in Trading Volume (%, 1-Month Lagged)	-1.62	-1.51	-1.51	-1.46	-1.50	-1.90
	[-1.55]	[-1.37]	[-1.37]	[-1.34]	[-1.36]	[-1.58]
Deal Financial Variables						
EBIT Margin (%)	15.29**	17.01**	17.04**	16.18**	17.08**	14.61**
	[2.42]	[2.50]	[2.50]	[2.38]	[2.50]	[2.12]
Dividend Payments ($mn.)	-.6039	-1.37	-1.50	-1.41	-1.54	-3.22
	[-0.06]	[-0.12]	[-0.13]	[-0.12]	[-0.13]	[-1.27]
Board Variable						
Board Exit (Yes=1, No=0)	46.78***	50.12***	50.12***	49.96***	50.26***	35.87***
	[9.06]	[9.08]	[9.08]	[9.01]	[9.08]	[5.75]
Market Variable						
Monthly U.S. LBO Volume (ln $bn.)	-1.46	-1.27	-1.25	-1.54	-1.28	.2269
	[1.61]	[-1.33]	[-1.31]	[-1.59]	[-1.33]	[0.23]
Club Deal Variable						
Share Sale by Co-Investor in Month (Yes=1, No=0)						35.61***
						[9.78]
Total Number of Observations	20,234	7,262	7,262	7,262	7,262	4,687
Months with Share Sales	1,633	684	684	684	684	520
Prob > Chi2	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R-Squared	0.041	0.041	0.041	0.041	0.041	0.075

Appendix 1. Data Sources

The following table lists information on data sources used for the purposes of our analyses. All major data sources are filings made by portfolio companies following rules and regulations of the US Securities and Exchange Commission (SEC). As our sample uses companies going public in US IPOs, we start tracking the exit process with the GP shareholdings as listed in S-1/424B filings at the time of the IPO. Once the company's shares start trading, we obtain GP share sales through Form 4 filings and Director Exits through form 8-K filings. As the GP's ownership stake falls below 10% and its Directors exit the portfolio company's Board, Form 4 filings do not have to be made anymore. We therefore track the exit process through forms SC-13G and DEF14A. The final exit of the GP can be found in four ways: (1) a Form 4 listing zero GP shareholdings after a share sale, (2) a form SC-13G showing zero GP shareholdings at a record date, (3) a DEF14A filing listing neither a GP nor any of its Directors as beneficial shareholders anymore, or (4) 8-K filings announcing the closing of M&A transactions (followed by a Form 4 showing the share sale, given the GP has to file it as a >10% shareholder or through a Director), (5) 8-K filings announcing Chapter 11 protection or any other liquidation of the portfolio company. All financial data and/or information on the LBO itself (date, volume etc.) is taken from 10-K filings once the company is public, or S-1/S-4 filings at or before the IPO.

SEC Filing	**Used For**	**Info**	**Published**
S-1/424B4	• LBO information • Shareholdings • Financials	TEV, leverage and GP equity injection at LBO, shareholdings at IPO, financial information for five fiscal years pre IPO	At IPO
S-4/424B3/4	• LBO information • Shareholdings	TEV, leverage and GP equity injection at LBO, shareholdings at event, financial information for five fiscal years pre event	At M&A events, exchange offers
Form 4	• Share Sales and • Shareholdings	(1) date, (2) price, (3) number of shares sold, (4) number of shares held post sale	At every share sale of >10% shareholders, directors officers
SC-13G/D	Shareholdings	Shareholdings of reporting shareholder at record date	End of calendar year if ownership >5%
DEF14A	• Director Exits • Shareholdings	Shareholdings of reporting shareholder at record date, Directors not standing for re-election	Annually, pre Shareholder Meeting
8-K			
- Item 1.01/02/03	• M&A • Chapter 11	M&A date and price (per share), selling shareholders, Chapter 11 dates and restructuring/process information	At trigger event: M&A announcement and closing, Chapter 11 filing
- Item 5.02	Director Exits	Name of resigning Director and resignation date (sometimes also resignation reason)	At trigger event: Director resignation
10-K	Financial Data	Detailed financial data for current and past fiscal year, overview financial data for past five fiscal years	Annually, pre Shareholder Meeting

Appendix 2. Data Precision: Share Sales and Board Exits

This table shows the fraction of actual versus implied/estimated data points in our three main samples. First, we report the fraction of GPs' share sale transactions for which we have the actual date versus those with an estimated date. Following Securities and Exchange Commission (SEC) rules in the US, all company insiders (10% shareholders, directors and officers of a company) have to report the changes in their shareholdings by filing a 'Form 4' with the SEC within two business days of the change taking effect. We are able to track a GP's exit process by using the information given in their Form 4 filings at and following their portfolio companies' IPOs. If a GP falls below the 10% ownership threshold but still has a Board Member in the respective portfolio company, we are able to track the exit process through the Director's Form 4 filings on behalf of its GP-employer. If a GP does not have a Board Member and falls below the 10% ownership threshold, we are able to track the exit process through more infrequent DEF14A or Schedule 13G/D filings. These filings only report the share ownership of 'beneficial' owners of at least 5% of a company's shares at specific dates, without showing the actual share sale dates and/or prices as in Form 4s. Using these filings, we record the GP shareholdings as of the record date given in the filings. For the sales price, we calculate the portfolio company's average share price between the last known sale of the GP and the record date. The final exit is recorded as soon as one of these two filings show a 0% ownership of the respective GP. We use the record date given in these filings as proxy for the exit date. As the table below shows, we are able to track the exact date, volume and price of 100% of all share sales at IPO, and of 96% of all share sales and distributions post-IPO. For the last (exit-) share sales, we are able to obtain Form 4-based information for only 64% of all deals. For 27% of the deals we use the SC-13G/DEF14A record dates as the (estimated) exit date and the average share price, as explained above, to determine the US-Dollar volume of the exit sale. For 9% we have to rely on DEF14A proxy statements. As M&A exits are always recorded in 8-K filings containing all relevant information (date, price etc.), we obtain 100% of all exit information for this subsample. Second, the bottom part of the table displays the fraction of Director Exits for which we obtain the actual exit date versus those for which we only obtain a date range. In some instances, the exact date at which a GP-Director exits a portfolio company's Board of Directors is not listed in SEC filings. Filings might only mention date ranges ("…left the company in June 2015"), exits around certain events without specifying dates ("All directors will resign following the completion of the merger"), or a company ceases to file relevant documents with the SEC before the full exit of a GP. For these reasons, we do not obtain the exact exit date for 11% of all Director exits. In these cases, we either use the closest/most likely exit date (assuming the midpoint in a given date range) or assume the Director left at the mentioned event (Chapter 11 filing).

	Full Sample	'Regular' Exit Sample	M&A Exit Sample	Chapter 11 Sample
IPO Sales				
- Exact Date (SEC Form 4)	100%	197 of 197 (100%)	50 of 50 (100%)	11 of 11 (100%)
Post-IPO Sales + Distributions				
- Exact Date (SEC Form 4)	96%	1,532 of 1,602 (96%)	206 of 212 (97%)	70 of 72 (97%)
- Closest Date (SEC SC-13)	4%	70 of 1,602 (4%)	6 of 212 (3%)	2 of 72 (3%)
Exit (Last Share Sales)				
- Exact Date (SEC Form 4)	64%	217 of 407 (53%)	129 of 129 (100%)	17 of 28 (61%)
- Closest Date (SEC SC-13)	9%	49 of 407 (12%)	0 of 129 (0%)	1 of 28 (4%)
- Latest Date (SEC DEF14A)	27%	141 of 407 (35%)	0 of 129 (0%)	10 of 28 (36%)
Board Exits				
- Exact Exit Date	89%	610 of 690 (88%)	283 of 307 (92%)	52 of 66 (79%)
- Exit Date Range	11%	80 of 690 (12%)	24 of 307 (8%)	14 of 66 (21%)

Appendix 3: Data Precision: LBO TEV and GP (Cash-) Equity Funding (2/2)

The graph below is a screenshot from Warner Music Group's S-1/424B filing made on May 10, 2005. It is representative of the way portfolio companies report information on their LBOs in SEC filings. Warner reports the acquisition date, total volume expressed as deal TEV, and the sources and uses of the deal funding. $1,048mn. of the total $2,898mn. deal volume are provided by the GPs ("Capital investment by the Investors"). In Warner's case it is not reported which of the GPs involved in the deal (Thomas H. Lee, Bain and Providence Equity) provided what fraction of the full $1,048mn. We therefore use the percent shareholdings of each GP to estimate their capital injections. As Warner, some companies in our sample do not explicitly report the equity injected by the GPs at LBO. We do not obtain these numbers for 29% of the 596 deals in our sample. We therefore derive the number based on the reported TEVs and leverage at LBO, and the GPs ownership fraction. Additional numbers to cross-check the generated GP equity injections are TEVs taken from CapitalIQ and Preqin, and leverage (issued notes and term loans) from LPC data. Using this methodology for the deals in which we do obtain explicit equity injections, we generate an insignificant difference of +4.5% between our implied values and the explicitly stated numbers.

The Acquisition

On March 1, 2004, Acquisition Corp., an indirect subsidiary of Warner Music Group, acquired substantially all of Time Warner's music division. The initial purchase price for the Acquisition was $2.595 billion (subject to customary post-closing adjustments), consisting of $2.560 billion in cash and $35 million in non-cash consideration in the form of warrants issued to Historic TW.

The Original Financing and the Acquisition Corp. Refinancing

We financed the Acquisition, related fees and expenses and a portion of our identified restructuring costs through our Original Financing of (i) $1.15 billion of borrowings under the term loan portion of Acquisition Corp.'s senior secured credit facility, which, in addition to the term loan facility, includes a $250 million revolving credit facility, (ii) borrowings under a $500 million senior subordinated bridge loan facility and (iii) a $1.25 billion aggregate initial capital investment by the Investors. See "Description of Indebtedness."

The following table sets forth the sources and uses of funds as if the Acquisition Corp. Refinancing had occurred on March 1, 2004 simultaneously with the Acquisition and the Original Financing:

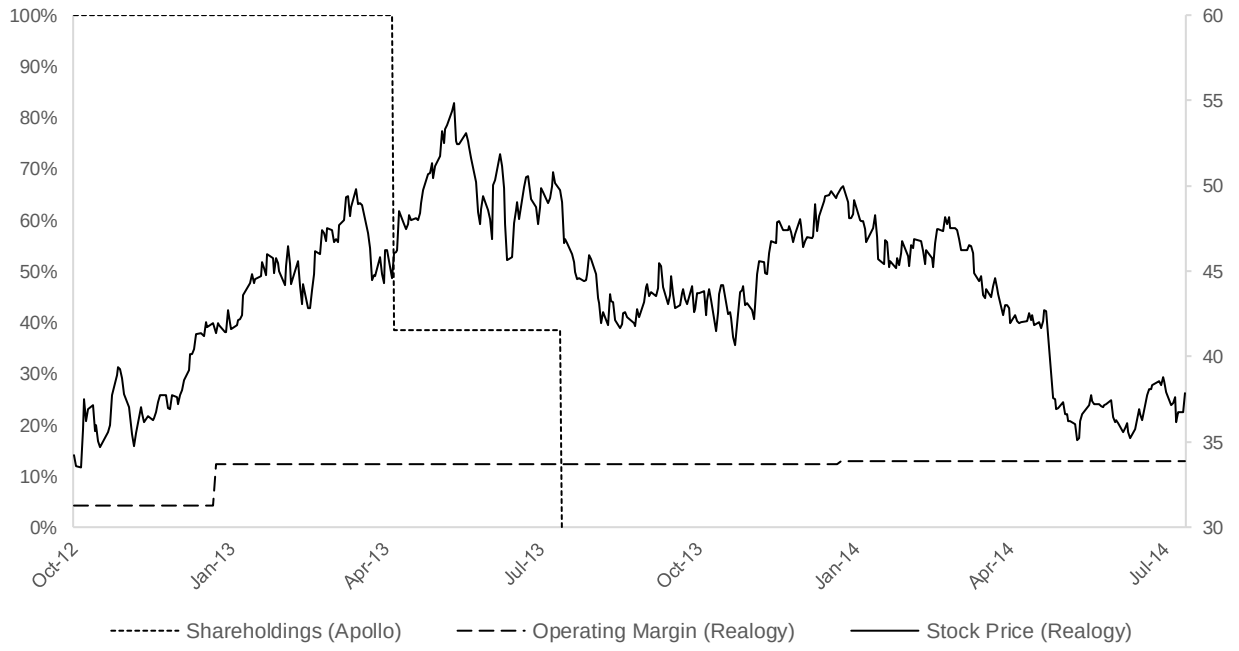
Sources		Uses	
(in millions)		(in millions)	
Revolving credit facility(1)	$ —	Purchase price(2)	$ 2,606
Term loan	1,200	Purchase price adjustments(4)	(72)
Senior subordinated notes(3)	650	Interest to Time Warner(5)	26
Capital investment by the Investors	1,048	Total cash consideration(2)	2,560
		Fees and expenses(6)	200
		Cash to balance sheet	138
Total sources	$ 2,898	Total uses	$ 2,898

Appendix 4. Representative Examples of the LBO Exit Process

Portfolio Company:	**Realogy**
Sponsor:	Apollo
LBO Date:	04/10/2007
TEV:	$9,261.9mn.
Pre-IPO Ownership:	98.7%
Notes:	180 days lockup agreement in place, first sale takes place on day #187 post IPO
Example for:	Fast and aggressive sale post IPO. Few transactions, each one very large, full exit ~1 year post IPO
Similar Deals:	North Face (Whitney & Co), RBC Bearings (Whitney & Co), Nighthawk Radiology (Summit Partners), Healthspring (GTCR), TNS (GTCR), FreightCar America (Trimaran), Universal Compression (Castle Harlan), Veridian (Monitor Clipper, Texas Growth Fund), Compass Minerals (Apollo), Constellium (Apollo), Evertec Group (Apollo), Commercial Vehicle Group (Norwest, Baird, Onex), Bucyrus International (American Industrial Partners), Dunkin' Brands (Carlyle, Bain, Thomas H. Lee)

Transaction	Date	Days between Sales	Price	Sale Vol. ($mn.)	% Shares Sold	Holdings Post Sale
IPO	10/11/2012	-	27	-	0.0%	100.0%
Share Sale[1]	04/16/2013	187	42.79	1,722.30	61.6%	38.4%
Exit[2]	07/22/2013	97	47.57	1,195.20	38.4%	0.0%

[1] https://www.sec.gov/Archives/edgar/data/1338750/000110465913030668/xslF345X03/a4.xml
[2] https://www.sec.gov/Archives/edgar/data/1338750/000110465913056333/xslF345X03/a4.xml



Portfolio Company:	**Community Health Systems**
Sponsor:	Forstmann Little & Co
LBO Date:	07/23/1996
TEV:	$1,397.1mn.
Pre-IPO Ownership:	95.5%
Notes:	Initial Lockup Period post IPO of 180 days, but waived by Merrill Lynch (Lead Underwriter) for the first Post-IPO Sale
Example for:	One sale very early on within Lockup period (waiver), then ~3.5yrs nothing, then exit very quickly
Similar Deals:	Del Monte Foods (Texas Pacific Group), Trinseo (Bain Capital), Premcor (Blackstone), Digitas (Hellman & Friedman), B&G Foods (BRS, Canterbury, Protostar), Alaska Communication Services (Fox Paine), Caribou Coffee (Arcapita), Carrol's Restaurant (Madison Dearborn), DJ Orthopedics (JP Morgan), UAP Holdings (Apollo), Polo Ralph Lauren (Goldman Sachs), H&E Equipment Services (BRS), CVR Energy (Kelso)

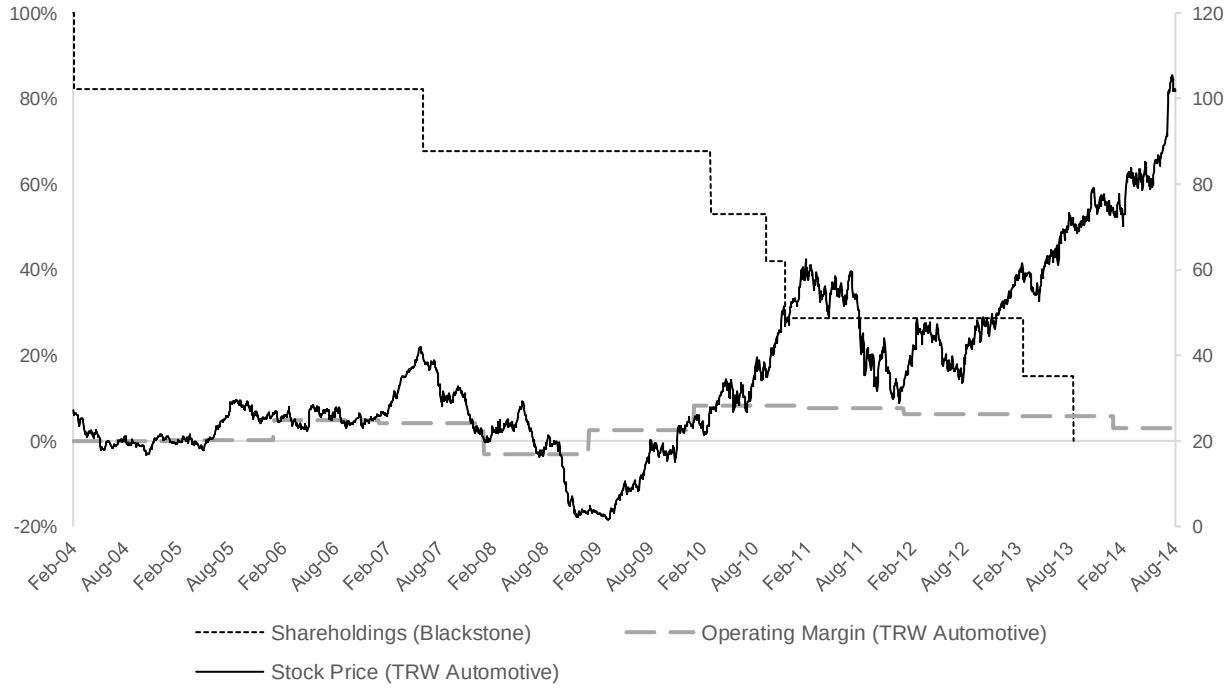
Transaction	Date	Days between Sales	Price	Sale Vol. ($mn.)	% Shares Sold	Holdings Post Sale
IPO	06/09/2000	-	13	-	0.0%	100.0%
Share Sale[1]	10/31/2000	144	27.05	206.98	14.2%	85.8%
Share Sale[2]	04/19/2004	1266	24.5	563.5	42.8%	43.0%
Exit[3]	09/21/2004	155	24.21	560.09	43.0%	0.0%

[1] https://www.sec.gov/Archives/edgar/data/1108109/000091205700046532/a2029077z424b4.txt
[2] https://www.sec.gov/Archives/edgar/data/1018325/000089534504000268/xslF345X02/dc4-community_forstmanntex.xml
[3] https://www.sec.gov/Archives/edgar/data/1018325/000089534504000673/xslF345X02/dc4-community_thodoreex.xml

Portfolio Company:	**TRW Automotive**
Sponsor:	Blackstone
LBO Date:	03/03/2003
TEV:	$4,725mn.
Pre-IPO Ownership:	78.4%
Notes:	Northrop Grumman 19% ownership
Example for:	Long exit process with multiple gaps between exit sales. All exit sales are of very similar size, with first and last sale being the largest and second largest sale, respectively (based on NOSH sold).
Similar Deals:	Domino's Pizza (Bain), Hertz Global (Clayton, Dubilier & Rice, Merrill Lynch, Carlyle), MedCath (KKR, Welsh Carson Anderson & Stowe), ON Semiconductor (Texas Pacific Group), Tuesday Morning (Madison Dearborn), Ruth's Chris Steakhouse (Madison Dearborn), Cinemark (Madison Dearborn, Quadrangle), Approach Resources (Yorktown Energy Partners), Dice Holdings (General Atlantic Partners, Quadrangle Capital), The Pantry (Freeman Spogli, Chase Manhattan), Quality Distribution (Apollo), Noranda Aluminium (Apollo), Prestige Brands (GTCR, TCW)

Transaction	Date	Days between Sales	Price	Sale Vol. ($mn.)	% Shares Sold	Holdings Post Sale
IPO[1]	02/06/2004	-	28	337.93	17.7%	82.3%
Share Sale[2]	06/04/2007	1214	40.45	404.5	14.7%	67.6%
Share Sale[3]	03/01/2010	1001	26.3	264.01	14.7%	52.9%
Share Sale[4]	09/09/2010	192	35.3	264.51	11.0%	41.9%
Share Sale[5]	11/15/2010	67	48.26	436.29	13.3%	28.6%
Share Sale[6]	02/20/2013	828	59.1	544.63	13.5%	15.1%
Exit[7]	08/05/2013	166	71.19	731.34	15.1%	0.0%

[1] https://www.sec.gov/Archives/edgar/data/1070843/000100547704000581/xslF345X02/edgar123.xml
[2] https://www.sec.gov/Archives/edgar/data/1070843/000089375007000211/xslF345X02/form4_ex.xml
[3] https://www.sec.gov/Archives/edgar/data/1070844/000118143110013461/xslF345X03/rrd268400.xml
[4] https://www.sec.gov/Archives/edgar/data/1070844/000118143110046470/xslF345X03/rrd286162.xml
[5] https://www.sec.gov/Archives/edgar/data/1267097/000118143110056322/xslF345X03/rrd291446.xml
[6] https://www.sec.gov/Archives/edgar/data/1070844/000118143113012044/xslF345X03/rrd371456.xml
[7] https://www.sec.gov/Archives/edgar/data/1267097/000110465913061064/xslF345X03/a4.xml



Portfolio Company:	**CommScope Holdings**
Sponsor:	Carlyle
LBO Date:	10/27/2010
TEV:	$4,320mn.
Pre-IPO Ownership:	98.4%
Notes:	180 days lock-up period, still first sale post-IPO within that period (after 154 days)
Example for:	Seemingly no pattern in exit timing and all share sales are roughly the same size. Roughly 30% of NOSH are held onto until final exit sales starting in August 2016. Also: shares sold in two tranches.
Similar Deals:	American Axle (Blackstone), Team Health (Blackstone), Paycom Software (WCAS), PBF Energy (Blackstone, First Reserve), SS&C Technologies (Carlyle), Targa Resources (Warburg Pincus), Kraton Performance Polymers (Texas Pacific Group, JP Morgan), Vantiv fka Fifth Third Processing (Advent), Envision Healthcare (Clayton Dubilier & Rice), Allison Transmission (Carlyle, Onex), Burlington Coat Factory (Bain), Brixmore Property Group (Blackstone, Centerbridge), Charles River Laboratories (DLJ Merchant Banking Partners), Continental Building Products (Lone Star), Eagle Bulk Shipping (Kelso), US Silica (Golden Gate), Sprouts Farmers Markets (Apollo), Spirit Airlines (Oaktree, Indigo), Pinnacle Foods (Blackstone), Petco Animal Supplies (Texas Pacific Group, Leonard Green & Partners), J Crew (Texas Pacific Group), Tempur Pedic (TA Associates)

Transaction	Date	Days between Sales	Price	Sale Vol. ($mn.)	% Shares Sold	Holdings Post Sale
IPO #1[1]	10/30/2013	-	14.21	109.31	5.0%	95.0%
IPO #2[2]	11/14/2013	15	14.21	45.78	2.1%	92.8%
Share Sale[3]	04/02/2014	139	21.17	426.05	13.2%	79.6%
Share Sale[4]	06/18/2014	77	22.13	445.37	13.2%	66.4%
Share Sale[5]	03/09/2015	264	30.62	612.4	13.1%	53.3%
Share Sale[6]	06/16/2015	99	30.76	615.2	13.1%	40.2%
Share Sale[7]	05/06/2016	325	28.9	578	13.1%	27.0%
Share Sale[8]	08/29/2016	115	29.04	333.96	7.5%	19.5%
Share Sale[9]	09/26/2016	28	30.37	303.7	6.6%	12.9%
Exit[10]	11/16/2016	51	33.21	654.8	12.9%	0.0%

[1] https://www.sec.gov/Archives/edgar/data/933790/000120919113050097/xslF345X03/c621002_4x1.xml
[2] https://www.sec.gov/Archives/edgar/data/933790/000120919113052229/xslF345X03/c627515_4x0.xml
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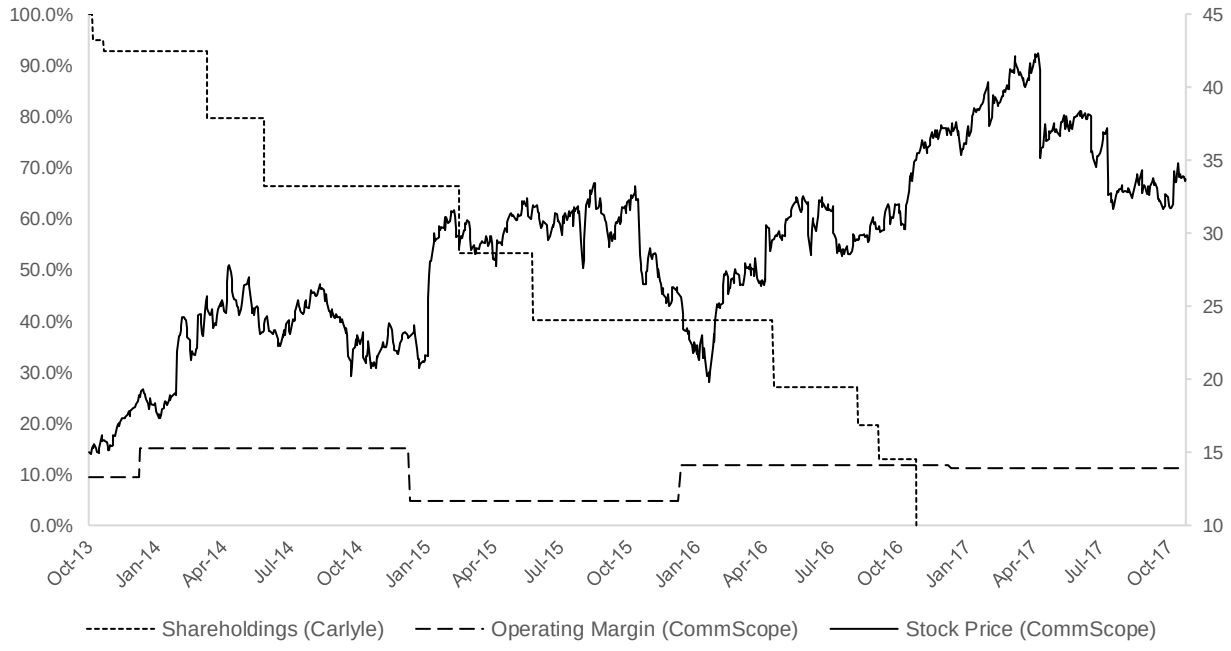
[10] https://www.sec.gov/Archives/edgar/data/933790/000089924316033842/xslF345X03/doc4.xml



Portfolio Company:	**Burlington**
Sponsor:	Bain
LBO Date:	01/18/2006
TEV:	$2,166.8mn.
Pre-IPO Ownership:	98.4%
Notes:	The price is never recorded for Distributions. The displayed price in the table is the company's share price on the day the distribution was made. The Volume is therefore the combination of assumed distribution price and number of shares distributed, assuming sale on the distribution day.
Example for:	Combination of Distributions and Share Sales. Warburg, Bain and GTCR seem to use this a lot.
Similar Deals:	OSI Restaurants (Bain), Bright Horizons Family (Bain), Burger King (Bain), ChipPac (Bain), DDi (Bain), Hospital Corp. of America (Bain, KKR), Solera Holdings (GTCR), Syniverse Holdings (GTCR), VeriFone (GTCR), Knoll (Warburg Pincus), Laredo Petroleum (Warburg Pincus), American Medical Systems (Warburg Pincus), TransDigm (Warburg Pincus), Antero Resources (Warburg Pincus), Polypore (Warburg Pincus), LPL Financial (Texas Pacific Group, Hellman & Friedman), Packaging Corp. of America (Madison Dearborn), PGT Inc. (JLL Partners), Alliance Data Systems (WCAS), Monotype Imaging (TA Associates), Tempur-Pedic (TA Associates), Verso Paper (Apollo)

Transaction	Date	Days between Sales	Price	Sale Vol. ($mn.)	% Shares Sold	Holdings Post Sale
IPO	10/03/2013	-	17	-	0.0%	100.0%
Distribution[1]	04/30/2014	209	25.99	29.99	2.1%	97.9%
Share Sale[2]	05/06/2014	6	24.78	262.95	19.5%	78.4%
Share Sale[3]	05/30/2014	24	24.78	44.6	3.3%	75.1%
Distribution[4]	10/06/2014	129	38.66	26.96	1.3%	73.8%
Share Sale[5]	10/10/2014	4	38.1	276.33	13.3%	60.4%
Distribution[6]	12/10/2014	61	43.82	38.6	1.6%	58.8%
Share Sale[7]	12/16/2014	6	43.1	301.82	12.9%	45.9%
Distribution[8]	01/12/2015	27	49.29	59.17	2.2%	43.7%
Share Sale[9]	01/16/2015	4	48.75	550.86	20.8%	23.0%
Distribution[10]	03/31/2015	74	59.42	108.31	3.4%	19.6%
Exit[11]	04/07/2015	7	58.77	626.92	19.6%	0.0%

[1] https://www.sec.gov/Archives/edgar/data/1040508/000118143114017767/xslF345X03/rrd408376.xml
[2] https://www.sec.gov/Archives/edgar/data/1040508/000118143114018102/xslF345X03/rrd408617.xml
[3] https://www.sec.gov/Archives/edgar/data/1040508/000118143114022393/xslF345X03/rrd410846.xml
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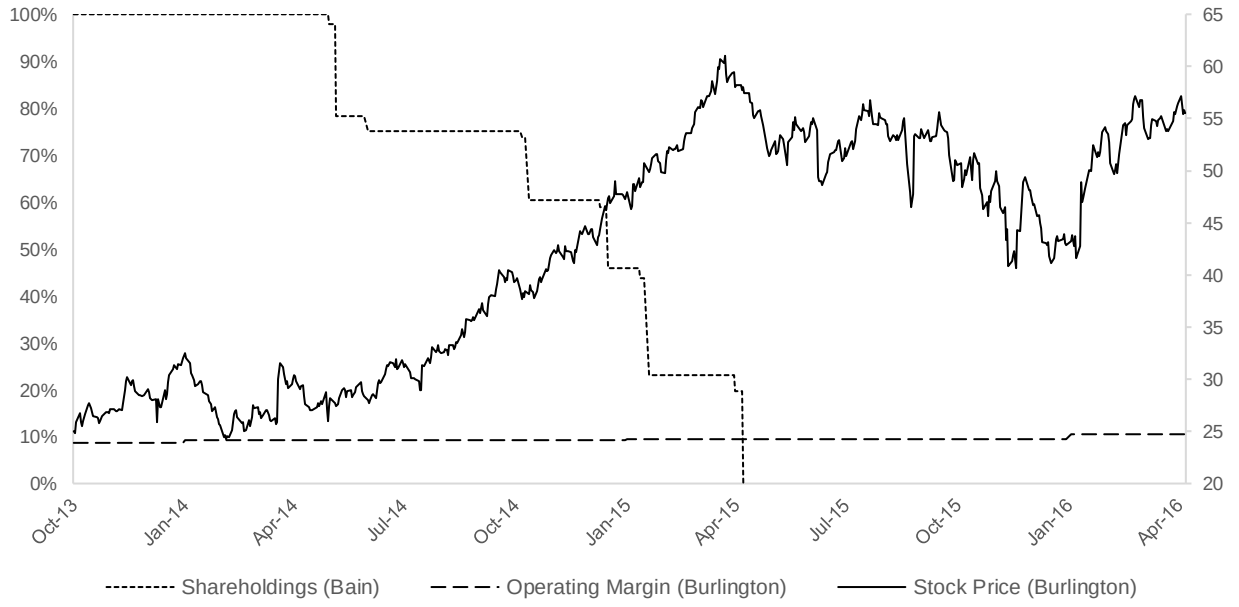
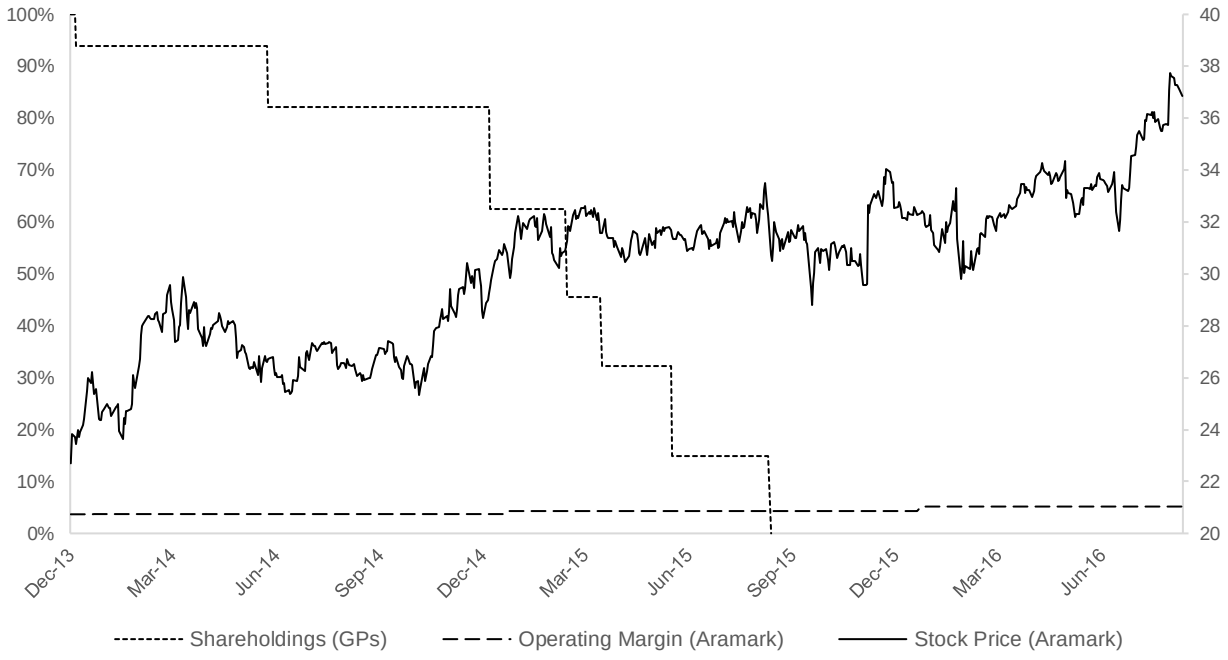


Portfolio Company:	**Aramark**
Sponsor:	Warburg Pincus, Thomas H. Lee, Goldman Sachs, CCMP, JP Morgan
LBO Date:	01/26/2007
TEV:	$8,300mn.
Example for:	All five sponsors have identical exit process, both in terms of % shares sold and dates
Similar Deals:	Burger King (Bain, Goldman Sachs, Texas Pacific Group), Dollar General (KKR, Goldman Sachs, Citigroup, Wellington, Canada Pension Plan), HD Supply (Bain, Carlyle, Clayton Dubilier & Rice), Dex Media (WCAS, Carlyle), Hertz Global (Carlyle, Clayton Dubilier & Rice, Merrill Lynch), Dice Holdings (Quadrangle, General Atlantic Partners), IMS Health (Leonard Green & Partners, Texas Pacific Group, Canada Pension Plan), Avago Technologies (KKR, Silver Lake, Seletar, Geyser), Extended Stay America (Blackstone, Centerbridge)

Transaction[1]	GP	Date	Days betw. Sales	Price	Sale Vol. ($mn.)	% Shares Sold	Holdings Post Sale
IPO	Warburg Pincus	12/17/2013	-	18.9	48.92	6.0%	94.0%
IPO	Thomas H. Lee	12/17/2013	-	18.9	47.88	6.0%	94.0%
IPO	Goldman Sachs	12/17/2013	-	18.9	47.88	6.0%	94.0%
IPO	CCMP	12/17/2013	-	18.9	23.95	6.0%	94.0%
IPO	JP Morgan	12/17/2013	-	18.9	23.95	6.0%	94.0%
1st Sale Post-IPO	Warburg Pincus	06/04/2014	169	25.54	131.44	11.9%	82.1%
1st Sale Post-IPO	Thomas H. Lee	06/04/2014	169	25.54	128.74	11.9%	82.1%
1st Sale Post-IPO	Goldman Sachs	06/04/2014	169	24.54	123.67	11.9%	82.1%
1st Sale Post-IPO	CCMP	06/04/2014	169	24.54	61.83	11.9%	82.1%
1st Sale Post-IPO	JP Morgan	06/04/2014	169	25.54	64.35	11.9%	82.1%
2nd Sale Post-IPO	Warburg Pincus	12/17/2014	196	27.02	228.85	19.6%	62.5%
2nd Sale Post-IPO	Thomas H. Lee	12/17/2014	196	27.02	224.09	19.6%	62.5%
2nd Sale Post-IPO	Goldman Sachs	12/17/2014	196	27.02	224.09	19.6%	62.5%
2nd Sale Post-IPO	CCMP	12/17/2014	196	27.02	112.05	19.6%	62.5%
2nd Sale Post-IPO	JP Morgan	12/17/2014	196	27.02	112.05	19.6%	62.5%
3rd Sale Post-IPO	Warburg Pincus	02/23/2015	68	29.88	220.06	17.0%	45.5%
3rd Sale Post-IPO	Thomas H. Lee	02/23/2015	68	29.88	215.49	17.0%	45.5%
3rd Sale Post-IPO	Goldman Sachs	02/23/2015	68	29.88	215.49	17.0%	45.5%
3rd Sale Post-IPO	CCMP	02/23/2015	68	29.88	107.74	17.0%	45.5%
3rd Sale Post-IPO	JP Morgan	02/23/2015	68	29.88	107.74	17.0%	45.5%
4th Sale Post-IPO	Warburg Pincus	03/26/2015	31	32.16	183.76	13.2%	32.3%
4th Sale Post-IPO	Thomas H. Lee	03/26/2015	31	32.16	179.95	13.2%	32.3%
4th Sale Post-IPO	Goldman Sachs	03/26/2015	31	32.16	179.95	13.2%	32.3%
4th Sale Post-IPO	CCMP	03/26/2015	31	32.16	89.97	13.2%	32.3%
4th Sale Post-IPO	JP Morgan	03/26/2015	31	32.16	89.97	13.2%	32.3%
5th Sale Post-IPO	Warburg Pincus	05/27/2015	62	31.47	236.03	17.3%	15.0%
5th Sale Post-IPO	Thomas H. Lee	05/27/2015	62	31.47	157.35	11.8%	20.5%
5th Sale Post-IPO	Goldman Sachs	05/27/2015	62	31.47	157.35	11.8%	20.5%
5th Sale Post-IPO	CCMP	05/27/2015	62	31.47	118.01	17.7%	14.6%
5th Sale Post-IPO	JP Morgan	05/27/2015	62	31.47	118.01	17.7%	14.6%
Exit Sale	CCMP	07/01/2015	35	30.98	96.44	14.6%	0%
Exit Sale	JP Morgan	07/01/2015	35	30.98	96.44	14.6%	0%
Exit Sale	Warburg Pincus	08/21/2015	86	32.3	210.5	15.0%	0%
Exit Sale	Thomas H. Lee	08/21/2015	86	32.3	281.84	20.5%	0%
Exit Sale	Goldman Sachs	08/21/2015	86	32.3	285.01	20.5%	0%

[1] SEC links omitted for reasons of brevity, can be provided upon request.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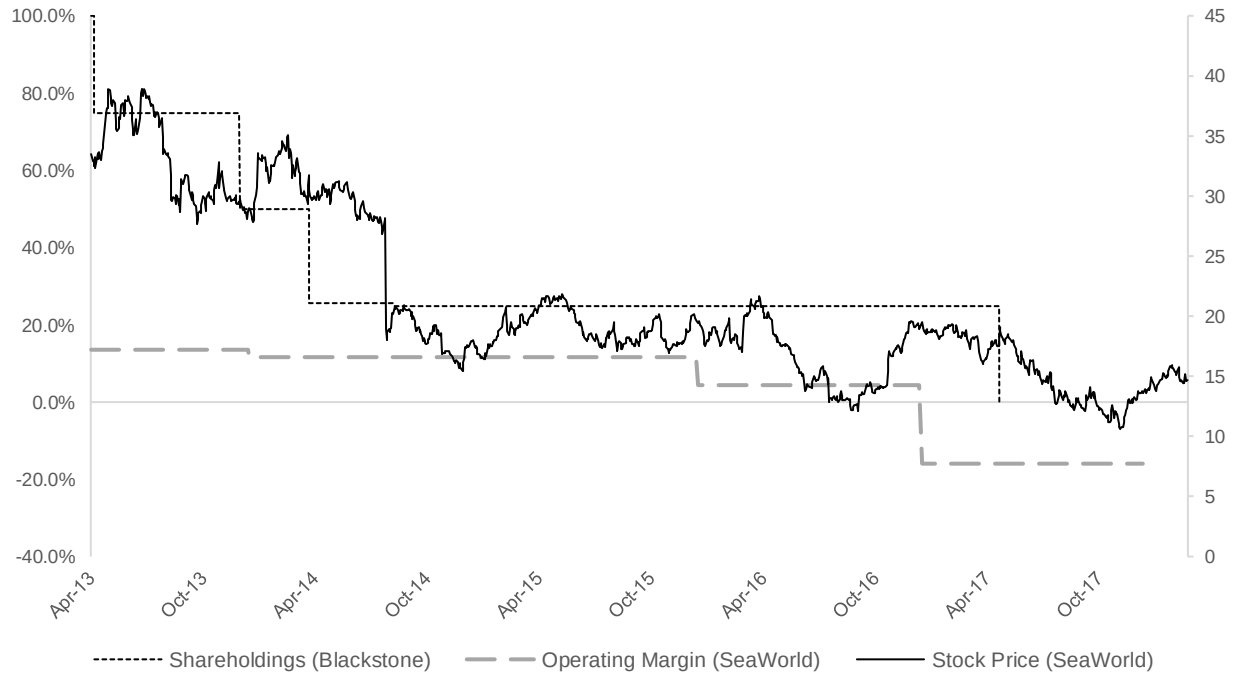
Shareholdings (GPs)
Operating Margin (Aramark)
Stock Price (Aramark)

Portfolio Company:	**SeaWorld Entertainment**
Sponsor:	Blackstone
LBO Date:	10/07/2009
TEV:	$2,503mn.
Pre-IPO Ownership:	100%
Notes:	The price is never recorded for Distributions. The displayed price in the table is the company's share price on the day the distribution was made. The volume is therefore the combination of assumed distribution price and number of shares distributed, assuming sale on the distribution day.
Example for:	Sale of Blackstone's remaining 25% stake in singular M&A transaction after four prior sales
Similar Deals:	GlobeSpan (Texas Pacific Group), Gulfstream Aerospace (Forstmann Little), TubeCity IMS (Onex), Emergency Medical (Onex), Prime Service (Investcorp), Morton's Restaurant (Castle Harlan, Laurel Crown), Educate (Citigroup, Apollo), AMIS (Citigroup, Francisco Partners), Dex Media (Carlyle, WCAS), Athlon Energy (Apollo), Eagle Test Systems (TA Associates), rue21 (Apax), Watkins-Johnson (Fox Paine), Domain Energy (First Reserve), LIN TV (Hicks Muse)

Transaction[1]	Date	Days between Sales	Price	Sale Vol. ($mn.)	% Shares Sold	Holdings Post Sale
IPO[2]	04/24/2013	-	25.38	505.06	25.3%	74.7%
Share Sale[3]	12/17/2013	237	28.88	563.16	24.8%	49.9%
Share Sale[4]	04/09/2014	113	28.88	548.72	24.2%	25.7%
Distribution[5]	08/25/2014	138	20.14	14.98	0.9%	24.8%
M&A Exit[6]	05/08/2017	987	23	448.55	24.8%	0.0%

[1] Some sales recorded in multiple filings. For reasons of brevity, only one filing is referenced for each transaction.
[2] https://www.sec.gov/Archives/edgar/data/1070844/000118143113023459/xslF345X03/rrd377334.xml
[3] https://www.sec.gov/Archives/edgar/data/1070844/000118143113063140/xslF345X03/rrd397427.xml
[4] https://www.sec.gov/Archives/edgar/data/1070844/000120919114026797/xslF345X03/doc4.xml
[5] https://www.sec.gov/Archives/edgar/data/1564902/000118143114030340/xslF345X03/rrd415272.xml
[6] https://www.sec.gov/Archives/edgar/data/1070844/000089924317012674/xslF345X03/doc4.xml



Portfolio Company:	**Warner Music Group**
Sponsor:	Thomas H. Lee, Bain, Providence Equity
LBO Date:	02/15/2004
TEV:	$2,898mn.
Pre-IPO Ownership:	80.5% jointly (THL 48.6%, Bain 20.8%, Providence 11.1%)
Example for:	No share sale for over 6 years, then complete sale in one single M&A transaction. Deal had no financial distress etc. (like e.g. Freescale Semiconductor)
Similar Deals:	Freescale Semiconductor (Blackstone, Carlyle, Permira, Texas Pacific Group), Golfsmith (Atlantic Equity), Sealy (KKR), Spinnaker Exporation (Warburg Pincus)

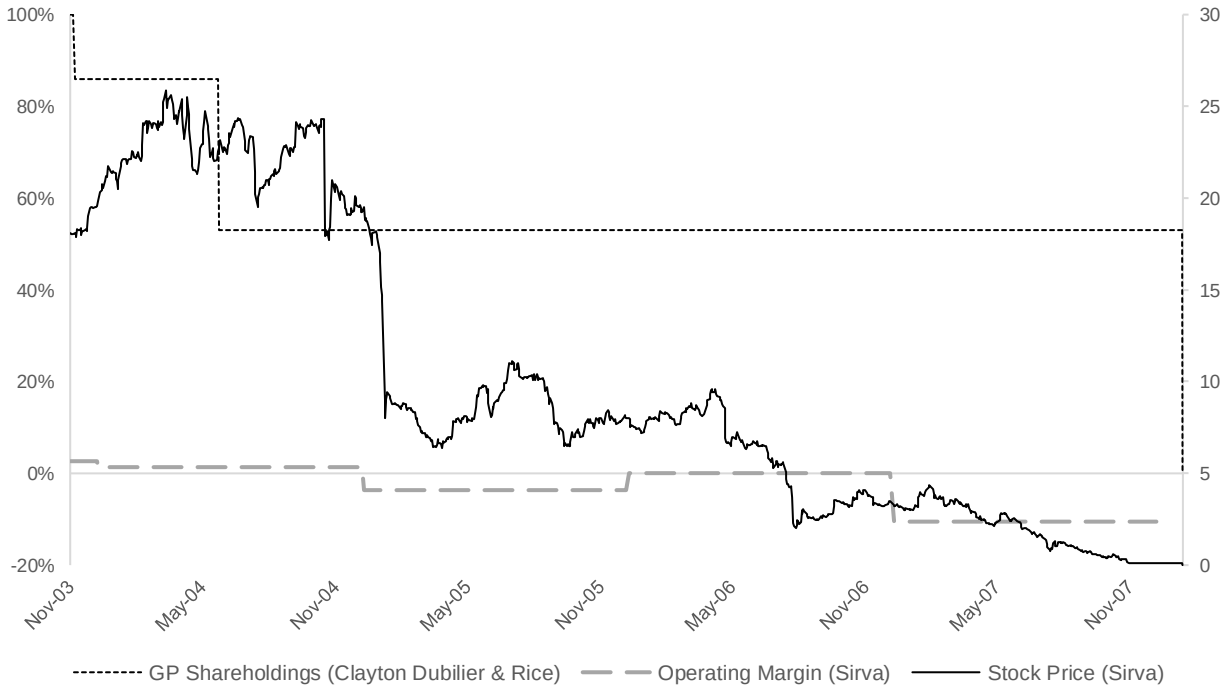
Transaction[1]	GP	Date	Days Betw. Sales	Price	Sale Vol. ($mn.)	% Shares Sold	Holdings Post Sale
IPO	Thomas H. Lee	05/11/2005	-	-	-	0%	100%
IPO	Bain	05/11/2005	-	-	-	0%	100%
IPO	Providence	05/11/2005	-	-	-	0%	100%
M&A Sale	Thomas H. Lee	07/20/2011	2261	8.25	464.92	100%	0%
M&A Sale	Bain	07/20/2011	2261	8.25	198.74	100%	0%
M&A Sale	Providence	07/20/2011	2261	8.25	106.47	100%	0%

[1] Sales reported across different filings, omitted for reasons of brevity. Can be provided upon request.

Portfolio Company:	**Sirva**
Sponsor:	Clayton, Dubilier & Rice
LBO Date:	11/19/1999
TEV:	$677.67mn.
Pre-IPO Ownership:	80.1%
Notes:	-
Example for:	Representative Chapter 11 deal. GP sells shares in IPO and Secondary Offering but retains 53% thereafter until Chapter 11. Exit happens in Chapter 11 procedure (unclear how, for how much) as Sirva re-filed with SEC and CDR was not listed as shareholder anymore.
Similar Deals:	AMF Bowling (Goldman Sachs, Blackstone, Kelso), Anchor Glass (Cerberus), Boyds Collection (KKR), Citadel Broadcasting (Forstmann Little), Verso Paper (Apollo), hhgregg Inc. (Freeman Spogli), Goodman's Stores (Sun Capital), RHI Entertainment (Kelso), GateHouse Media (Fortress), CHC Group (First Reserve)

Transaction	Date	Days Betw. Sales	Price	Sale Vol. ($mn.)	% Shares Sold	Holdings Post Sale
IPO[1]	12/1/2003	-	18.5	118.49	14.0%	86.0%
Share Sale[2]	6/15/2004	197	22	330.50	32.9%	53.0%
Chapter 11	2/5/2008	1330	-	-	-	-

[1] https://www.sec.gov/Archives/edgar/data/1074387/000118143103033857/xslF345X02/rrd22751.xml
[2] https://www.sec.gov/Archives/edgar/data/942674/000118143103033858/xslF345X02/rrd22750.xml
[3] https://www.sec.gov/Archives/edgar/data/942674/000118143104030854/xslF345X02/rrd45211.xml
[4] https://www.sec.gov/Archives/edgar/data/1074387/000118143104030857/xslF345X02/rrd45285.xml



Appendix 5: Post-IPO Performance Using PE-Fund Performance Data

This table displays results of robustness tests for Table 7 Panel A of this paper. As in Table 7, we show summary statistics of absolute and relative deal-level performance benchmarks: Total Value to Paid-in Multiple ('TVPI'), Internal Rate of Return ('IRR'), and the Public Market Equivalent according to Kaplan and Schoar (2005, 'KS-PME'). We calculate all performance numbers based on deal-level cash flows from each portfolio company's IPO until the GPs' final exit, identical to Table 7. However, we only report the numbers for the subsample of deals for which we have post-IPO fund performance indicators of the lead PE fund invested in each GP-portfolio company pair (N=368). In part (1) of the table, we display pre-fee performance numbers for the reduced 368-sample, using the exact same calculation as in Table 7. In parts (2)-(4) we report performance numbers post-fees, subtracting carried interest and management fees. The fee data is taken from Preqin's 'Terms & Conditions' database, identical to Table 7. Modes are 2% for management fees, 8% for hurdle rates and 20% for carried interest. The average fund-level IRR is 16.9%. Part (2) calculates carried interest on a deal-by-deal basis, as in Table 7. We calculate rolling IRRs using all pre- and post-IPO cash flows on deal-level, and start subtracting carried interest payments once the deal IRR surpasses a hurdle rate. Part (3) uses IRRs of the lead investment fund by each GP at the time of each share sale. If that fund-IRR surpasses the hurdle rate at the time of a share sale we deduct carried interest. Part (4) also uses IRRs of the lead investment fund; however, we use the IRR of each fund at the end of its lifetime – effectively the IRR which would be used to calculate carried interest payments in reality. If this IRR is higher than the fund hurdle rate, we apply carried interest to each share sale retrospectively. We calculate management fees by applying contractual annual management fees to the invested capital by the GP in each company. To account for industry-typical 'cost basis' calculations of management fees, we adjust the invested capital downward by the percentage of shares sold post-IPO to lower the effective management fee payments. Numbers in brackets are p-values indicating the statistical significance of differences of means (t-test) and medians (Wilcoxon) from 1 for TVPI and KS-PMEs and 0 for IRRs.

	All Deals		**'Regular' Exit**		**M&A Exit**		**Chapter 11**	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
(1) Gross Returns (Pre-Fees)								
TVPI	1.15	1.08	1.19	1.13	1.25	1.14	0.14	0.09
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
IRR *(in %)*	7.4	6.9	12.1	9.8	14.4	10.5	-78.5	-88.4
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
KS-PME w/ S&P 500	1.07	1.03	1.12	1.05	1.12	1.07	0.13	0.10
	[0.07]	[0.16]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
KS-PME w/ Russell 2000	1.01	0.98	1.06	1.01	1.06	0.97	0.13	0.09
	[0.85]	[0.72]	[0.02]	[0.10]	[0.02]	[0.74]	[0.00]	[0.00]
(2) Net Returns (Post-Fees): Deal-by-Deal Carry Calculation								
TVPI	0.96	0.92	1.00	0.94	1.03	0.98	0.12	0.09
	[0.12]	[0.00]	[0.98]	[0.20]	[0.63]	[0.82]	[0.00]	[0.00]
IRR *(in %)*	-7.04	-5.50	-5.80	-5.20	-2.85	-0.50	-89.82	-98.15
	[0.00]	[0.00]	[0.00]	[0.15]	[0.52]	[0.75]	[0.00]	[0.00]
KS-PME w/ S&P 500	0.89	0.87	0.94	0.90	0.92	0.87	0.11	0.08
	[0.00]	[0.00]	[0.01]	[0.00]	[0.17]	[0.02]	[0.00]	[0.00]
KS-PME w/ Russell 2000	0.85	0.83	0.89	0.87	0.88	0.83	0.11	0.08
	[0.00]	[0.00]	[0.00]	[0.00]	[0.02]	[0.00]	[0.00]	[0.00]
(3) Net Returns (Post-Fees): Carry Calculation with Fund Data at Sales								
TVPI	0.98	0.93	1.01	0.99	1.06	0.95	0.13	0.07
	[0.37]	[0.04]	[0.70]	[0.62]	[0.32]	[0.81]	[0.00]	[0.00]
IRR *(in %)*	-8.20	-5.25	-4.22	-1.00	-2.00	1.54	-82.55	-98.15
	[0.00]	[0.00]	[0.04]	[0.89]	[0.35]	[0.71]	[0.00]	[0.00]
KS-PME w/ S&P 500	0.91	0.88	0.95	0.90	0.95	0.90	0.12	0.08
	[0.00]	[0.00]	[0.00]	[0.00]	[0.41]	[0.14]	[0.00]	[0.00]
KS-PME w/ Russell 2000	0.86	0.84	0.90	0.87	0.91	0.87	0.12	0.07
	[0.00]	[0.00]	[0.00]	[0.00]	[0.08]	[0.03]	[0.00]	[0.00]
(4) Net Returns (Post-Fees): Carry Calculation with Fund Data at Fund-End								
TVPI	0.94	0.90	0.98	0.92	1.02	0.92	0.13	0.09
	[0.02]	[0.00]	[0.31]	[0.00]	[0.73]	[0.44]	[0.00]	[0.00]
IRR *(in %)*	-10.10	-7.90	-8.24	-6.91	-4.05	-3.85	-84.81	-91.05
	[0.00]	[0.00]	[0.00]	[0.05]	[0.40]	[0.38]	[0.00]	[0.00]
KS-PME w/ S&P 500	0.88	0.85	0.92	0.86	0.92	0.88	0.12	0.09
	[0.00]	[0.00]	[0.00]	[0.00]	[0.14]	[0.05]	[0.00]	[0.00]
KS-PME w/ Russell 2000	0.83	0.82	0.87	0.83	0.87	0.86	0.12	0.09
	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]	[0.02]	[0.00]	[0.00]

Appendix 6: Post-IPO Fees Using PE-Fund Performance Data

This table displays results of robustness tests for Table 7 Panel B of this paper, using the reduced N=368 sample with available post-IPO PE fund performance data identical to Appendix 4. As in Table 7, we calculate total fee numbers on deal-level: management fees, carried interest and the total deal-fees calculated as the sum of management fees and carried interest. We also report the percentages the respective deal fee numbers are of the total deal distributions, i.e. how much (in percent) of the total deal distributions are paid out as fees to GPs. All deal fee calculations are done in the exact same manner as presented in Appendix 4. Part (1) reports absolute and relative fee numbers using a deal-by-deal carried interest calculation (as part (2) of Appendix 4, and identical to the approach displayed in Table 7). Part (2) reports absolute and relative fee numbers using fund-level carried interest data at the time of each share sale (as part (3) of Appendix 4). Part (3) reports absolute and relative deal-fee numbers using fund-level carried interest data at the end of each fund's lifetime (as part (4) of Appendix 4). Part (4) of the table reports the percentage-difference between the deal-fee numbers as reported in part (1) and (3). These numbers show the difference between the deal-by-deal carried interest calculation (we also use in Table 7 on our full N=564 sample) and carried interest calculations using PE funds' end-of-lifetime IRRs and hurdle rates. According to our numbers for the reduced N=368 sample as shown below, deal-by-deal numbers understate the average deal-fees by 16.8% in comparison to a fund-level calculation.

	All Deals		**'Regular' Exit**		**M&A Exit**		**Chapter 11**	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
(1) Net Returns (Post-Fees): Deal-by-Deal Carry Calculation								
Total Fees per Deal ($mn.)								
- Management Fees	11.06	4.07	9.46	3.37	14.07	6.47	19.51	8.14
- Carried Interest	91.31	46.01	98.00	49.33	89.78	48.30	5.68	0.00
- Total Fees	102.37	53.83	107.46	55.28	103.85	59.27	25.19	12.13
Fees as % of Total Deal Distributions (%)								
- Management Fees	2.43	1.01	1.94	0.88	3.95	1.31	116.2	18.46
- Carried Interest	14.23	17.31	14.28	17.00	14.08	17.64	4.86	0.00
- Total Fees	16.67	18.69	16.22	18.35	18.02	19.22	121.1	19.49
(2) Net Returns (Post-Fees): Carry Calculation with Fund Data at Sales								
Total Fees per Deal ($mn.)								
- Management Fees	11.06	4.07	9.46	3.37	14.07	6.47	19.51	8.14
- Carried Interest	80.41	28.69	98.75	41.70	75.58	29.60	3.32	0.00
- Total Fees	99.46	44.74	108.21	50.89	89.65	45.39	22.83	8.60
Fees as % of Total Deal Distributions (%)								
- Management Fees	2.43	1.01	1.94	0.88	3.95	1.31	116.2	18.46
- Carried Interest	13.35	20.00	13.69	20.00	12.33	20.00	7.78	0.00
- Total Fees	15.78	20.52	15.63	20.50	16.27	20.58	123.97	26.31
(3) Net Returns (Post-Fees): Carry Calculation with Fund Data at Fund-End								
Total Fees per Deal ($mn.)								
- Management Fees	11.06	4.07	9.46	3.37	14.07	6.47	19.51	8.14
- Carried Interest	108.47	48.10	120.27	50.66	95.71	53.12	2.87	0.00
- Total Fees	119.52	54.42	129.73	62.78	109.78	58.41	22.39	8.60
Fees as % of Total Deal Distributions (%)								
- Management Fees	2.43	1.01	1.94	0.88	3.95	1.31	116.2	18.46
- Carried Interest	15.93	20.00	16.12	20.00	15.35	20.00	9.47	0.00
- Total Fees	18.36	20.71	18.06	20.64	19.29	20.91	125.67	29.50
(4) %-Difference Between (3) and (1)								
- Management Fees	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
- Carried Interest	18.8%	4.5%	22.7%	2.7%	6.6%	10.0%	-49.5%	0.0%
- Total Fees	16.8%	1.1%	20.7%	13.6%	5.7%	-1.5%	-11.1%	-29.1%

Appendix 7. Description of Cross-Sectional Regression Variables

This table contains descriptions of all dependent and independent variables used across multivariate regression models in this paper, along with their source. 'Original calculation' means the variable was calculated by the authors, and not taken directly from a database source.

Variables	Source	Description
Dependent Variables		
Exit Duration (in Years) from IPO to Exit	SEC	Cash flow-weighted time (in years) from IPO to last share sale of GP in each GP-portfolio company pair. Post-IPO cash flows include all shares sales and in-kind distributions to LPs. Original calculation based on SEC filings.
Exit Duration (in Years) from IPO to Exit incl. Divs.	SEC	Cash flow-weighted time (in years) from IPO to last share sale of GP in each GP-portfolio company pair. Post-IPO cash flows include all share sales, in-kind distributions to LPs and (common stock) dividends. Original calculation based on SEC filings.
Exit Length (in Years) from IPO to Exit	SEC	Years from IPO to last share sale of GP in each GP-portfolio company pair. Original calculation based on SEC filings.
Fund Variables		
Fund in Carry (Yes=1, No=0)	Preqin	Dummy variable taking the value of 1 if the IRR of the (lead) investment PE fund in each GP-portfolio company pair is higher than its Hurdle Rate at the time of the portfolio company's IPO, and 0 otherwise. Original calculation based on Preqin fund performance (IRR) and Terms & Conditions ('T&C', for Hurdle Rate) data. Preqin releases 'T&C' data anonymized (i.e. without the PE fund names). We therefore match the data by fund size and vintage year to our sample deals. Fund performance data can be matched 1:1 as all fund-level information (including names) is available.
Fund IRR at IPO (%)	Preqin	IRR of the (lead) investment PE fund in each GP-portfolio company pair at the time of the portfolio company's IPO. Taken from Preqin fund performance data.
Difference IRR-Hurdle Rate (%)	Preqin	Difference between IRR and Hurdle Rate of the (lead) investment PE fund in each GP-portfolio company pair at the time of the portfolio company's IPO. Original calculation based on Preqin fund performance (IRR) and T&C (Hurdle Rate) data. Preqin T&C data is matched by fund size and vintage year, as explained above.
Fund in Carry * %-Days Stock Price>IPO Price	Preqin, CRSP	Interaction term of 'Fund in Carry' variable, as described above, and '%-Days Stock Pice>IPO Price' variable, as defined below.
Diff. IPO Year/Fund Vintage Year	Preqin, SEC	Difference (in Years) between PE funds' vintage years and the IPO years of their portfolio companies. Original calculation based on Preqin fund performance- and SEC data.
Fund Outside Inv. Period at IPO (Yes=1, No=0)	Preqin, SEC	Dummy variable taking the value of 1 in all GP-portfolio company pairs in which the invested PE fund is outside its designated investment period at the time of the portfolio company's IPO, and 0 if the fund is within the investment period. Original calculation based on Preqin Fund Terms & Conditions ('T&C') data. Preqin T&C data is matched by fund size and vintage year, as explained above.
Fund Size (ln $mn.)	Preqin	Volume of PE funds' Committed Capital. Taken from Preqin fund performance data.
GP Variables		
Historic Fundraising (ln $mn.)	Preqin	Total (US-$) volume of committed capital in all raised funds by each GP in our sample. Original calculation based on Preqin fund performance data.
GP Age at IPO (Years)	Preqin	Age (in Years) of each GP at the time of their portfolio company's IPO. Original calculation based on Preqin fund performance data, measured from IPO to the vintage year of the first recorded fund in the Preqin data base.
Fundraising at Time of IPO (Yes=1, No=0)	Preqin	Dummy variable taking the value of 1 if the GP in each GP-portfolio company pair is raising a follow-up fund at the time of its portfolio company's IPO, and 0 otherwise. We determine whether a GP is raising a fund if it has a fund with a vintage year within the first two years after the portfolio company's IPO. Original calculation based on Preqin fund performance data.
Stock Performance Variables		
%-Days Stock Price>IPO Price (IPO to Exit)	CRSP	Percent of (trading) days, counted from IPO to exit, in which the portfolio companies' stock price is above the stock price at the end of the first trading day. Original calculation using CRSP stock price data.
Absolute Stock Return IPO-Exit (%)	CRSP	Absolute stock return of portfolio companies between IPO and exit, calculated based on the stock price at the end of the first trading day post-IPO and the stock price on the day of the last GP share sale. Original calculation using CRSP stock price data.
Abs. Stock Return IPO-Lockup End (in %)	CRSP, SEC	Absolute stock return of portfolio companies between IPO and the end of the lockup period, calculated based on the stock price at the end of the first trading day post-IPO and the stock price on the last day of companies' lockup periods. Original calculation using CRSP stock price data. Lockup period information obtained from S-1 filings.
Market Corrected Stock Return IPO-Exit (%)	CRSP	Excess stock return of portfolio companies between IPO and exit over Russell 2000 stock index, calculated based on the stock price at the end of the first trading day post-IPO and the stock price on the day of the last GP share sale. Original calculation using CRSP stock price data.

Post-IPO Dividend Payments (ln $mn.)	CRSP, SEC	Pro-rata post-IPO common stock dividends received by GP until final share sale. Calculated using the number of common shares held by GPs between IPO and last share sale, and per-share dividend as paid out by their portfolio companies.
Portfolio Company Variables		
EBIT Margin at IPO (%)	SEC	Portfolio company EBIT Margin in IPO (fiscal) year. Original calculation using S-1/424B and 10-K accounting data.
Return on Assets at IPO (%)	SEC	Portfolio company Return on Assets in IPO (fiscal) year. Original calculation using S-1/424B and 10-K accounting data.
Pre-IPO TVPI	SEC	Portfolio company level-TVPI based on the GP's equity investment at LBO and pre-IPO payments (dividend, share redemptions, fees etc.) from portfolio companies to GP investors. For the TVPI, the payments to GPs are measured pro rata, based on the respective GP's company %-ownership. Original calculation based on SEC data.
Pre-IPO Cash Distributions from PC to GP (ln $mn.)	SEC	US-$ amount of all pre-IPO portfolio company payments to GP investors, including dividends, fees and share redemptions/repurchases. Measured pro-rata, based on the respective GP's company %-ownership. Original calculation based on SEC data.
IPO Variables		
Underpricing (%)	CRSP, SEC	%-difference between portfolio company IPO offer price and stock price at the end of the first day of trading. Original calculation based on CRSP and SEC (for IPO price) data.
Shares sold by GP in IPO (% of GP Holdings)	SEC	Shares sold by GP in portfolio company's IPO, calculated as % of total GP shareholdings pre-IPO. Original calculation based on SEC S-1/424B data.
Shares sold by Issuer (Yes=1, No=0)	SEC	Dummy variable taking the value of 1 if a portfolio company issues and sells its own shares in its IPO, and 0 if only pre-IPO shareholders sell shares. Original calculation based on SEC S-1/424B data.
Length LBO to IPO (in Years)	SEC, Various	Length (in Years) between LBO and IPO of a portfolio company. The IPO date is taken from SEC filings, the LBO date from our core LBO deal list (based on prior data, Capital IQ, Preqin etc.), as explained in the data section.
Quick Flip (Yes=1, No=0)	SEC, Various	Dummy variable taking the value of 1 if the time between a portfolio company's LBO and IPO is < 1 year and 0 if it is >=1 year, in line with Jerry Cao's (2011) definition. Original calculation using LBO and IPO dates as defined above.
Board Variables		
Board Seats GP (% of total Board Seats)	SEC	Percent of board seats held by each GP investor in their portfolio companies at the time of the IPO. Original calculation based on S-1/424B data.
Board Seats GP Held post Exit (Yes=1, No=0)	SEC	Dummy variable taking the value of 1 if a GP holds at least 1 board seat in a portfolio company following its last share sale, and 0 if the GP has no more board seats after the final share sale. Original calculation based on SEC 10-K and DEF14A data.
Deal Variables		
Deal TEV (ln $bn.)	SEC, Various	Total Enterprise Value in bn. US-$ of LBO. Original calculation based on a variety of sources (SEC filings, Capital IQ/Preqin deal data, LPC and FISD/Mergent debt data), as explained in Appendix 2 and the data section.
Club Deal (Yes=1, No=0)	SEC, Various	Dummy variable taking the value of 1 if LBO has >1 GP investor, and 0 if it has only 1 GP investor. Original calculation based on a variety of LBO sources and original LBO dataset, as explained in Appendix 2 and the data section.
Deal Leverage (% Debt of TEV)	LPC, FISD, SEC, Various	LBO leverage, calculated as the debt-percentage of TEV. Original calculation based on LBO data (as explained in Appendix 2) and LPC Dealscan syndicated loan data and Mergent/FISD corporate note data.
No. Debt Facilities of LBO Debt	LPC, FISD, SEC, Various	Number of different debt facilities comprising total LBO debt, including term loan facilities and corporate notes. Original calculation based on LBO data (as explained in Appendix 2) and LPC Dealscan syndicated loan data and Mergent/FISD corporate note data.
Cost of LBO Debt (bp over LIBOR)	LPC, FISD	Average cost of LBO debt calculated as basis points over LIBOR. Original calculation using data taken from loan AISD spreads over LIBOR from LPC Dealscan data and Mergent/FISD Coupon Rates of LBO notes.
GP Ownership (% of Shares Held)	SEC	GP %-share ownership in portfolio company, taken from S-1/424B filings.
Market Variables		
U.S. LBO Volume in IPO Quarter (ln $bn.)	Capital IQ	Aggregate US-$ volume of all US (=target based in US) LBOs in the quarter of each portfolio company's IPO, calculated using Capital IQ LBO deal data.
U.S. M&A Volume in IPO Quarter (ln $bn.)	Capital IQ	Aggregate US-$ volume of all US (=target based in US) M&As in the quarter of each portfolio company's IPO, calculated using Capital IQ M&A deal data.
Avg. U.S. LBO EBITDA Multiple in IPO Quarter	Capital IQ, Compustat	Average EBITDA Multiple of all US LBOs in the quarter of each portfolio company's IPO, calculated using Capital IQ LBO deal data transaction values and corresponding Compustat and Capital IQ EBITDA numbers of LBO targets.

Appendix 8. Summary Statistics of Cross-Sectional Regression Variables

This table contains summary statistics for all dependent and independent variables used across the various multivariate regression models in this paper.

Variables	Obs.	Mean	Median	SD	25%	75%
Exit Duration (in Years) from IPO to Exit	564	2.008	1.541	1.744	.8531	2.662
Exit Duration (in Years) from IPO to Exit incl. Dividends	564	2.019	1.553	1.720	.8652	2.662
Exit Length (in Years) from IPO to Exit	564	2.956	2.350	2.279	1.257	4.116
Fund in Carry (Dummy: Yes=242, No=126)	368	.657	1	.475	0	1
Fund IRR at IPO (%)	351	.157	.131	.185	.054	.238
Difference IRR-Hurdle Rate (%)	351	.081	.051	.189	-.021	.162
Fund in Carry * %-Days Stock Price<IPO Price	368	.378	.206	.402	0	.815
Diff. IPO Year/Fund Vintage Year	423	5.251	5	2.836	3	7
Fund Outside Inv. Period at IPO (Dummy: Yes=215, No=208)	423	.508	1	.500	0	1
Fund Size (ln $bn.)	418	2.812	1.425	3.645	.600	3.600
Historic Fundraising (ln $bn.)	564	32.537	12.620	46.111	1.902	41.912
GP Age at IPO (Years)	564	13.46	12	8.57	7	19
Fundraising at Time of IPO (Dummy: Yes=223, No=212)	435	.512	1	.500	0	1
%-Days Stock Price>IPO Price (IPO to Exit)	564	.569	.621	.371	.194	.952
Absolute Stock Return IPO-Exit (%)	564	30.43	19.34	.826	-.237	.766
Abs. Stock Return IPO-Lockup End (in %)	564	.089	.090	.354	-.112	.296
Market Corrected Stock Return IPO-Exit (%)	564	.101	.068	.807	-.353	.538
Post-IPO Dividend Payments (ln $mn.)	564	.314	0	.836	0	0.035
EBIT Margin at IPO (%)	564	.105	.087	.123	.046	.1615
Return on Assets at IPO (%)	564	.070	.06	.078	.032	.1
Pre-IPO TVPI	564	.536	.143	.924	.015	.691
Pre-IPO Cash Distributions from PC to GP (ln $mn.)	564	66.836	11.848	146.90	.891	58.428
Underpricing (%)	564	.112	.060	.225	0.01	.151
Shares sold by GP in IPO (% of GP Holdings)	564	.122	0	.214	0	.171
Shares sold by Issuer (Dummy: Yes=549, No=15)	564	.973	1	.161	1	1
Length LBO to IPO (in Years)	564	3.349	2.771	2.229	1.682	4.756
Quick Flip (Dummy: Yes=65, No=499)	564	.115	0	.319	0	0
Board Seats GP (% of total Board Seats)	564	.260	.230	.193	.125	.4
Board Seats GP Held post Exit (Dummy: Yes=212, No=352)	564	.375	0	.484	0	1
Deal TEV (ln $bn.)	564	1,438.6	456.05	3,156.8	192.5	1,103.9
Club Deal (Dummy: Yes=383, No=181)	564	.679	1	.467	0	1
Deal Leverage (% Debt of TEV)	564	.599	.659	.222	.494	.758
No. Debt Facilities of LBO Debt	564	3.078	2	2.666	1	4
Cost of LBO Debt (bp over LIBOR)	564	.312	.298	.092	.252	.345
GP Ownership (% of Shares Held)	564	.463	.41	.310	.18	.74
U.S. LBO Volume in IPO Quarter (ln $bn.)	564	38.852	25.469	49.590	13.676	36.384
U.S. M&A Volume in IPO Quarter (ln $bn.)	564	315.762	306.511	141.868	226.314	366.526
Avg. U.S. LBO EBITDA Multiple in IPO Quarter	564	6.063	6.829	2.936	4.723	8.036

Appendix 9. Cross-Sectional Regressions: Additional Analyses and Robustness

This table shows results of cross-sectional OLS regression and Cox Proportional Hazard models. The unit of observation is a GP-portfolio company pair. Model 1: The dependent variable is exit length, calculated (in years) from IPO to final share sale. Model 2: The dependent variable is the post-Lockup Duration. Absolute stock return between IPO and the end of lockup replaces previous stock return variables. Observations do not include 17 deals that exit at IPO. Model 3: Main regression model (identical to Model 1 of Table 9a) is run for sub-sample of GP-portfolio company pairs with no PE fund-level info available. Models 4 and 5: Cox Proportional Hazard model using exit and time to exit from IPO as 'failure' event. Censored data includes 41 deals which were still ongoing as of Dec. 2017. Numbers in brackets are Hazard Ratios. Model 6: OLS regression model as in Model 1 of Table 9a, but with alternative selected control variables. Numbers in parentheses are t-values, asterisks indicate statistical significance at 1% (***), 5% (**) and 10% (*) levels. Descriptions and summary statistics of all variables are given in Appendix Tables 4a and 4b, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Fund Variables						
Fund in Carry (Yes=1, No=0)	.530**	.452**			-.410***	.592***
	[2.13]	[2.30]			[.663]	[3.78]
Fund Outside Inv. Period at IPO (Yes=1, No=0)	-.523**	-.391*			.199	-.164
	[-1.99]	[-1.79]			[1.22]	[-1.03]
Fund Size (ln $mn.)	.048	-.146			-.109	-.003
	[0.33]	[-1.12]			[.896]	[-0.04]
GP Variables						
Historic Fundraising (ln $mn.)	.064	.072			.012	
	[1.40]	[1.54]			[1.01]	
Fundraising at Time of IPO (Yes=1, No=0)	-.189	.040			-.031	
	[-0.51]	[0.14]			[.968]	
GP Age at IPO (Years)						.005
						[0.46]
Stock Performance Variables						
%-Days Stock Price>IPO Price (IPO to Exit)	-2.65***		-1.93***	1.42***	1.64***	-1.66***
	[-7.62]		[-6.88]	[4.16]	[5.16]	[-6.41]
Abs. Stock Return IPO-Lockup End (in %)		-1.27***				
		[-4.66]				
Post-IPO Dividend Payments (ln $mn.)	.311***	.268***	.243**	-.181***	-.093**	.217***
	[3.05]	[2.92]	[2.56]	[.834]	[.911]	[3.14]
Portfolio Company Variables						
EBIT Margin at IPO (%)	-2.61***	-2.11***	-1.90***	.497*	1.07***	
	[-3.37]	[-3.01]	[-2.76]	[1.64]	[2.92]	
Return on Assets at IPO (%)						-1.47*
						[-1.74]
Pre-IPO TVPI	-.260*	-.153	-.211**	.064	.120*	
	[-1.92]	[-1.26]	[-2.23]	[1.06]	[1.12]	
Pre-IPO Cash Distributions from PC to GP (ln $mn.)						-.001**
						[-2.17]
IPO Variables						
Underpricing (%)	-.774**	-.373	-1.11***	.400**	.467**	-1.03***
	[-2.02]	[-1.29]	[-4.08]	[1.49]	[1.59]	[-4.00]
Shares sold by GP in IPO (% of GP Holdings)	-1.62**	-1.62***	-3.49***	2.64***	2.83***	-3.58***
	[-2.37]	[-3.00]	[-7.65]	[14.07]	[1.71]	[-8.00]
Shares sold by Issuer (Yes=1, No=0)	.707*	.875***	.575*	-.182	.010	.547*
	[1.84]	[2.62]	[1.92]	[.832]	[1.01]	[1.86]
Length LBO to IPO (in Years)	.030	.045	.013	-.015	-.055*	
	[0.56]	[0.80]	[0.32]	[.984]	[.946]	
Quick Flip (Yes=1, No=0)						-.053
						[-0.19]
Board Variables						
Board Seats GP (% of total Board Seats)	1.41*	.455	.590	-1.07***	-.904*	.422
	[1.77]	[0.70]	[1.06]	[.341]	[.404]	[0.78]
Board Seats GP Held post Exit (Yes=1, No=0)	-.249	-.213	-.020	.059	.253	-.105
	[-0.75]	[-0.78]	[-0.08]	[1.06]	[1.28]	[-0.56]
Deal Variables						
Deal TEV (ln $bn.)	.015	.028	.110	-.123**	-.094	.141*
	[0.13]	[0.31]	[1.50]	[.883]	[.909]	[1.78]
Club Deal (Yes=1, No=0)	.640**	.397	.012	-.196	-.234	.102
	[2.00]	[1.36]	[0.05]	[.821]	[.791]	[0.44]
Deal Leverage (% Debt of TEV)	-.396	-.214	-.160	.542**	.568	
	[-0.64]	[-0.45]	[-0.38]	[1.72]	[1.76]	
No. Debt Facilities of LBO Debt	.041	.036	.013	-.006	-.019	
	[0.90]	[0.91]	[0.37]	[.993]	[.980]	
Cost of LBO Debt (bp over LIBOR)						-.557
						[-0.70]
GP Ownership (% of Shares Held)	1.36**	1.38**	.432	-1.10***	-1.29***	.835*
	[2.26]	[2.36]	[0.89]	[.330]	[.273]	[1.67]
Market Variables						
U.S. LBO Volume in IPO Quarter (ln $bn.)	.036	.087**	.067	-.052*	-.070**	
	[0.74]	[1.98]	[1.61]	[.948]	[.932]	
U.S. M&A Volume in IPO Quarter (ln $bn.)						.292*
						[1.69]
Avg. U.S. LBO EBITDA Multiple in IPO Quarter						.017
						[0.93]
Number of Observations	325	325	325	605	361	349
Exit Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes	No	No	Yes
Adj. R-Squared (Prob > Chi2 for Cox Models 4+5)	0.350	0.239	0.360	0.00	0.00	0.377

Appendix 10: Description of Probit and Tobit Regression Variables

This table contains descriptions of all dependent and independent variables used across multivariate probit and tobit regression models in this paper, along with their source. 'Original calculation' means the variable was calculated by the authors, and not taken directly from a database source.

Variables	Source	Description
Dependent Variables		
GP Share Sale Transaction in Given Month (Yes=1, No=0)	SEC	Dummy variable taking the value of 1 for all post-IPO months in which a GP sells at least one share in a respective portfolio company, and 0 for all months without share sales. This raw data on post-IPO share sales is hand-collected using SEC Form 4 and SC-13 filings. Original calculation based on SEC filings.
Volume of GP Share Sale Transaction in Given Month ($mn.)	SEC	Volume (in $mn.) of all GP share sale transactions in each month post-IPO in a portfolio company. The variable takes the value of $0 in each month with no share sale transactions. The data is based on SEC Form 4 filings, indicating both number of shares sold and sales price for each share sale transaction. Original calculation based on SEC filings.
Fund Variables		
Difference IRR-Hurdle Rate (%)	Preqin	Difference between IRR and Hurdle Rate of the (lead) investment PE fund in each GP-portfolio company pair, measured during each month of the post-IPO period of the portfolio company. Original calculation based on Preqin fund performance (IRR) and T&C (Hurdle Rate) data. Preqin releases 'T&C' data anonymized (i.e. without the PE fund names). We therefore match the data by fund size and vintage year to our sample deals. Fund performance data can be matched 1:1 as all fund-level information (including names) is available.
Fund IRR (%)	Preqin	IRR of the (lead) investment PE fund in each GP-portfolio company pair, measured during each month of the post-IPO period of the portfolio company. Taken from Preqin fund performance data.
Fund in Carry (Yes=1, No=0)	Preqin	Dummy variable taking the value of 1 if the IRR of the (lead) investment PE fund in each GP-portfolio company pair is higher than its Hurdle Rate, and 0 otherwise. Measured during each month of the post-IPO period of the portfolio company. Original calculation based on Preqin fund performance (IRR) and Terms & Conditions ('T&C', for Hurdle Rate) data. Matching of fund performance and T&C data as described above.
GP Variables		
GP Fundraising Period (Yes=1, No=0)	Preqin	Dummy variable taking the value of 1 if the GP in each GP-portfolio company pair is raising a follow-up fund, and 0 otherwise, measured in each month during its portfolio company's post-IPO period. We determine whether a GP is raising a fund if it has a fund with a vintage year within the first two years after the portfolio company's IPO. Original calculation based on Preqin fund performance data.
Stock Performance Variables		
Stock Price > IPO Price (Yes = 1, No=0)	CRSP	Dummy variable taking the value of 1 if a portfolio company's stock price is higher than the company's IPO price in any given month post-IPO, and zero otherwise. Original calculation based on CRSP data.
Absolute Monthly Stock Return (%, 1-Month Lagged)	CRSP	Absolute monthly stock return of each portfolio company during its post-IPO period, lagged by one month. Original calculation based on CRSP data.
Market-Corrected Monthly Stock Return (%, 1-Month Lagged)	CRSP	Excess stock return (over Russell 2000 stock index) of each portfolio company during its post-IPO period, measured over Russell 2000 stock index, and lagged by one month. Original calculation based on CRSP data.
Stock Trading Volume		
Trading Volume > Avg. Trading Volume (Yes=1, No=0, 1-Month Lagged)	CRSP	Dummy variable taking the value of 1 if the average monthly trading volume of a portfolio company's stock is higher than the average trading volume of the portfolio company's stock measured over the entire post-IPO period, and 0 otherwise. Original calculation based on CRSP data.
Monthly Change in Trading Volume (%, 1-Month Lagged)	CRSP	Percentage change in the average monthly stock trading volume of each portfolio company's stock, lagged by one month. Original calculation based on CRSP data.
Deal Financial Variables		
EBIT Margin (%)	SEC	Portfolio company EBIT Margin in IPO (fiscal) year taken from S-1/424B and 10-K data.
Dividend Payments ($mn.)	CRSP, SEC	Pro-rata post-IPO common stock dividends received by GP until final share sale. Calculated using the number of common shares held by GPs between IPO and last share sale, and per-share dividend as paid out by their portfolio companies.
Board Variable		
Board Exit (Yes=1, No=0)	SEC	Dummy variable taking the value of 1 if there is at least one GP director board exit in a month during the portfolio company's post-IPO period, and 0 otherwise. Original calculation based on SEC 8-K and 10-K/424B filings.
Market Variable		
Monthly U.S. LBO Volume (ln $bn.)	Capital IQ	Aggregate monthly US-$ volume of all US (=target based in US) LBOs. Original calculation using Capital IQ LBO deal data.
Club Deal Variable		
Share Sale by Co-Investor in Month (Yes=1, No=0)	SEC	Dummy variable measured only for club deals, i.e. portfolio companies with at least two GP investors. It takes the value of 1 if both GPs sell shares in the same month during the portfolio company's post-IPO period. Original calculation using our share sale data.

Appendix 11. Summary Statistics of Probit and Tobit Regression Variables

This table contains summary statistics for all dependent and independent variables used across the probit and tobit multivariate regression models in this paper.

Variables	Obs.	Mean	Median	SD	25%	75%
GP Share Sale Transaction in Given Month (Yes=1,633; No=18,601)	20,234	.080	0	.272	0	1
Volume of GP Share Sale Transaction in Given Month ($mn.)	20,234	13.134	0	81.966	0	1833.4
Difference IRR-Hurdle Rate (%)	7,262	.093	.06	.147	-.255	.885
Fund IRR (%)	7,262	.169	.139	.144	-.175	.965
Fund in Carry (Yes=5,825; No=1,437)	7,262	.802	1	.398	0	1
GP Fundraising Period (Yes=2,830; No=4,432)	7,262	.389	0	.487	0	1
Stock Price>IPO Price (Yes=10,574; No=9,660)	20,234	.522	1	.499	0	1
Absolute Monthly Stock Return (%, 1-Month Lagged)	20,234	.006	.006	.146	-.710	1.929
Market-Corrected Monthly Stock Return (%, 1-Month Lagged)	20,234	.003	.001	.101	-.654	1.352
Trading Vol.>Avg. Trading Vol. (Yes=7,791; No=12,443, 1-Month Lagged)	20,234	.385	0	.486	0	1
Monthly Change in Trading Volume (%, 1-Month Lagged)	20,234	.176	-.037	1.147	-.977	28.411
EBIT Margin (%)	20,234	.085	.086	.153	-.318	.405
Dividend Payments ($mn.)	20,234	.010	0	.059	0	.8
Board Exit (Yes=450; No=19,784)	20,234	.022	0	.147	0	1
U.S. LBO Volume per Month (ln $bn.)	20,234	10.097	10.023	.888	7.888	12.407
Share Sale by Co-Investor in Month (Yes=748, No=12,120)	12,868	.058	0	.233	0	1