

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

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Abstract

We analyze how private equity funds (GPs) sell down their stakes in companies they take public. GPs earn private equity management fees and carried interest on public equity holdings. The average duration of post-IPO holdings is 3 years, whereas lockups expire after 6 months. PE-backed IPOs perform well during the lockup, but we find no evidence that GPs add value for investors through the timing of their sell-down strategies. GPs appear reluctant to sell losers, consistent with behavioral biases. We find that long goodbyes are more likely when the fund is performing better, and result in higher payments to GPs.

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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 (PE) 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, since PE funds usually hold controlling stakes, they are subject to lock-up periods – typically of six months – following an initial public offering, which delays further sales. Thereafter 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 justify the sums they charge the limited partners (LPs) for doing so – typically annual management fees of 1–2% and a profit share of 20%? 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 PE fund. Muscarella and Vetsuypens (1990) and Cao and Lerner (2009) refer to such IPOs as ‘reverse LBOs’ and we call them ‘PE-backed IPOs’. In recent years, as the size and number of LBO funds have grown, such IPOs have comprised around 25% of U.S. IPOs (Ritter 2020).¹ 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

¹ This proportion relates to IPOs during the period 2001–2019.

range. In around 25% of deals, GPs still retain around one-half of their holdings after 5 years. And some GPs hold onto stakes for over 10 years.

During this sell-down process, GPs typically remain on the board of portfolio companies.² As insiders with long experience of, and insight into, those firms, they may be able to time disposals skillfully and enhance the value of the fund for themselves and for the LPs. If so, they may do a better job (after the lock-up restrictions have ended) of managing public equity than the LPs, or a public equity manager, could do. On the other hand, remaining on the board of the companies will restrict their ability to trade, notably around announcement dates or if there is material non-public information (for instance regarding a potential takeover).³ The first hypothesis we test is whether GPs add value through the timing of their disposals.

In contrast to venture capital (VC) funds which, as Iliev and Lowry (2020) document, often continue to provide finance in the years following the IPO, consistent with the VC possessing an informational advantage, LBO funds do not invest additional sums after the IPO.⁴ However, during the sell-down period, they may add value by the strategic advice they provide as board members. Therefore, to focus on the timing and magnitude of GPs' disposals, we control for any strategic value added by analyzing disposals while the GPs are still on the portfolio company's board. We then compare the actual sell-down with plausible alternatives which could have been implemented mechanically, such as equal monthly sales over the period until the final GP director exits the board.⁵

The second hypothesis we test is whether GPs are motivated by their own option-like compensation structure to pursue a 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 refer to this as the 'conflict of interest' hypothesis. The remuneration to GPs comes in two forms. First, there is an annual management fee, typically around 1–2%

² In only 7% of deals do GPs not maintain a board seat while they remain a shareholder. Whilst it is typical for GP-directors to resign when their sell-down is complete, in some cases they remain on the board.

³ One way for a GP to sell-down a stake while remaining on the board would be to set up a sale plan under SEC Rule 10b5. These can be established when the board member is not aware of any material non-public information, and specify a plan to sell the stake down on a pre-arranged schedule.

⁴ In a few cases, GP stakes increase post-IPO due to stock dividends, exercise of warrants etc., but we do not see significant additional sums being invested in portfolio companies.

⁵ We do not attempt to estimate the value of the strategic advice itself, as the counterfactual – how much would the company have been worth without a GP on the board – is impossible to observe or even estimate.

of the capital committed by the LPs for the first half of the fund's life after which the fee basis changes to the remaining capital invested (that is, net of any realizations). It is important to note that shares in companies that have gone public are included as part of invested capital, albeit at cost rather than market value. 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 may create an incentive to sell 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 an incentive 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.

The final hypothesis we test is whether the timing and volume of disposals by GPs are a function of the level of the share price of the listed company. In particular, we test for an 'issue price effect': whether disposals (after the end of the lock-up period) are more likely when the share price trades above the IPO price. GPs may be subject to behavioral biases, in particular to the disposition effect, whereby they are more willing to realize profits than losses (Shefrin and Statman (1985)), or to 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 (Tversky and Kahneman (1974)) and is in any case economically irrelevant to their remaining holding. 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.

Our main results are as follows. First, we document how PE firms achieve exit when they take their portfolio companies public. Only 3% of GPs fully exit at the IPO. In around one-half of transactions, the

GP sells 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-downs vary considerably. In most of the remaining transactions, the company is acquired before the PE fund achieved a full market exit. Finally, 22 of the 330 companies enter Chapter 11 before a full PE exit occurs. 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 initially strong, especially during the lock-up period. Monthly excess returns during the lock-up, relative to the Russell 2000 index, average 1.22% (1.33% relative to the S&P 500). This result is partly driven by a few very strong performers: median excess returns are 0.66% against the Russell 2000. Monthly mean (median) alphas using the Fama-French 3-factor model are 1.64% (1.48%) during the lock-up. There is no evidence, therefore, that PE funds squeeze the juice out of their portfolio companies which then perform poorly immediately after the IPO. These results are broadly in line with prior research. The outperformance remains significant over the first year, and then declines in magnitude and significance. Three years after the IPO mean and median alphas are not significantly different from zero. However, performing over the longer term in line with public markets produced, over this sample period when markets were rising, significant absolute returns. Therefore, the incremental carried interest payments, post-IPO, on these retained stakes were also significant.

Third, to test whether GPs add value for LPs by the timing or speed of their sell-down program, we use SEC data to 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.⁶ On this basis, the average investment multiple, from IPO to exit, is

⁶ This is in line with the literature on this topic which commonly uses the closing price on the first trading day as a starting point for post-IPO performance calculations, such as Ritter (2015).

1.13 and the IRR is 6.3%.⁷ However, the Kaplan-Schoar (2005) public market equivalent (PME) has a mean (median) of 1.00 (0.96) relative to the Russell 2000 index and 1.04 (0.99) relative to the S&P 500. These returns are not significantly above 1.00, and so we reject the hypothesis that GPs add value, even on a gross basis, through their sell-down strategy. The results are not qualitatively different if we confine ourselves to the sell-downs which took place while GPs were represented on the board of the portfolio company.

Fourth, we explore the net returns – accounting for management fees and carried interest – resulting from GPs’ sell-down strategies. Holding onto stakes longer results in higher management fees and, in our sample, higher carried interest payments. The former result is mechanical, but the latter largely reflects the rising stock market over our sample period, since we find that on average these PE-backed LBOs perform broadly in line with the market. In effect, LPs are paying private equity fees on public equity holdings. Fees vary significantly depending on the speed of exit. For the 25% fastest exits we estimate that management fees and carried interest – from LBO to final exit – average \$39m per deal, based on the actual selling pattern. For the whole sample our estimate is \$92m. However, we find that even a simple algorithmic sell-down – where an equal amount is sold each month for the period during which there is a GP on the board – produces similar net returns for the LP. Since we find no evidence that GPs add value through their sell-down strategy the question for LPs, which is beyond the scope of this paper, is whether GPs justify the post-IPO fees they charge LPs, not by their management of the sell-down process itself, but by the strategic advice they provide to the portfolio company.

Fifth, we explore 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.

⁷ 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.

Sixth, we find strong support for an issue-price effect: 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, consistent with behavioral bias.

Our paper makes several contributions to the literature. Early papers on PE-backed LBOs mostly focused on the IPO and short-term stock performance and on the longer-term operating performance and organizational structure of such deals (Muscarella and Vetsuypens (1989, 1990)).⁸ More recent research has started to analyze 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 selecting stocks and providing strategic advice through their participation on the board, it does not measure the post-IPO value added by GPs through the timing of disposals. We find, in line with Cao and Lerner (2009), that stocks held by GPs add modest value to LPs, but that GPs add no value by the way in which they time their post-IPO disposals.

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 to qualify for

⁸ At that time, PE-backed IPOs were sometimes referred to as 'Second Initial Public Offerings', or 'SIPOs', as well as reverse LBOs.

carried interest. In a similar vein, Robinson and Sensoy (2013) find that, when the basis on which GPs earn management fees changes from committed capital to invested capital, GPs tend to retain their remaining investments for longer in order to continue to earn management fees, thereby creating an incentive for them to hold onto ‘zombies’. We identify a previously unidentified potential conflict of interest between GPs and LPs: the discretion to sell-down the stakes in public companies generates significant additional fees for GPs that do not reflect any skill in disposing of their holdings in the public markets. Whether these additional fees are compensated by value which GPs add to the share price through the strategic advice they provide to the boards of portfolio companies after IPO is a counterfactual which is unobservable to the econometrician. However, it is a question which LPs must answer if they are to justify the private equity fees which they pay for the management of public holdings.

To the extent that GPs’ reluctance to sell below the IPO price is consistent with both the disposition and anchoring effects, our findings are in keeping with recent work by Akepanidaworn 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.

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 a simple algorithmic approach. Section IV explores the factors that determine GP sell-downs. 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. Our focus is on mature companies, rather than early-stage or growth companies, since we are interested in IPOs as a route to an exit, rather than as an intermediate financing event. As shown by Iliev and Lowry (2020), venture capitalists frequently invest further sums in a portfolio company after they go public, with the IPO allowing liquidity for founders, employees, and early investors. This could also be the case with companies backed by growth or expansion capital funds. We limit our focus to LBOs by applying two filters. First, we identify transactions that are flagged as LBOs by CapitalIQ and merge this with data on IPOs from SDC Platinum and CapitalIQ. Second, we include a transaction only if it involves at least 50% debt (as a proportion of total enterprise value). This will exclude growth companies, as the typical capital structure applied by funds investing in such companies involves low levels of debt, thereby allowing the available cash-flow to be re-invested to fund growth.⁹

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.¹⁰

⁹ These filters are effective, as we observe no cases where the PE fund increases their shareholding significantly post-IPO, which would be necessary if they were financing growth.

¹⁰ 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.

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 2017.¹¹

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 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.¹²

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

¹¹ 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.

¹² 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.

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 Online Appendix 1. In addition, Online 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 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, a result that is in line with the findings of Field and Hanka (2001) and Brav and Gompers

(2003). 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 in the 1980s and 1990s. We discuss the possible use of *in specie* distributions for PE-backed IPOs in Section V.

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 deals¹³ 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 subsamples, 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 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.

¹³ 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.

To provide further color on the types of exit strategy we observe in our sample, we include some case study examples in Online 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. Drawing on SEC data, in Table 5 we show typical board sizes of 7–8, with around half the seats being occupied by GPs of the fund(s).¹⁴ 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: 42% of GP directors exit 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. On a full-sample level, these numbers show that 70% of all directors (761 out of 1087, excluding at-IPO exits) remain with the company at least until the final share sale. On a deal-level, the numbers show that only 7% (32 out of 478, excluding deals with full board exits at IPO) of deals retain a share package after the last GP director exits the board. We analyze whether continued board participation by a GP influences the speed of sell-down in our econometric analysis.

¹⁴ See Online Appendix 1 and 2 for details on the sources, and precision, of the information regarding boards of directors.

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 three questions. First, we analyze how the companies that GPs take public perform. Our focus in this section is on performance *after* the IPO, to ascertain whether PE-backed IPOs perform well in absolute and risk-adjusted terms once they enter the public market. Second, by tracking each individual share sale after the IPO, we test whether GPs added value for LPs by their sell-down strategy. Third, we estimate the net returns earned by investors, after management fees and carried interest, how these different sell-down strategies impact on net returns.

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.¹⁵ 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.¹⁶

¹⁵ For up-to-date details on the underpricing of U.S. IPOs, see Jay Ritter's website at <https://site.warrington.ufl.edu/ritter/ipo-data/>

¹⁶ See, for example, Loughran and Ritter (2002).

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 measure returns until the actual final exit date by the GP for the 564 GP-portfolio company pairs.

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.¹⁷ Buy-and-hold returns, with dividends reinvested, present a similar picture.¹⁸ We find that, on average, the performance of these PE-backed IPOs is initially strong, especially during the lock-up period.

These raw returns also reflect the fact that U.S. stock markets were rising over the sample period. Therefore, in the next rows of Table 6 we re-calculate these performance measures relative to the S&P 500 and to the Russell 2000 stock index. The latter index, comprising the smallest 2000 firms in the broad Russell 3000 index, may be a more appropriate benchmark for the performance of PE-backed IPOs given the typical mid-cap size of firms that PE funds acquire (as discussed by Harris, Jenkinson, and Kaplan (2016)). We also calculate Jensen's alphas and Fama-French 3-factor alphas.

¹⁷ Note that the sample of firms changes as the window of analysis widens, since we can only track companies for as long as they remain on the market (and so are not the subject of M&A transactions or de-listed owing to bankruptcy).

¹⁸ 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).

We find, on average, that PE-backed IPOs outperform public markets, but mainly during the lock-up period. Monthly excess returns against the S&P 500 (Russell 2000) during the lock-up period average 1.33% (1.22%). This result is partly driven by a few very strong performers, but median excess returns are still 0.78% (0.66%) per month. Thereafter the outperformance generally drops away and median monthly excess returns become insignificant by the first anniversary of the IPO. Mean excess 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 monthly returns marginally outperform the S&P 500 and marginally underperform the Russell 2000. Mean excess returns are positive and significant. A similar pattern is found for buy-and-hold excess returns, with initial impressive gains during the lock-up period, which then fall away.

Alphas tell the same story, whether we use a single factor or three-factor model. Monthly mean (median) alphas using the Fama-French 3-factor model are 1.64% (1.48%) during the lock-up. There is no evidence, therefore, that PE funds squeeze the juice out of their portfolio companies which then perform poorly immediately after the IPO. In fact, the evidence is consistent with markets initially undervaluing such companies, as witnessed by the strong run-up in prices during the lock-up period. Three years after the IPO, mean and median alphas are not significantly different from zero. However, performing over the longer term in line with public markets produced, over this sample period when markets were rising, significant absolute returns. Therefore, the incremental carried interest payments, post-IPO, on these retained stakes are likely to be significant. We estimate such payments in Section III.C.

Our evidence on the longer-term performance is similar to that in Cao and Lerner (2009). For their 1996–2003 sub-sample, they report slightly lower buy-and-hold raw returns of 8.53% and 11.01% in the 12- and 24-month period following the IPO, respectively. Over 36 months our returns are almost identical. A similar pattern is shown for Jensen’s alphas: for the 12-month period they find slightly lower alphas at 0.41, and over 24 and 36 months their reported alphas of 0.37 and 0.23, respectively, are very close to those that we find. Ritter (2015) covers a sample of 987 buyout-backed IPOs from 1980 to 2012 and reports a

buy-and-hold raw return of 33.5% and a market-corrected return of 2.7% across the 36 months following the IPO; the former is higher, and the latter is lower in comparison to our numbers.¹⁹

B. Gross returns after the IPO based on actual GP sell-down strategies

The results in the previous section track the performance of the companies after their IPO. In the months and years after (and sometimes before) the end of the lock-up period, the GPs sell down their stakes and return the proceeds to the LPs. We now focus on how well they manage this process. If they are good at choosing the right time to sell, their ‘value added’ 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. 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 ratio (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 serves as the paid-in capital in this calculation, and we then track all subsequent cash-flows from sales until the final exit. We use SEC Form 4 share sale data to obtain the precise date and volume of each share sale. For all share sales beneath a 5% ownership threshold, we either use directors’ Form 4 data or the GPs’ SC-13 filings.²⁰ Using these values and cash flows, we construct an internal rate of return (IRR) for each deal.²¹ Finally, we measure returns relative to public markets using the Kaplan-Schoar (2005) public market equivalent (PME) measure, again using the Russell 2000 as benchmark index.

The results are presented in Table 7. Across all deals the mean (median) investment multiple for the post-IPO holdings is 1.13 (1.06), 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

¹⁹ Other stock-related performance numbers which are not mentioned here are also comparable across the three papers. An example is underpricing which is, on average, 8.9% in Ritter (2015), 12.88% in Cao and Lerner (2009), and 11.20% in our sample, as reported in Appendix 2. Hogan, Olson and Kish (2001) report an average underpricing for RLBOs between 1987 and 1998 of 7.64%

²⁰ A detailed description of our data sources and the tracking of share sales is given in Online Appendix 1 and 2.

²¹ 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.

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 for 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, as we documented above, 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) PME does this, using the precise dates of the cash-flows. Performance in line with public markets is reflected in a PME of 1.0. The results in Table 7 show that, following the IPO, the sell-down process resulted in mean returns very similar to public markets – 1.04 (1.00) relative to the S&P 500 (Russell 2000) – and median returns slightly underperforming public markets across all deals. Breaking the sample down by exit category, we find that the regular exits produce mean PMEs significantly above one, but median returns are indistinguishable from public market performance. Deals that exited via M&A also produced PMEs very close to one.²²

Therefore, from the end of the first trading day, and taking account of the timing of the disposals, we find the returns to investors are very similar, on average, to those available from public markets. In this sense, we find no evidence that GPs add value for investors by their sell-down strategy. It should be recalled that these returns do not take account of the costs that PE funds charge for managing these public

²² Previous evidence on absolute and relative performance is mostly 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.

investments. We next examine the impact on net returns of these costs and whether there is evidence that alternative sell-down strategies would have produced better returns for investors.

C. Alternative sell-down strategies and net returns to investors

PE funds face two main constraints in their sell-down strategy. First, and most obviously, such stakes are subject to a lock-up period. Second, they typically hold sizeable stakes in the companies they take public and there may be limited capacity to absorb a very large stake. The examples we document in Online Appendix 4 demonstrate a variety of different approaches, from a few quick block sales to a drip-feed approach. In this section, we start by documenting the gross returns earned by companies that chose fast and slow exit routes. Then we analyze how the sales process impacts on fees and carried interest payments, and hence net returns. This will help to quantify how much value-added the continued involvement of the GP would need to generate to justify the additional fees.

In Table 8 we start by estimating the gross returns earned on the deals, from the initial investment (before the IPO) to final disposal, taking account of the actual share disposals post-IPO. We look through this ‘full deal’ lens as carried interest depends on overall profits and can only be estimated over the entire life of the investment. As can be seen from column 1, on average these PE-backed IPOs are very successful, with a gross multiple of over 4 and an IRR approaching 50%. The difference between mean and median returns reflects a few spectacularly successful deals.

We then consider these returns for the slowest and fastest sell-downs in columns 2 and 3. 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. The returns are clearly much higher for the quick exits than the long goodbyes. There could be many explanations for this pattern, but it hints at post-IPO performance being a possible determinant of the sell-down strategy, with those deals that perform strongly after the IPO being sold more quickly. A potential limiting factor on the sale strategy could be liquidity of the stock. We explore the determinants of holding periods and the timing and quantity of share sales in a regression framework in Section IV.

During the sell-down phase, GPs typically stay on the board of the company. As explained in section II.C, this is the case for 478 of our deals, and in most of these cases (93%), they depart the board after or at the time of their last share sale. We assume that any impact of having the GP continue to be involved in the company is co-terminous with their period on the board. Therefore, in column 4 we calculate the actual returns earned on the N=478 sub-sample of deals that had a GP on the board post-IPO. As can be seen, the average performance is very similar to that of the full sample. To test whether GPs add value through their sell-down strategy, while controlling for any impact they might have on the governance and value of the firm, we compare these actual returns with those produced by a simple algorithmic sell-down strategy. In column 5 we calculate the returns that would have been earned had the GP sold down in equal monthly amounts over their tenure on the board. Gross investment multiples from such an algorithmic sell-down are, on average, higher than those achieved. IRRs are similar. This counterfactual is instructive as it controls for the impact of the continued strategic involvement of the GP in the company and so focuses on any ‘timing’ skills that could be a justification for the long goodbyes. We find no evidence of such skill.

Next, we consider the impact of management fees and carried interest payments on the net returns earned by LPs. The motivation for this study is to understand why private equity funds continue to hold onto their public shareholdings for so long, and one potential reason is the fee structure. We evaluate the impact of long goodbyes on the payments to GPs, from LBO to final exit, and the net returns to LPs of the actual, and counterfactual algorithmic, sell-down strategies.

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, *including after a portfolio company goes public*. 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 Online 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 Preqin data on fund terms is anonymized, but we impute average management fees by fund size and vintage year and use these to approximate the fees charged by the funds in our sample. Clearly, long goodbyes involve more management fees being paid to GPs.

Carried interest depends on the overall performance of the deal and the fund. Again, we use the Preqin survey and find that most GPs are paid 20% of the total appreciation in the fund's value (after management fees) provided that 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 TVPI. Therefore, the (fund level) IRR determines whether carried interest is paid, and the TVPI defines how much.

We track the cash flows from LBO to final exit and impute a carried interest payment on a distribution if the deal has returned its invested capital plus the 'preferred return' associated with the hurdle rate. This is in line with a 'U.S. waterfall', which would be in place for most of the funds (see Huther, Robinson, Sievers and Hartmann-Wessels (2020)). As we do not have fund-level performance data for all funds, we assume that the fund has, overall, achieved its designated hurdle rate. Since this will tend to overstate carried interest, we impose a condition that works in the opposite direction, by only counting carried interest payments if the *deal* has an IRR over the hurdle at the time of the distribution. As a robustness check we recalculate the carried interest on the subset of funds where we know their returns, which suggests our approach is conservative, given that most buyout funds generate carried interest payments²³.

²³ There are 368 deal involvements where Preqin report performance data. We find that for this sub-sample the average fees are somewhat higher per deal than using our algorithm, which requires the deal to be above the hurdle at the time of the distribution but does not impose a fund-level hurdle.

Our estimates of net returns are shown in Table 8, along with the average fees and carried interest per deal. Given the private equity fee structure, it is no surprise that net and gross returns are significantly different: for instance, median investment multiples are about 0.6 lower after accounting for fees and carried interest. The mean (median) net multiple achieved across the whole sample is 3.25x (2.51x). This sits between the observed return on the fastest exits, 3.72 (2.96), and the slowest exits 2.76 (2.15). Focusing on the subset where the GP was on the board after the IPO, we find that the algorithmic sell-down, in equal monthly installments, would have resulted in significantly higher mean net investment multiples, and similar (slightly lower) IRRs.

Over the full deal, we estimate mean management fees and carried interest at \$19.65m and \$72.59m, respectively, resulting in total payments to the GPs of \$92.21m. Medians are a lot lower, reflecting the right skew in the distributions of holding periods and returns. However, for the fastest quartile of exits, the fees and carried interest payments are much lower, resulting in mean total payments of \$39.11m. In contrast, the slowest exits generate fees and carried interest that sum to over \$120.77m, even though gross returns on these deals are the lowest. We also calculate the total management fees as a proportion of the total distributions over the life of the deal. On this basis we find significant differences in the management fee percentages. The carried interest percentage is higher for the quick exits, reflecting their better average performance.²⁴

Finally, if we focus on the sample where the GP continues to be involved, we find that an algorithmic sell-down would have resulted in significantly lower management fees, and similar carried interest payments. Overall, median payments to the GP would have been significantly lower.

As previously noted, it is impossible to know whether the performance of the firm would have been better (or indeed worse) had the GP sold down their stake more quickly and left the board at that point. Investors will form expectations about likely GP tenure and any anticipated value added would be

²⁴ Management fees are charged on committed capital during the investment period and on invested capital after that, as explained earlier. These deals, on average, generate gross returns of 3-4x invested capital, and so the annual fees of 1.5%-2% per annum are divided in our calculation by the total distributions. Total fees on the basis of invested capital would be significantly higher.

compounded into the IPO issue price. The only paper to consider this issue (Fuerth and Rauch (2015)) found no impact of unanticipated PE fund director exits on share prices. However, if LPs receive any value from GPs in return for the fees they pay after the IPO, that value must be in the form of a better share price performance since, as we have found, it does not come from skill in timing disposals.

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

The previous section presented evidence that allows us to reject the hypothesis that GPs add value for LPs through their sell-down strategies. We also documented the significant fees associated with continuing to hold public equity under a private equity fee structure. In this section we explore the factors that determine when GPs sell their stakes after the lock-up period. Specifically, we test the ‘issue price’ and ‘conflicts of interest’ hypotheses to see whether sell-downs are motivated by factors other than performance.

For the issue price 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, consistent with behavioral biases. Behavioral effects could be the disposition effect (reflecting a greater readiness to take profits than losses – see Shefrin and Statman (1985)) or the anchoring effect (in which the anchor here is the IPO price – see Tversky and Kahneman (1974)). Any behavioral biases could be within 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.²⁵

²⁵ 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.

For the conflicts 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 reluctant to sell down their listed holdings when the fund IRR is below the hurdle on the grounds that this would destroy the potential for that holding to take the IRR back above that level into carried interest territory. The conflicts of interest hypothesis, if upheld, is consistent with an agency problem, namely, that the timing of disposals reflects the structure of 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 to analyze the timing of each individual transaction (using a probit model) and the quantity sold (using a tobit model). We consider these in turn.

A. What explains the duration of the post-IPO holding?

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, the share price performance of the company may influence duration. This is particularly relevant to test the issue price hypothesis: are GPs influenced 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.

Second, 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).

Third, GP-level variables could explain behavior: whether the GP is experienced and reputable, 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.

Fourth, there are 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, if an investment had already produced a handsome return by the time of the IPO, GPs are 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 influence post-IPO behavior.

The combination of variables we choose for each of the five categories is rooted in the previous literature. To test the issue price hypothesis, we use the IPO issue price, especially in relation to the post-IPO stock price. Prior literature on prospect theory and disposition effects shows that investors rely on reference prices in their trading behavior, and that these are frequently the most obvious ‘references’ within certain transactions. For example, in M&A pricing the reference points are popular stock price peaks, such as the 52-week high (Baker, Pan and Wurgler (2012)), and the stock price at which CEOs join companies act as reference points in equity issuances (Baker and Xuan (2016)). Loughran and Ritter (2002) show that the offer price can help explain underpricing in IPOs.

We therefore use the IPO issue price as the headline reference point for GPs when considering a post-IPO share sale, as it might be the most obvious – albeit economically irrelevant – benchmark to judge their stocks’ post-IPO performance by. In line with the prospect theory and disposition effects, and as shown by previous empirical research on the topic (e.g. Shefrin and Statman (1985), Odean (1998), Grinblatt and Keloharju (2001), or Grinblatt and Han (2005)), GPs might be more likely to sell winners (i.e. stocks with prices higher than the IPO price) than losers (stocks with prices lower than the IPO price). We hypothesize that stocks with worse post-IPO performances relative to the IPO price should therefore trigger longer post-IPO durations.

To test the influence of stock trading volume on a GP's exit behavior, we measure each stock's trading turnover during the first 180 days after the IPO. Following the broad literature on stock trading volumes (e.g. Lee and Swaminathan (2000), Chordia and Swaminathan (2000), Chae (2005), or Statman, Thorley and Vorkink (2006)), we measure trading liquidity as the ratio of the daily volume of shares traded to the number of shares outstanding, net the number of lockup-restricted shares at IPO.²⁶

We also test a variety of PE-related variables. First, 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.²⁷ 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.

At the 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'

²⁶ Average daily stock turnover rates in our sample (calculated as the daily number of shares traded divided by the total number of outstanding shares) are 0.8% (median 0.7%) during the first 180 days, and 0.7% (median 0.6%) during the first 365 days after the IPO. These numbers are in line with findings in the literature. Average daily turnover rates for NYSE/AMEX-listed stocks are roughly 0.5% during the beginning of our sample period in the second half of the 1990s (Chae, 2005), and increase to 1.4% (0.95% median) during the later stages of our sample period around 2010 (Hu, 2014). It is also noteworthy that our regression results are the same for the 180- and 365-day turnover, and for the outstanding share volume including and excluding the lockup restricted shares.

²⁷ The relationship between investor reputation and post-IPO share sale behavior is also well established for other institutional investor groups, such as venture capital firms. For example, Lin and Smith (1998) show that well-established and reputable VCs are more likely to sell shares post-IPO but refrain from selling unless the IPO is underpriced. On a related note, Gompers (1994) shows that younger and less reputable VC firms take companies public sooner to build reputation in the hope of better fundraising possibilities. Lerner (1994) shows that more experienced VCs are better at timing the IPOs of their portfolio companies. These dynamics might also extend to exit processes involving LBOs.

indicator is 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 additional 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 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 1, and summary statistics for the variables are presented in Appendix 2 of this paper.

We run various regressions, each at the GP-deal level and using duration and exit length (in years) as the dependent variables. 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. 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. It should be noted that we find no significant impact of liquidity: average turnover as a percentage of shares outstanding (excluding those subject to the lock-up) has no significant effect on share disposal strategies.

We construct different measures of stock price performance in columns 2 and 3 – the absolute stock return from IPO to exit, and the stock price performance relative to the market. These are clearly different types of variables, and do not capture any time series features of the stock 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 are more influenced

by absolute performance (“is the share price higher than the price we set at IPO”) than relative performance. Again, we find no significant impact of trading liquidity on duration in this cross-sectional regression.

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 IPO, 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, albeit marginally so, and suggest that the incentive to hold onto stakes does not necessarily increase linearly with the performance of the fund.

In column 7, we run the regression model specification including the fund-specific variables but replacing the exit duration with the exit length measured in years from IPO to last share sale as dependent variable. This way, we exclude the size-weighting effect that is captured in the exit duration and focus purely on the calendar time of the exit process. The results confirm the prior findings.

Overall, the results suggest strongly that there is an issue price effect – GPs sell their winners and hold onto their losers, consistent with the disposition effect. However, we do not find evidence for a conflict of interest. Rather than retaining their holdings when the fund is below the hurdle rate, thereby benefitting from the option-like characteristics of this arrangement and pocketing management fees as a hedge against missing out on carried interest, GPs are more likely to hold onto their stakes if the fund is in carry. If LPs are aware of this tendency, they may tolerate it in order to pay GPs a discretionary fee for good performance; if they are not, they may be allowing it through inattention.

We perform a series of robustness tests which are presented in Online Appendix 7. First, we replace the exit duration with the post-IPO lockup duration as dependent variable. Even though we see a few cases in which GPs sell shares during the lockup period, these are the exception, and in general the sale process begins in earnest only after the lockup period ends. This alternate dependent variable does 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 (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 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.

B. What explains the timing of individual sales?

We next analyze 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 irrespective of the actual volumes sold, and a tobit model to explain the volume of such sales. We use a near-identical combination of explanatory variables to the OLS regressions in Table 9, transformed into (post-IPO) time series and measured at the time of each share sale transaction. In doing so, we test the occurrence of issue price effects or the GP-related effects more precisely than in Table 9: instead of the overall post-IPO duration, we now relate each share sale to the portfolio company's stock price at the time of the sale – and relative to the IPO price – and the PE fund's performance at the time of each sale. We also use similar control variables as in Table 9, to capture the companies' relevant post-IPO performance and dividend behavior on which the presence of PE firms, despite reductions in ownership, might have considerable impact (Huang, Ritter and Zhang (2016)). Full details of the time series variables can be found in Appendix 3 along with summary statistics in Appendix 4.

The probit results are reported in Table 10. The model in column 1 focuses on the issue price hypothesis, where we find that the probability of a share sale is significantly higher when the trading price exceeds the IPO price. We control for liquidity using both an indicator variable – which picks up if lagged monthly turnover is higher than average – and a continuous variable measuring the lagged change in monthly turnover. When (lagged) trading volume is high relative to recent history, the probability of a sale increases, but the effect is economically small and is statistically significant only in some formulations. We find no significant impact from the continuous variable, in line with the earlier cross-sectional duration regressions. We do find a strong positive 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 issue 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. The liquidity variables are insignificant; across all our models we therefore find very limited evidence that liquidity impacts on the timing of share disposals. In the tobit regressions, fund performance measures are generally insignificant.²⁸

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 – notably 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 add value for LPs by their sell-down strategies. 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. Controlling for the possible impact of the GP via their continued board membership, we find that simple algorithmic sell-

²⁸ We perform additional robustness checks in Online Appendix 8 to control for so-called ‘blackout’ periods during which company insiders with access to Material Non-Public Information (‘MNPI’) are not allowed to trade shares. While all tobit/probit regression results are confirmed in these tests, we do find that – in line with the legal restrictions on share sales during ‘blackout’ periods – the announcement of ‘MNPI’ events, such as M&A transactions, significantly reduces the probability of share trades during and following the announcement months.

downs would have produced higher returns for investors. Therefore, we find no evidence to support the hypothesis that GPs add value by timing the sell-down astutely. Since LPs are paying GPs private-equity fees for the management of publicly traded shares, they must satisfy themselves that GPs are adding value elsewhere. This can only be through the strategic advice they provide to the boards of portfolio companies which, however, is unmeasurable in the absence of a clean counterfactual.

The second hypothesis we test relates to conflicts of interest. We test whether sell-downs are a function of the performance of the fund at the time of the sale. If GPs were focused solely on the interests of the LPs the current fund return should have no bearing on disposals. Alternatively, GPs may be 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, and poorly performing funds might have incentives to retain stakes to earn management fees for longer. In fact, we find very limited evidence that fund performance impacts on the speed of sell-downs. There is some evidence that share sales are less likely to occur when the performance of the fund is strong (rather than weak), although the economic importance and significance of these results are limited.

Third, we test for the existence of an issue price effect. We find clear 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. However, market-adjusted prices are irrelevant. 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 earn far lower

management fees. Indeed, some of the issues we address in this paper could be avoided entirely by distributing the shares belonging to the LPs to them at the IPO.²⁹ GPs could receive their carried interest *in specie* and continue to serve on the board after the IPO for as long as they were adding value. More radically, in the future such PE-backed IPOs could be natural candidates for a Direct Listing (as employed recently in various technology IPOs, including Spotify and Slack) provided some of the LPs were prepared to sell their shares immediately in the aftermarket. In this way, LPs could achieve immediate separation rather than a long goodbye and save significant sums in management fees and carried interest. We leave such issues for future research.

²⁹ 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, our analysis suggests that it might be in LPs' interests to receive the shares immediately after the IPO lock-up period, rather than allowing the GPs to manage the process on their behalf.

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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%.

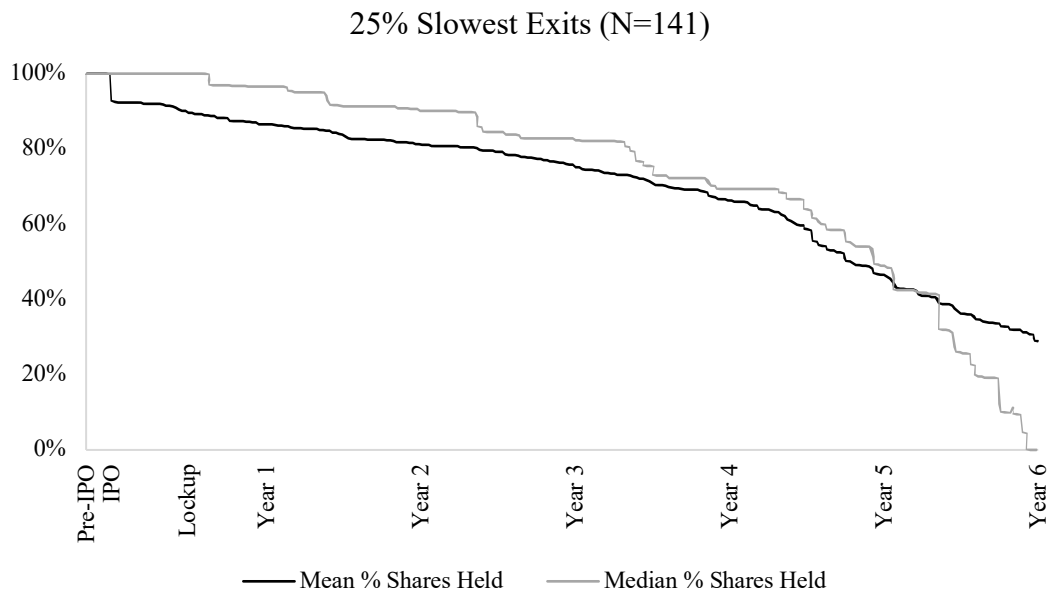
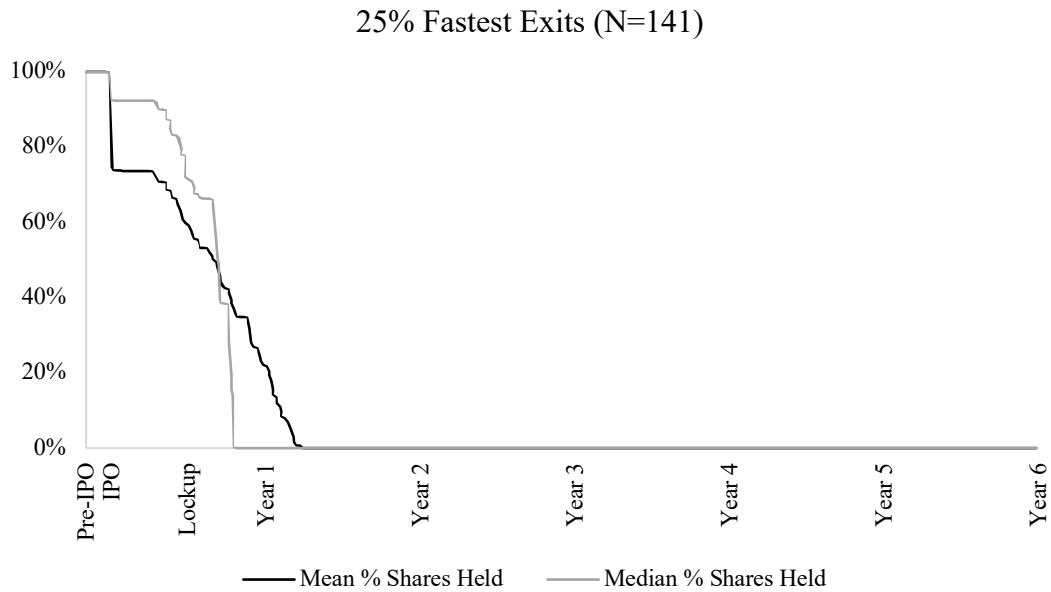


Figure 2. Carried Interest Provisions

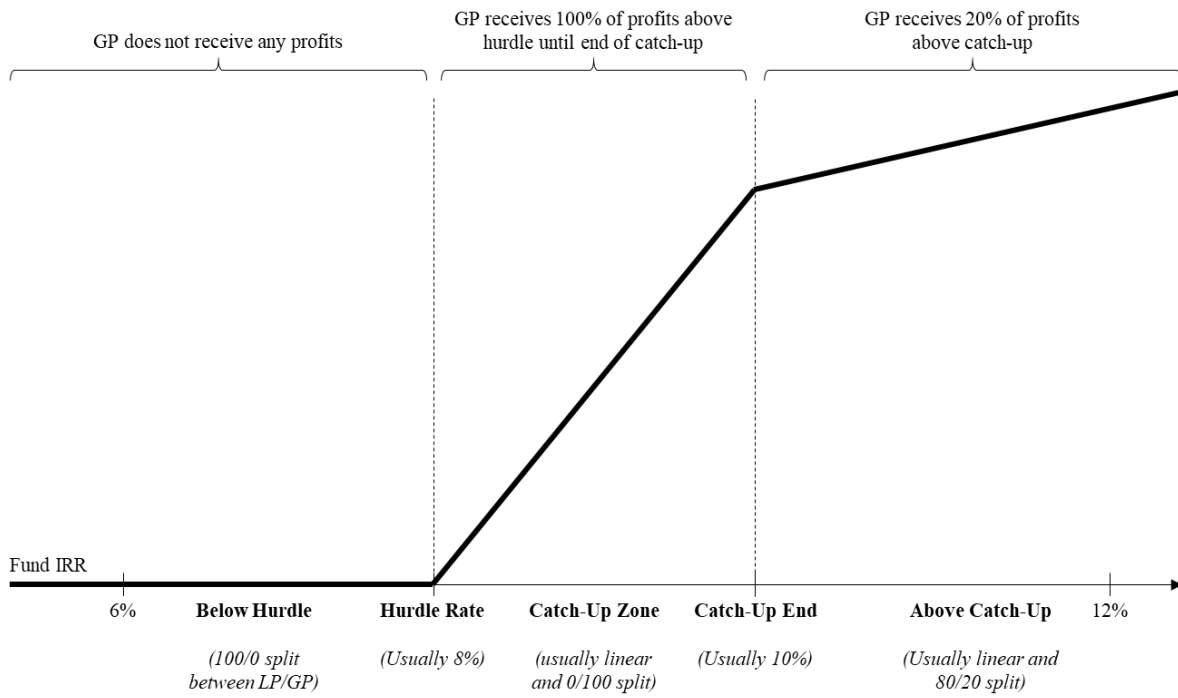


Table 1. Sample Description

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.

| <i>Numbers, unless otherwise noted</i> | 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 |
| <i>Total</i> | <i>2,726</i> | <i>2,221</i> | <i>393</i> | <i>112</i> | <i>174</i> |
| 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 (<i>in Days</i>) | 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) 1 st 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 2 nd 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 3 rd 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 4 th 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 5 th 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 6 th 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 7 th 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 8 th 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 9 th 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). Excess returns are measured over the S&P 500 and Russell 2000 stock indexes. Jensen's Alpha is the intercept of firm-specific time-series regressions of monthly firm excess returns and the Russell 2000 stock 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.

| <i>All numbers in %</i> | 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

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 the S&P 500 and Russell 2000 stock indexes as benchmark. All numbers are reported gross, i.e. pre-fees. We calculate all performance numbers based on deal-level cash flows from each portfolio company's IPO until the GPs' final exit, which takes account of the timing chosen by the GP for the share sales. The starting point for the analysis is the end of the first trading day, as any IPO underpricing is a cost to the LP, rather than a benefit. 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. Numbers in brackets are p-values indicating the statistical significance of differences in means (t-tests) and medians (Wilcoxon) from 1 for TVPIs and KS-PMEs, and 0 for IRRs.

| | All Deals | | 'Regular' Exit | | M&A Exit | | Chapter 11 | |
|------------------------|-----------|--------|----------------|--------|----------|--------|------------|--------|
| | Mean | Median | Mean | Median | Mean | Median | Mean | Median |
| 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 (<i>in %</i>) | 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] |

Table 8: LBO Deal Performance and Fees

This table shows performance indicators calculated for the whole LBO, from the initial GP equity investment at LBO until the last share sale post-IPO. We report both cash multiples and Internal Rates of Return (IRRs), using the full time series of deal-level cash flows as the basis for our calculations, including all actual deal cash in- and outflows: the GP initial LBO equity investment, all pre-IPO dividends, deal-level fees (LBO fee, monitoring fees, ‘recap’ and M&A fees, and termination fees, assuming 50% deal fee rebates), distributions and follow-on investments, as well as all at-IPO and post-IPO cash flows from share sales, share acquisitions, pro-rata dividend payments and share distributions. In addition to the gross (i.e. pre-fees) numbers, we also report the numbers net of management fees, carried interest, and the sum of both as the total deal-fees paid. 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 the aforementioned time series of deal cash in- and outflows. Once the 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. Below the performance numbers, we report the full fee volumes per deal (in \$mn.), as well as the deal fees as percentage of the total deal distributions (in \$mn.) to account for size effects. In column (1), we report these numbers for all 564 deals in our sample. In column (2), we report the numbers for the 25% of deals (N=141) with the fastest post-IPO exits, and in column (3) for the 25% of deals (N=141) with the slowest post-IPO exits. The post-IPO exit length is measured as the time between the IPO and the last share sale. In column (4) we report the numbers for a subsample of deals which had at least one GP director on the board post-IPO (N=478). This subsample is used for the hypothetical trading pattern shown in column (5). In this column (5), we replace the actual post-IPO share sales with a hypothetical post-IPO trading pattern. For each deal, we determine the date of the very last post-IPO GP director board exit, and equally spread all share sales across each month between this exit date and the end of the IPO lockup period. In other words, we develop a ‘naïve’ trading algorithm pretending GPs sell their shares in equal monthly increments from the end of the lockup period until the very last GP director exits the respective portfolio company’s board of directors. In columns (1), (2), (3) and (4) the numbers in brackets are p-values indicating the statistical significance of the differences in means (t-test) and medians (Wilcoxon) from 1. In column (5), the p-values indicate the statistical significance of the differences in means (t-tests) and medians (Wilcoxon) of the performance metrics between the column (4) and (5) numbers. Reported IRRs are winsorized at the 98% level.

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|--|-------------------------------|--------|------------------------------|--------|------------------------------|--------|--|--------|--|--------|
| | Actual Share Sales (N=564) | | 25% Fastest Exits (N=141) | | 25% Slowest Exits (N=141) | | Subsample w/post-IPO GP Directors (N=478) | | ‘Naïve’ Algorithm Until Full Board Exit (N=478) | |
| | Mean | Median | Mean | Median | Mean | Median | Mean | Median | Mean | Median |
| Gross Full Deal Performance (Pre-Fees) | | | | | | | | | | |
| Gross Cash Multiple | 4.15 | 3.17 | 4.71 | 3.63 | 3.56 | 2.68 | 4.18 | 3.13 | 4.45 | 3.23 |
| | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.01] | [0.10] |
| Gross IRR | 48.6% | 31.9% | 71.5% | 45.7% | 32.1% | 21.2% | 52.3% | 34.4% | 53.8% | 33.6% |
| | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.87] | [0.20] |
| Net Full Deal Performance (Net of Fees) | | | | | | | | | | |
| Net Cash Multiple | 3.25 | 2.51 | 3.72 | 2.96 | 2.76 | 2.15 | 3.28 | 2.50 | 3.47 | 2.55 |
| | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.02] | [0.15] |
| Net IRR | 44.5% | 28.3% | 62.3% | 36.1% | 31.4% | 20% | 48.1% | 30.2% | 44.1% | 28.6% |
| | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.00] | [0.92] | [0.86] |
| Fee Volume per Deal (\$mn.) | | | | | | | | | | |
| Management Fees | 19.65 | 6.62 | 5.39 | 1.60 | 32.97 | 15.82 | 18.19 | 5.80 | 16.33 | 5.44 |
| | | | | | | | | | [0.00] | [0.10] |
| Carried Interest | 72.57 | 28.70 | 33.72 | 11.43 | 87.80 | 38.29 | 63.46 | 25.40 | 65.95 | 22.04 |
| | | | | | | | | | [0.32] | [0.52] |
| Total Fees | 92.21 | 41.28 | 39.11 | 14.66 | 120.77 | 62.87 | 81.65 | 37.11 | 82.28 | 34.61 |
| | | | | | | | | | [0.78] | [0.01] |
| Fees as % of Total Distributions | | | | | | | | | | |
| Management Fees | 5.1% | 2.4% | 3.1% | 1.6% | 8.1% | 4.0% | 5.1% | 2.4% | 4.8% | 2.4% |
| Carried Interest | 11.1% | 12.8% | 12.3% | 14.0% | 9.3% | 11.6% | 11.1% | 12.9% | 10.8% | 12.4% |
| Total Fees | 16.2% | 16.4% | 15.4% | 16.3 | 17.4% | 16.9% | 16.2% | 16.3% | 15.6% | 15.8% |

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 with full exits at IPO. The dependent variable in models (1) to (6) is the Exit Duration, calculated from IPO to Exit for each GP investment in a portfolio company. The dependent variable in model (7) is the Exit Length, calculated (in years) from IPO to final share sale. Standard errors are clustered on the GP fund-level. 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 1 and 2, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Fund Variables | | | | | | | |
| Fund in Carry (Yes=1, No=0) | | | | .485*** [3.04] | | | .537** [2.23] |
| Fund IRR at IPO (%) | | | | | 1.06** [2.30] | | |
| Difference IRR-Hurdle Rate (%) | | | | | | .982** [2.19] | |
| Fund Outside Inv. Period at IPO (Yes=1, No=0) | | | | -.306 [-1.64] | -.288 [-1.58] | -.289 [-1.58] | -.508* [-1.96] |
| Fund Size (ln \$mn.) | | | | .018 [0.18] | .037 [0.35] | .033 [0.31] | .054 [0.37] |
| GP Variables | | | | | | | |
| Historic Fundraising (ln \$mn.) | | | | .029 [0.84] | .023 [0.65] | .023 [0.67] | .060 [1.31] |
| Fundraising at Time of IPO (Yes=1, No=0) | | | | -.041 [-0.16] | -.033 [-0.13] | -.032 [-0.11] | -.201 [-0.55] |
| Stock Performance and Trading Variables | | | | | | | |
| %-Days Stock Price>IPO Price (IPO to Exit) | -1.57*** [-7.53] | | | -1.93*** [-6.97] | -1.93*** [-6.85] | -1.94*** [-6.89] | -2.59*** [-7.83] |
| Absolute Stock Return IPO-Exit (%) | | -.373*** [-2.73] | | | | | |
| Market Corrected Stock Return IPO-Exit (%) | | | -.173 [-1.36] | | | | |
| Post-IPO Dividend Payments (ln \$mn.) | .356*** [6.44] | .338*** [5.63] | .335*** [5.76] | .248*** [2.74] | .229** [2.34] | .229** [2.35] | .321*** [3.15] |
| Stock Trading Turnover First 180 Days (%) | 2.23 [0.85] | 3.73 [1.19] | 3.16 [1.03] | -7.48 [-0.22] | -1.05 [-0.33] | -1.04 [-0.32] | 4.59 [0.60] |
| Portfolio Company Variables | | | | | | | |
| EBIT Margin at IPO (%) | -1.18** [-2.01] | -1.26** [-2.01] | -1.26** [-2.01] | -1.97*** [-2.89] | -1.96*** [-2.83] | -1.96*** [-2.83] | -2.57*** [-3.29] |
| Pre-IPO TVPI | -1.41** [-2.54] | -1.63*** [-2.87] | -1.58*** [-2.78] | -2.52*** [-2.82] | -2.64*** [-2.79] | -2.64*** [-2.79] | -2.41* [-1.78] |
| IPO Variables | | | | | | | |
| Underpricing (%) | -.998*** [-3.30] | -1.04*** [-3.39] | -.908*** [-2.85] | -1.10*** [-3.11] | -1.09*** [-3.03] | -1.09*** [-3.03] | -.968* [-1.89] |
| Shares sold by GP in IPO (% of GP Holdings) | -2.93*** [-8.67] | -3.12*** [-8.87] | -3.05*** [-8.72] | -3.57*** [-7.59] | -3.53*** [-7.40] | -3.52*** [-7.40] | -1.54** [-2.29] |
| Shares sold by Issuer (Yes=1, No=0) | .421*** [2.58] | .390** [2.35] | .412** [2.51] | .632** [2.13] | .587* [1.84] | .580* [1.83] | .706* [1.81] |
| Length LBO to IPO (in Years) | -.034 [-1.10] | -.053 [-1.62] | -.058* [-1.74] | .059 [1.26] | .065 [1.36] | .064 [1.35] | .022 [0.39] |
| Board Variables | | | | | | | |
| Board Seats GP (% of total Board Seats) | .676 [1.54] | .655 [1.39] | .721 [1.52] | .526 [0.91] | .551 [0.93] | .545 [0.92] | 1.45* [1.82] |
| Board Seats GP Held post Exit (Yes=1, No=0) | .087 [0.43] | .031 [0.14] | -.021 [-0.09] | -.058 [-0.22] | -.025 [-0.09] | -.029 [-0.09] | -.257 [-0.78] |
| Deal Variables | | | | | | | |
| Deal TEV (ln \$bn.) | .080 [1.35] | .075 [1.23] | .058 [0.94] | .052 [0.65] | .060 [0.77] | .062 [0.79] | .012 [0.09] |
| Club Deal (Yes=1, No=0) | .043 [0.21] | .089 [0.40] | .077 [0.34] | -.004 [-0.02] | -.005 [-0.01] | -.004 [-0.01] | .616* [1.94] |
| Deal Leverage (% Debt of TEV) | -.118 [-0.38] | -.058 [-0.18] | -.020 [-0.06] | -.137 [-0.32] | -.140 [-0.33] | -.137 [-0.32] | -.370 [-0.60] |
| No. Debt Facilities of LBO Debt | .032 [1.04] | .020 [0.60] | .023 [0.70] | .021 [0.60] | .015 [0.43] | .015 [0.42] | .046 [1.00] |
| GP Ownership (% of Shares Held) | .619* [1.67] | .873** [2.20] | .849** [2.15] | .416 [0.81] | .286 [0.58] | .295 [0.59] | 1.31** [2.13] |
| Market Variables | | | | | | | |
| U.S. LBO Volume in IPO Quarter (ln \$bn.) | .066** [2.04] | .074** [2.21] | .078** [2.33] | .079* [1.96] | .071 [1.64] | .072 [1.64] | .044 [0.94] |
| Number of Observations | 547 | 547 | 547 | 325 | 325 | 325 | 325 |
| Exit Control Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R-Squared | 0.348 | 0.274 | 0.263 | 0.385 | 0.379 | 0.378 | 0.354 |

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. GP and Portfolio Company Fixed Effects are included. Standard errors are clustered on the GP fund-level. 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 3 and 4, 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, 1-Month Lagged) | .0173** | .0153** | .0153** | .0146* | .0150* | .0095 |
| | [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] |
| 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. GP and Portfolio Company Fixed Effects are included. Standard errors are clustered on the GP fund-level. 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 3 and 4, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|
| Fund Variables | | | | | | |
| Difference IRR-Hurdle Rate (%) | | -6.75 [-1.10] | | | -6.63 [-1.08] | -6.56 [-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 [1.10] | 1.78 [1.07] | 1.82 [1.09] | 1.88 [1.13] | .250 [0.15] |
| Stock Performance Variables | | | | | | |
| Stock Price > IPO Price (Yes = 1, No=0) | 27.46*** [11.60] | 28.42*** [11.29] | 28.42*** [11.29] | 28.21*** [11.15] | 28.62*** [11.32] | 14.81*** [6.61] |
| Absolute Monthly Stock Return (% , 1-Month Lagged) | 10.63* [1.65] | 11.90* [1.69] | 11.90* [1.69] | 11.26 [1.61] | | 8.69 [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, 1-Month Lagged) | 3.12* [1.87] | 2.82 [1.57] | 2.82 [1.57] | 2.62 [1.47] | 2.76 [1.54] | 1.39 [0.77] |
| Monthly Change in Trading Volume (% , 1-Month Lagged) | -1.62 [-1.55] | -1.51 [-1.37] | -1.51 [-1.37] | -1.46 [-1.34] | -1.50 [-1.36] | -1.90 [-1.58] |
| Deal Financial Variables | | | | | | |
| EBIT Margin (%) | 15.29** [2.42] | 17.01** [2.50] | 17.04** [2.50] | 16.18** [2.38] | 17.08** [2.50] | 14.61** [2.12] |
| Dividend Payments (\$mn.) | -6039 [-0.06] | -1.37 [-0.12] | -1.50 [-0.13] | -1.41 [-0.12] | -1.54 [-0.13] | -3.22 [-1.27] |
| Board Variable | | | | | | |
| Board Exit (Yes=1, No=0) | 46.78*** [9.06] | 50.12*** [9.08] | 50.12*** [9.08] | 49.96*** [9.01] | 50.26*** [9.08] | 35.87*** [5.75] |
| Market Variable | | | | | | |
| Monthly U.S. LBO Volume (In \$bn.) | -1.46 [1.61] | -1.27 [-1.33] | -1.25 [-1.31] | -1.54 [-1.59] | -1.28 [-1.33] | .2269 [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. 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 Price>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 (In \$mn.) | Preqin | Volume of PE funds’ Committed Capital. Taken from Preqin fund performance data. |
| GP Variables | | |
| Historic Fundraising (In \$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 and Liquidity 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 (In \$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. |
| Stock Trading Turnover First 180 Days (%) | CRSP | Average stock trading turnover in the first 180 days post-IPO, calculated as the ratio of the daily numbers of shares traded to the total share free float. The free float is calculated as the numbers of shares outstanding minus all lockup-restricted shares at IPO. |
| 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 (In \$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 (In \$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 Online Appendix 1-3 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 Online Appendix 1-3 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 Online Appendix 1-3) 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 Online Appendix 1-3) 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 (In \$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 (In \$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 2. 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 |
| Stock Trading Turnover First 180 Days (%) | 564 | .024 | .018 | .030 | .013 | .027 |
| 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 3: 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 (In \$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 4. 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 |

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

Tim Jenkinson, Howard Jones, and Christian Rauch *

Online Appendix

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Online Appendix 1. Data Sources

The following table provides 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 4s do not have to be filed anymore. We therefore track the exit process through forms SC-13G and DEF14A. The final exit of the GP can be found in five 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 |

Online 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%) |

Online Appendix 3. Data Precision: LBO TEV and GP (Cash-) Equity Funding

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 usage 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 and Mergent FISD 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 |

Online Appendix 4. Representative Examples of the LBO Exit Process

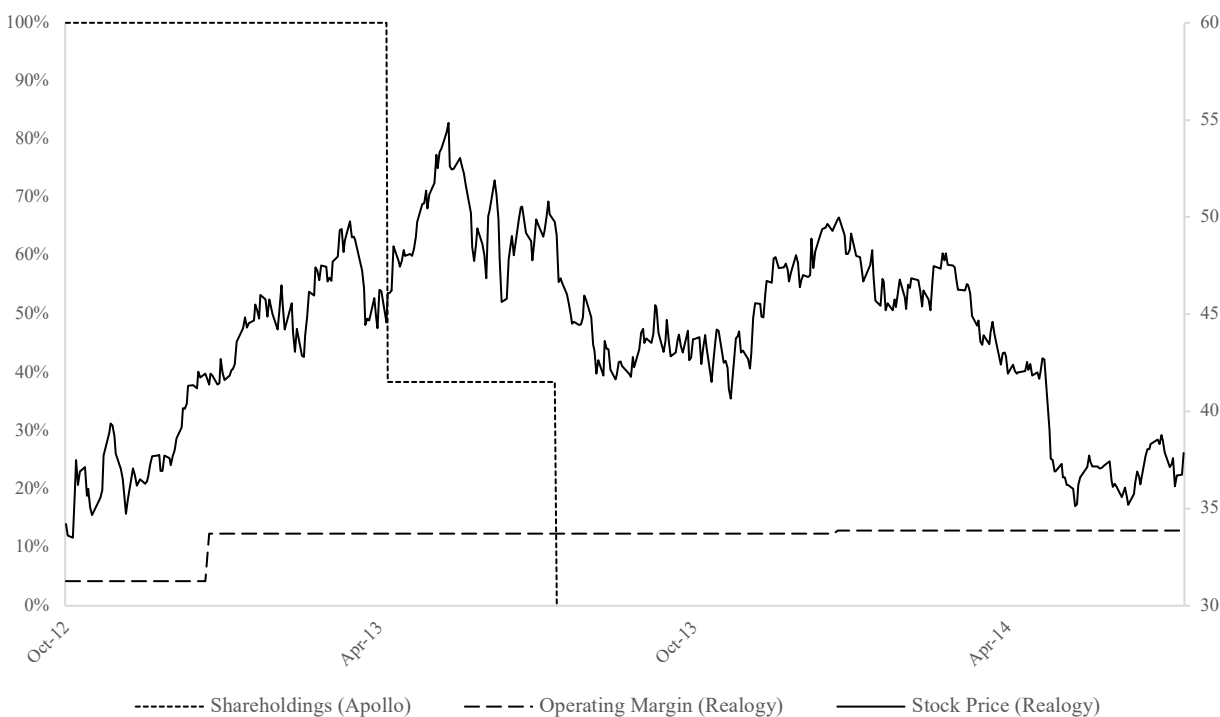
| | |
|---------------------------|--|
| Portfolio Company: | Realogy |
| Sponsor: | Apollo |
| LBO Date: | 04/10/2007 |
| TEV: | \$9,261.9mn. |
| Pre-IPO Ownership: | 98.7% |
| Notes: | 180 days lockup agreement in place, first sale takes place on day #187 post IPO |
| Example for: | Fast and aggressive 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

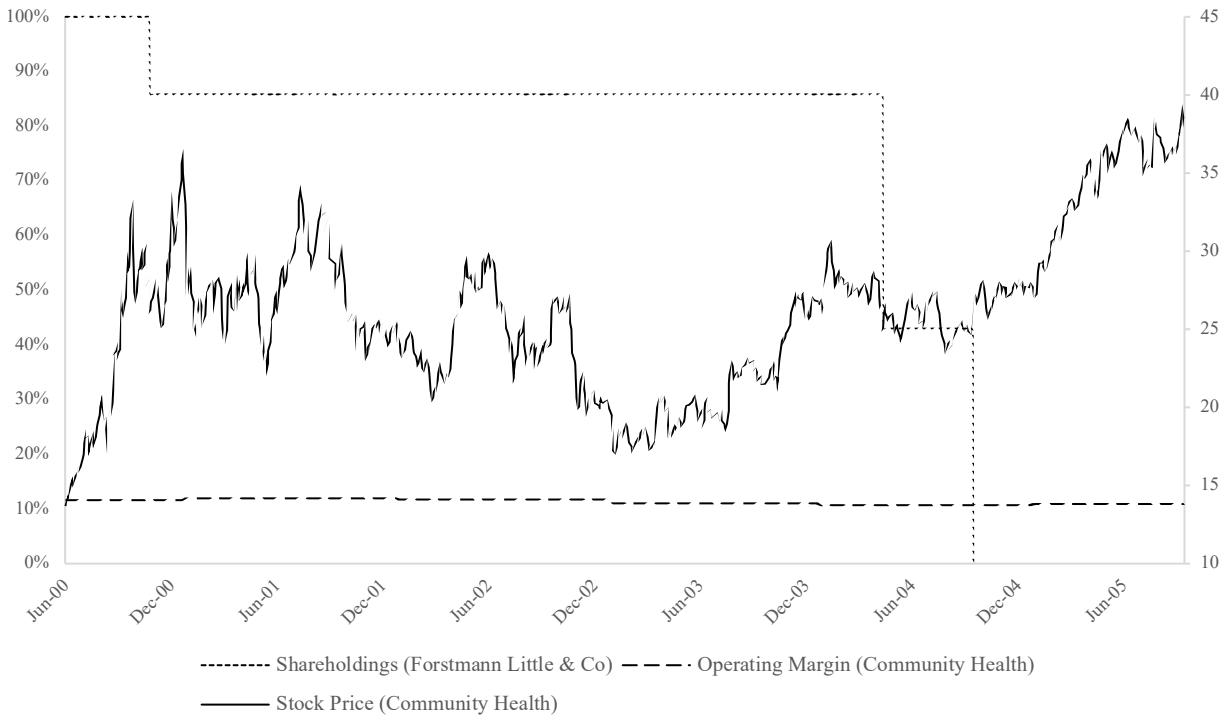
Similar Deals: Del Monte Foods (Texas Pacific Group), Trinseo (Bain Capital), Premcor (Blackstone), Digitas (Hellman & Friedman), B&G Foods (BRS, Canterbury, Protostar), Alaska Communication Services (Fox Paine), Caribou Coffee (Arcapita), Carrol's Restaurant (Madison Dearborn), DJ Orthopedics (JP Morgan), 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/xs1F345X02/dc4-community_forstmannltx.xml

³ https://www.sec.gov/Archives/edgar/data/1018325/000089534504000673/xs1F345X02/dc4-community_thodorex.xml



Portfolio Company: TRW Automotive

Sponsor: Blackstone

LBO Date: 03/03/2003

TEV: \$4,725mn.

Pre-IPO Ownership: 78.4%

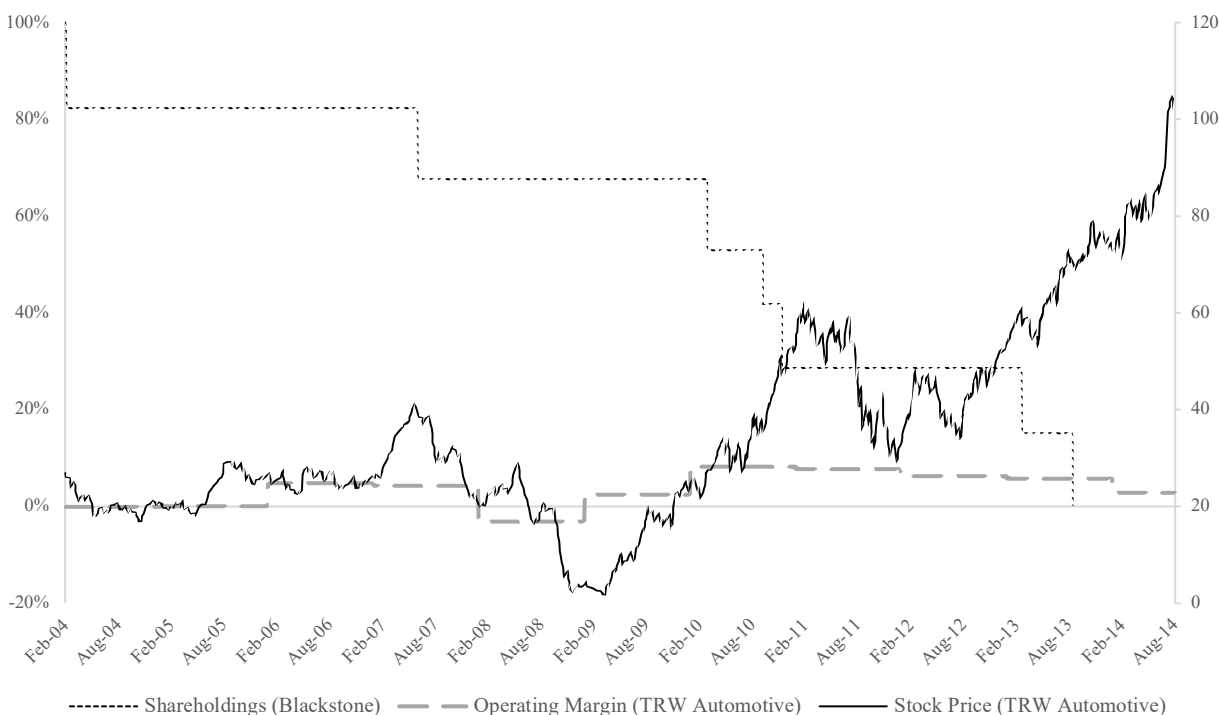
Notes: Northrop Grumman 19% ownership

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/rd268400.xml>
⁴ <https://www.sec.gov/Archives/edgar/data/1070844/000118143110046470/xslF345X03/rd286162.xml>
⁵ <https://www.sec.gov/Archives/edgar/data/1267097/000118143110056322/xslF345X03/rd291446.xml>
⁶ <https://www.sec.gov/Archives/edgar/data/1070844/000118143113012044/xslF345X03/rd371456.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/e621002_4s1.xml

² https://www.sec.gov/Archives/edgar/data/933790/000120919113052229/xslF345X03/e627515_4x0.xml

³ <https://www.sec.gov/Archives/edgar/data/933790/000120919114025679/xslF345X03/doc4.xml>

⁴ <https://www.sec.gov/Archives/edgar/data/933790/000120919114042650/xslF345X03/doc4.xml>

⁵ <https://www.sec.gov/Archives/edgar/data/933790/000120919115025154/xslF345X03/doc4.xml>

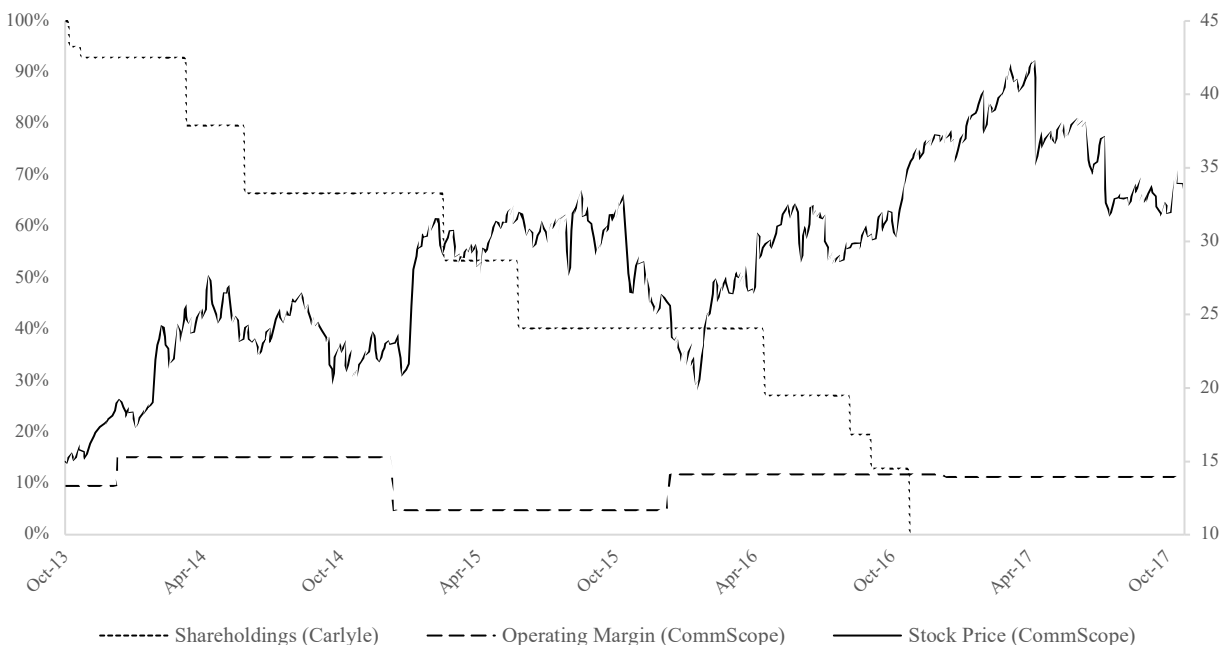
⁶ <https://www.sec.gov/Archives/edgar/data/933790/000120919115053738/xslF345X03/doc4.xml>

⁷ <https://www.sec.gov/Archives/edgar/data/933790/000089924316019548/xslF345X03/doc4.xml>

⁸ <https://www.sec.gov/Archives/edgar/data/933790/000089924316028279/xslF345X03/doc4.xml>

⁹ <https://www.sec.gov/Archives/edgar/data/933790/000089924316030102/xslF345X03/doc4.xml>

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>

⁴ <https://www.sec.gov/Archives/edgar/data/1040508/000120919114062495/xslF345X03/does4.xml>

⁵ <https://www.sec.gov/Archives/edgar/data/1040508/000120919114063115/xslF345X03/does4.xml>

⁶ <https://www.sec.gov/Archives/edgar/data/1040508/000120919114075042/xslF345X03/does4.xml>

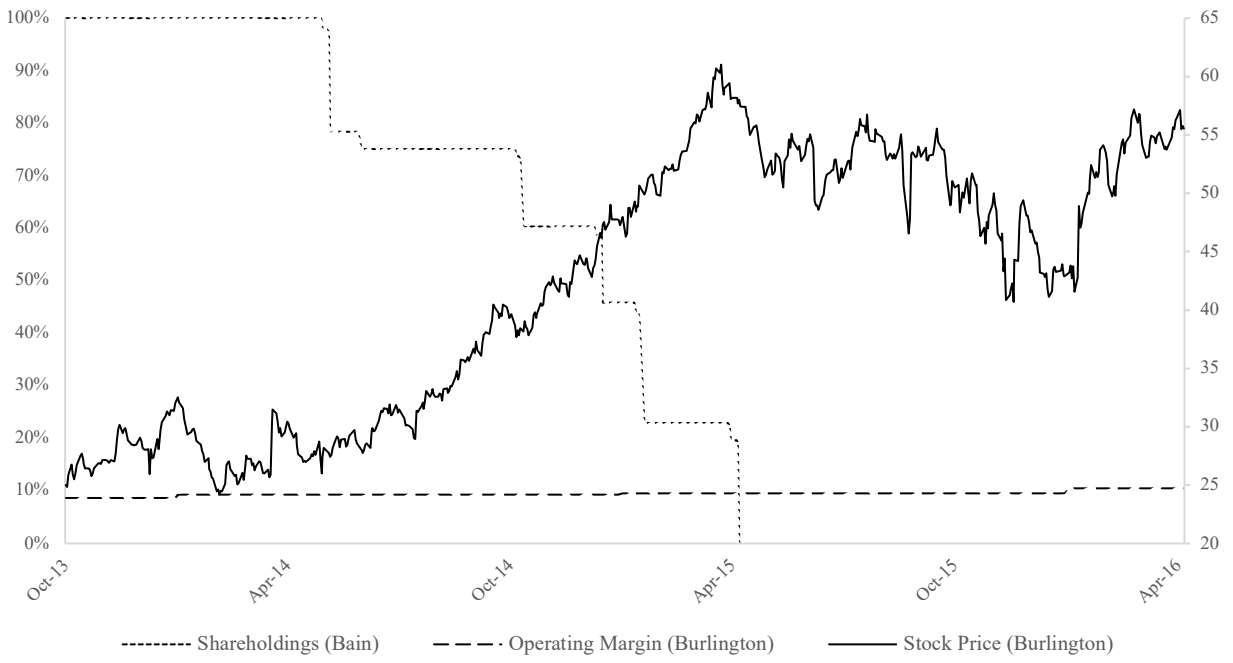
⁷ <https://www.sec.gov/Archives/edgar/data/1040508/000120919114076738/xslF345X03/does4.xml>

⁸ <https://www.sec.gov/Archives/edgar/data/1040508/000120919115004219/xslF345X03/does4.xml>

⁹ <https://www.sec.gov/Archives/edgar/data/1040508/000120919115005447/xslF345X03/does4.xml>

¹⁰ <https://www.sec.gov/Archives/edgar/data/1040508/000120919115031313/xslF345X03/does4.xml>

¹¹ <https://www.sec.gov/Archives/edgar/data/1040508/000120919115033143/xslF345X03/does4.xml>

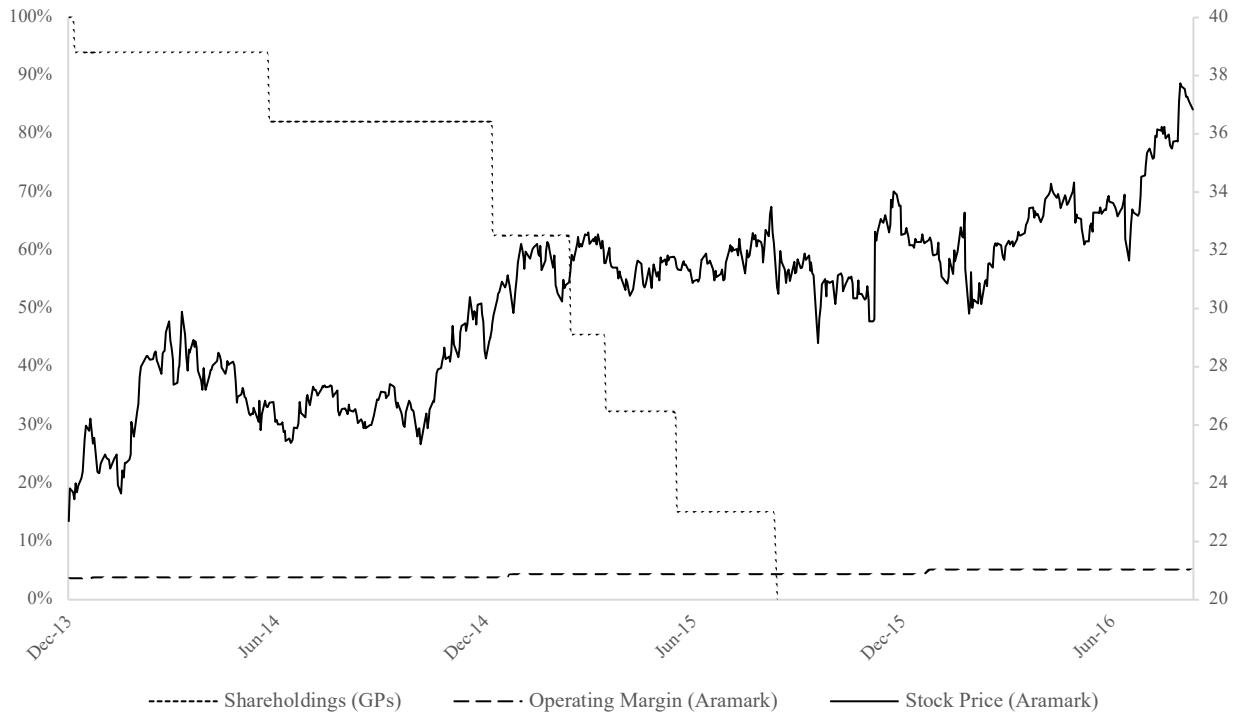


| | |
|---------------------------|---|
| Portfolio Company: | Aramark |
| Sponsor: | Warburg Pincus, Thomas H. Lee, Goldman Sachs, CCMP, JP Morgan |
| LBO Date: | 01/26/2007 |
| TEV: | \$8,300mn. |
| Example for: | All five sponsors have identical exit process, both in terms of % shares sold and dates |

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% |
| 1 st Sale Post-IPO | Warburg Pincus | 06/04/2014 | 169 | 25.54 | 131.44 | 11.9% | 82.1% |
| 1 st Sale Post-IPO | Thomas H. Lee | 06/04/2014 | 169 | 25.54 | 128.74 | 11.9% | 82.1% |
| 1 st Sale Post-IPO | Goldman Sachs | 06/04/2014 | 169 | 24.54 | 123.67 | 11.9% | 82.1% |
| 1 st Sale Post-IPO | CCMP | 06/04/2014 | 169 | 24.54 | 61.83 | 11.9% | 82.1% |
| 1 st Sale Post-IPO | JP Morgan | 06/04/2014 | 169 | 25.54 | 64.35 | 11.9% | 82.1% |
| 2 nd Sale Post-IPO | Warburg Pincus | 12/17/2014 | 196 | 27.02 | 228.85 | 19.6% | 62.5% |
| 2 nd Sale Post-IPO | Thomas H. Lee | 12/17/2014 | 196 | 27.02 | 224.09 | 19.6% | 62.5% |
| 2 nd Sale Post-IPO | Goldman Sachs | 12/17/2014 | 196 | 27.02 | 224.09 | 19.6% | 62.5% |
| 2 nd Sale Post-IPO | CCMP | 12/17/2014 | 196 | 27.02 | 112.05 | 19.6% | 62.5% |
| 2 nd Sale Post-IPO | JP Morgan | 12/17/2014 | 196 | 27.02 | 112.05 | 19.6% | 62.5% |
| 3 rd Sale Post-IPO | Warburg Pincus | 02/23/2015 | 68 | 29.88 | 220.06 | 17.0% | 45.5% |
| 3 rd Sale Post-IPO | Thomas H. Lee | 02/23/2015 | 68 | 29.88 | 215.49 | 17.0% | 45.5% |
| 3 rd Sale Post-IPO | Goldman Sachs | 02/23/2015 | 68 | 29.88 | 215.49 | 17.0% | 45.5% |
| 3 rd Sale Post-IPO | CCMP | 02/23/2015 | 68 | 29.88 | 107.74 | 17.0% | 45.5% |
| 3 rd Sale Post-IPO | JP Morgan | 02/23/2015 | 68 | 29.88 | 107.74 | 17.0% | 45.5% |
| 4 th Sale Post-IPO | Warburg Pincus | 03/26/2015 | 31 | 32.16 | 183.76 | 13.2% | 32.3% |
| 4 th Sale Post-IPO | Thomas H. Lee | 03/26/2015 | 31 | 32.16 | 179.95 | 13.2% | 32.3% |
| 4 th Sale Post-IPO | Goldman Sachs | 03/26/2015 | 31 | 32.16 | 179.95 | 13.2% | 32.3% |
| 4 th Sale Post-IPO | CCMP | 03/26/2015 | 31 | 32.16 | 89.97 | 13.2% | 32.3% |
| 4 th Sale Post-IPO | JP Morgan | 03/26/2015 | 31 | 32.16 | 89.97 | 13.2% | 32.3% |
| 5 th Sale Post-IPO | Warburg Pincus | 05/27/2015 | 62 | 31.47 | 236.03 | 17.3% | 15.0% |
| 5 th Sale Post-IPO | Thomas H. Lee | 05/27/2015 | 62 | 31.47 | 157.35 | 11.8% | 20.5% |
| 5 th Sale Post-IPO | Goldman Sachs | 05/27/2015 | 62 | 31.47 | 157.35 | 11.8% | 20.5% |
| 5 th Sale Post-IPO | CCMP | 05/27/2015 | 62 | 31.47 | 118.01 | 17.7% | 14.6% |
| 5 th 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.

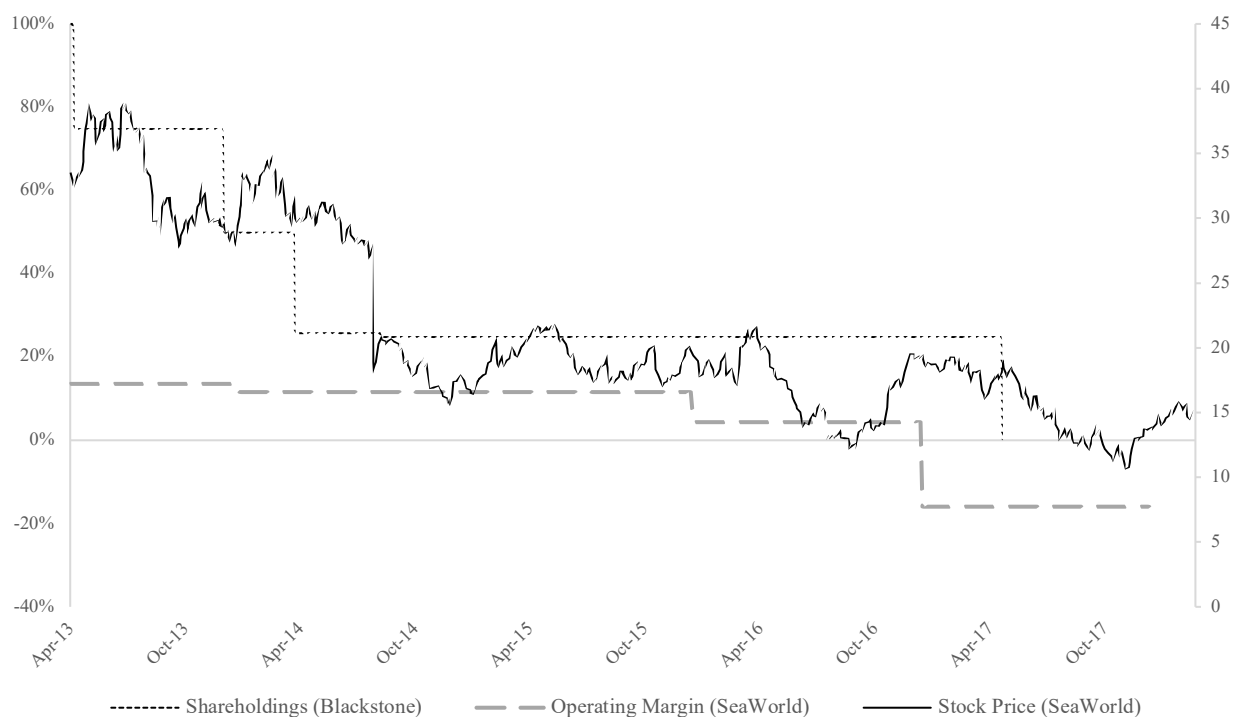


| | |
|---------------------------|---|
| Portfolio Company: | SeaWorld Entertainment |
| Sponsor: | Blackstone |
| LBO Date: | 10/07/2009 |
| TEV: | \$2,503mn. |
| Pre-IPO Ownership: | 100% |
| Notes: | The price is never recorded for Distributions. The displayed price in the table is the company's 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/rrd15272.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) |

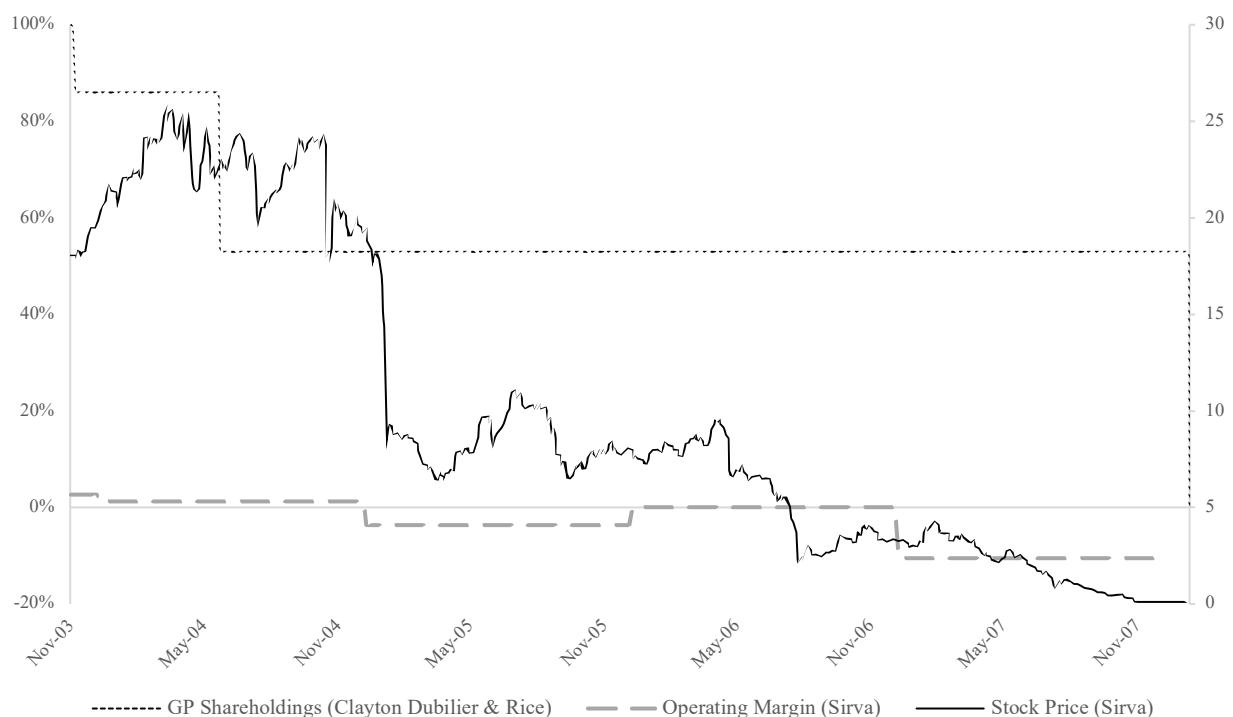
| Transaction | Date | Days Betw. Sales | Price | Sale Vol. (\$mn.) | % Shares Sold | Holdings Post Sale |
|-------------------------|-----------|------------------|-------|-------------------|---------------|--------------------|
| IPO ¹ | 12/1/2003 | - | 18.5 | 118.49 | 14.0% | 86.0% |
| Share Sale 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>



Online Appendix 5. Share Sales by Calendar Week and Month

This table shows relative frequencies of GPs' post-IPO share sales transactions and sale volumes by calendar week and month. In Panel A we report the GP post-IPO share sale transactions by calendar month over the period 1995-2017, calculated as the percentage of total share sale transactions we record in our sample across all 564 GP-LBO Company pairs. We also report mean and median US-Dollar volumes per share sale transaction. In Panel B, we report the share sale transactions by calendar week, also calculated as the percentage of total share sale transactions we record in our sample. All percentages sum up to 100%.

Panel A

| Month | % of Total Sales | Sale Volume (\$mn.) | |
|-----------|------------------|---------------------|--------|
| | | Mean | Median |
| January | 4.60 | 111.6 | 21.9 |
| February | 8.60 | 102.8 | 27.5 |
| March | 9.40 | 114.8 | 47.9 |
| April | 6.44 | 160.9 | 60.0 |
| May | 10.76 | 107.2 | 32.9 |
| June | 7.08 | 107.9 | 41.4 |
| July | 7.00 | 117.1 | 19.9 |
| August | 9.92 | 86.2 | 19.7 |
| September | 8.12 | 89.5 | 17.6 |
| October | 6.24 | 111.6 | 18.1 |
| November | 11.88 | 92.9 | 21.6 |
| December | 10.00 | 123.9 | 38.4 |

Panel B

| Calendar Week | % of Total Sales | Calendar Week | % of Total Sales | Calendar Week | % of Total Sales |
|---------------|------------------|---------------|------------------|---------------|------------------|
| 1 | 0.08 | 19 | 2.44 | 37 | 1.36 |
| 2 | 0.96 | 20 | 2.84 | 38 | 1.84 |
| 3 | 1.12 | 21 | 2.76 | 39 | 1.96 |
| 4 | 1.16 | 22 | 2.32 | 40 | 2.12 |
| 5 | 1.16 | 23 | 2.04 | 41 | 1.76 |
| 6 | 2.28 | 24 | 2.16 | 42 | 1.56 |
| 7 | 2.12 | 25 | 1.64 | 43 | 1.08 |
| 8 | 1.96 | 26 | 1.04 | 44 | 1.32 |
| 9 | 2.28 | 27 | 1.40 | 45 | 2.08 |
| 10 | 1.60 | 28 | 1.04 | 46 | 3.28 |
| 11 | 2.48 | 29 | 1.28 | 47 | 3.48 |
| 12 | 3.04 | 30 | 1.68 | 48 | 1.88 |
| 13 | 1.52 | 31 | 2.08 | 49 | 2.84 |
| 14 | 1.60 | 32 | 2.36 | 50 | 3.04 |
| 15 | 1.48 | 33 | 2.44 | 51 | 3.80 |
| 16 | 1.60 | 34 | 2.60 | 52 | 1.20 |
| 17 | 1.40 | 35 | 2.16 | 53 | 0.32 |
| 18 | 1.44 | 36 | 1.56 | | |

Online Appendix 6. Stock Returns Before and After GP Director Board Exits

This table shows monthly raw and excess returns (over the Russell 2000 stock index) for our in-sample portfolio companies. All returns are shown for two successive post-IPO periods. First, we report returns for the period between the end of the lockup period and the GPs' last board exit in the portfolio companies ('Pre-Exit', in column 1). Second, we report returns for the 12-, 24-, and 36-month periods following the GPs' last board exit in the portfolio companies ('Post-Exit', in columns 2, 3 and 4, respectively). We define 'last board exit' as the month in which the very last board seat in a portfolio company is given up that was held by any of the GPs originally invested in the portfolio company's LBO, i.e. the month in which all GPs fully exit a portfolio company's board of directors. We report mean and median returns as well as the number of portfolio companies. The statistical significance of the differences in stock returns between the periods is shown by p-values for difference-in-means and -medians tests. It is important to note that for the 'post-exit' analyses (columns 2, 3 and 4), we include only those portfolio companies that have (1) at least 12 months of stock returns in the 'pre-exit' period, and that have (2) stock returns for the full 'post-exit' period, i.e. that have stock returns across all the 12-, 24-, and 36- months in the respective 'post-exit' periods. While this reduces the sample sizes within each category accordingly, it allows us to compare only those stock returns of portfolio companies that show up in both the pre- and post-exit period samples which increases result comparability and interpretability. In the 'pre-exit' period (column 1) we include all portfolio companies with at least 12 months of stock returns pre-exit, irrespective of the number of months post-exit. Asterisks indicate statistical significance at 1% (***) , 5% (**) and 10% (*) levels.

| | (1) | | (2) | | (3) | | (4) | |
|-------------------------------|-------------------------------------|--------|---------------------|--------|---------------------|--------|---------------------|--------|
| | Pre-Exit (Starting with Lockup-End) | | 12 Months Post Exit | | 24 Months Post Exit | | 36 Months Post Exit | |
| | N (PCs)=326 | | N (PCs)=130 | | N (PCs)=111 | | N (PCs)=88 | |
| | Mean | Median | Mean | Median | Mean | Median | Mean | Median |
| Raw Monthly Returns | | | | | | | | |
| Lockup-End to 'Exit' (%) | 0.85 | 0.70 | 1.10 | 0.94 | 1.26 | 1.00 | 1.15 | 0.69 |
| Post-'Exit' (%) | | | 0.71 | 0.92 | 0.77 | 0.77 | 0.75 | 0.74 |
| Difference (%) | | | -0.39 | -0.02 | -0.49 | -0.23 | -0.40 | 0.05 |
| P-Value | | | 0.38 | 0.59 | 0.18 | 0.27 | 0.28 | 0.57 |
| Excess Monthly Returns | | | | | | | | |
| Lockup-End to 'Exit' (%) | 0.18 | -0.14 | 0.47 | 0.14 | 0.65 | 0.31 | 0.58 | 0.15 |
| Post-'Exit' (%) | | | -0.21 | -0.39 | 0.09 | -0.21 | 0.08 | -0.14 |
| Difference (%) | | | -0.68* | -0.53 | -0.55* | -0.53 | -0.50 | -0.29 |
| P-Value | | | 0.08 | 0.13 | 0.08 | 0.11 | 0.13 | 0.29 |

Online Appendix 7. 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 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 2: Main regression model (identical to Model 1 of Table 9) is run for sub-sample of GP-portfolio company pairs with no PE fund-level info available. Models 3 and 4: 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 5: OLS regression model as in Model 1 of Table 9, 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 1 and 2, respectively.

| | (1) | (2) | (3) | (4) | (5) |
|---|----------|----------|----------|----------|----------|
| Fund Variables | | | | | |
| Fund in Carry (Yes=1, No=0) | .461** | | | -.412*** | .592*** |
| | [2.37] | | | [.653] | [3.73] |
| Fund Outside Inv. Period at IPO (Yes=1, No=0) | -.376* | | | .201 | -.164 |
| | [-1.73] | | | [1.20] | [-1.03] |
| Fund Size (ln \$mn.) | -.136 | | | -.105 | -.003 |
| | [-1.07] | | | [.899] | [-0.04] |
| GP Variables | | | | | |
| Historic Fundraising (ln \$mn.) | .067 | | | .012 | |
| | [1.58] | | | [1.01] | |
| Fundraising at Time of IPO (Yes=1, No=0) | .023 | | | -.032 | |
| | [0.08] | | | [.967] | |
| GP Age at IPO (Years) | | | | | .005 |
| | | | | | [0.45] |
| Stock Performance and Liquidity Variables | | | | | |
| %-Days Stock Price>IPO Price (IPO to Exit) | | -1.69*** | 1.45*** | 1.63*** | -1.67*** |
| | | [-6.45] | [4.16] | [5.22] | [-6.39] |
| Abs. Stock Return IPO-Lockup End (in %) | -1.24*** | | | | |
| | [-4.44] | | | | |
| Post-IPO Dividend Payments (ln \$mn.) | .278*** | .243** | -.182*** | -.092** | .217*** |
| | [3.07] | [3.12] | [.834] | [.921] | [3.13] |
| Stock Trading Turnover First 180 Days (%) | .513 | .824 | -.441 | -.532 | -.115 |
| | [0.83] | [0.26] | [1.52] | [1.66] | [-0.03] |
| Portfolio Company Variables | | | | | |
| EBIT Margin at IPO (%) | -2.07*** | -1.80*** | .497* | 1.07*** | |
| | [-2.94] | [-2.83] | [1.64] | [2.92] | |
| Return on Assets at IPO (%) | | | | | -1.47* |
| | | | | | [-1.73] |
| Pre-IPO TVPI | -.134 | -.159* | .064 | .121* | |
| | [-1.09] | [-1.71] | [1.06] | [1.15] | |
| Pre-IPO Cash Distributions from PC to GP (ln \$mn.) | | | | | -.001** |
| | | | | | [-2.18] |
| IPO Variables | | | | | |
| Underpricing (%) | -.595 | -1.02*** | .401** | .447** | -1.03*** |
| | [-1.46] | [-3.07] | [1.49] | [1.53] | [-3.01] |
| Shares sold by GP in IPO (% of GP Holdings) | -1.53*** | -3.40*** | 2.71*** | 2.81*** | -3.58*** |
| | [-2.79] | [-8.13] | [14.55] | [1.70] | [-7.91] |
| Shares sold by Issuer (Yes=1, No=0) | .867** | .520* | -.181 | .014 | .547* |
| | [2.57] | [1.93] | [.836] | [1.02] | [1.86] |
| Length LBO to IPO (in Years) | .037 | -.016 | -.015 | -.045* | |
| | [0.66] | [-0.43] | [.982] | [.966] | |
| Quick Flip (Yes=1, No=0) | | | | | -.053 |
| | | | | | [-0.19] |
| Board Variables | | | | | |
| Board Seats GP (% of total Board Seats) | .502 | .545 | -1.05*** | -.944* | .421 |
| | [0.78] | [1.03] | [.350] | [.402] | [0.77] |
| Board Seats GP Held post Exit (Yes=1, No=0) | -.219 | .056 | .059 | .252 | -.105 |
| | [-0.81] | [0.22] | [1.06] | [1.29] | [-0.56] |
| Deal Variables | | | | | |
| Deal TEV (ln \$bn.) | .025 | .126* | -.122** | -.092 | .141* |
| | [0.27] | [1.85] | [.880] | [.909] | [1.78] |
| Club Deal (Yes=1, No=0) | .364 | .048 | -.196 | -.232 | .103 |
| | [1.25] | [0.21] | [.822] | [.802] | [0.43] |
| Deal Leverage (% Debt of TEV) | -.181 | -.251 | .541** | .565 | |
| | [-0.39] | [-0.64] | [1.74] | [1.72] | |
| No. Debt Facilities of LBO Debt | .041 | .011 | -.006 | -.019 | |
| | [1.03] | [0.31] | [.988] | [.981] | |
| Cost of LBO Debt (bp over LIBOR) | | | | | -.560 |
| | | | | | [-0.70] |
| GP Ownership (% of Shares Held) | 1.30** | .573 | -1.11*** | -1.25*** | .838* |
| | [2.19] | [1.23] | [.331] | [.274] | [1.66] |
| Market Variables | | | | | |
| U.S. LBO Volume in IPO Quarter (ln \$bn.) | .095** | .068* | -.051* | -.070** | |
| | [2.09] | [1.84] | [.948] | [.932] | |
| U.S. M&A Volume in IPO Quarter (ln \$bn.) | | | | | .293* |
| | | | | | [1.66] |
| Avg. U.S. LBO EBITDA Multiple in IPO Quarter | | | | | .017 |
| | | | | | [0.92] |
| Number of Observations | 325 | 325 | 605 | 361 | 349 |
| Exit Control Variables | Yes | Yes | Yes | Yes | Yes |
| Fixed Effects | Yes | Yes | No | No | Yes |
| Adj. R-Squared (Prob > Chi2 for Cox Models 4+5) | 0.247 | 0.360 | 0.00 | 0.00 | 0.377 |

Online Appendix 8. Controlling for Post-IPO ‘MNPI’-Events in Probit Regression Models

This table shows results of multivariate probit regression models. We expand the main models as reported in Tables 10 and 11 to control for selected post-IPO ‘MNPI’ events, that is, events during which corporate insiders are not allowed to sell shares due to Material Non-Public Information they possess (‘blackout-periods’). We choose M&A transactions as well as corporate bond issues and the closing of syndicated loans (‘funding transactions’) as such events. On average, each GP-portfolio company pair has 1.4 M&A transactions (median of 1) between the IPO and the GP’s exit, and 0.98 funding transactions (median of 0). Of 684 months with post-IPO share sales, there are only 46 with announcements of M&A transactions (6.7%), and 67 for funding transactions (9.8%). In Models 1 and 3 we test the contemporaneous influence of M&A and funding transaction announcements on the probability of share sales, in models 2 and 4 we test the lagged influence, i.e. whether trading in the month prior to an announcement is affected by the transactions. In Model 5 we test an additional indicator for ‘private’ information GPs might possess: the difference between a portfolio company’s earnings and the quarterly consensus earnings estimate forecast taken from IBES data. 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 control variables are given in Appendix 3 and 4, respectively.

| | (1) | (2) | (3) | (4) | (5) |
|---|----------|----------|----------|----------|----------|
| Fund Variables | | | | | |
| M&A Transaction | -.0366* | | | | |
| | [-1.66] | | | | |
| M&A Transaction (t+1) | | -.0486** | | | |
| | | [-2.09] | | | |
| Funding Transaction | | | -.0053 | | |
| | | | [-0.22] | | |
| Funding Transaction (t+1) | | | | -.0709** | |
| | | | | [2.14] | |
| Difference between EPS and EPS forecast (%) | | | | | .8445 |
| | | | | | [0.79] |
| Fund Performance Variable | | | | | |
| Fund IRR (%) | -.0536** | -.0534** | -.0543** | -.0522** | -.0634** |
| | [-2.11] | [-2.10] | [-2.13] | [-2.05] | [-2.49] |
| GP Variables | | | | | |
| GP Fundraising Period (Yes=1, No=0) | .0030 | .0028 | .0035 | .0035 | .0003 |
| | [0.42] | [0.39] | [0.49] | [0.49] | [0.04] |
| Stock Performance Variables | | | | | |
| Stock Price > IPO Price (Yes = 1, No=0) | .1111*** | .1119*** | .1118*** | .1111*** | .1174*** |
| | [13.46] | [13.48] | [13.44] | [13.39] | [14.42] |
| Absolute Monthly Stock Return (%, 1-Month Lagged) | .0416 | .0431 | .0412 | .0441 | .0387 |
| | [1.22] | [1.27] | [1.21] | [1.31] | [1.28] |
| Stock Trading Volume | | | | | |
| Trading Volume > Avg. Trading Volume (Yes=1, No=0, 1-Month Lagged) | .0154** | .0154** | .0153** | .0151* | .0134* |
| | [1.97] | [1.97] | [1.96] | [1.93] | [1.82] |
| Monthly Change in Trading Volume (%, 1-Month Lagged) | -.0056 | -.0056 | -.0058 | -.0060 | -.0078 |
| | [-1.14] | [1.15] | [-1.17] | [-1.21] | [-1.44] |
| Deal Financial Variables | | | | | |
| EBIT Margin (%) | .0640** | .0635** | .0636** | .0651** | |
| | [2.21] | [2.20] | [2.19] | [2.26] | |
| Dividend Payments (\$mn.) | -.0455 | -.0451 | -.0457 | -.0438 | -.0593 |
| | [-0.89] | [-0.88] | [-0.90] | [-0.86] | [-1.06] |
| Board Variable | | | | | |
| Board Exit (Yes=1, No=0) | .1925*** | .1929*** | .1933*** | .1922*** | .1624*** |
| | [11.15] | [11.30] | [11.16] | [11.13] | [8.82] |
| Market Variable | | | | | |
| Monthly U.S. LBO Volume (ln \$bn.) | -.0006 | -.0006 | -.0007 | -.0006 | -.0010 |
| | [-0.14] | [-0.14] | [0.18] | [-0.15] | [-0.24] |
| Total Number of Observations | 7,262 | 7,262 | 7,262 | 7,262 | 7,262 |
| Months with Share Sales | 684 | 684 | 684 | 684 | 684 |
| Prob > Chi2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Pseudo R-Squared | 0.102 | 0.102 | 0.101 | 0.102 | 0.092 |

Online Appendix 9. LBO Gross and Net Deal Performance using PE Fund-Level Performance Data

This table displays robustness tests for Table 8. We report gross and net performance indicators calculated for the whole LBO, from the initial GP equity investment at LBO until the last share sale post-IPO, as in Table 8. We report the numbers for a subsample of N=413 deals for which we have end-of-lifetime IRR numbers of the lead PE fund. We use these end-of-lifetime IRRs to determine the deal-level carry payments. As in Table 8, we report both cash multiples and Internal Rates of Return (IRRs), using the full time series of deal-level cash flows as the basis for our calculations, including all actual deal cash in- and outflows: the GP initial LBO equity investment, all pre-IPO dividends, deal-level fees (LBO fee, monitoring fees, ‘recap’ and M&A fees, and termination fees, assuming 50% deal rebates), distributions and follow-on investments, as well as all at-IPO and post-IPO cash flows from share sales, share acquisitions, pro-rata dividend payments and share distributions. In addition to the gross (i.e. pre-fees) numbers, we also report the numbers 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 use the end-of-lifetime IRR of the lead PE fund invested in each respective deal. If the end-of-lifetime fund IRR surpasses the fund hurdle rate, we deduct the carried interest off each distribution. We obtain all fund-specific data from Preqin’s ‘Terms & Conditions’ and fund performance 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. Below the performance numbers, we report the full fee volumes per deal (in \$mn.), as well as the deal fees as percentage of the total deal distributions (in \$mn.). The numbers in brackets for the hypothetical exit patterns are p-values indicating the statistical significance of the differences in means (t-tests) and medians (Wilcoxon) of the performance metrics between each respective hypothetical exit patterns and the actual share sale exits. For the actual share sale patterns, they indicate the statistical significance of the difference from 1. Reported IRRs are winsorized at the 98% level.

| | Actual Share Sales | |
|---|---------------------------|-----------------|
| | Mean | Median |
| Gross Full Deal Performance (Pre-Fees) | | |
| Gross Cash Multiple | 4.21 [0.00] | 3.18 [0.00] |
| Gross IRR (%) | 51.3% [0.00] | 31.9% [0.00] |
| Net Deal Performance | | |
| Net Cash Multiple | 3.35 [0.00] | 2.73 [0.00] |
| Net IRR (%) | 42.3% | 25.8% |
| Management Fees (\$mn) | 22.53 | 8.21 |
| Carried Interest (\$mn) | 79.06 | 28.74 |
| Total Fees (\$mn) | 101.59 | 42.86 |
| Fees as % of Distributions | | |
| Management Fees | 5.2% | 2.6% |
| Carried Interest | 10.1% | 12.5% |
| Total Fees | 15.3% | 16.4% |