

The Performance of Secondary Buyouts

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June 2015

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Keywords: Private equity, buyouts, performance, secondary buyouts

JEL Classification: G23, G24

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On Secondary Buyouts

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Abstract

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1. Introduction

Transactions known as secondary buyouts (SBOs), in which a private equity firm sells a portfolio company to another private equity firm, have evolved from a rarity in the 1990s to 40% of private equity exits in recent years (Strömberg, 2008). The rise of SBOs has elicited concerns that such transactions cannot create value, and even that they predictably destroy value, for private equity investors (the limited partners with stakes in private equity funds). Given that private equity (PE) funds manage about \$3 trillion worldwide, it is important to empirically assess the validity of the claims made about a large fraction of transactions in this asset class. Such is the goal of this study.

The first claim we address is that SBOs are just “pass-the-parcel” deals in which the main motivations for the buying fund are to spend capital and collect fees. This suspicion arises from certain distinctive features of private equity funds: they have a finite period in which to invest their capital, after which time general partners usually earn management fees on the invested capital. Axelson et al. (2009) note an agency conflict between general partners and investors: if the fund has excess capital near the end of the investment period, then a general partner has an incentive to “burn money” by taking bad deals. SBOs are plausibly a preferred investment channel for such a fund: they have lower search costs than other buyouts (the companies owned by private equity firms are publicly known) and lower adverse selection problems (any company present in the portfolio of another PE firm is a priori up for sale.)

A second concern is what additional value, if any, an SBO buyer can bring to the portfolio company compared to that of the first private equity owner. Conceivably, a buyer with complementary skills to those of the seller might be able to further enhance the value of the portfolio company, but the academic literature is largely silent on what these complementarities might be.

Third, investors often have stakes in several private equity funds. As a result, investors can find themselves on both the buying side and the selling side of an SBO transaction. Consequently, they end

up owning the same asset after the transaction, but have paid large transaction costs; some observers equate this situation to a tax on investors.

Our empirical analysis relies on several large data sets, some of them hand-collected. Our sample includes 5,849 buyouts for which we have precise returns data. Our main findings are as follows. Our evidence is partially consistent with the money-burning view of SBOs. We find that SBOs made late in the buying fund's investment period, when the fund is under pressure to spend capital, underperform other buyouts, while at the same time exhibiting slightly higher risk. Controlling for a number of factors, the Public Market Equivalent (PME) of late SBOs is about 0.3 lower on average than for comparable buyouts. Late SBOs generate negative Net Present Value (NPV) for the limited partners invested in the buying fund: net of fees, late SBOs return \$0.88 on average when an investment in the stock market index would have returned \$1. The follow-on-funds of funds that made late SBOs are markedly smaller, consistent with the view that the investors penalize funds that burn money: investing in late SBOs appears to be a short-lived trick for general partners.

SBOs made early in the investment period, which represent nearly two-thirds of our sample, perform as well as other buyout transactions and generate a positive NPV for investors, similar to other buyout transactions. The follow-on-funds of funds that engage in SBOs early in their investment period are not penalized by investors: they raise funds of similar size as those that do not engage in SBOs, suggesting that investors are not dissatisfied with funds doing early SBOs.

We uncover an important source of value creation in SBOs: the presence of complementary skill sets between the buyer and the seller. To identify PE firm skill sets we construct two novel data sets on the educational backgrounds and career paths of the general partners (GPs) of PE funds, as well as on the strategies pursued by private equity firms in their portfolio companies. We collect biographical information on the 1,978 general partners of 138 PE firms, and financial performance information on 2,137 companies owned by 121 PE firms. Using this unique detailed data, we classify PE firms as

Finance-oriented or Operations-oriented; MBA-dominated or not MBA-dominated; regional or global; and “margin-grower” or “sales grower.” We find that SBO transactions between firms with complementary skill sets generate significantly higher returns for buyers than SBOs between firms with similar skills. Moreover, we find that the net-of-fees NPV of SBOs that occurred between two complementary PE firms is large and positive. In contrast, and consistent with often expressed concerns about SBOs, transactions between funds without complementary skill sets do not generate value for investors.

Finally we investigate the situation known as “LP overlap,” in which limited partners (LPs) in private equity funds find themselves on both the buying and the selling side of an SBO transaction. We show that, assuming that GPs never return capital to investors (an assumption that is almost always met in practice) the widespread view is incorrect: SBOs do not, as commonly believed, generate extra transaction costs for limited partners involved in both sides of the transaction. Yet the eventuality of LP overlap is relevant for limited partners’ allocation decisions to PE funds: by investing in funds with complementary skills, limited partners stand to gain more from their PE investments, should they find themselves on both sides of an SBO transaction.

Previous studies have documented some other agency costs of private equity funds: Axelson et al. (2013a) suggest that they use too much leverage; Gompers (1996) and Robinson and Sensoy (2013) find that funds exit good deals too early; Lopez-de-Silanes et al. (2015) find that some funds raise too much money.

Other contemporaneous studies examine secondary buyouts empirically and present results that are complementary to ours. Unlike this paper, most focus on the corporate finance side of SBOs. Wang (2012), Jenkinson and Sousa (2012), and Bonini (2014) find that, on average, SBOs exhibit smaller operating performance gains than other buyout transactions. Achleitner and Figge (2014) find low average returns for SBOs compared to other buyout transactions.

The most closely related study is that of Arcot et al. (2015). Arcot et al. make a comprehensive study of the determinants of SBO activity, something we do not examine here. They find that: buying pressure makes buying an SBO more likely; selling pressure makes an exit via SBO more likely; buying pressure dominates selling pressure; and greater fund specialization (by size or industry) does not make SBOs more likely. In addition, they find that buying pressure makes buyers pay more and syndicate less, and that selling pressure depresses valuations.

Both Arcot et al. (2015) and our paper study the investment performance of SBOs. Arcot et al. (2015) infer deal performance from the growth rate of enterprise value, whereas we have access to the equity return obtained by the GP. Both their study and ours find that money-burning incentives are associated with worse SBO investment performance. We find in addition some evidence of money burning even in the primary buyouts (PBOs) of funds that did late SBOs (but less than in late SBOs). Our access to proprietary and detailed data also enables us to test several alternative interpretations to money burning, and to quantify the value gains and losses suffered by investors in SBOs.

While the investment performance of SBOs made under pressure is the final question studied by Arcot et al. (2015), it is the starting point of our paper. Building on their pioneering work we examine the consequences for PE firms of investing in late SBOs: we quantify the wealth lost by investors in those deals, and we show that investors appear to vote with their feet in future fund raising by the same PE firm. We also show that SBOs have more than just a dark side: SBOs between PE firms with complementary skill sets between the buyer and the seller are associated with higher performance and more value creation for investors. Even the widely decried LP overlap in SBOs can benefit investors if they invest in funds with complementary skills. Overall, our evidence paints a comprehensive and nuanced picture of SBOs: not all SBOs are money-burning devices.

2. Data and descriptive statistics

We first explain our definition of secondary buyouts and the construction of our core data set. Then we outline the differences between secondary and primary buyout transactions using descriptive statistics.

2.1. Variable definitions

We define an SBO as a deal in which a private equity (PE) firm (or a group of private equity firms) sells the majority of shares of a company in its portfolio to another PE firm (or group of PE firms). By implication we classify so-called tertiary buyouts, fourth buyouts, etc. as SBOs. Our definition necessarily excludes a number of transactions sometimes classified as SBOs in commercial databases. Appendix A defines other variables we use in the analysis, while Appendix B offers more details on our definition of a secondary buyout.

2.2. Data source

To study the performance of SBOs, we need data on the returns obtained by PE firms on their investments. These data are not public information, but can be obtained in three ways. First, one can contact PE firms individually and ask for their investment returns. Some data used by Franzoni et al. (2012) were obtained this way. Second, one can ask investors for the list of private equity investments they have made and their corresponding returns. Ljungqvist and Richardson (2003) obtained this type of data. A third way is to ask investors for the fund raising prospectuses they receive from PE firms. These fund raising prospectuses contain the firms' track records, i.e., the complete set of past investments with their returns. An increasing number of studies use this type of data (cf. Braun et al., 2013; Lopez-de-Silanes et al., 2015). Each approach has its pros and cons.

Our data set is of the third type: it comes from Private Placement Memorandums (PPMs) received by a group of potential investors. While having the lowest selection bias of the three types of data, our data set has the disadvantage of excluding the PE firm's investments since its last round of fund raising. In addition, we have only summary statistics for performance, in the form of the total distributed divided by the total invested (Cash Multiple) and the Internal Rate of Return (IRR), instead of the detailed data on cash flows per investment used by Ljungqvist and Richardson (2003), Franzoni et al. (2012), and Braun et al. (2013).

From our set of PPMs, we extract the following data: (1) the month and year in which the investment was initiated; (2) the month and year of exit (date realized); (3) the investment's industry; (4) the country where the investment is located; (5) the value of equity invested (referred to below as "investment size" in PPMs); (6) the total amount distributed (realized value); (7) the current valuation of any unsold stake (unrealized value); (8) the total value (sum of realized and unrealized value); (9) the multiple (total value divided by investment size); (10) the IRR; (11) the status (unrealized, partially realized, or fully realized); and (12) the exit route (trade sale, initial public offering (IPO), etc.). Not all PPMs provide this full set of information, and we use commercial databases to complement our data. Appendix C provides details on this data set.

2.3. Descriptive statistics

Our sample consists of 548 SBOs, of which 467 SBOs are liquidated (and thus have return data), and 7,449 PBOs, of which 5,382 are liquidated. We know the exit route for 421 SBOs and 4,326 PBOs. Finally, for some specifications we also require information on all the other investments made by the fund. That subsample contains 231 SBOs and 3,240 PBOs. Appendix Table A.1 shows these statistics by year.

Fig. 1 shows the rise of SBOs to being a major channel for PE exits. Throughout the 1990s, SBOs are a fairly marginal exit route. Starting in 2003, the percentage of SBOs in PE exits starts to grow sharply (with the exception of a dip during the financial crisis) and is now around 40%. Numbers from other data sets are consistent with this time-series (e.g., Strömberg, 2008).

Figure 1

Table 1 compares secondary buyouts with same-year primary buyouts along several dimensions. Table 1, Panel A reports exit channels. SBOs are much less likely than PBOs to be exited through an IPO (8% vs. 21%) or a trade sale (27% vs. 38%), while SBOs are also much more likely than PBOs to be exited through an SBO (43% vs. 20%). These differences are large, suggesting that once a company enters the SBO route, it is relatively likely to stay there and to shun the traditional exit routes, in particular, public markets. SBOs are as likely to end in bankruptcy as PBOs. See Hotchkiss et al. (2011) for an analysis of bankruptcy among PE-backed firms.

Table 1

Table 1, Panel B offers a first look at performance differences between secondary buyouts and primary buyouts, broken down by exit route. We observe that SBOs underperform PBOs regardless of the exit route. Interestingly, buyout investments that are exited via a secondary buyout exhibit strong performance. This result is true for both SBOs and PBOs.

Overall, the median and average cash multiples are markedly lower for the average SBO than for PBOs, as are other measures of performance, such as public market equivalents and internal rates of return. Whereas an SBO returns \$2.34 for every \$1 invested on average, PBOs return \$2.76, i.e., 18% more.

In Table 1, Panel C we compare a number of characteristics of SBOs versus PBOs. We first look at the occurrence of high and low returns and find that the lower performance of SBOs results from a smaller upside. The percentage of “home runs” (which we define as transactions with a Cash Multiple

greater than 3) is 24% for SBOs vs. 35% for PBOs. The percentage of losses (transactions with a Cash Multiple less than 1) is identical for SBOs and PBOs, at 26%. Hence, SBOs are less likely to deliver spectacular returns than PBOs. This finding is consistent with anecdotal evidence. The well-known “home runs” in the buyout industry are all PBOs, not SBOs (e.g., Angel Trains, Boart Longyear, Celanese, Dr Pepper, PanAmSat, and Snapple).

SBOs and PBOs differ in a few ways. SBOs tend to be larger and more leveraged investments, are held during periods of low stock-market returns, and are conducted by private equity firms that are more diversified and have more experience. In our regression analyses we include these characteristics as control variables.

3. Are SBOs bought late money-burning devices?

Axelson et al. (2009) note that the fixed investment period of PE funds results in incentives for the general partner to burn money at the end of the investment period. After that time, the general partner typically earns management fees only on the invested portion of the fund’s capital. As a result, general partners with unspent capital near the end of the investment period (colloquially known as “dry powder”) face a dilemma. If they do not invest, they forgo fees on the uninvested portion of the fund’s committed capital; if they invest, they earn these fees. Moreover, raising a new fund is harder if the general partner still has a lot of unspent capital in an existing fund. Thus, at the end of the investment period the general partner has an incentive to invest in deals that are not in the best interest of the limited partners.

SBOs are a plausible channel for a fund wishing to “burn money.” Consider the options faced by a general partner with unspent capital at the end of the investment period. One option would be to source a traditional primary buyout (PBO), either buying a company from a family (or a division from a conglomerate) or taking a public firm private. Search costs and adverse selection costs are likely to be

high in such deals, making them impractical for a general partner in a hurry to spend. Another option would be to purchase an auctioned asset. Relative to a sourced deal, an auction reduces the search costs, but the adverse selection problem remains if the auction seller is a family or corporation. If, however, the auction seller is a private equity firm, as in an SBO, both search costs and adverse selection costs are likely to be low. A buyout fund has no incentive to sell only the “lemons” in its portfolio. According to this money-burning hypothesis, general partners who want to burn their capital are likely to buy SBOs in the later part of their fund’s investment period and to overpay for such deals. This view of SBOs was expressed by the *Wall Street Journal*’s “Heard on the Street” column, which noted, “Unused capital, known as ‘dry powder,’ [...] could give some managers an incentive to scramble and spend money before it expires. And it may already be visible in secondary buyouts” (September 26, 2012, p. 32).

Consistent with this view that SBOs bought late in the investment period are money-burning devices, Arcot et al. (2015) find that funds under pressure to buy are more likely to buy SBOs. They also find that SBOs bought late fetch high valuations and subsequently tend to underperform. Arcot et al. (2015) measure company valuation as Total Enterprise Value/Earnings Before Interest, Taxes, Depreciation and Amortization (Total Enterprise Value/EBITDA), and they infer deal performance from the growth rate of Total Enterprise Value. These measures of valuation and deal performance have some limitations: the ratio Total Enterprise Value/EBITDA might be high because of a high growth rate, not because the deal is overpriced. The growth rate of Total Enterprise Value differs from the equity return because of leverage and intermediary distributions. These problems might explain why some of their results are statistically weak. We have access to the equity return obtained by the GP. In this section we examine the predictions of the money-burning hypothesis for SBO performance using our more detailed data.

3.1. Testing the money-burning hypothesis

We construct three dummy variables: i) *SBO bought late*, which takes the value one if the transaction is an SBO that is bought in the second half of the investment period, and is zero otherwise; ii) *SBO*

bought early, which takes the value one if the transaction is an SBO that is bought in the first half of the investment period, and is zero otherwise; iii) *PBO bought late*, which takes the value one if the transaction is a PBO that is bought in the second half of the investment period, and is zero otherwise. According to the money-burning hypothesis, only SBOs bought late should underperform. For this test, we restrict our sample to deals made by funds for which we know the performance of all their other investments, and which have limited life (i.e., non-evergreen funds).

Table 2

The results in Table 2 show that the coefficient on *SBO bought late* is indeed negative and statistically significant throughout our specifications. The underperformance of late buyouts is economically large: the PME of late SBOs is lower than that of other buyouts by 0.3 or more, depending on the specification (in our sample the median PME for PBOs is 1.29).

Importantly, Specification 4 in Table 2 shows that SBOs bought early do not underperform other buyouts. It also shows that late PBOs do not underperform on average, which is inconsistent with the view that the underperformance of late SBOs is due to PE funds walking down their demand curve by investing first in the most valuable deals, before acting on weaker opportunities. It could be, however, that the PBOs of the funds with late SBOs underperform somewhat, if late SBOs indicates that the fund is under pressure. We find support for this idea in Specifications 5–7 of Table 2. We find some underperformance for the PBOs of funds that did late SBOs. Their underperformance is less pronounced than that of SBOs bought late.

Some funds might feel under pressure to invest simply because of their vintage year, rather than because of an agency problem. For example, imagine that shortly after a fund is raised adverse market conditions cause investment opportunities to dry up for several years. Funds raised in this “lost vintage” year will all face the need to deploy capital quickly if investment opportunities resume as their investment period is ending. This “lost vintage” explanation of late SBO underperformance sits

somewhere between our money-burning story and the “walking down the demand curve” story. By including fund quarter-of-birth fixed effects in Specifications 2 through 6 of Table 2, we rule out this “lost vintage” explanation of late SBO underperformance. In Specification 1, to which we do not introduce fund quarter-of-birth fixed effects, the coefficient on the *SBO bought late* variable is slightly less negative than in Specifications 2–7, suggesting that the “lost vintage” effect is not driving our results.¹

Throughout the specifications, we control for investment size, club deal, and buyer characteristics (portfolio concentration, scale, and experience); Lopez-de-Silanes et al. (2015) find that these investment characteristics are related to buyout returns. We also control for several fixed effects. Private equity firm fixed effects capture what is specific to PE firms. Return cycles are captured by interacting industry and investment inception year fixed effects. Cross-countries differences are controlled for both at the company level and at the fund level (by having a fund-focus country fixed effect). Interestingly, the results of Table 2 are similar if we use fund age rather than dummy variables to measure money-burning incentives.

3.2. Further empirical tests for the money-burning hypothesis

In Specification 6 of Table 2 we introduce the idea of “dry powder,” in the variable we label *Excess cash*. The idea is to measure the extent to which a fund is late in spending its capital. For example, if the average fund at the end of year three has spent 60% of the capital, then a fund that has spent only 40% is late in its spending. A fund that has spent 70% is early and thus under much less pressure to spend capital. We capture the normal spending rate by fitting the fraction of committed capital spent as a

¹ We thank the referee for suggesting this alternative explanation.

quadratic function of fund age in our sample. We define *Excess cash* as the difference between the cash left to be spent by the fund at the time of investment inception and the fitted amount of cash left to be spent for a fund of that age. When we interact *SBO bought late* with *Excess cash*, we find a significantly negative coefficient, which confirms that the presence of excess cash magnifies the underperformance of late SBOs.

In Specification 7 we introduce *Relative investment size*, the size of the current investment of a fund minus the average size of all past investments made by the same fund. Our intuition is that a fund that is burning money would probably do larger deals in order to spend its capital more quickly. Our results are consistent with this conjecture. When we interact *SBO bought late* and *Relative investment size*, the coefficient is negative and statistically significant.

Taken together our results strongly suggest that the completion of an SBO late in the investment period of the fund reflects behavior consistent with the money-burning hypothesis. SBOs bought early, which represent nearly two-thirds of our sample, perform as well as other buyouts. These results are consistent with and complementary to those of Arcot et al. (2015).

4. When do second private equity owners add value in an SBO?

Much research has shown how PE owners create value in ways that public owners cannot (see Kaplan (1989) for the seminal study on this topic). But the literature is largely silent on how one PE owner could create value for a company that has already undergone PE ownership. *The Economist* reflected the general opinion on February 10, 2010, noting in “Circular Logic” that “Once a business has been spruced up by one owner, there should be less value to be created by the next.” The skepticism surrounding the rise of SBOs is in part a reflection of this void in the PE literature. Yet PE practitioners themselves have expressed the view that SBOs can create value when the transaction takes place

between funds with complementary skill sets. We now examine this argument and study empirically whether the existence of complementary skills between the buying PE fund and the selling PE fund is associated with more value creation.

4.1. Complementary skills in SBOs: an example

The SBO case study on Com Hem by Strömberg (2013) illustrates the role of complementary skills in SBO value creation and motivates our empirical analysis. In June 2003, EQT, a regional private equity firm with a focus on Scandinavia at that time, bought a Swedish cable TV company called Com Hem from TeliaSonera. The latter had to sell Com Hem, a non-core division, due to anti-trust regulation; a piece of information that EQT probably acquired thanks to its strong local knowledge. EQT used a standard PE recipe: it grew the company by implementing an efficiency program and added new services and products. EQT also strengthened the board and incentivized the existing management. Over the two-and-a-half years of EQT ownership, EBITDA rose from SEK 53m to SEK 700m and the company became the leading Swedish triple play operator (cable, TV, telephone).

After this increase in EBITDA, Com Hem was a much bigger company with a value of SEK 10.5 billion. At that stage, EQT needed to exit for at least two reasons: (1) The PE model is one in which companies are held for three to five years; and (2) the company was probably a large fraction of EQT's portfolio at that stage, raising diversification concerns.

Com Hem was bought in December 2005 by Carlyle and Providence Equity Partners, two US-based global PE firms with experience in multinational telecom companies. The buyers implemented a strategy based on external growth. They acquired UPC, the second largest cable provider at that time in Sweden, for SEK 3 billion and merged it with Com Hem. They also invested SEK 4 billion to upgrade the network and offer new services. Given that EQT had paid SEK 1 billion for Com Hem, it seems

unlikely that EQT or any other regional PE firm at the time would have been able to spend as much as Carlyle and Providence to expand the company.

Com Hem is an example of an SBO that appears to have a value-creation rationale. EQT cannot keep the company to implement the next strategy phase and Carlyle and Providence seem to be the right owners for the company at that stage.

4.2. Hypotheses

Value creation can refer to (1) the present value of the portfolio company free cash flows, or (2) higher investment returns for the buyer or the seller. The argument that complementary skills can generate value applies to the former. In the Com Hem example, if under the ownership of Carlyle and Providence the company's free cash flows grow faster than do those of comparable companies, Carlyle and Providence are said to have added value.

We analyze three types of PE skills that can give rise to complementarities between buyer and seller in SBOs. First, we conjecture that to increase profitability, some PE firms focus on boosting margins in their portfolio companies (by cutting costs, increasing prices, or both) while other PE firms specialize in growing revenues. A PE firm with a margin focus might bring value to a firm that has so far been sponsored by a PE firm with a growth focus (and vice versa).

Second, we build on the work of Acharya et al. (2013), who find that the career path of general partners (ex-consultants vs. ex-bankers) strongly influences the type of deals they excel at: ex-consultants tend to outperform in internal value-creation programs, while ex-bankers do well in mergers and acquisitions (i.e., buy-and-build strategies). From their results we conjecture that an operation-oriented PE firm might bring value to a company that has so far been sponsored by a finance-oriented PE firm (and vice versa).

Third, directly drawing from the Com Hem example, we examine another complementarity, that between regional PE firms (those that focus on one or two countries) and global PE firms. The idea is that a regional PE firm can get a company up to speed in its home market but cannot further help it reach a multinational dimension. To do so, it would need to change its sponsor and be owned by a global PE firm instead.

4.3. Data

To classify PE firms as “margin growers” or “sales growers,” we assemble the list of all the companies that, according to Capital IQ, went through a leveraged buyout (LBO) for all of the PE firms in our sample. We keep the subsample for which Capital IQ has both EBITDA and sales data from year $t-1$ to year $t+3$, where t is the year of the LBO, and we require at least two valid observations per PE firms. We obtain a sample of 2,137 companies from 121 PE firms.

For each of the 121 PE firms we compute the time-series average growth in margin (defined as EBITDA divided by sales) and the growth in sales. In order to make margin growth and sales growth comparable, we compute a z-score of the time-series average of margin growth by subtracting the cross-sectional average and dividing by the standard deviation of the time-series average across all PE firms. We classify PE firms whose normalized average margin growth rate is higher than its normalized average sales growth rate as “margin growers,” and other PE firms as “sales growers.” Due to the normalization, we have about as many firms classified as margin growers and as sales growers.

To measure complementarities based on professional experience and education, we gather biographical information on the general partners of the PE firms in our sample. We primarily use our Private Placement Memoranda because these give the names of the partners at the time the fund was raised and typically list any partners who left, as well as their departure date. We cross-check this

information with that provided in Capital IQ, Thomson, LinkedIn, and on the websites of private equity firms.

Table 3

We have complete biographical information for 138 PE firms and their 1,978 (past and present) general partners. We categorize each general partner as either finance-oriented (for those with experience in finance or accounting) or as operations-oriented (for those with consulting or industry experience) as in Acharya et al. (2013). We then classify PE firms as finance-oriented if the majority of their general partners were finance-oriented at the time of the transaction, and as operations-oriented otherwise. In our sample, 55% of the PE firms are finance-oriented and 45% are operations-oriented.

Also following Acharya et al. (2013), we categorize educational backgrounds by recording whether a general partner has an MBA degree (37% of them do). Next, we compute the percentage of MBA holders in each PE firm. We classify a firm as MBA-oriented if its percentage of MBA-holders is above the mean across firms, which is 43%.

To categorize PE firms as regional or global, we count the number of different countries each firm had invested in at the time of the SBO. We classify firms that had invested in two countries or less as regional and those that had invested in three countries or more as global. For this classification we need to restrict ourselves to the sample for which we know the full investment history of both the buying and selling PE firms. We exploit this categorization of PE firms differently from the others (margin vs. growth, finance vs. operations, MBA-oriented) in that we require the seller to be regional and the buyer to be global, while for the other PE firm categories we only require the buyer and seller to have different skills.

4.4. Investment returns and value creation

We observe investment returns for SBO buyers and sellers, rather than excess free cash flows for the portfolio companies. Investment returns are the result of both value creation and value sharing between buyers and sellers. In addition to influencing value creation in portfolio companies, complementary skill sets may also affect value sharing. To infer value gains due to complementarities from investment returns, we need to disentangle the two effects.

We argue that when the SBO buyer has skills that are complementary to those of the seller, the buyer will share in more of the value gains. If we call c the value gain brought on by a buyer with complementary skills, and s the fraction of those gains captured by the seller in a deal with complementarity skill sets ($s < 1$), then the incremental investment return for the buyer from investing in a deal with complementary skills (compared to a deal with no complementary skills) is $(1-s)c$. The incremental return for the seller is sc .

We infer value gains from investment returns as follows. We run a regression of buyer investment returns on deal characteristics and a dummy variable indicating complementary skills: the coefficient on this dummy is an estimate of $(1-s)c$. We run the same regression with seller investment returns as the dependent variable: the coefficient on the dummy is an estimate of sc . The sum of these two coefficients is an estimate of c , the value gains due to complementary skill sets.

Table 3 presents regression results of buyer returns (Panel A) and seller returns (Panel B) on deal characteristics and dummy variables indicating the presence of complementary skill sets between buyer and seller in the SBO. The dummy variables of interest are *Margin grower trades with sales grower*; *Buyer has a different educational background than seller*, *Buyer has a different professional background than seller*, and *Regional PE firm sells to global PE firm*.

The results of Table 3 confirm that complementary skill sets are associated with greater value creation in SBOs. For all the skill sets we consider and for almost all specifications, the combined returns of buyers and sellers are much larger in the presence of complementarities. The buyer

incremental PME are significantly larger for SBOs with complementary skills (the incremental PME is generally in the range of 0.5 and is statistically significant). In non-tabulated results we added *SBO bought late* as a control variable. The sample size is reduced but *SBO bought late* remains significant and none of the above results are affected. Hence, the late SBO effect complements the effect of complementarity of skills. Seller incremental PMEs are usually not significantly different from zero, suggesting that buyers capture the bulk of the value they add to the company. There is one exception: the incremental returns associated with a regional PE firm selling to a global one are even higher for the seller than for the buyer. This case of complementary skill sets is special, however: companies sold by a regional PE firm to a global one are likely to have been extremely successful, and seller returns should be mechanically higher in such transactions.

We have replicated the analysis of Table 3 using the difference in professional background between buyer and seller, and the difference in educational background between buyer and seller, in lieu of dummy variables (we do not report the results in the interest of space). We obtain similar results. Overall, our results suggest that the presence of complementary skills strongly contributes to value creation in SBOs.

5. Risk and investor welfare in SBOs

5.1. Are underperforming SBOs less risky?

A potential explanation for the underperformance of some SBOs (late SBOs, or SBOs between PE firms with no complementary skills) is that such transactions are less risky. Before examining this explanation empirically, we note that there is no generally accepted method of controlling for risk in the context of private equity. Conceptually, there is no consensus on what the right set of risk factors is, or on whether idiosyncratic risk should be taken into account. Empirically, for non-traded assets (such as private equity stakes) measuring risk is even more difficult because we do not observe a time-series of

market values. As a result of these difficulties, there are no standard approaches to correcting for risk in private equity research. For example, Hochberg and Rauh (2013) state that “precise measures of risk for [their] PE fund investment sample are not available and thus that differences in returns may in theory be due to differences in risk profiles of investments.” Another example is Cornelli et al. (2013) who use a dummy variable for “staged” investments as a measure of risk. In the context of LBOs, however, this measure would not be useful because deals are not staged.

It is plausible that some SBOs are less risky. For example, late SBOs might carry less risk if funds reaching the end of their investment period prefer to invest in safer transactions, for fear of endangering their track records, even if by doing so they sacrifice a higher upside. SBOs occurring between two similar parties can be less risky because the buyer understands better what the seller has done, and the transition is smoother as a result. It could also be that it is less risky to continue the seller’s strategy than to change strategies.

Table 4 shows four sets of risk estimates: (1) bankruptcy rate; (2) capital loss rate; (3) leverage; and (4) beta. We obtain betas by regressing IRR on the contemporaneous average stock-market returns as in Axelson et al. (2013b). The resulting slope can be interpreted as a proxy for the systematic risk for that group of investments (we label this measure “unconditional beta”). In addition, we run the same regression with IRR as a dependent variable but with our standard set of explanatory variables (as in Table 2, Specification 3) and add interaction effects between each of the dummy variables of interest (e.g., *SBO bought late*) and stock-market returns. We label the coefficient estimates on these interaction terms “conditional betas.”

Table 4

On each of these four dimensions of risk, we find that late SBOs are more, rather than less risky. Late SBOs have a 12% bankruptcy rate, which is three percentage points higher than that of other buyouts. Late SBOs have a higher propensity to lose capital (i.e., to have a multiple below one); their average

leverage ratio is two percentage points higher than that of other buyouts; and their conditional and unconditional betas are higher. We note that, overall, buyouts made early in the fund's life exhibit higher risk, which is consistent with what Barrot (2014) finds in venture capital.

We also perform two additional analyses. In a regression setting we find that late SBOs have a higher propensity to lose capital, when controlling for all of our standard control variables and adjusting for their average underperformance (see Appendix Table A.2). Second, liquidity can be an important dimension of risk in private equity. Late in a fund's investment period, and hence relatively close to the end of the fund's life, general partners might look for targets that are more likely to be exited quickly. If SBOs are indeed more likely to provide earlier exits, they might be more suitable investments for a fund late in its investment schedule. This higher liquidity of SBOs could carry a price and lead to lower returns. Our results in Appendix Table A.3 show that late SBOs are not held longer.

Similarly, SBO transactions between PE firms with complementary skill sets generally exhibit lower risk. The one exception involves transactions in which the buyer has a different educational background than the seller, for which some risk measures are higher. Overall, risk does not offer a satisfactory explanation of the performance patterns we uncover in SBOs.

5.2. Investor welfare in SBOs

The underperformance of certain groups of SBOs raises the question of whether limited partners would have been better off having the capital returned to them. The answer depends on what limited partners would have done with the money. Our results show that if limited partners had invested it in the average PE fund, they would have been better off. Alternatively, limited partners could have invested the returned capital in the stock market. Following the literature, we use the Standard and Poor's (S&P) 500 to proxy for the stock market and the Public Market Equivalent of Kaplan and Schoar (2005). In addition, we need to deduct fees from our gross-of-fees performance figures. To do so, we assume that management fees are equal to 20% of investment capital. Next, we deduct 20% carried interest on funds

that returned more than 1.084 (investments have an average duration of four years and 8% is the typical hurdle rate) after management fees are taken out. Table 5 shows that buyout transactions generate PMEs above one with figures that are virtually identical to those shown in the literature (Harris et al., 2014; Robinson and Sensoy, 2011), suggesting that our assumptions on fee structure are reasonable and our sample is representative.

Table 5

Late SBOs appear to be negative-NPV investments; their PME averages 0.88, i.e., late SBOs return \$0.88 on the dollar when an investment in the stock-market index would have returned \$1. For late SBOs to break even we would need to assume that fees are about at half the levels reported in the literature: management fees would have to be less than 1% of capital invested and carried interest less than 10%. As far as we know from both the literature and our discussion with practitioners, there are no funds charging such low fees. This underperformance result is thus robust to assumptions on the fee structure.

SBOs between PE firms *with* complementary skills generate positive NPVs for investors whereas SBOs between PE firms *without* complementary skills generate negative NPVs for investors. The apparent exception involves transactions in which a regional PE firm sells to a global PE firm. The discrepancy between this finding and the Table 3, Panel A result (which reports overperformance for such transactions) is due to the inclusion of industry-time fixed effects in the regression of Table 3. This means that the regional-to-global transactions tend to happen in boom times and compared to other transactions done in boom times the regional-to-global transactions have high returns.

5.3. Investor reaction to late SBO underperformance

Given our finding that late SBOs destroy value for investors, a natural question is whether investors penalize funds accordingly through a lower participation in the next fund raising round, effectively “voting with their feet.” We examine this conjecture in Table 6.

Table 6

We report regressions of the follow-on fund size on the fraction of capital invested in late SBOs, early SBOs, and late PBOs. (We cannot run this analysis for SBO transactions between PE firms without complementary skill sets because the sample size is too small, at less than 50 funds.) A higher fraction of capital invested in late SBOs is associated with a significantly lower follow-on fund size. The effect is large: an increase in the fraction of capital invested by the median fund in late SBOs from zero to 10% translates into an expected roughly 20% lower follow-on fund size, controlling for the size and the performance of the fund doing late SBOs, as well as vintage year fixed effects. Importantly, consistent with the results above, investors do not penalize funds for doing early SBOs.

The lower size of follow-on-funds of funds that did late SBOs has several possible interpretations. Perhaps general partners, realizing the difficulty of sourcing primary buyouts, choose to raise a smaller fund. Alternatively, dissatisfied investors penalize the private equity firm. Our data do not allow us to disentangle these demand and supply effects. If investor dissatisfaction caused the smaller size of follow-on funds, it could be because the fund failed to source good deals early on, leading investors to revise down their assessment of the general partner’s quality and reduce their demand for its funds. Or investors might penalize the fund because it destroyed value in late SBOs.

If investors impose a penalty on funds doing late SBOs, this raises the question of how general partners trade off reputational concerns against immediate financial advantage. One interpretation of our results is that the average general partner puts a low value on reputation relative to fees. Another interpretation is that general partners feel that forsaking capital itself entails a loss of reputation, as it amounts to an admission that they were not able to find valuable investment opportunities.

6. LP overlap in SBOs and its consequences for LPs

Limited partners in private equity funds are sometimes invested in both the buying fund and the selling fund of an SBO. This situation is known as “LP overlap” and has attracted much controversy, as expressed by *The Economist* on January 18, 2014, which noted, “Investors who back private-equity firms [...] are less than happy with the rise of secondaries. [...] They are in essence buying firms from themselves, with hefty transaction costs.” The perception that limited partners pay an extra layer of fees, since they end up owning the same asset after the SBO, is a common one. As a result, LP overlap is one of the most contentious issues surrounding secondary buyouts. It has been described as a “viral infection.”²

6.1. Transaction costs borne by limited partners in SBOs with LP overlap: an illustrative example

We first illustrate the transaction costs borne by LPs with an example. In October 2010, Green Equity Investors V bought Aspen Dental Management from Ares Corporate Opportunities Fund II in an SBO.

Table 7

Table 7, Panel A provides details of the Aspen transaction. CalPERS was a limited partner in both funds. CalPERS held a 7.5% stake in the buying fund and a 9.7% stake in the selling fund. Through its stake in the selling fund, CalPERS indirectly sold \$24 million of Aspen equity. Through its stake in the buying fund, CalPERS indirectly bought \$18.7 million of Aspen equity. For CalPERS, the gross transaction was the sum of its sale (\$24 million) and purchase (\$18.7 million) of equity in Aspen, a total of \$42.7 million. Since CalPERS was on both the buying and selling sides, the net Aspen transaction for CalPERS was the difference between the sale and the purchase, a reduction of its Aspen equity stake by

² Canderle (2011), Kindle Locations 2113-2114.

\$5.3 million. This discrepancy between the net transaction and the gross transaction is characteristic of SBOs with LP overlap and illustrates the main cause of the controversy surrounding SBOs, in that transaction fees paid in practice are a proportion of the gross transaction amount, not of the net transaction amount.

CalPERS paid fees on both sides of this transaction. From practitioner interviews that we conducted, we obtained the following estimates of transaction costs in buyouts: Financial advisory is a flat fee of \$2–4 million plus 1% of the enterprise value (i.e., debt value plus equity value) to be paid by both the buyer and the seller. Legal advisory amounts to \$1–3 million, also to be paid by both the buyer and the seller. The buyer needs to carry some additional due diligence, which tends to be a fixed cost of about \$1 million. Finally, the buyer needs to arrange loans with a bank (or a consortium of investors); the cost of this lending arrangement is typically 2% of the amount borrowed.

Applying these estimates of transaction fees to the Aspen SBO, we estimate the total buyer fees at \$15 million, and the total seller fees at \$10 million. Given CalPERS's stakes in the buying and selling funds, these estimates imply that its share of transaction costs in the Aspen SBO was about \$2.1 million (7.5% of \$15 million plus 9.7% of \$10 million). As a percentage of CalPERS's gross Aspen transaction, the fees paid by CalPERS amount to about 4.9% ($2.1/42.7$). But as a percentage of CalPERS's net Aspen transaction, its fees are a staggering 40% ($2.1/5.3$).

CalPERS was not the only limited partner on both sides of the Aspen Dental SBO. Pitchbook reports eight other limited partners in the same situation. Table 7, Panel B reports the estimated transaction fees paid by each, as well as their net transaction. As a percentage of their net transaction, the transaction fees paid by limited partners with LP overlap in Aspen range from 6% to 66%, with a median of 10% and a mean of 22%. On this evidence, it would seem that the worries often expressed by LPs about LP overlap in SBOs are justified: those limited partners subject to LP overlap in SBOs pay two rounds of transaction fees, and transaction fees are large relative to the net transaction.

6.2. The counterfactual: what transaction costs would limited partners have borne in alternative transactions?

The evidence above begs the question: would transaction costs have been lower if the GP had not bought an SBO with LP overlap? In practice, GPs almost never return capital to LPs. If we take this fact as given, there were only two possible alternatives to the SBO with LP overlap:

(1) Ares (the selling fund) keeps its stake in Aspen instead of selling it.

(2) Ares sells its stake in other forms of exits.

Case (1): if Ares refrains from selling Aspen, CalPERS saves on the transaction costs of the exit. Note, however, that these savings are only temporary. Ares, like almost all private equity funds, is structured as a finite-life entity, and will eventually sell its Aspen stake. At that time, CalPERS will pay the transaction cost on the sale.

If Ares keeps its stake in Aspen instead of selling it to Green Equity, CalPERS also saves the transaction cost it would pay as an investor in the buying fund, Green Equity. But eventually, at some point before the end of its investment period, Green has to invest the capital that it did not invest in Aspen. When that happens, CalPERS will have to pay the buying fund's transaction costs.

Ultimately, if Ares keeps its stake in Aspen, CalPERS has not really saved on transaction costs: it has only postponed them.

Case (2): if Ares sells its stake in Aspen through a different transaction than an SBO with LP overlap, CalPERS does not save on the exit transaction costs relative to the Aspen SBO. Whether the exit is through a trade sale, an IPO, or an SBO with no LP overlap, Ares pays the transaction costs of selling, and CalPERS bears its share of them.

In this scenario, CalPERS does not pay transaction costs on the buying side. However, just as in case (1), Green will eventually invest its capital in some other target company, and CalPERS will have to pay the buyer's transaction cost on that purchase.

Thus, if we assume that GPs never return capital to investors, an SBO with LP overlap does not generate extra transaction costs for the limited partners involved. Alternative transactions only lead to a temporary postponement of the transaction costs. Regardless of the type of transaction chosen, for any portfolio company that a fund invests in, a limited partner pays two rounds of transaction costs: one at entry and one at exit.

Our assumption that GPs never return capital to investors is borne out in practice. However, the fact that GPs never return capital to investors is unlikely to be value-maximizing for LPs: it might well result from GPs' incentives to burn money. In our view, the reason why LPs are uneasy about SBOs with LP overlap is that two salient features of such deals expose GPs' reluctance to return capital: the simultaneity of entry and exit costs, and the fact that the LP ends up owning the same asset after the SBO. Ultimately, whether SBOs with LP overlap hurt investors hinges on the performance of those transactions.

6.3. LP overlap in SBOs as an opportunity for LPs

The eventuality of LP overlap is relevant for LPs when they decide on which PE funds to commit to. Consider an LP investing in two PE funds that start simultaneously. Suppose that Fund 1 invests in a portfolio company, and after five years sells it to Fund 2, which sells it five years later. In this situation, over ten years, the LP continues to hold the same portfolio company. This hypothetical situation is not unrealistic: in the case of Aspen, CalPERS's net transaction (the absolute value of the difference between the equity stakes indirectly bought and sold by CalPERS in the SBO) was only about 12% of its gross transaction (the sum of the equity stakes indirectly bought and sold by CalPERS in the SBO). It would have been 100% in the absence of LP overlap.

If the SBO brings no value to the company under this scenario, the LP pays two roundtrip transaction costs for nothing. If, however, the SBO is value-increasing, the LP gains. Interestingly, LPs can stack

the deck in their favor by investing in funds with complementary skills, which are likelier to generate value should they engage in SBOs with each other. Thus, the eventuality of SBOs with LP overlap gives LPs an opportunity to optimize their choice of funds and increase expected returns.³ Whether LPs take advantage of this opportunity is an empirical question.

Our discussion gives rise to alternative predictions for the performance of SBOs with LP overlap. If LPs' suspicion of SBOs with LP overlap is justified and such transactions reflect GPs' desire to burn money, we would expect lower returns for SBOs with LP overlap than for SBOs without LP overlap. If GPs are not aware of the LP overlap in an SBO transaction, we would expect the same performance for SBOs with LP overlap as for SBOs without LP overlap. If LPs foresee the eventuality of LP overlap and invest in PE funds with complementary skills, we expect higher returns for SBOs with LP overlap than for SBOs without LP overlap.

Unfortunately, data limitations do not allow us to examine these predictions empirically. The intersection of our Private Placement Memorandum data and of our LP overlap data is very small. Moreover, we only have data on LP allocations for public pension funds and insurance companies, so that we might incorrectly code some SBOs as having no LP overlap when in fact they do have LP overlap. Nor can we observe whether a GP is aware of LP overlap when considering an SBO transaction. How LPs decide on their PE fund allocation is a broad question that goes beyond the scope of this paper, but would be an interesting topic for future research.

6.4. The extent of LP overlap in SBOs

³ We thank the referee for suggesting this point to us.

Large institutional investors often have stakes in many private equity funds (Sensoy et al., 2014) and they are potentially subject to LP overlap. To assess the likelihood of LP overlap in SBOs, we obtain LP commitment information for companies involved in 114 SBOs from the Pitchbook database. For these deals we either know the equity portion, or infer it by assuming an equity portion of 40% (the median equity percentage in the SBOs for which we know the equity portion). Of these 114 SBOs, 76 SBOs had no LP overlap and 38 had LP overlap. We count 107 cases of LP-deals (involving 50 unique LPs) involved in SBOs with some LP overlap. We measure the extent of LP overlap by calculating the number of SBOs in which the limited partner is invested in both the buying and the selling side, divided by the number of SBOs in which the limited partner is invested in the selling side: this “LP overlap ratio” represents the probability of LP overlap, conditional on the limited partner being on the selling side of an SBO.

Fig. 2 reports the distribution of the LP overlap ratio broken down by the number of limited partners’ private equity commitments. Limited partners invested in few funds mechanically have zero or low LP overlap ratios. For limited partners invested in more than 20 funds, we find a median LP overlap ratio of 17%. While the claims of an LP overlap “viral infection” are overstated, LP overlap occurs with significant frequency for large private equity investors.

Figure 2

7. Conclusion

SBOs have become a large share of private equity transactions. The growth of SBOs has given rise to three major questions: (1) are SBOs money-burning devices for general partners reaching their deadline for investing committed capital? (2) what value can a new private equity owner add that the previous private equity owner has not already added? (3) when limited partners are invested in both the buying side and the selling side of an SBO, do they pay an extra layer of transaction costs?

We construct several unique data sets to investigate these questions. We find that on average, SBOs made close to the investment deadline underperform, are riskier, and destroy value for investors. Investors appear to penalize PE firms that make late SBOs: the follow-on-funds of funds that participate in late SBOs are markedly smaller.

We uncover an important source of value creation in SBOs: complementary skill sets between the buyer and the seller. SBOs perform better, and create value for investors, when they occur between a PE firm focusing on margin growth and a PE firm focusing on sales growth, or between two PE firms in which the general partners have different educational backgrounds or career paths. SBOs also create value when a global fund buys from a regional fund.

Finally, assuming that GPs never return capital to investors, we show that even when a limited partner is on both sides of an SBO, the transaction does not generate extra transaction costs for investors, contrary to a widespread view. Yet the eventuality of LP overlap is relevant for investors: by investing in funds with complementary skills, LPs stand to gain more from their PE investments, should they find themselves on both sides of an SBO transaction.

While our results on complementary skills indicate that the potential for value creation in SBOs is real, our results on money burning suggest that the finite investment period of PE funds has negative consequences for PE investors, begging the question of why PE funds are structured as finite-life entities. Historically, the first private equity funds were organized as closed-end funds. This structure was largely abandoned in favor of finite-life limited partnerships in the 1970s (Lerner and Schoar, 2004). Axelson et al. (2009) show some benefits of PE fund institutional features. Our results reveal some costs.

It is tempting to speculate on whether changes to standard PE contractual arrangements—for example, contractual caps on the percentage of a fund that a general partner can invest in late SBOs—might improve limited partners' welfare. A detailed discussion of whether such caps would result in a

superior contract overall is beyond the scope of this paper. We note a possible cost of caps on late SBOs: they would needlessly penalize funds raised just before market conditions worsen and investment opportunities dry up (funds in “lost vintages”). Caps might also be unnecessary, as investors appear to penalize PE firms that engage in late SBOs by reducing their participation in future fund raisings by the same PE firm. Overall, our findings paint a nuanced picture of SBOs.

Appendix A. Variable description

Background is finance-oriented: More than 50% of general partners in a PE firm have worked in finance or accounting.

Background is MBA-oriented: PE firm has a higher percentage of general partners with an MBA degree than the average PE firm.

Buyer (seller) has a different professional background than seller (buyer): Buyer (seller) background is finance-oriented and seller (buyer) background is MBA-oriented, or vice versa.

Buyer/Seller experience: (Natural logarithm of the) number of investments made by the PE firm as of the focal investment inception date.

Buyer/Seller portfolio concentration: Value-weighted Herfindhal index based on the 48 Fama-French industries of the investments held by the PE firm at the same time as the focal investment.

Buyer/Seller scale (NIP): (Natural logarithm of the) number of investments held by the PE firm at the same time as the focal investment. This variable is called Number of Investments held in Parallel (NIP) in Lopez-de-Silanes et al. (2015).

Company country fixed effects: Fixed effects based on the country of the investment's location. The information sources for the country of the investment are the PPM (34%), the websites of PE firms (30%), the Thomson database (33%), and the Capital IQ database (3%).

Duration: Number of years between the investment initiation date and the investment (final) exit.

Excess cash: We fit the fraction of committed capital spent as a quadratic function of fund age in our sample of funds. Excess cash is the difference between the cash left to be spent by the fund at the time of investment inception and the "fitted" amount of cash left to be spent for a fund of that age. The average speed of cash spending in our data set is similar to that in other data sets (e.g., Robinson and Sensoy, 2011).

Fund age: Number of years between investment inception date and date of the first investment.

Fund birth quarter fixed effects: Fixed effects based on the quarter when the fund made its first investment.

Fund country fixed effects: Fixed effects based on the country in which a fund is located.

Fund size: Sum of investment size across fund investments.

Investment: An investment includes all "add-on" acquisitions and divestments made by the company while held by the PE firm. Debt-only and public equity investments are excluded.

Investment size: Total cash invested by the fund into the focal investment, converted into 2010 US dollars. It should in principle include any cash transfers from the fund to the portfolio company, including loans.

IRR: Internal rate of return. If missing, it is interpolated by $\text{Multiple}^{(1/\text{duration})}-1$. This calculation is from the fund perspective and thus is gross of fees, is computed in the currency originally used in the PPM to report performance, and should in principle include any cash transfers from the fund to/from the portfolio company, including loans.

Margin (sales) grower: A margin (sales) grower is defined as a PE firm whose normalized average margin (sales) growth rate of its portfolio companies is higher than its normalized average sales (margin) growth rate. The margin (sales) growth rate is defined as the time-series average of margin (sales) growth of the portfolio company subtracted by the cross-sectional average margin (sales) growth and divided by the standard deviation (of the time-series average across all PE firms). The margin (sales) growth rate of a portfolio company is the change in EBITDA (sales) from year $t-1$ to year $t+3$, where t is the year of the LBO. Source: Capital IQ.

Multiple: Ratio of total cash received from the investment plus its current valuation (if partially liquidated) to the total cash invested. This calculation is from the fund perspective and thus is gross of fees, is computed in the currency originally used in the PPM to report performance, and should in principle include any cash transfers from the fund to/from the portfolio company, including loans.

PE firm: Private equity firm, defined as any organization that undertakes buyout investments via funds that it advises. Firms that specialize in other private equity assets such as venture capital, timber, infrastructure, land, real estate, or mezzanine are excluded.

PME: Public market equivalent. The ratio of the present value of dividends to the present value of the amount invested. To calculate this measure, we assume that the full amount of the investment is made at the investment initiation date and that all of the distributions take place at the (final) exit date. To discount the cash flows, we use the Center for Research in Security Prices (CRSP) equally weighted return series. The cash flows are taken from the fund perspective and thus is gross of fees, and is computed in the currency originally used in the PPM to report performance. It should in principle include any cash transfers from the fund to/from the portfolio company, including loans.

Regional (Global) PE firm: A PE firm investing in companies located in up to two (more than two) different countries before the SBO.

Relative investment size: Investment size divided by fund size.

SBO, SBO/PBO bought late (early): Secondary buyout is defined in Appendix B. A secondary or primary buyout is late (early) if it is made when the fund is older (younger) than 2.5 years.

Year X industry fixed effects: Fixed effects based on both the year of investment inception and the industry of the investment. The industries are manually assigned to one of the 48 Fama-French industry classifications using their Standard Industry Classification (SIC) codes or their would-be SIC codes (based on the information in siccode.com).

Appendix B. Definition of a secondary buyout

A secondary buyout (SBO) is a transaction in which a private equity (PE) firm or a group of private equity firms sell (in total) the majority of the shares of a company to another private equity firm or group of private equity firms. This definition means that the following type of transactions that commercial databases often list as SBOs are excluded from our sample:

Trade sale to a PE-owned company: A PE firm sells its portfolio company to the portfolio company of a PE-owned company. We classify such deals as a trade sale. For example, in April 2007, the PE firms American Capital, Caterton Partners, and KRG Capital Partners sold their portfolio company Case Logic to Thule, a Swedish manufacturer of load carriers for cars. Pitchbook, for instance, categorizes this deal as an SBO, because the PE firm Candover owned Thule at the time of the deal. In contrast, we categorize this deal as a trade sale. In May 2007, Candover subsequently sold Thule to Nordic Capital. This deal constitutes a majority transaction of a portfolio company between two PE firms. Hence, we label that deal an SBO.

Similarly, the PE firm Riverside bought FLA Orthopedics from the PE firm Canaan Partners in April 2004. In 2007, Riverside sold FLA Orthopedics to BSN Medical, which is owned by the PE firm Montagu. Pitchbook defines both deals as SBOs. In contrast, we define the first deal as an SBO and the second one as a trade sale.

IPO then Secondary: If a PE firm partially exits its portfolio company via an IPO and the remaining shares are sold to a PE firm, then we consider the transaction an SBO if the stake sold post-IPO is a majority stake. For example, the PE firm JL Partners took Builder First Source public in June 2005. Pitchbook, for instance, states that Builder First Source was exited via an IPO. However, JL Partners kept a 52% majority stake, which it sold in February 2006, after the expiration of the lockup period, to Warburg Pincus Equity. We thus label this deal an SBO.

Secondary block: Transactions in which a PE firm buys a minority stake of a portfolio company from another PE firm are not considered SBOs. For example, the PE firm Triton sold 20% of Tetra GmbH to AXA Private Equity. Another example is the transaction of Segur Iberia, a Spanish company specializing in guarding services and alarm systems. The PE firm Corpin Capital went with N+1 Private Equity in a club deal to buy Segur Iberia from the PE firm 3i. In a follow-up deal, Corpin Capital bought the minority stake of N+1 Private Equity. Here, a minority block was sold, and the buyer was already invested in the company. Pitchbook categorized this transaction as an SBO but we do not.

Appendix C. PPM data

We assembled the data by collecting fund-raising prospectuses, usually referred to as private placement memorandums (PPMs). PPMs contain the performance and characteristics of all prior investments made by the firm. Private equity (PE) firms are organizations that manage private equity funds. A firm can have several funds running at any point in time. Funds have a finite lifetime lasting 10 to 14 years. The typical firm launches a new fund every two to four years. When a firm raises a new fund, it gives a fund-raising prospectus to potential investors. Investors commit capital at fund inception and cannot add or withdraw capital during the fund's life. Several investors gave us access to their prospectuses, under signed confidentiality agreements which bar us from disclosing information about the identity of the PE firms or their investments.

Lopez de Silanes et al. (forthcoming) use the same dataset and show that this dataset has similar coverage overall as the two most comprehensive publicly available PE datasets: Capital IQ and Thomson Reuters. Although these commercial databases keep track of the industry, country, and initiation date of the investments, they do not contain the performance information available for our sample. Yet, given the nature of our data source, our coverage is much better before 2000 than it is for more recent years.

There could be a concern that some PE firms show a selected track record but do not say so. To assess this potential problem, we first went to the databases of Thomson and Capital IQ and verified that all the investments reported for each of our PE firms in those databases were also in our dataset. We find it to be the case. Second, we read the legal disclaimers of our PPMs. The typical PPM disclaimer states that the fund has "taken all reasonable care to ensure that the facts stated in the Memorandum are true and accurate in all material respects and there are no other facts, the omission of which would make misleading any statement in the Memoranda, whether of fact or of opinion. The General Partner accepts responsibility accordingly." Typically, the firm is only exempted from liability for estimates of economic trends, projected performance, forward-looking statements, and economic and market information prepared by third parties. Third, we mentioned this concern to the investors who provided us with the PPM and to industry lawyers. They dismissed our concern, arguing that the legal disclaimer limiting the responsibility of the firm applies in practice only to forecasts and that a PE firm misrepresenting its past investment record could be sued. They also pointed out to us that, unlike hedge fund investors, PE investors know the investments made by the firm because investors are asked to provide capital for each investment separately and they receive audited annual reports containing the list of investments. Finally, they argued that new investors generally ask old investors about their experience with the PE firm. In these circumstances, excluding past investments from the PPM could cause great damage to the firm.

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Table 1

Characteristics of primary versus secondary buyouts.

This table compares the characteristics of the sample of primary buyouts (PBOs) to that of the sample of secondary buyouts (SBOs). The sample is constructed from Private Placement Memorandums (PPMs) received by a group of potential investors (see Appendix C for details). PBOs are investments in companies purchased from an entity other than a private equity fund (e.g. family, conglomerate); SBOs are buyout investments that are not PBOs (i.e. includes tertiary). Panel A shows the percentage of investments (equally weighted) that are exited via IPO, trade sale, bankruptcy, secondary buyout (SBO), and other routes (e.g. sale to management). Panel B shows the median and mean performance in each sample broken down by exit route. Multiple is the total amount received by the fund divided by total amount invested by the fund. The other two performance measures are the Public Market Equivalent (PME) and the Internal Rate of Return (IRR). Panel C compares the mean of several variables in the two samples. The sample is restricted to investments for which we know the exit route, and it is further restricted to those for which we know performance when we compute performance statistics. Variable definitions are listed in Appendix A. ^a significant at 1%; ^b significant at 5%; ^c significant at 10%.

Panel A: Comparing exit status

	<i>Entry channel</i>		Difference	z-Stat
	PBOs	SBOs		
<i>Exit route</i>				
IPO	0.21	0.08	0.12 ^c	1.82
Trade sale	0.38	0.27	0.11 ^b	2.41
Bankruptcy	0.18	0.19	-0.01	-0.25
SBO	0.20	0.43	-0.23 ^a	-6.63
Other exit route	0.03	0.03	0.00	-0.02

Panel B: Descriptive statistics on performance

	Number of observations	Median			Mean		
		Multiple	PME	IRR	Multiple	PME	IRR
<i>Primary Buyout (PBO)</i>							
<i>Exit routes</i>							
IPO	900	3.24	1.91	0.43	4.09	2.68	0.72
Trade sale	1650	2.42	1.49	0.33	3.00	1.92	0.53
Bankruptcy	793	0.00	0.00	-1.00	0.32	0.21	-0.77
SBO	874	2.65	1.47	0.31	3.15	1.89	0.46
Other exit routes	109	2.09	1.13	0.22	2.62	1.55	0.23
All observations	4326	2.20	1.29	0.27	2.76	1.75	0.31
<i>Secondary Buyout (SBO)</i>							
<i>Exit routes</i>							
IPO	35	2.61	2.00	0.36	3.62	2.53	0.44
Trade sale	113	2.30	1.63	0.30	2.72	1.97	0.46
Bankruptcy	82	0.00	0.00	-1.00	0.15	0.12	-0.83
SBO	180	2.57	1.51	0.28	2.85	1.84	0.35
Other exit routes	11	2.00	1.14	0.24	2.52	1.24	0.22
All observations	421	2.03	1.25	0.22	2.34	1.58	0.15

Panel C: Comparing SBO and PBO mean characteristics

	Entry channel		Difference	t-Stat
	PBOs	SBOs		
Home run (Multiple > 3)	0.35	0.24	0.10 ^a	4.31
Losses (Multiple < 1)	0.26	0.26	-0.00	-0.10
Duration	4.38	4.41	-0.03	-0.27
Investment Size (\$ million)	49.53	70.34	-20.82 ^a	-5.59
Leverage	0.66	0.67	-0.00	-0.52
Stock-market Return (annual)	0.16	0.13	0.03 ^a	6.81
Buyer Portfolio Concentration	0.18	0.17	0.02 ^a	2.59
Buyer Scale (NIP)	37.18	34.85	2.33	1.06
Buyer Experience (\$ billion)	1.66	2.64	-0.98 ^a	-5.43

Table 2

Performance of secondary buyouts and buyer fund characteristics.

This table shows the estimates of ordinary least squares (OLS) regressions. Dependent variable is the buyer's Public Market Equivalent (PME). A buyout is bought late (*early*) if it is made when the fund is older (*younger*) than 2.5 years. The sample is restricted to transactions for which we know the performance of all the transactions made by the fund. Other control variables are: investment size, club deal, buyer portfolio concentration, scale and experience. See Appendix A for variable definitions and Appendix C for sample details. *t*-Statistics reported in italics below each coefficient are based on standard errors clustered by both investment inception year and private equity firms.

	Spec 1	Spec 2	Spec 3	Spec 4	Spec 5	Spec 6	Spec 7
SBO bought late	-0.36 ^a	-0.52 ^a	-0.47 ^a	-0.41 ^a	-0.42 ^a	-0.40 ^a	-0.37 ^b
	-2.96	-3.78	-3.35	-2.90	-2.88	-2.77	-2.51
SBO bought early				-0.07	-0.08	-0.07	-0.07
				-0.47	-0.53	-0.50	-0.44
PBO bought late				0.32 ^a	0.28 ^a	0.29 ^a	0.28 ^a
				4.13	3.05	3.09	3.04
PBO bought late by a fund					-0.27 ^c	-0.31 ^c	-0.25
that bought at least one SBO late					-1.67	-1.86	-1.54
PBO bought late by a fund					0.42 ^b	0.44 ^b	0.41 ^b
that bought at least one SBO early					2.17	2.27	2.13
Excess cash						0.07	
						0.30	
SBO bought late						-1.17 ^c	
* Excess cash						-1.83	
SBO bought early						0.11	
* Excess cash						0.18	
PBO bought late						0.26	
* Excess cash						0.60	
Relative investment Size							0.09
							0.78
SBO bought late							-0.51 ^b
* Relative investment size							-2.08
SBO bought early							-0.26
* Relative investment size							-0.95
PBO bought late							-0.33 ^c
* Relative investment size							-1.82
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects:							
Buyer firm	No	No	Yes	No	No	No	No
Fund birth quarter	No	Yes	Yes	Yes	Yes	Yes	Yes
Fund country	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Company country	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Year x Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted <i>R</i> -square	4.76	7.18	8.83	7.71	7.80	7.76	7.83
Number of observations	3471	3471	3471	3471	3471	3471	3471

^a significant at 1%; ^b significant at 5%; ^c significant at 10%.

Table 3

Performance of secondary buyouts and differences in buyer-seller characteristics.

This table reports estimates of OLS regressions. The dependent variable is the buyer's Public Market Equivalent (PME) in Panel A; and the dependent variable is the seller's Public Market Equivalent (PME) in Panel B. The sample is restricted to SBO transactions for which we know the characteristics of both the buying and selling funds. Other control variables are: investment size; club deal; buyer portfolio concentration, scale and experience; seller portfolio concentration, scale and experience. Fixed effects include company country and industry, and the transaction year. See Appendix A for variable definitions and Appendix C for sample details. Robust *t*-statistics are reported in italics below each coefficient.

Panel A: Buyer returns

	Spec 1	Spec 2	Spec 3	Spec 4	Spec 5	Spec 6	Spec 7	Spec 8	Spec 9
Regional PE firm sells to Global PE firm	0.85 ^a				0.61 ^b				1.54 ^a
	2.75				2.31				4.12
Buyer is a Global PE firm	-0.05 ^a				0.00				0.00
	-2.93				-0.12				0.11
Seller is a Global PE firm	-0.01				-0.03				0.03 ^c
	-0.38				-1.13				1.74
'Margin grower' trades with a 'Sales grower'		0.46 ^a				0.61 ^a			0.80 ^a
		3.37				2.80			4.03
Buyer is a 'Margin grower'		-0.69 ^a				-0.29			-0.07
		-3.41				-1.12			-0.26
Seller is a 'Margin grower'		-0.27				-0.09			0.27
		-1.42				-0.43			1.17
Buyer has a different professional background than seller			0.59 ^a				0.55 ^a		0.98 ^a
			3.06				2.69		5.39
Buyer's professional background is Finance-oriented			-0.03				0.15		0.23
			-0.17				0.73		1.07
Seller's professional background is Finance-oriented			0.15				0.15		0.71 ^a
			0.74				0.77		3.63
Buyer has a different educational background than seller				0.63 ^a				0.47 ^b	-0.01
				2.84				2.28	-0.05
Buyer's educational background is MBA-oriented				-0.30 ^c				-0.25	-0.82 ^a
				-1.65				-1.25	-3.12
Seller's educational background is MBA-oriented				-0.65 ^a				-0.75 ^a	-0.49 ^c
				-2.80				-3.11	-1.85
All fixed effects included?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All other buyer and seller characteristics included?	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Adjusted R-square	9.37	28.80	9.37	6.29	19.08	37.08	30.41	24.31	47.65

Number of observations	149	151	166	172	149	95	120	125	81
^a significant at 1%; ^b significant at 5%; ^c significant at 10%.									
<i>Panel B: Seller returns</i>									
	Spec 1	Spec 2	Spec 3	Spec 4	Spec 5	Spec 6	Spec 7	Spec 8	Spec 9
Regional PE firm sells to Global PE firm	1.25 ^b				1.23 ^b				2.58 ^a
	2.35				2.54				3.18
Buyer is a Global PE firm	-0.02				0.03				0.14 ^a
	-0.68				0.90				4.05
Seller is a Global PE firm	0.02				0.03				0.04 ^c
	0.81				0.86				1.90
‘Margin grower’ trades with a ‘Sales grower’		-0.84				0.12			0.24
		-0.25				0.39			0.81
Buyer is a ‘Margin grower’		4.49				-0.71 ^c			-1.58 ^a
		0.98				-1.87			-3.07
Seller is a ‘Margin grower’		3.57				-0.05			-0.12
		0.91				-0.13			-0.40
Buyer has a different professional background than seller			-0.27				-0.05		-0.34
			-0.11				-0.13		-1.22
Buyer’s professional background is Finance-oriented			2.34				0.64 ^c		0.87 ^a
			0.79				1.67		2.59
Seller’s professional background is Finance-oriented			-1.24				0.35		0.93 ^a
			-0.38				1.13		3.12
Buyer has a different educational background than seller				0.65				-0.25	-0.66
				0.23				-0.52	-1.22
Buyer’s educational background is MBA-oriented				4.84 ^c				-0.37	-0.54
				1.67				-0.84	-1.15
Seller’s educational background is MBA-oriented				-7.04 ^b				-0.89 ^c	-0.38
				-2.01				-1.78	-0.83
All fixed effects included?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

All other buyer and seller characteristics included?	No	No	No	No	Yes	Yes	Yes	Yes	No
Adjusted <i>R</i> -square	5.96	-7.39	10.70	13.87	19.25	17.05	8.45	10.51	41.13
Number of observations	149	151	166	172	128	81	101	105	81

^a significant at 1%; ^b significant at 5%; ^c significant at 10%.

Table 4

Risk of different types of PBOs and SBOs.

This table shows statistics pertaining to risk measures: i) the fraction of the investments that are bankrupt; ii) the fraction of the investments that result in a capital loss; iii) leverage (debt divided by total enterprise value); iv) a conditional and unconditional estimate of Beta. See Appendix A for variable definitions and Appendix C for sample details.

	Probability of		Leverage	Beta	
	bankruptcy	capital loss		Unconditional	Conditional
SBO bought late	12%	28%	65%	1.67	1.85
SBO bought early	10%	20%	67%	2.34	2.41
PBO bought early	10%	27%	64%	1.49	1.47
PBO bought late	8%	22%	62%	1.42	1.41
SBO bought late <i>Minus</i> Other buyouts	3%	3%	2%	0.15	0.36
Regional PE firm sells to Global PE firm	18%	27%	75%	2.05	1.51
Not a regional PE firm selling to a Global PE firm	13%	26%	71%	1.93	1.86
‘Margin grower’ trades with a ‘Sales grower’	12%	20%	70%	1.89	1.89
‘Margin grower’ <i>does not</i> trade with a ‘Sales grower’	13%	28%	68%	2.74	2.76
Buyer has a different professional background than seller	7%	21%	70%	0.79	0.81
Buyer has the same professional background as seller	18%	29%	70%	2.61	2.69
Buyer has a different educational background than seller	0%	8%	67%	2.03	2.05
Buyer has the same educational background as seller	20%	36%	73%	1.52	1.74

Table 5

NPV of different types of PBOs and SBOs.

This table shows statistics pertaining to investors' aggregate performance for different types of SBOs. To calculate the aggregate PME net of fees we assume a total management fee of 20% of invested capital for each investment. We assume that funds that returned, after management fees are deducted, more than $(1.08)^4$ were in the money and deducted 20% carried interest all the investments of these funds. 8% is the usual hurdle rate and four years is the average duration of a transaction. See Appendix A for variable definitions and Appendix C for sample details.

	Number of observations	Multiple	PME gross- of- fees	PME net- of- fees
SBO bought late	84	1.67	1.14	0.88
SBO bought early	148	2.14	1.30	0.98
PBO bought early	2312	2.56	1.50	1.11
PBO bought late	927	2.79	1.78	1.31
SBO bought late <i>Minus</i> Other buyouts	--	-0.92	-0.43	-0.27
Regional PE firm sells to Global PE firm	22	1.51	0.88	0.80
Not a regional PE firm selling to a Global PE firm	127	2.17	1.47	1.17
'Margin grower' trades with a 'Sales grower'	75	2.28	1.56	1.21
'Margin grower' <i>does not</i> trade with a 'Sales grower'	76	1.83	1.15	0.95
Buyer has a different professional background than seller	87	2.45	1.61	1.26
Buyer has the same professional background as seller	79	1.61	1.14	0.93
Buyer has a different educational background than seller	66	2.77	1.94	1.57
Buyer has a the same educational background as seller	106	1.63	1.05	0.82

Table 6

SBOs bought late and follow-up fund size.

This table reports estimates of OLS regressions. Funds are the unit of observation. The dependent variable is the natural logarithm of the follow-on fund size. Explanatory variables are the fraction of the fund size invested in different types of buyout investments, fund size and fund performance. Standard errors are clustered by follow-on fund vintage year. Data on Fund size and cash multiple is from Preqin. When cash multiple is missing in Preqin (25% of the observations) we compute the gross-of-fees cash multiple with our data and calculate the net-of-fees cash multiple like in Table 5. See Appendix A for variable definitions and Appendix C for sample details.

Dependent variable: Natural logarithm of follow-on fund size		
	Spec 1	Spec 2
Fraction invested in 'SBOs bought late' by focal fund	-2.07 ^a -2.68	-2.01 ^a -2.65
Fraction invested in 'SBOs bought early' by focal fund	0.22 0.34	0.12 0.20
Fraction invested in 'PBOs bought late' by focal fund	0.93 ^a 2.66	0.91 ^b 2.57
Natural logarithm of Focal Fund Size	0.73 ^a 15.10	0.73 ^a 15.22
Natural logarithm of Focal Fund Cash Multiple		0.20 ^b 2.28
Vintage year fixed effects	Yes	Yes
Adj. R-square	69.57	69.92
Number of observations	207	207

^a significant at 1%; ^b significant at 5%.

Table 7

An example of LP overlap: Aspen Dental.

We use data from Pitchbook and Moody's, except for italicized numbers, which we obtained from Capital IQ or assumed based on conversations with practitioners. Bold numbers are derived from data. Numbers are in millions of US dollars. Transaction costs are based on a transaction value of \$547.5 million and a loan of \$200 million. Panel A derives the transactions costs for CalPERS and Panel B summarizes the transaction costs for the nine limited partners that are on both sides of the Aspen Dental Management SBO (i.e. overlap).

Panel A: Transaction costs paid by CalPERS (\$ million)

	Green Equity Investors V	Ares Corporate Opportunities Fund II
Role in SBO	Buyer	Seller
Fund size	5300	2065
CalPERS' fund commitment	400	200
CalPERS' fund percentage stakes	7.5%	9.7%
<i>Equity values:</i>		
Funds' pre-SBO equity stake in Aspen	0.0	347.5
CalPERS' pre-SBO equity stake in Aspen	0.0	33.7
Funds' post-SBO equity stake in Aspen	247.5	100.0
CalPERS' post-SBO equity stake in Aspen	18.7	9.7
<i>Transaction costs:</i>		
Financial advisory	8.0	8.0
Legal advisory	2.0	2.0
Various due diligence reports	1.0	0.0
Loan fees	4.0	0.0
Total transaction costs	15.0	10.0
Transaction costs (indirectly) paid by CalPERS	1.1	1.0

Panel B: Relative transaction costs for overlapping LPs in Aspen Dental SBO (\$ million)

	Transaction cost (1)	Net transaction (2)	Relative transaction cost (1)/(2)
CalPERS	2.1	5.3	40%
State of Wisconsin Investment Board	0.5	1.3	40%
New York State Teachers' Retirement System	0.5	4.3	12%
New York State Common Retirement Fund	0.7	8.5	8%
State Teachers Retirement System of Ohio	0.7	12.0	6%
Variable Annuity Life Insurance Company	0.1	1.0	10%
Western National Life Insurance Company	0.1	1.0	10%
Michigan Department of Treasury	1.3	2.0	66%
Princess Private Equity	0.1	1.9	7%

Mean	22%
Median	10%

Fig. 1. Percentage of SBOs among exits per year. This figure shows the fraction of buyout investments that are exited via a secondary buyout transaction in a given year (source: Pitchbook). Other exits routes include IPOs, trade sales and bankruptcies.

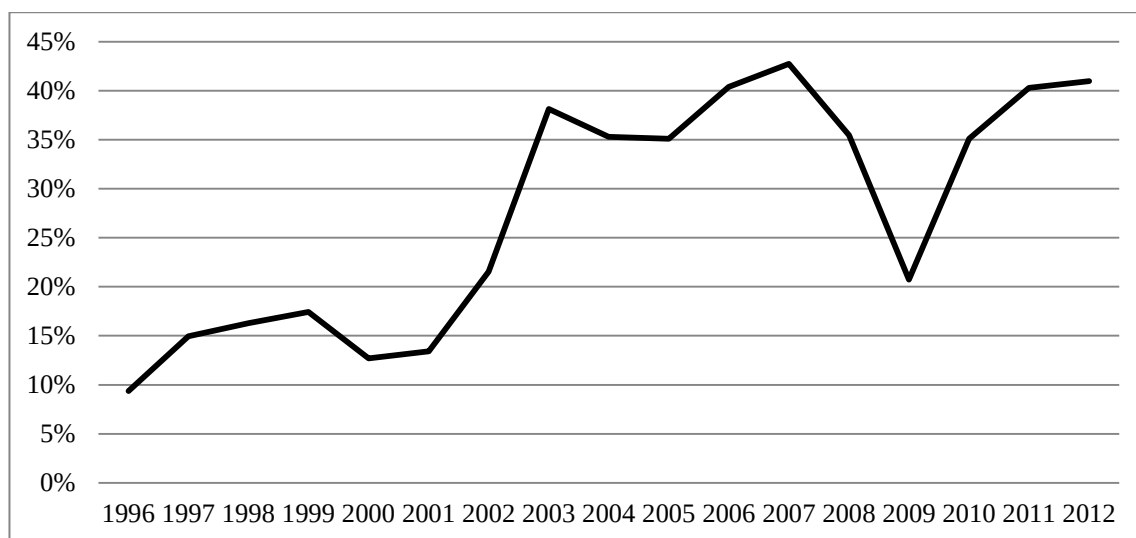


Fig. 2. Box plot of LP overlap ratio vs. number of funds held by limited partners. The overlap ratio is defined as the number of SBOs in which the limited partner (LP) was invested in both the buying fund and the selling fund, divided by the number of SBOs in which the LP was invested in the selling fund. The LPs are all U.S. pension funds and insurance companies listed by Pitchbook as having been involved in at least one SBO for which Pitchbook could identify the selling fund and the buying fund. Boxes in the plot are bordered at the 25th and 75th percentiles, with a median line at the 50th percentile. Whiskers extend from the box to the upper and lower adjacent values and are capped with an adjacent line. The upper adjacent value is the largest observation that is less than or equal to third quartile plus $1.5 \times$ interquartile range. The lower adjacent value is the smallest observation that is greater than or equal to first quartile minus $1.5 \times$ interquartile range. The circles are values above the upper adjacent value.

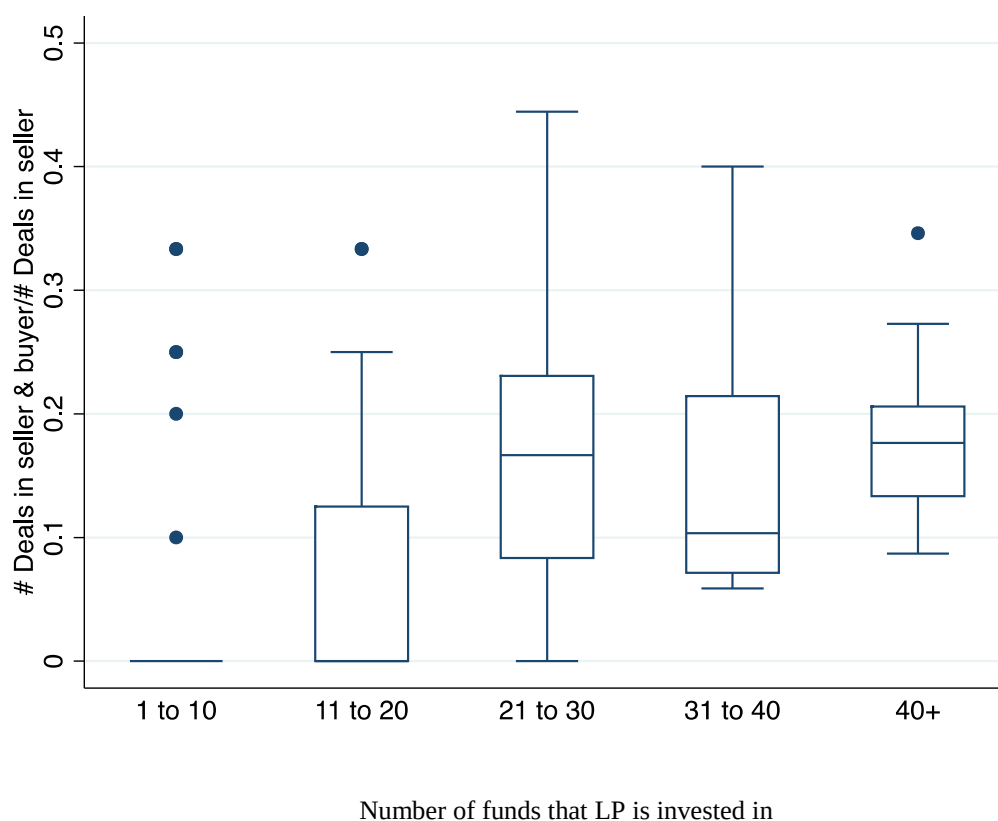


Table A.1

Descriptive statistics by investment inception year

This table shows our sample of buyout investments by inception year. Results are shown separately for the sub-sample of secondary buyouts (SBOs, Panel A) and for the sub-sample of primary buyouts (PBOs, Panel B). PBOs are investments in companies purchased from an entity other than a private equity fund (e.g. family, conglomerate); SBOs are buyout investments that are not PBOs (i.e. includes tertiary). Four time-series are displayed. The first column shows the total number of investments in our data set; the second column shows the number of liquidated investments; and the third column shows the number of liquidated investments for which we know the exit route. The fourth column shows the number of liquidated investments (i) made by limited-life PE funds; and (ii) for which we know the performance of all the other investments made by that limited-life PE fund. See Appendix A for variable definitions and Appendix C for sample details.

Panel A: Secondary buyouts

	Number of investments by inception year			
	Full sample	Liquidated sample	Sub-sample for which we know the exit route	Sub-sample for which we know the complete fund track record
1986	1	1	1	0
1987	4	4	4	1
1988	2	2	2	2
1989	2	2	2	2
1990	1	1	1	0
1991	3	3	3	2
1992	6	6	6	3
1993	3	2	2	1
1994	2	2	2	1
1995	9	9	7	6
1996	14	14	13	7
1997	37	37	36	17
1998	28	28	28	7
1999	31	30	29	18
2000	48	43	42	24
2001	19	18	17	10
2002	31	31	28	27
2003	49	45	39	27
2004	77	61	52	41
2005	84	63	55	25
2006	59	39	35	10

2007	38	26	17	0
Total	548	467	421	231

Panel B: Primary buyouts

	Number of investments by inception year			
	Full sample	Liquidated sample	Sub-sample for which we know the exit route	Sub-sample for which we know the complete fund track record
1986	68	68	45	25
1987	65	65	40	23
1988	122	122	80	52
1989	116	116	83	60
1990	148	147	113	80
1991	147	144	116	89
1992	218	212	159	133
1993	207	205	151	131
1994	306	297	221	153
1995	349	336	250	184
1996	431	387	313	194
1997	574	482	394	286
1998	593	460	373	248
1999	763	547	436	337
2000	722	511	421	345
2001	389	284	252	191
2002	364	256	238	214
2003	409	276	246	228
2004	458	226	191	159
2005	444	165	146	84
2006	390	59	44	19
2007	166	17	14	5
Total	7,449	5,382	4,326	3,240

Table A.2

Propensity to underperform

This table shows the results of a Probit regression in which the dependent variable is a dummy variable equal to one if the Modified PME is below one; and zero otherwise. Modified PME is the same as the original PME for all investments except late SBOs, for which it is set to 0.4 plus the original PME so that we control for late SBO underperformance (0.4 being the magnitude of the underperformance). *t*-Statistics are reported in italics below each coefficient; they are based on standard errors clustered by both investment inception year and private equity firms. ^a Significant at 1%; ^b significant at 5%; ^c significant at 10%. See Appendix A for variable definitions and Appendix C for sample details.

	Spec 1	Spec 2	Spec 3	Spec 4	Spec 5	Spec 6
SBO bought late	0.11 ^c	0.11 ^c	0.08	0.07	0.07	0.06
	<i>1.91</i>	<i>1.95</i>	<i>1.34</i>	<i>1.11</i>	<i>1.32</i>	<i>0.98</i>
SBO bought early			-0.03	-0.03	-0.03	-0.04
			<i>-0.75</i>	<i>-0.63</i>	<i>-0.68</i>	<i>-1.03</i>
PBO bought late			-0.09 ^a	-0.09 ^a	-0.09 ^a	-0.09 ^a
			<i>-4.08</i>	<i>-3.97</i>	<i>-3.96</i>	<i>-4.07</i>
Mills ratio				0.20		
				<i>1.03</i>		
Excess cash					0.00	
					<i>0.02</i>	
SBO bought late					0.56 ^b	
* Excess cash					2.42	
SBO bought early					0.09	
* Excess cash					<i>0.49</i>	
PBO bought late					0.01	
* Excess cash					<i>0.04</i>	
Relative investment Size						0.01
						<i>0.22</i>
SBO bought late						0.17
* Relative investment size						1.36
SBO bought early						0.14
* Relative investment size						1.50
PBO bought late						0.02
* Relative investment size						<i>0.50</i>
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects:						
Buyer firm	Yes	No	No	No	No	No
Fund birth quarter	Yes	Yes	Yes	Yes	Yes	Yes

Fund country	Yes	Yes	Yes	Yes	Yes	Yes
Company country	Yes	Yes	Yes	Yes	Yes	Yes
Year x Industry	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	3471	3471	3471	2819	3471	3471

Table A.3: Investment duration

This table reports the results of OLS regressions with investment duration as dependent variable. Explanatory variables and specifications are the same as in Table 2. *t*-statistics are reported in italics below each coefficient; they are based on standard errors clustered by both investment inception year and private equity firms. ^a significant at 1%; ^b significant at 5%; ^c significant at 10%. See Appendix A for variable definitions and Appendix C for sample details.

	Spec 1	Spec 2	Spec 3	Spec 4	Spec 5	Spec 6
SBO bought late	0.14	0.13	-0.03	-0.03	-0.05	-0.14
	<i>0.64</i>	<i>0.56</i>	<i>-0.13</i>	<i>-0.09</i>	<i>-0.21</i>	<i>-0.61</i>
SBO bought early			0.20	0.16	0.20	0.21
			<i>1.32</i>	<i>0.91</i>	<i>1.35</i>	<i>1.40</i>
PBO bought late			-0.50 ^a	-0.50 ^a	-0.51 ^a	-0.50 ^a
			<i>-5.71</i>	<i>-5.08</i>	<i>-5.71</i>	<i>-5.66</i>
Mill's ratio				-0.43		
				<i>-0.45</i>		
Excess cash					-0.44	
					<i>-1.33</i>	
SBO bought late					0.89	
* Excess cash					<i>0.73</i>	
SBO bought early					0.50	
* Excess cash					<i>0.60</i>	
PBO bought late					0.37	
* Excess cash					<i>0.67</i>	
Relative investment Size						0.52 ^a
						<i>3.28</i>
SBO bought late						0.61
* Relative investment size						<i>1.43</i>
SBO bought early						-0.36
* Relative investment size						<i>-1.03</i>
PBO bought late						-0.39 ^b
* Relative investment size						<i>-2.05</i>
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects:						
Buyer firm	Yes	No	No	No	No	No
Fund birth quarter	Yes	Yes	Yes	Yes	Yes	Yes
Fund country	Yes	Yes	Yes	Yes	Yes	Yes
Company country	Yes	Yes	Yes	Yes	Yes	Yes
Year x Industry	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-square	14.66	10.47	11.36	11.55	11.31	11.67
Number of observations	3471	3471	3471	2819	3471	3471

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