Second Hand or Second Generation?
The Performance of Secondary Buyouts

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Abstract

Secondary buyouts (SBOs) can be viewed as an oxymoron: Booming SBO activity meets past studies that show an underperformance of such deals, claiming that first-round buyers leave no potential for value creation on the table. Or in other words, SBOs can only be successful if poor-performing primary buyouts (PBOs) are acquired by second-round buyers, which points to the "negative correlation hypothesis". This paper reviews if PBO performance predicts SBO performance and if SBO performance is really worse than PBO performance. Using a unique back-to-back sample of 552 buyouts, we find that the internal rate of returns (IRRs) between back-to-back PBO/SBOs are uncorrelated and thus reject the "negative correlation hypothesis". In addition, we find no difference in the IRRs and operating performance between both buyout rounds if we take into account size and holding period differences, two well-known pitfalls of IRR related rank orders, and compare SBOs with PBO peers of similar size and holding period. We even find that SBOs outperform those PBO peers if the professionalisation of an asset takes time. At the same time, SBOs benefit from the prior PE-ownership and already build on a professionalised asset ("groundwork hypothesis"). This particularly holds for smaller portfolio firms. Our results suggest that the current perception of SBOs should be revised and turn from "second hand" deals to "second generation" deals, which provide investors with a well-performing alternative to first-round deals.

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1. Introduction

"How well investors are being served by secondary buyouts is less clear […] the risk of overpayment in a secondary buyout is great. Once a business has been spruced up by one owner, there should be less value to be created by the next." [1]

"So there may be less potential upside every time you pass it on. […] The risk is really that there is not that much juice in the lemon to squeeze." [2]

In the past decades, the private equity (PE) market has developed significantly, defying several global crises and running from one record to the next. In this market environment, secondary buyouts (SBOs), i.e. one PE fund selling a portfolio company to another PE fund, have evolved from a rarity in the 1990s to a critical entry and exit option of PE firms nowadays (Bonini, 2015; Preqin, 2020; Strömberg, 2008). Despite its surge increase, SBOs are often met with scepticism by practitioners and researchers. The vital reasoning behind this is that PE firms with similar business models rely on the same sources of value creation and only sell a portfolio firm once the identified value at buyout entry has been fully extracted (Achleitner et al., 2012; Cumming et al., 2007; Wright et al., 2009). If true, SBOs face the inherent problem that no potential for value creation is left on the table by first-round buyers. They can only be successful if second-round buyers acquire poor-performing first-round deals. This perception suggests a negative correlation between the performance of back-to-back PBO/SBOs, i.e., two consecutive buyout rounds of the same firm. We label this as the "negative correlation hypothesis".

Testing this hypothesis has so far been seriously hampered by extremely high data requirements to establish robust and conclusive back-to-back samples with data on IRRs.[3]

Overcoming the limitations of past studies, we established a unique back-to-back sample of 276 global buyout chains, for which deal values have been available at buyout entry and exit for PBOs and consecutive SBOs.[4] Using the annualised growth rate of a portfolio firm's enterprise value to approximate deal IRRs, we find no correlation between the IRRs of back-to-back PBO/SBOs. We, therefore, reject the "negative correlation hypothesis".

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[1] See the article "Circular Logic" in the February 27, 2010 issue of "The Economist"
[2] See the article "Private equity plays risky game of musical chairs" in the September 25, 2018 issue of "The Financial Times"
[3] Bonini (2015), analyzing a back-to-back buyout sample of 163 and 89 European, mostly UK, PBO/SBO chains, had to produce almost half of his sample by estimating exit deal values for unrealised SBOs.
[4] This is equivalent to a sample of 552 stand-alone buyouts.

Despite being directly connected by public opinion (and the quotes above), performance correlation and performance rank order of PBO/SBOs are two different topics. One can easily demonstrate cases where the IRRs are negatively correlated while SBO IRRs being higher than PBO IRRs at the same time and vice versa.[5] Thus, even after rejecting the "negative correlation hypothesis", it is still an open question whether or not SBOs underperform PBOs. Most past studies found significantly lower IRRs of SBOs compared to PBOs and only marginal improvements, if at all, in the operating performance of portfolio firms (e.g. Bonini, 2015; Degeorge et al., 2016; Sousa & Jenkinson, 2012; Wang, 2012). Only Achleitner & Figge (2014) found no underperformance of SBOs. We start our comparison relying on our back-to-back PBO/SBOs sample and obtain similar results to past studies: SBOs display significantly lower IRRs than PBOs but are at the same time less risky. However, we also find SBOs being larger and having a slightly longer holding period. As these differences are well known to distort IRR related rank orders (see Phalippou (2008) for a review), we benchmark the IRRs of SBOs against the ones of matched PBO peers of similar size and holding period and find no significant differences in the performance between both buyout rounds. We, therefore, conclude that similar buyouts generate similar investor returns independent of the buyout round.

In a deeper analysis of SBO outperformance, we find support for the "groundwork hypothesis", suggesting that SBOs benefit from a professionalised asset. At the same time, similar PBO peers have to professionalise an asset themselves and thus less time to execute more complex value creation strategies. The effect of "groundwork" particularly holds for smaller portfolio firms as larger firms are more likely to show a high degree of professionalisation prior to the initial buyout mitigating the "groundwork" effect.

Finally, we expand our analysis scope to operating performance and investigate if sales CAGR and EBITDA margin change differ between both buyout rounds. Comparing SBOs with matched PBO peers of similar size and holding periods, we again do not find significant differences in performance. In the next step, we change our matching procedure and compare the operating excess performance between both buyout rounds, using matched public peers as a control group for each of them. We find first-round deals exited via SBO to outperform first-round deals exited via trade

[5] See Figure A1 in the appendix for a demonstration.

sale.[6] In order to avoid any potential selection bias, we do not limit our sample to back-to-back PBO/SBOs and include PBOs in our analysis that were exited via trade sale. If we compare the operating excess performance between SBOs and PBOs of similar size and holding period, our results also hold. There is no difference in the operating performance between both buyout rounds, using similar public peers as a control group.

Our general conclusion is that PE ownership is likely to lead to significant changes in the characteristics of a portfolio firm, which transforms a company at PBO entry to another, new one at SBO entry, i.e. version 2.0., which is hardly comparable to its original image.

This paper makes several contributions to existing literature.

First, we contribute to previous literature on the relationship between back-to-back deals and investigate if PBO performance is a good predictor of consecutive SBO performance. Past studies assume a negative correlation between the performance of back-to-back deals (Bonini, 2015; Degeorge et al., 2016; Wang, 2012). We find that the IRRs of back-to-back PBO/SBOs are independent (uncorrelated) of each other, i.e. high returns in SBOs should also be achievable when acquiring well-performing PBO targets. Consequently, we reject the "negative correlation hypothesis".

Second, we add to previous studies that shed light on the performance of different buyout rounds (Achleitner & Figge, 2014; Bonini, 2015; Degeorge et al., 2016; Sousa & Jenkinson, 2012; Wang, 2012). SBOs show a significantly lower performance compared to initial buyouts. However, we find this back-to-back comparison to be distorted by size and holding period differences. Comparing, therefore, SBOs with PBO peers of similar size and holding period, we find the performance gap to disappear, which contrasts with the results of most past studies (e.g. Bonini 2015). SBOs can outperform PBO peers of similar size, holding period and value creation strategy if the portfolio firm was an SME at the entry of the initial buyout. SBOs thereby benefit most from the prior PE ownership as they build on a professionalised asset. At the same time, similar PBO peers have to carry out a time-consuming professionalisation of the asset themselves and thus less time to execute more complex value creation strategies ("groundwork hypothesis").

Third, we contribute to the literature on entry and exit strategies of PE-backed buyouts (e.g. Bonini, 2015; Jenkinson & Sousa, 2015; Wright et al., 2009). Our results suggest that PE firms

[6] Second round buyers prefer to select well performing first round deals for an SBO as portfolio firms need to be able to cope with increased levels of debt. On the other hand, strategic investors may base their investment decision more on projected synergies with existing operations, which are not achievable for financial buyers at the same scale.

select well-performing first-round deals for an SBO, which outperform first-round deals exited via trade sale. Our findings have implications on our methodology, comparing the operating performance between different buyout rounds. While several past studies purely base their operating performance comparison on back-to-back PBO/SBOs (e.g. Bonini, 2015), we suggest including all PBOs independent of the exit channel to avoid selection bias.[7]

The remainder of this paper is structured as follows. Section 2 discusses the theoretical background and related literature. In section 3, we explain the sample construction process and present summary statistics. Section 4 discusses the correlation analysis of back-to-back PBO/SBOs. In section 5, we detail the performance analysis based on IRR. In section 6, we expand our analysis to operating performance. Section 7 shows robustness tests for the results of sections 4 to 6. Section 8 concludes.

2. Performance and risk profile of SBOs: Theoretical background

The surging increase in SBO volumes in the recent past raises questions about the motivations of such deals (Cumming et al., 2007; Strömberg, 2008; Wright et al., 2009). So far, several studies have analysed the phenomenon of SBO. Most of them found an underperformance compared to PBOs (e.g. Bonini, 2015; Sousa & Jenkinson, 2012; Wang, 2012). Therefore, the predominant perception of SBOs by researchers and practitioners is rather negative. The limited value creation potential in SBOs is considered the main reason for the significant performance gap to PBOs, although SBOs are deemed to be less risky. In this paper, we investigate if the rather negative public perception of SBOs is justified.

2.1. Value creation in SBOs

The traditional business model of PE firms is often associated with mitigating agency problems at portfolio firms by enhancing governance practices, implementing monitoring tools, and increasing free cash flows. According to Wright et al. (2009), this is, however, only a steep one-off change in performance, i.e. once agency problems are resolved, there are only minor, if any, "low hanging fruits" left that a PE firm can easily capture during a buyout. Jensen (1989) states that further value can be generated by implementing new strategies and investing into the portfolio company, may it be the support of an internationalisation strategy, product portfolio expansion, or add-on acquisitions, or the introduction of new management.[8] However, many researchers are

[7] We exclude buyout backed IPOs and receiverships in our analysis; see section 3.1 for further details.
[8] See Perembetov et al. (2014) for a breakdown of value creation drivers in leveraged buyouts.

sceptical as to whether any further value can be realised in an SBO as limited potential for value creation is left after the initial buyout or difficult to capture within the investment horizon of PE firms (Bonini, 2015; Jenkinson & Sousa, 2015; Wang, 2012; Wright et al., 2009). Achleitner & Figge (2014) argue that a specific untapped potential for value creation exists for each portfolio firm. Only if it is large enough, then an SBO might be successful as well. Past studies point to two reasons why further value might still be left on the table for second round buyers. First, PE funds have a finite lifespan. At the end of a fund's lifetime, PE firms are forced to sell the portfolio firm, which may be too early to fully exploit the total value of a portfolio firm (Jenkinson & Sousa, 2015). Second, some PE firms may only capture a particular share of value, given a lack of skills and knowledge. Thus, second round buyers with a complimentary skill set may add further value by focusing on other parts to create value (Wang, 2012). Degeorge et al. (2016) even find that complementary skill sets can lead to an outperformance of SBOs compared to PBOs. These skill-sets include specialisations in specific industries, technologies, and geographies (Rigamonti et al., 2016) or experience in different stages of the business cycle of a portfolio firm (Jenkinson & Sousa, 2015). Despite the efforts of explaining the economic rationale of SBOs and showing use cases where an SBO works well (e.g. Achleitner et al., 2014; Degeorge et al., 2016), most studies portrait a rather negative picture of SBOs and link the underperformance of this family of deals to the lack of value creation that first-round buyers leave (e.g. Bonini, 2015; Sousa & Jenkinson, 2012; Wang, 2012).

2.2. Risk profile of SBOs

In theory, lower returns of second-round deals may be explained by the lower risk associated with such deals. Degeorge et al. (2016) find that SBOs are more likely to be executed by PE firms under pressure, typically close to the end of the fund's lifetime, compared to PBOs. However, they also show that at least for late SBOs, the lower risk does not offer a satisfactory explanation of the performance patterns. Strömberg (2008), in contrast, postulates that SBOs are more likely to lead to successful exits than public to private and private to private deals. Besides lower screening costs, Bonini (2015) argues that information asymmetries have been resolved in the initial buyout by professionalizing the financial reporting of a portfolio firm. In addition, the management team has gained significant experience in dealing with PE firms, which make SBOs less risky than PBOs.

3. Data

3.1. Sample description

In the first step, we follow Hammer et al. (2017), Rigamonti et al. (2016), Tykvova and Borell (2012), and Wang (2012) and select all buyouts that have been completed between 1 January 1997 and 31 December 2017, using Bureau van Dijk's deal database "Zephyr". We include institutional buyouts (IBO) and PE sponsor-backed management buyouts (MBO), management buy-ins (MBI) or buy-in management buyouts (BIMBOs), for which the financing is classified as either "private equity" or "leveraged buyout". We do not include venture capital buyouts and private investments in public equity (PIPEs). We complement our buyout database with completed buyouts between 1 January 1997 and 31 December 2017 from Thomson Reuter's deal database "Preqin" – only new deals have been included.[9]

In the second step, we only select PBOs and SBOs, exclude deals mistakenly classified as late-stage buyouts, although they are corporate acquisitions, VC deals, or because the deal was only announced but never completed.[10] We further exclude receiverships and deals exited via IPO for the following reasons. For buyout backed IPOs, the actual exit date of the PE investment is inconclusive as the PE firm still holds large blocks of shares after the IPO. These shares can either be sold piecemeal in the open market over time or directly to the public via a secondary market offering, considering pre-defined lock-up periods. Receiverships could give rise to a selection bias when using back-to-back samples as PBOs, by construction, cannot include receiverships, while SBOs can (Wang, 2012). In addition, past studies already found similar receivership rates between primary and secondary buyouts, which does not require any further investigation (Bonini, 2015; Degeorge et al., 2016; Guo et al., 2011).

In the third step, we further refine our buyout sample by type of performance comparison. We check for our IRR performance samples for available deal values at entry and exit and manually complement missing deal values from MergerMarket, Google News, and PE firm websites. This leaves us with 1,534 PBOs and 486 SBOs. We refer to this sample as the "IRR sample". In the next step, we only select deals for which the primary and secondary buyout of the same portfolio firm are available. We refer to this sample as the "BTB IRR sample", which comprises 552 buyouts in total, thereof 276 PBOs and consecutive SBOs each. For our operating performance samples, we

[9] The entire database covers 33,956 buyouts, thereof 16,841 exited buyouts with known and 17,115 unexited buyouts.
[10] We know the deal type for 9,604 buyouts out of the 16,841 exited buyouts. We count 7,291 buyouts primary buyouts, 1,970 secondary buyouts and 343 tertiary, quaternary and quinary buyouts.

collect the following accounting data from Bureau van Dijk's "Orbis": (i) EBITDA and (ii) sales. We only select those deals where relevant accounting data is available at buyout entry and exit. We define entry and exit years as the fiscal years of a portfolio firm closest to the actual buyout dates. We manually complement missing accounting data from CapitalIQ, MergerMarket, and a portfolio firm's website. We refer to this sample as the "operating sample", which comprises 671 deals in total, thereof 508 PBOs and 163 SBOs. Similar to the "BTB IRR sample", we only select deals for which the primary and secondary buyout of the same portfolio firm are available. This sample is referred to as the "BTB operating sample" and counts 100 buyouts in total, thereof 50 PBOs and SBOs each.

3.2. Sample distribution

3.2.1. IRR samples

Table 1 Panel A depicts the distribution of buyouts by entry (exit) year. Both IRR samples count the majority of buyouts in the years prior to and after the 2008-2009 global financial crisis. By buyout round, most PBOs were exited prior to 2008, the majority of SBOs after 2009. Panel B of Table 1 depicts the distribution by ff10 industry sector.[11] Manufacturing (20.7%), High-Tech (15.4%), and Shops (13.6%) record the highest number of deals (excluding Others). Table 1 Panel C depicts the distribution by country, which is similar to the extant literature on leveraged buyout performance (Achleitner & Figge, 2014; Hammer et al., 2017; Wang, 2012). The United Kingdom (UK) (33.4%) and the United States (US) (24.5%), followed by several European countries, are dominating our IRR samples.

— Insert Table 1 about here —

3.2.2. Operating samples

Table 2 Panel A depicts the distribution of buyouts by entry (exit) year. Both operating samples are relatively evenly distributed over the period 2000 and 2016. If we compare both buyout rounds, there are no significant differences in the relative number of deals by exit year except that a slightly higher fraction of SBOs was exited after the 2008-2009 global financial crisis. Panel B of Table 2 depicts the distribution by ff10 industry sector. Manufacturing (19.8%), followed by High-Tech (16.5%) and Shops (15.9%), account for the majority of buyouts (excluding Others). The

[11] We base our industry sectors on the Fama French classification scheme, similar to Wang (2012); see Fama & French (1997) for a definition of industry sectors.

distribution of industry sectors is relatively similar between both buyout rounds. Panel C of Table 2 depicts the distribution by country. As expected, the United Kingdom (33.7%) dominates our operating samples based on the number of buyouts, followed by the European countries France (22.8%), Sweden (7.7%), and Germany (7.3%). The absence of US deals in the operating samples results from the lack of relevant accounting data using Orbis as the primary source for EBITDA and sales figures at buyout entry and exit.[12] However, this is mainly in line with the sample distribution of Bonini (2015).

— Insert Table 2 about here —

3.3. Summary statistics

Table 3 depicts summary statistics for all samples used in this study. Panel A and B provide key statistics for both samples on IRR, i.e. "IRR sample" and "BTB IRR sample", respectively, as well as Panel C and D for both samples on operating values, i.e. "operating sample" and "BTB operating sample", respectively. Non-back-to-back samples seem to be more balanced in average deal values and holding period compared to back-to-back samples. PBOs are significantly shorter than SBOs in both back-to-back samples, and the gap in entry deal values is more significant. Exemplary for the "BTB IRR sample", PBOs more than double in deal size from 257.3 m USD to 518.5 m USD within 4.3 years on average. SBOs have a more significant increase in deal values in absolute terms and lower relative terms by growing from 518.5 m USD to 901.8 m USD within 4.5 years on average. By contrast, PBOs and SBOs of the "IRR sample" have a similar holding period length of 4.5 years and grow deal values from 364.6 m USD to 648.0 m USD and 435.6 m USD to 778.3 m USD, respectively. Interestingly, sales of both operating samples significantly grow across both buyout rounds, while mean EBITDA margins exhibit a significant increase in the PBO but only a marginal increase in the SBO.

— Insert Table 3 about here —

[12] Private US firms are not required to submit annual financial reports which consequently limits the coverage of private US firms in the databases Orbis and CapitalIQ

4. Does PBO performance predict SBO performance?

This section tests the "negative correlation hypothesis" using our " BTB IRR sample". We use the enterprise value IRR as an instrument to measure investor-related buyout performance. Our enterprise value IRR is calculated as follows:

$$Y_i = \left(\frac{x_{i,j}}{x_{i,t}}\right)^{\frac{1}{j-t}} - 1 \quad (1)$$

where Y_i is the annualised growth rate of the portfolio firm's enterprise value of buyout i from entry to exit, $x_{i,j}$ the deal value of buyout i at exit date j, $x_{i,t}$ the deal value of buyout i at entry date t, and j-t the holding period of buyout i, calculated as the difference between the exit date j and entry date t.

— Insert Figure 1 about here —

Figure 1 displays the split IRRs between the two consecutive buyout rounds, where the IRRs in the PBO and consecutive SBO are drawn on the x axis and y axis, respectively. We winsorise IRRs on the 1% and 5% levels. Both scatter plots do not allow to identify any pattern between the IRRs of both buyout rounds. The correlation coefficients of 0.0620 and 0.0684, close to 0, for the 1% and 5% winsorised IRRs, respectively, confirm that the IRRs of back-to-back PBO/SBOs are uncorrelated to each other. In other words, high returns in SBOs should also be achievable when acquiring well-performing PBO targets, and the argument that solid returns in SBOs can only be realised if poor-performing assets were acquired does not hold. Thus, we reject the "negative correlation hypothesis" concerning the performance of back-to-back PBO/SBOs.

5. Do SBOs generate lower investor returns than (similar) PBOs?

Even though technically correlation and rank order of SBO/PBO performance are separate issues, the current rationale for SBO underperformance originates from the "negative correlation hypothesis": SBOs can only be successful if poor-performing first-round deals are acquired, and the general view that poor-performing first-round deals are rarely the case. Our results so far lead us to reject the "negative correlation hypothesis". However, it still leaves the question open whether or not SBOs underperform against PBOs. In this section, we investigate if SBOs generate lower investor returns than PBOs.

5.1. Comparing back-to-back PBO/SBOs

We start by directly comparing the IRRs between back-to-back PBO/SBOs. We perform a paired t-test for equality of means and a non-parametric Wilcoxon signed-rank test for equality of medians to investigate if any differences in the IRRs between both buyout rounds exist (see Table 4).

— Insert Table 4 about here —

We find that IRRs in the PBO are significantly lower than in the consecutive SBO. PBOs generate an IRR of 33.6% on average, SBOs of only 21.7%. The performance gap also holds for median IRRs. PBOs and SBOs show a median IRR of 23.1% and 14.4%, respectively. Both differences are statistically significant at the 1% level and confirm the results of Bonini (2015) that SBOs underperform when we directly compare back-to-back deals. Our results also indicate that SBOs are less risky, given a lower volatility of IRRs than PBOs (see the standard deviation in IRRs between both buyout rounds in Panel A of Table 4).

However, this direct comparison of both buyout rounds does not enable a comparison of apples with apples. SBOs are of greater size and at the same time slightly longer on average compared to PBOs (see Panel A and B of Table 3 and Panel B and C of Table 4), which are well-known pitfalls of growth-related rank orders, such as IRR (see Phalippou (2008) for a review). We explore if size and holding period length negatively impact IRR and run a correlation analysis between entry deal value, holding period, and IRR on our "BTB IRR sample" (see Panel D of Table 4). Both entry deal value and holding period show a negative correlation with IRR, confirming that increasing entry deal size and holding period yield lower IRRs. Consequently, we need to establish a revised performance comparison that considers size and holding period differences between both buyout rounds.

5.2. Comparing SBOs with similar PBOs

As a next step, we investigate if the performance gap still holds for a comparison that considers differences in size and holding period.

We follow Boucly et al. (2011) and compare each SBO of our "IRR sample" with PBO peers of similar size and holding period. Consequently, a matching deal (a "matched PBO") meets the three following criteria: (i) entry deal value is in the ±50% bracket of the entry deal value of the SBO, (ii) holding period is in the ±50% bracket of the holding period of the SBO but not longer or shorter

than two years, and (iii) entry year of both buyouts is the same. If there are more than five control firms, we just keep the five neighbours nearest to the target and define the distance between two buyouts as

$$Y_{j,t} = \sqrt{\sum_{i=1}^{n} \left(\frac{x_{i,j} - x_{i,t}}{\max x_i - \min x_i} \right)^2} \quad (2)$$

where $Y_{j,t}$ is the scaled Euclidian distance between buyout j and t, $x_{i,j}$ the value of indicator i of buyout j, $x_{i,t}$ the value of indicator i of buyout t, max x_i the maximum value of indicator I, and min x_i the minimum value of indicator i.[13]

We refer to this matching procedure as "PE matching IRR". The ±50% bracket follows previous literature (Bonini, 2015; Boucly et al., 2011; Guo et al., 2011) and is a trade-off between matching accuracy and the need to get a control firm for as many SBOs as possible.

We again perform a paired t-test for equality of means and a non-parametric Wilcoxon signed-rank test for equality of medians to investigate if any differences in the IRRs between SBOs and matched PBOs exist. We follow Barber & Lyon (1996) and compare each SBO with the nearest and median of the five nearest PBO peers.

— Insert Table 5 about here —

The results of Table 5 suggest that the mean and median IRRs between SBOs and PBO peers of similar size and holding period are not significantly different. We conclude that similar buyouts generate similar investor returns independent of the buyout round.[14]

5.3. Can SBOs outperform similar PBOs?

5.3.1. Theoretical foundation of the "groundwork hypothesis"

In this section, we investigate if SBOs benefit from the fact that the previous owner in the initial buyout was a PE firm or syndicate of PE firms. Contrary, PBOs, by definition, involve no prior PE-ownership but portfolio firms that were owned by company members or non-governmental organisations or publicly traded before the buyout. This change in ownership from non-PE to PE

[13] We calculate the scaled Euclidian distance between the buyout of interest and each control peer and select those five peers with the shortest distance / highest similarity. The squared difference between the maximum and minimum value of an indicator is used as a weight. As a note, we receive similar control peers if we apply other methods for measuring distance, e.g. standardised Euclidian distance.

[14] To our knowledge, this is the first study so far that compares the IRRs between SBOs and PBO peers of similar size and holding period.

in the initial buyout is likely to impact the value creation strategy. PBOs typically focus on professionalizing business practices of a portfolio firm and financial engineering (e.g. Acharya et al., 2013; Arcot et al., 2015; Hoskisson et al., 2013; Lahmann et al., 2017), which we define as PE "groundwork". If sufficient time is left, more complex value creation strategies are additionally executed or at least initiated. SBOs, by contrast, take over portfolio firms that have most likely been already professionalised in the initial buyout and are thus ready for more complex value creation strategies directly at buyout entry (Meuleman et al., 2009; Wright et al., 2009). We expect that SBOs benefit most from the "groundwork" in the initial buyout and an already professionalised asset if the professionalisation of an asset for similar PBO peers takes time. As longer holding periods are costly, a more time-consuming professionalisation might restrain PBOs in executing more complex value creation strategies while SBOs have the time. This particularly holds for smaller portfolio firms as they are more likely to lack professional structures, thereby increasing the value of "groundwork" in the initial buyout for the buyer in the SBO (e.g. Hellmann & Puri, 2002). We, therefore, hypothesise that SBOs outperform similar PBO peers if the portfolio firm was a "small and medium-sized enterprise" (SME) at the entry of the initial buyout ("groundwork hypothesis"). Even though not necessarily an SME anymore, the portfolio firm may still be small enough at SBO entry to require more time for similar PBO peers to professionalise it. At the same time, the buyer in the initial buyout may have also been busy in professionalizing the asset and only been able, if at all, to initiate a more complex value creation strategy, thereby leaving enough untapped value creation potential for the buyer in the SBO – apart from the fact that the asset is already professionalised for the buyer in the SBO.

5.3.2. Methodology, variables and summary statistics

We use linear regressions to determine if the "groundwork hypothesis" holds and SBOs outperform similar PBO peers if the portfolio firm is relatively small and thus less professionalised as we expect that SBOs thereby benefit most from the "groundwork" in the initial buyout by building on a professionalised asset rather than being busy with professionalizing the asset themselves. Our dependent variable is the difference in IRRs between SBOs and the control group of matched PBO peers, defined as excess IRR and calculated as

$$Y_i = x_i - p_i \tag{3}$$

where Y_i represents the excess IRR of buyout i, x_i the IRR of buyout i, and p_i the (median) IRR of the control group of buyout i.[15]

We establish two control groups. Besides our existing matching procedure, "PE matching IRR", we further require that (iv) both buyouts execute a similar value creation strategy by differentiating between organic and inorganic (buy-and-build) value creation strategies.[16] According to Nikoskelainen & Wright (2007) and Valkama et al. (2013), buyouts with add-on acquisitions generate higher IRRs than those without. We, therefore, make sure that the selection of value creation strategy does not influence our performance comparison. We refer to this matching procedure as "PE strategy matching IRR".

Our independent variable *SBO/SME at the entry of the initial buyout* is an indicator variable equal to one if the portfolio firm was classified as an SME at the entry of the initial buyout. We use the deal value as a proxy for firm size and classify a portfolio firm as an SME at the entry of the initial buyout if the entry deal value in the initial buyout is below USD 100 m. For SBOs with an unknown entry deal value in the initial buyout, we use the exit deal value in the initial buyout and a cut-off value of USD 350 m.[17]

We control for several effects in our linear regressions, including industry (ff10 industry sector of the portfolio firm in the SBO), time (entry year of the SBO) and country (based on the portfolio firm's headquarters) fixed effects, which is in line with past studies in PE research (e.g. Achleitner et al., 2012; Arcot et al., 2015; Bonini, 2015; Hammer et al., 2017).

5.3.3. Results

Table 6 presents the results of our regression analysis.

— Insert Table 6 about here —

We find positive and statistically significant coefficients for the effect of *SBO/SME at the entry of the initial buyout* for both matching strategies and variations in the number of control peers. Our results support the "groundwork hypothesis", suggesting that SBOs benefit from the prior PE-ownership and PE "groundwork" in the initial buyout by building on a professionalised asset. At

[15] As IRRs of SBOs and matched PBO peers can turn negative, a log-scaled ratio of the two IRRs as dependent variable is not advisable.
[16] We use the add-on acquisitions sample of Hammer et al. (2017) and construct a measure that indicates if the portfolio firm has engaged in add-on activities during the buyout.
[17] The cut-off value of USD 350 m is based on the entry deal value of USD 100 m in the initial buyout (SME definition), compounded by the mean IRR (34%) over the mean holding period (4.3 years) in the intial buyout.

the same time, similar PBO peers have to professionalise an asset themselves and thus have less time to execute more complex value creation strategies. As smaller portfolio firms are presumably less professionalised, the effect of "groundwork" increases, yielding an outperformance of SBOs over similar PBO peers. By contrast, larger portfolio firms are more likely to show a higher degree of professionalisation mitigating the effect of "groundwork".

6. Do SBOs operationally underperform (similar) PBOs?

6.1. Methodology

In the previous section, we found no difference in investor returns when comparing SBOs with PBO peers of similar size and holding period. In this section, we expand our analysis to operating performance. We use EBITDA margin change and sales CAGR as indicators for the operating performance of a portfolio firm. We calculate sales CAGR similar to our enterprise value IRR as the annualised growth rate of a portfolio firm's sales from buyout entry to exit and EBITDA margin change as

$$Y_i = \frac{x_{i,j} - x_{i,t}}{j - t} \quad (4)$$

where Y_i is the EBITDA margin change of buyout i, $x_{i,j}$ the EBITDA margin of buyout i at exit year j, $x_{i,t}$ the EBITDA margin of buyout i at entry year t, j the exit year, and t the entry year.

We establish two different types of control groups.

First, we compare each SBO of our "operating sample" with PBOs of similar size and holding period, analogous to section 5. Thus, a matching deal (a "matched PBO") meets the three following criteria: (i) entry sales are in the ±50% bracket of the entry sales of the SBO, (ii) EBITDA margin is in the ±10 ppts bracket of the entry EBITDA margin, and (iii) holding period is in the ±50% bracket of the holding period of the SBO but not longer or shorter than two years.[18] If there are more than five control firms, we keep the five neighbours nearest to the target. Distance between an SBO and PBO peer is defined as in section 5.2. We refer to this matching procedure as "PE matching acc".

Second, we compare each buyout, i.e. primary and secondary buyout, of our "operating sample" with comparable public peers, using Thomson Reuter's "EIKON" database.[19] We follow Barber &

[18] In contrast to "PE matching IRR", we exclude the criterion same entry year of both buyouts (to not reduce our sample size too sharply) but include it in our robustness tests in section 7.

[19] We retrieve all companies that were listed between 1 January 1997 and 31 December 2017 and collect EBITDA and sales figures in each year where the company was publicly listed to form a control peer sample.

Lyon (1996) and apply an industry-size-year matching.[20] In the base matching, a matching company (a "control firm") meets the following four criteria: (i) it is listed at buyout entry and exit to be able to compare the same period, (ii) sales are in the ±50% bracket of the entry sales of the buyout company, (iii) EBITDA margin is in the ±10 ppts bracket of the entry EBITDA margin of the buyout company, and (iv) it belongs to the same ff5 industry sector of the buyout company. If there are more than ten control firms, we keep the ten neighbours nearest to the target. We define the distance between a PE-backed portfolio firm and a public peer as in section 5.2. We refer to this matching procedure as "base non-PE matching acc". Unlike Barber & Lyon (1996) and Bonini (2015), we define size as a combination of sales and EBITDA margin for two reasons. First, our operating performance analysis is based on both sales and EBITDA margin. Thus we search for public peers that are most similar at entry concerning both financial indicators. Second, in most but not all cases, sales are a perfect proxy for the size of a company, whereas sales in combination with EBITDA margin provide a more accurate picture. For example, intermediaries, such as wholesalers or procurement organisations, leverage economies of scale to offer products at a lower price level than the recommended/retail selling price of manufacturers to their customers. However, they do not contribute any additional value to the product itself. Thus, sales without considering the EBITDA margin would overestimate company size. The extended matching further requires that (v) headquarters are located in the same region to account for the fact that the majority of portfolio firms are SMEs (see section 3.3 and Table 3), which most likely create a significant fraction of their sales and earnings in their home market, i.e. the region they are operating in.[21] We refer to this matching procedure as "extended non-PE matching acc".[22]

Table 7 depicts an overview of our operating performance analyses.

[20] This is in line with the matching strategy of Bonini (2015). Besides an industry-size-year matching, Barber & Lyon (1996) suggest to apply a pre-event performance matching which has been adopted by several other studies in this field in the meantime (e.g. Boucly et al., 2011; Guo et al., 2011). Our matching strategy is partly based on a pre-event performance matching as we define entry year as the financial year that is closest to the entry date of the buyout. For buyouts for which the financial year matches the year of the buyout entry date – this is the case for less than half of the buyouts of our sample – the impact of PE ownership/activity on our financial indicators is expected to be limited, if at all.

[21] We use the following world regions based on the geoscheme of the "United Nations": Africa & Middle East, Asia, Continental Europe (excluding the UK), Eastern Europe, Northern America (excluding the US), Latin America & the Caribbean, Oceania, the UK, and the US.

[22] We use a stricter matching strategy in section 7.2.2 as part of our robustness analysis. In general, there is a trade-off between finding peers that perfectly match the size dimension and peers that exactly operate within the same industry sector and are almost direct competitors to the portfolio firm of interest. In addition, we use the Fama French 5 and 10 instead of the Fama French 48 industry classification scheme because some private firms in our sample only have two-digit SIC codes.

— Insert Table 7 about here —

First, we compare the operating performance between back-to-back PBO/SBOs to investigate if PBOs outperform consecutive SBOs (see performance analysis 1 of Table 7).

Second, we compare the operating performance between SBOs and adjusted PBOs to investigate if SBOs and size and PBO peers of similar size and holding period perform equally solid or weak operationally (see performance analysis 2 of Table 7).

Third, we compare the operating performance between SBOs and similar public peers to review if overperformance of PE as an asset class compared to other investment alternatives applies to the deal type SBO (see performance analysis 3 of Table 7).

Fourth, we compare the operating excess performance between SBOs and PBOs to see if SBOs and PBOs outperform public peers equally strongly. We follow Barber & Lyon (1996), Guo et al. (2011), and Kaplan (1989) and define excess performance as similar to excess IRR as in section 5.3.2 (see performance analysis 4 of Table 7)

Fifth, we combine the analyses 3 and 5 and compare the operating excess performance between SBOs and adjusted PBOs (see performance analysis 5 of Table 7).[23] Unlike performance analysis 3, it checks for differences in the distribution of portfolio firm sizes between both buyout types in our sample. Unlike performance analysis 3, it considers industry fixed effects as the excess performance is defined as the delta between a buyout backed portfolio firm and similar public peers of the same industry sector.

We perform paired and two sample t-tests for equality of means and non-parametric Wilcoxon signed-rank and two-sample Wilcoxon rank-sum (Mann-Whitney) tests for equality of medians to investigate if any differences in the operating performance between SBOs and similar PBOs exist.

6.2. Results

We start by replicating our IRR analysis and directly compare the operating performance between PBOs and consecutive SBOs based on our "BTB operating sample".

— Insert Table 8 about here —

[23] To our knowledge, this is the first study so far that compares (i) the operating excess performance between PBOs and SBOs, by not using a back-to-back sample and by applying an industry-size-year matching to find suitable public peers as a control group, as well as (ii) the operating excess performance between SBOs and PBO peers of similar size and holding period; see section 6.2 for an explanation why back-to-back samples are less suited for such a performance comparison between two consecutive buyout rounds.

Table 8 shows the results of the difference tests. We find that first-round deals significantly outperform consecutive second round deals in terms of sales CAGR and EBITDA margin change for mean and median values. However, SBOs still record a positive sales CAGR of 8.1% and EBITDA margin change of up to 0.2 ppts. These results complement our IRR analysis (see section 4.3), showing that the performance of second-round deals is inferior compared to one of the first-round deals, but still positive and associated with a lower risk, given a lower volatility in sales CAGR and EBITDA margin change (see the standard deviation in sales CAGRs and EBITDA margin changes between both buyout rounds in Table 8). Similar to our IRR analysis, directly comparing back-to-back PBO/SBOs may be misleading as SBOs are of greater size and by far longer, which are well-known pitfalls of growth-related rank orders.

Next, we compare SBOs with PBO peers of similar size and holding period and expect that the operating performance gap disappears once similar buyouts are compared to each other.

— Insert Table 9 about here —

Table 9 provides the results of the comparison between SBOs and PBO peers of similar size and holding period. We find that for all comparisons of both indicators, both buyout types perform equally strong. SBO, nearest PBO peer and median of the five nearest PBO peers record an average sales CAGR of 9.2%, 8.6% and 9.1%, respectively, and an average EBITDA margin change of 0.1 ppts, 0.0 ppts and 0.3 ppts, respectively. We constitute that similar buyouts achieve similar sales and profitability growth rates independent of the buyout round.[24]

Past studies (e.g. Bonini, 2015) do not compare the operating performance of similar independent/non-back-to-back buyouts but the operating excess performance of buyouts, using public peers as a control group. Based on our "operating sample", we measure the operating excess performance of SBOs to explore if SBOs perform operationally at least better than similar public peers. We find an SBO outperformance over similar public peers.[25] In the base matching, the outperformance is statistically significant at the 1% level for EBITDA margin change when comparing SBOs with at least five similar public peers. In addition, SBOs show considerably

[24] To our knowledge, only Wang (2012) performs a similar matching procedure for sales CAGR and EBITDA margin change as indicators. The operating performance between SBO and nearest PBO peer in terms of size (total assets) and industry classification (ff10) is compared based on a sample of 59 SBOs. However, his analysis is limited to the time period one year prior to the year to three years after the buyout and thus does not consider the entire holding period of buyouts (similar to Bonini (2015), who compares the operating performance of the entire holding period of PBOs with only the first two years of the holding period of SBOs).

[25] See Table A1 in the appendix.

higher annualised sales growth rates– 9.8% on average of SBOs compared to 8.1%, 7.5% and 7.8% of the nearest public peer, a median of the five nearest public peers and median of the ten nearest public peers, respectively –, although sales CAGRs are not statistically significantly different between SBOs and similar public peers. The results hold for the extended matching, which considers the regional dimension of a portfolio firm. Interestingly, they are also statistically significant for the difference in sales CAGRs.

Next, we compare the operating excess performance between both buyout rounds to review if SBOs operationally outperform public peers equally strong than PBOs. Table 10 shows the results of the difference tests for the operating excess performance between both buyout rounds.

— Insert Table 10 about here —

Although Bonini (2015) found an underperformance of SBOs compared to PBOs, we recognise no difference in the operating excess performance between both buyout rounds. In both matching procedures, the operating excess performance between both buyout rounds is comparably high for both indicators and all variations, in most cases even slightly higher for SBOs in the base matching when we count the number of negative t and z values and compare them to positive ones.

In the last step, we compare the operating excess performance between SBOs and PBO peers of similar size and holding period, i.e. combining the PE and non-PE matching. This allows us to verify if our results are distorted by a sample bias in the form of entry size differences between both buyout rounds. Table 11 illustrates the results of the difference tests for the operating excess performance between SBOs and similar PBO peers.

— Insert Table 11 about here —

Our previous results also hold if we compare the operating excess performance between SBOs and PBOs of similar size and holding period. In the base matching, SBOs perform marginally better than PBOs and vice versa in the extended matching. In total, we conclude that the operating excess performance is similarly high between both buyout rounds. We further conclude that our "operating sample" is not prone to any sample bias in the form of entry size differences between both buyout rounds.

Unlike Bonini (2015), we include all PBOs independent of the exit type in our analysis for two reasons. First, we can use our "operating sample" instead of "BTB operating sample", which

provides a significantly larger sample size for the performance analysis. Second and more important, we avoid any potential selection bias as second-round buyers seem to select well-performing first-round deals for an SBO predominantly. By limiting our analysis to back-to-back PBO/SBOs, we would only consider PBOs with exit type buyout, neglect less performing first-round deals that were exited via a trade sale and thereby overestimate the operating performance of PBOs. We test the "selection bias hypothesis" by comparing the operating excess performance of PBOs with exit type buyout to the one with exit type trade sale. We perform a two-sample t-test for equality of means and a non-parametric two-sample Wilcoxon rank-sum (Mann-Whitney) test for equality of medians to investigate if the operating excess performance of PBOs with exit type buyout exceeds the one with exit type trade sale. We find PBOs that enter an SBO to operationally outperform PBOs that are sold to strategic investors – results are statistically significant in most cases for sales CAGR and EBITDA margin change for both matching procedures and all variations in the number of public control peers.[26] While PBOs with exit type trade sale show a comparably high sales CAGR as their public control peers, PBOs with exit type buyout perform significantly stronger than their public control peers. For EBITDA margin, both exit types outperform their public control peers; however, PBOs with exit type buyout at a much stronger pace. We conclude that comparisons of the operating excess performance between back-to-back deals are likely to be prone to a selection bias and accordingly overestimate the operating excess performance of PBOs. This limits the power of studies comparing the operating performance of PBOs and SBOs based on a back-to-back sample.[27]

7. Robustness analysis

Our results contrast to most previous studies on the IRR and operating performance between consecutive buyout rounds. Therefore, we run several tests to confirm the robustness of our results. Specifically, we run a regression analysis to explore if the IRR explains the IRR in the SBO in the initial buyout by controlling for various potentially interfering factors. We further adapt our matching procedures to investigate whether a looser or stricter matching strategy results in a performance delta between both buyout rounds. Finally, we explore if the "groundwork hypothesis" holds for portfolio firms that are still an SME at SBO entry.[28]

[26] See Table A3 in the appendix.
[27] This bias of back-to-back comparisons for operating performance does not apply to IRR comparisons: High operating performance in the initial buyout is compensated by corresponding high exit/entry prices.
[28] We provide further robustness tests in the appendix.

7.1. Correlation analysis of back-to-back PBO/SBOs

To make sure that our correlation analysis in section 4.1 between the IRRs of back-to-back PBO/SBOs is not distorted by any other effects, e.g. PE sponsor or buyout characteristics, we run a regression analysis with the log scaled IRR in the initial buyout as a dependent variable, and the log scaled IRR in the SBO as an independent variable. We control for several effects in our logit regression. Indicator control variables are introduced for the HEC Dow Jones ranking (top 20) of the PE firm in the SBO, which acts as a proxy for past performance, and for the PEI ranking (top 50) of the PE firm in the SBO, which acts as a proxy for reputation and fund size. Categorical control variables are created for entry deal values as a proxy for portfolio firm size (small and mid). Further, the entry channel in the PBO, exit channel in the SBO, and holding period of the PBO and SBO are included as control variables. Even after controlling for time, country and industry fixed effects, and portfolio firm, PE sponsor and buyout characteristics, our result of uncorrelated IRRs between back-to-back PBO/SBOs holds. Although the regression coefficient is negative, it is close to 0, and statistical significance is absent.[29] We again conclude that the IRR in the initial buyout has no to limited predictive power on the IRR in the consecutive SBO.

7.2. Performance analysis of PBOs and SBOs

7.2.1. IRR difference tests

We introduce two modifications of our matching procedure "PE matching IRR". In our first modification, we exclude the criterion same entry year of both buyouts to increase the number of SBOs with a matching partner and at the same time matching accuracy with regards to entry sales and entry EBITDA margin. In our second modification, we additionally require the same ff5 industry sector of both buyouts to rule out industry fixed effects. All other criteria of the original matching procedure remain the same. We refer to the first and second modification as "PE loose robust matching IRR" and "PE strict robust matching IRR", respectively.

— Insert Table 12 about here —

The results presented in Table 12 are in line with our previous findings. For both modifications of our original matching procedure, the IRRs between both buyout rounds are equally strong for all variations in the number of control peers.

[29] See Table A4 in the appendix.

7.2.2. Regression analysis on "groundwork hypothesis"

We define *SBO/SME at SBO entry* as a new independent variable and explore if the "groundwork hypothesis" holds for portfolio firms that are still an SME at the entry of the SBO. Even after interpreting the notion of a small portfolio firm more strictly, SBOs outperform similar PBO peers in both matching procedures and variations in the number of control peers if the portfolio firm size at entry is small.[30]

7.2.3. Operating performance difference tests

We adapt our matching procedure "PE matching acc" and require the same entry year of both buyouts to rule out any year fixed effects, while all other criteria remain the same. We refer to this as "PE robust matching acc". Again, the operating performance between both buyout rounds is similarly high for all variations in the number of control peers.[31]

The matching procedures with similar public peers ("base non-PE matching acc" and "extended non-PE matching acc") are adapted as follows. In the base matching, a control firm needs to belong to the same ff10 instead of ff5 industry sector of the portfolio firm, increasing the industry fit of our control group. At the same time, all other criteria remain the same. We refer to this as "base non-PE robust matching acc". Matching procedures of previous studies also include a stricter industry fitting. Bonini (2015), for example, searches for control peers that belong to the same four-digit Standard Industrial Classification (SIC) code.[32] Therefore, we investigate if different results are caused by different industry fitting. In the extended matching, a control firm's headquarters needs to belong to the same country instead of the region, mitigating country fixed effects, especially in the portfolio firm's home country. All other criteria remain the same. We refer to this as "extended non-PE robust matching acc".

— Insert Table 13 about here —

Our results are well aligned with our previous findings. The performance between both buyout rounds is comparable for EBITDA margin change and sales CAGR for all variations in the number of control peers and both adapted matching procedures. Lastly, we perform the robustness test for the fifth performance analysis by comparing the operating excess performance of SBOs with the one of PBO peers of similar size and holding period, using "base non-PE robust matching acc" and

[30] See Table A6 in the appendix.
[31] See Table A7 in the appendix.
[32] The Fama French industry classification scheme is based on SIC codes; see Fama & French (1997) for details.

"extended non-PE robust matching acc" to find similar public peers. We base our PE matching on "PE matching acc" instead of "PE robust matching acc" to not reduce our sample size too sharply as "PE robust matching" would already downsize our sample from originally 163 SBOs to only 86, irrespective of further reductions from both non-PE robust matching procedures. We find that our previous results again hold.[33]

The presented matching procedures of this and the previous sections consider size, holding period, industry and country characteristics of buyouts and apply looser and stricter matching procedures to compare the performance between similar buyouts of consecutive buyouts rounds. All results draw a uniform picture of the performance of SBOs, which is comparable to adjusted PBOs for investor returns and a portfolio firm's operating performance.

8. Conclusion

The surging increase in SBO activity in the past has attracted academic interest in investigating the performance of those deals. The majority of studies found a lower performance of SBOs compared to PBOs, defining buyout performance as investor returns and a portfolio firm's operating performance. The main explanation for this result related more to the correlation of the performance than to the rank order: first-round buyers would leave no or only limited potential for further value creation on the table. In other words, only if the initial buyer is not able to extract all untapped value, second round buyouts might be successful. This points towards a negative correlation between the performance of back-to-back PBO/SBOs.

This paper investigates if the performance of the initial buyout explains SBO performance and if the "negative correlation hypothesis" holds, using a back-to-back sample of 276 PBO/SBO chains. We further analyse the hypothesis that SBO performance is lower than PBO performance, using a sample of 1,534 PBOs and 486 SBOs for a comparison of the IRRs and another sample of 508 PBOs and 163 SBOs for a comparison of the operating performance.

Our results are as follows. First, we find that back-to-back deals are independent (uncorrelated) of each other, i.e. high returns in SBOs should also be achievable when acquiring well-performing PBO targets, and the argument that solid returns in SBOs can only be realised if poor-performing assets were acquired does not hold. Therefore, we reject the "negative correlation hypothesis" and conclude that PE ownership in most cases significantly changes a portfolio firm in terms of product,

[33] See Table A9 in the appendix.

geographical and industry coverage, amongst others. Although it is the same portfolio firm at PBO and SBO entry, in theory, it evolves to a different firm in practice. Second, we find that by directly comparing the IRRs between back-to-back PBO/SBOs, SBO performance is inferior compared to the one in the initial buyout but still positive and associated with a lower risk. However, this comparison is distorted by differences in size and holding period, which are well-known pitfalls of growth-related rank orders. When we compare the performance between SBOs and PBO peers of similar size and holding period, we do not find any difference, neither in investors returns nor in the operating performance of a portfolio firm. Our results hold if we compare the operating excess performance between both buyout rounds, using public peers as a control group. We even find that SBOs can outperform PBO peers of similar size, holding period and value creation strategy if the professionalisation of an asset takes time, while SBOs benefit from the prior PE-ownership and already build on a professionalised asset, which particularly holds for smaller portfolio firms ("groundwork hypothesis"). We run several matching procedures and robustness tests to prove our results' reliability, which contradict the findings of most past studies in this field. Our results suggest that operational value creation is a crucial driver of investor returns in SBOs as second-round deals are indeed able to improve the operating performance of a portfolio firm. This result further suggests that private equity has more value creation potential than only mitigating agency problems (which in most cases would already be resolved by the first PE buyer).

Our study has several implications for future research. Our findings reveal that differences in size and holding period potentially distort direct back-to-back performance comparisons. In particular, operating back-to-back analyses are prone to a potential selection bias caused by different exit channels. We suggest applying a matching strategy and comparing SBOs with size and holding period adjusted PBOs. In addition, we find that SBOs, in particular, benefit from the prior PE-ownership and outperform PBO peers of similar size, holding period and value creation strategy if the professionalisation of an asset is time-consuming. This needs to be taken into account when analysing the performance of SBOs.

It would be fascinating to investigate if our results also hold when tertiary, quaternary and further buyout rounds are included in the performance analysis. Is there a point, if any, at which performance for "pass-the-parcel" deals collapses, and why? What are signs that determine well and poor performing "pass-the-parcel" deals well in advance? At least for SBOs, our results suggest that the current perception of SBOs should be revised and turn from "second hand" deals to "second generation" deals, which provide investors with a well-performing alternative to PBOs.

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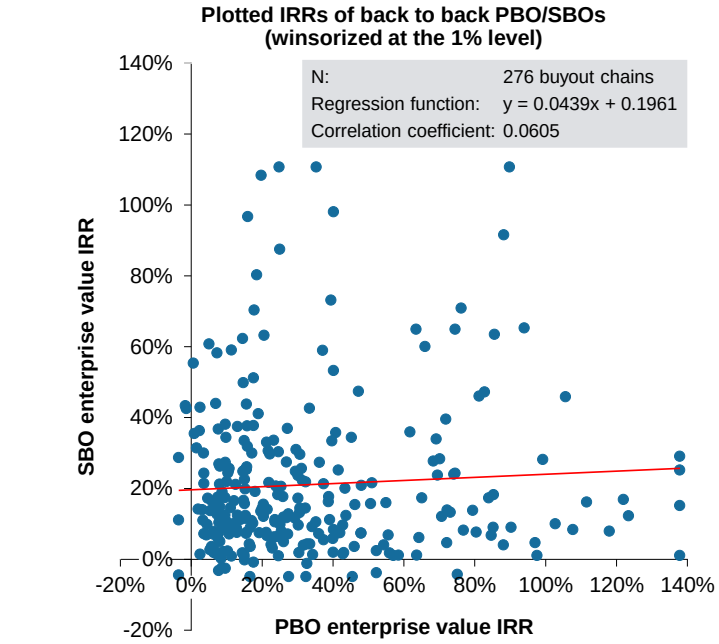
Figure 1: Plotted IRRs of back-to-back PBO/SBOs

The figure presents plotted enterprise value IRRs of back-to-back PBO/SBOs. N = 552 buyouts / 276 PBO/SBO chains in "BTB IRR sample".



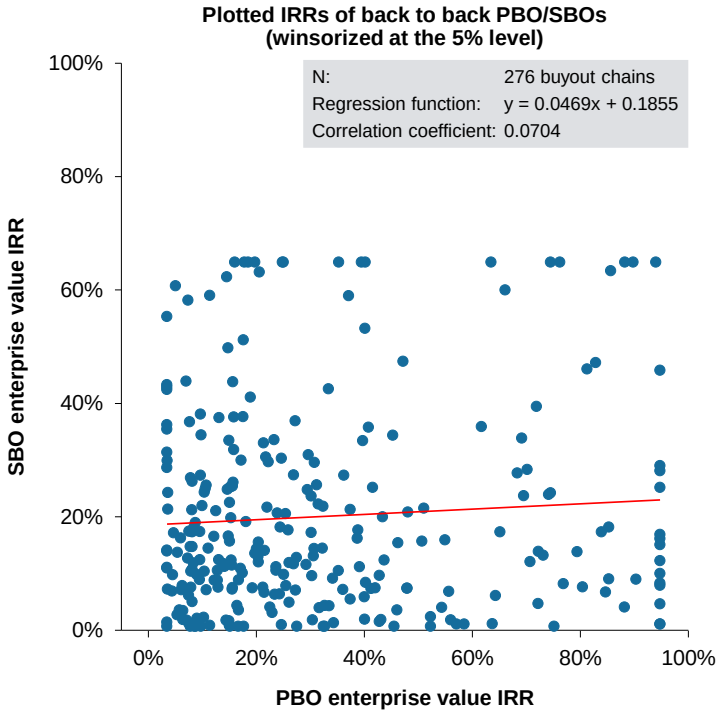


Table 1: IRR sample distribution

The table presents distributions of both IRR based samples. The "IRR sample" and "BTB IRR sample" consist of 2,020 and 552 primary and secondary buyouts, respectively that were entered in the period between 1997–2016.

Panel A: Distribution by deal entry (exit) year

	"IRR sample"						"BTB IRR sample"	
	Total (PBO & SBO)		PBO		SBO		Total (PBO & SBO)	
Year	N	%	N	%	N	%	N	%
1992	1 (0)	0.0 (0.0)	1 (0)	0.1 (0.0)	0 (0)	0.0 (0.0)	1 (0)	0.2 (0.0)
1993	1 (0)	0.0 (0.0)	1 (0)	0.1 (0.0)	0 (0)	0.0 (0.0)	1 (0)	0.2 (0.0)
1995	2 (0)	0.1 (0.0)	2 (0)	0.1 (0.0)	0 (0)	0.0 (0.0)	2 (0)	0.4 (0.0)
1996	1 (0)	0.0 (0.0)	1 (0)	0.1 (0.0)	0 (0)	0.0 (0.0)	1 (0)	0.2 (0.0)
1997	37 (0)	1.8 (0.0)	36 (0)	2.3 (0.0)	1 (0)	0.2 (0.0)	10 (0)	1.8 (0.0)
1998	81 (3)	4.0 (0.1)	76 (3)	5.0 (0.2)	5 (0)	1.0 (0.0)	17 (1)	3.1 (0.2)
1999	112 (11)	5.5 (0.5)	104 (10)	6.8 (0.7)	7 (1)	1.4 (0.2)	32 (2)	5.8 (0.4)
2000	137 (26)	6.8 (1.3)	120 (24)	7.8 (1.6)	18 (2)	3.7 (0.4)	38 (8)	6.9 (1.4)
2001	117 (17)	5.8 (0.8)	105 (17)	6.8 (1.1)	12 (0)	2.5 (0.0)	40 (5)	7.2 (0.9)
2002	114 (43)	5.6 (2.1)	96 (40)	6.3 (2.6)	18 (3)	3.7 (0.6)	40 (12)	7.2 (2.2)
2003	176 (61)	8.7 (3.0)	138 (54)	9.0 (3.5)	38 (7)	7.8 (1.4)	44 (26)	8.0 (4.7)
2004	172 (125)	8.5 (6.2)	125 (110)	8.1 (7.2)	47 (15)	9.7 (3.1)	52 (35)	9.4 (6.3)
2005	212 (173)	10.5 (8.6)	149 (152)	9.7 (9.9)	63 (21)	13.0 (4.3)	54 (49)	9.8 (8.9)
2006	198 (178)	9.8 (8.8)	138 (151)	9.0 (9.8)	60 (27)	12.4 (5.6)	55 (53)	10.0 (9.6)
2007	197 (233)	9.8 (11.5)	122 (173)	8.0 (11.3)	75 (60)	15.4 (12.3)	59 (72)	10.7 (13.0)
2008	96 (128)	4.8 (6.3)	70 (99)	4.6 (6.5)	26 (29)	5.3 (6.0)	23 (31)	4.2 (5.6)
2009	56 (34)	2.8 (1.7)	51 (28)	3.3 (1.8)	5 (6)	1.0 (1.2)	7 (7)	1.3 (1.3)
2010	67 (125)	3.3 (6.2)	46 (88)	3.0 (5.7)	21 (37)	4.3 (7.6)	19 (36)	3.4 (6.5)
2011	77 (151)	3.8 (7.5)	52 (101)	3.4 (6.6)	25 (50)	5.1 (10.3)	13 (41)	2.4 (7.4)
2012	64 (147)	3.2 (7.3)	42 (111)	2.7 (7.2)	22 (36)	4.5 (7.4)	14 (34)	2.5 (6.2)
2013	49 (103)	2.4 (5.1)	26 (67)	1.7 (4.4)	23 (36)	4.7 (7.4)	17 (41)	3.1 (7.4)
2014	38 (115)	1.9 (5.7)	27 (83)	1.8 (5.4)	11 (32)	2.3 (6.6)	8 (23)	1.4 (4.2)
2015	11 (141)	0.5 (7.0)	4 (100)	0.3 (6.5)	7 (41)	1.4 (8.4)	4 (24)	0.7 (4.3)
2016	4 (123)	0.2 (6.1)	2 (75)	0.1 (4.9)	2 (48)	0.4 (9.9)	1 (34)	0.2 (6.2)
2017	0 (78)	0.0 (3.9)	0 (45)	0.0 (2.9)	0 (33)	0.0 (6.8)	0 (16)	0.0 (2.9)
2018	0 (2)	0.0 (0.1)	0 (0)	0.0 (0.0)	0 (2)	0.0 (0.4)	0 (2)	0.0 (0.4)
2019	0 (3)	0.0 (0.1)	0 (3)	0.0 (0.2)	0 (0)	0.0 (0.0)	0 (0)	0.0 (0.0)
Total	2,020	100.0	1,534	100.0	486	100.0	552	100.0

Panel B: Distribution by ff10 industry sector

	"IRR sample"						"BTB IRR sample"	
	Total (PBO & SBO)		PBO		SBO		Total (PBO & SBO)	
	N	%	N	%	N	%	N	%
1 NoDur	209	10.3	159	10.4	50	10.3	76	13.8
2 Durbl	69	3.4	47	3.1	22	4.5	21	3.8
3 Manuf	418	20.7	311	20.3	107	22.0	127	23.0
4 Enrgy	20	1.0	16	1.0	4	0.8	3	0.5
5 HiTec	312	15.4	252	16.4	60	12.3	60	10.9
6 Telcm	73	3.6	56	3.7	17	3.5	20	3.6
7 Shops	274	13.6	208	13.6	66	13.6	73	13.2
8 Hlth	136	6.7	106	6.9	30	6.2	39	7.1
9 Utils	26	1.3	22	1.4	4	0.8	5	0.9
10 Other	483	23.9	357	23.3	126	25.9	128	23.2
Total	2,020	100.0	1,534	100.0	486	100.0	552	100.0

Panel C: Distribution by country of headquarters

	"IRR sample"						"BTB IRR sample"	
	Total (PBO & SBO)		PBO		SBO		Total (PBO & SBO)	
	N	%	N	%	N	%	N	%
United Kingdom	674	33.4	507	33.1	167	34.4	220	39.9
United States	494	24.5	394	25.7	100	20.6	80	14.5
France	166	8.2	100	6.5	66	13.6	68	12.3
Germany	108	5.3	76	5.0	32	6.6	46	8.3
Italy	74	3.7	56	3.7	18	3.7	22	4.0
Rest of World	64	3.2	56	3.7	8	1.6	5	0.9
Spain	51	2.5	40	2.6	11	2.3	10	1.8
Sweden	48	2.4	38	2.5	10	2.1	17	3.1
Netherlands	47	2.3	33	2.2	14	2.9	14	2.5
Australia	46	2.3	34	2.2	12	2.5	9	1.6
Japan	33	1.6	27	1.8	6	1.2	8	1.4
Canada	25	1.2	23	1.5	2	0.4	4	0.7
Denmark	23	1.1	16	1.0	7	1.4	7	1.3
Belgium	21	1.0	16	1.0	5	1.0	6	1.1
Norway	20	1.0	14	0.9	6	1.2	9	1.6
Finland	16	0.8	12	0.8	4	0.8	8	1.4
South Korea	16	0.8	14	0.9	2	0.4	2	0.4
Switzerland	14	0.7	11	0.7	3	0.6	1	0.2
Israel	14	0.7	11	0.7	3	0.6	7	1.3
Ireland	14	0.7	12	0.8	2	0.4	0	0.0
India	12	0.6	10	0.7	2	0.4	2	0.4
China	10	0.5	8	0.5	2	0.4	4	0.7
New Zealand	8	0.4	8	0.5	0	0.0	1	0.2
Luxembourg	8	0.4	6	0.4	2	0.4	2	0.4
Poland	7	0.3	5	0.3	2	0.4	0	0.0
Singapore	7	0.3	7	0.5	0	0.0	0	0.0
Total	2,020	100.0	1,534	100.0	486	100.0	552	100.0

Table 2: Operating sample distribution

The table presents distributions of both operating based samples. The "operating sample" and "BTB operating sample" count 671 and 100 primary and secondary buyouts, respectively, that were entered in the period between 1997–2015.

Panel A: Distribution by deal entry (exit) year

	"Operating sample"						"BTB operating sample"	
	Total (PBO & SBO)		PBO		SBO		Total (PBO & SBO)	
Year	N	%	N	%	N	%	N	%
1997	25 (0)	3.7 (0.0)	22 (0)	4.3 (0.0)	3 (0)	1.8 (00)	4 (0)	4.0 (0.0)
1998	24 (1)	3.6 (0.1)	23 (0)	4.5 (0.0)	1 (1)	0.6 (0.6)	2 (0)	2.0 (0.0)
1999	35 (4)	5.2 (0.6)	30 (4)	5.9 (0.8)	5 (0)	3.1 (0.0)	7 (2)	7.0 (2.0)
2000	44 (10)	6.6 (1.5)	35 (9)	6.9 (1.8)	9 (1)	5.5 (0.6)	10 (2)	10.0 (2.0)
2001	25 (8)	3.7 (1.2)	23 (8)	4.5 (1.6)	2 (0)	1.2 (0.0)	4 (0)	4.0 (0.0)
2002	36 (21)	5.4 (3.1)	27 (20)	5.3 (3.9)	9 (1)	5.5 (0.6)	10 (5)	10.0 (5.0)
2003	54 (30)	8.0 (4.5)	38 (27)	7.5 (5.3)	16 (3)	9.8 (1.8)	8 (4)	8.0 (4.0)
2004	58 (48)	8.6 (7.2)	43 (38)	8.5 (7.5)	15 (10)	9.2 (6.1)	12 (12)	12.0 (12.0)
2005	13 (11)	1.9 (1.6)	10 (9)	2.0 (1.8)	3 (2)	1.8 (1.2)	4 (3)	4.0 (3.0)
2006	85 (52)	12.7 (7.7)	65 (36)	12.8 (7.1)	20 (16)	12.3 (9.8)	11 (10)	11.0 (10.0)
2007	76 (67)	11.3 (10.0)	53 (53)	10.4 (10.4)	23 (14)	14.1 (8.6)	8 (10)	8.0 (10.0)
2008	31 (21)	4.6 (3.1)	25 (17)	4.9 (3.3)	6 (4)	3.7 (2.5)	3 (4)	3.0 (4.0)
2009	28 (24)	4.2 (3.6)	20 (19)	3.9 (3.7)	8 (5)	4.9 (3.1)	5 (3)	5.0 (3.0)
2010	35 (53)	5.2 (7.9)	21 (38)	4.1 (7.5)	14 (15)	8.6 (9.2)	5 (11)	5.0 (11.0)
2011	40 (46)	6.0 (6.9)	29 (34)	5.7 (6.7)	11 (12)	6.7 (7.4)	1 (4)	1.0 (4.0)
2012	29 (56)	4.3 (8.3)	22 (42)	4.3 (8.3)	7 (14)	4.3 (8.6)	3 (10)	3.0 (10.0)
2013	21 (49)	3.1 (7.3)	14 (35)	2.8 (6.9)	7 (14)	4.3 (8.6)	2 (7)	2.0 (7.0)
2014	11 (49)	1.6 (7.3)	8 (35)	1.6 (6.9)	3 (14)	1.8 (8.6)	0 (4)	0.0 (4.0)
2015	1 (89)	0.1 (13.3)	0 (69)	0 (13.6)	1 (20)	0.6 (12.3)	1 (4)	1.0 (4.0)
2016	0 (32)	0.0 (4.8)	0 (15)	0.0 (3.0)	0 (17)	0.0 (10.4)	0 (5)	0.0 (5.0)
Total	671	100.0	508	100.0	163	100.0	100	100.0

Panel B: Distribution by ff10 industry sector

	"Operating sample"						"BTB operating sample"	
	Total (PBO & SBO)		PBO		SBO		Total (PBO & SBO)	
	N	%	N	%	N	%	N	%
1 NoDur	68	10.1	54	10.6	14	8.6	12	12.0
2 Durbl	26	3.9	20	3.9	6	3.7	4	4.0
3 Manuf	133	19.8	101	19.9	32	19.6	24	24.0
4 Enrgy	7	1.0	5	1.0	2	1.2	1	1.0
5 HiTec	111	16.5	86	16.9	25	15.3	10	10.0
6 Telcm	16	2.4	8	1.6	8	4.9	4	4.0
7 Shops	107	15.9	76	15.0	31	19.0	16	16.0
8 Hlth	36	5.4	25	4.9	11	6.7	2	2.0
9 Utils	8	1.2	7	1.4	1	0.6	2	2.0
10 Other	159	23.7	126	24.8	33	20.2	25	25.0
Total	671	100.0	508	100.0	163	100.0	100	100.0

Panel C: Distribution by country of headquarters

	"Operating sample"						"BTB operating sample"	
	Total (PBO & SBO)		PBO		SBO		Total (PBO & SBO)	
	N	%	N	%	N	%	N	%
United Kingdom	226	33.7	165	32.5	61	37.4	40	40.0
France	153	22.8	113	22.2	40	24.5	30	30.0
Sweden	52	7.7	46	9.1	6	3.7	4	4.0
Germany	49	7.3	33	6.5	16	9.8	9	9.0
Rest of World	38	5.7	28	5.5	10	6.1	2	2.0
Italy	36	5.4	27	5.3	9	5.5	2	2.0
Belgium	30	4.5	26	5.1	4	2.5	2	2.0
Spain	29	4.3	23	4.5	6	3.7	6	6.0
Finland	22	3.3	19	3.7	3	1.8	0	0.0
Czech Republic	11	1.6	10	2.0	1	0.6	0	0.0
Netherlands	9	1.3	6	1.2	3	1.8	2	2.0
Norway	9	1.3	6	1.2	3	1.8	2	2.0
Austria	7	1.0	6	1.2	1	0.6	1	1.0
Total	671	100.0	508	100.0	163	100.0	100	100.0

Table 3: Summary statistics

The table presents summary statistics for all samples used in this paper. As a note, the number of observations in our performance analyses may differ from the respective sample size as not necessarily all buyouts have a matching partner.

Panel A: "IRR sample"												
	Total (PBO and SBO)				PBO				SBO			
	N	Mean	SD	Median	N	Mean	SD	Median	N	Mean	SD	Median
Entry deal value *(in m USD)*	2,020	381.7	842.5	128.8	1,534	364.6	890.6	105.7	486	435.6	666.2	197.7
Exit deal value *(in m USD)*	2,020	679.3	1,279.8	275.0	1,534	648.0	1,353.0	235.5	486	778.3	1,009.7	410.0
Holding period *(in years)*	2,020	4.5	2.3	4.1	1,534	4.5	2.3	4.1	486	4.5	2.2	4.2
Panel B: "BTB IRR sample"												
	Total (PBO and SBO)				PBO				SBO			
	N	Mean	SD	Median	N	Mean	SD	Median	N	Mean	SD	Median
Entry deal value *(in m USD)*	552	387.9	540.1	170.0	276	257.3	377.2	103.1	276	518.5	640.2	257.3
Exit deal value *(in m USD)*	552	710.2	872.9	397.2	276	518.5	640.2	257.3	276	901.8	1,023.4	531.7
Holding period *(in years)*	552	4.4	2.1	4.0	276	4.3	2.0	3.8	276	4.5	2.1	4.2
Panel C: "Operating sample"												
	Total (PBO and SBO)				PBO				SBO			
	N	Mean	SD	Median	N	Mean	SD	Median	N	Mean	SD	Median
Entry sales *(in m USD)*	671	112.0	262.2	45.2	508	102.0	269.3	39.0	163	143.3	236.8	69.9
Exit sales *(in m USD)*	671	153.6	336.7	64.9	508	138.8	348.2	55.1	163	199.6	294.6	92.6
Entry EBITDA margin	671	0.125	0.138	0.108	508	0.112	0.136	0.099	163	0.165	0.138	0.140
Exit EBITDA margin	671	0.133	0.133	0.112	508	0.121	0.129	0.106	163	0.168	0.142	0.140
Holding period *(in years)*	671	4.3	2.3	4.0	508	4.3	2.4	4.0	163	4.3	2.1	4.0
Panel D: "BTB operating sample"												
	Total (PBO and SBO)				PBO				SBO			
	N	Mean	SD	Median	N	Mean	SD	Median	N	Mean	SD	Median
Entry sales *(in m USD)*	100	133.2	188.7	76.0	50	100.2	136.8	58.1	50	166.2	225.8	96.0
Exit sales *(in m USD)*	100	197.6	274.5	111.8	50	166.2	225.8	96.0	50	229.1	315.1	128.3
Entry EBITDA margin	100	0.149	0.113	0.139	50	0.133	0.111	0.121	50	0.165	0.114	0.152
Exit EBITDA margin	100	0.168	0.119	0.152	50	0.165	0.114	0.152	50	0.171	0.124	0.152
Holding period *(in years)*	100	4.1	2.1	4.0	50	3.6	1.7	3.0	50	4.6	2.4	4.5

Table 4: Back-to-back comparison of IRR, entry deal value and holding period

Panel A, B and C provide summary statistics for the IRRs, entry deal values (in m USD) and holding periods (in years) on primary and secondary buyouts of a portfolio firm. We report mean and median significance tests. The difference in means is estimated by a paired t-test (t) for means. The difference in medians is estimated by a nonparametric Wilcoxon signed-rank test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Panel D reports correlation statistics for the variables IRR, entry deal value and holding period. N = 533 in "BTB IRR sample".

Panel A: IRR			
	PBO	SBO	Difference test
	(1)	(2)	(1)-(2)
Mean	0.336	0.217	4.784 ***
Median	0.231	0.144	5.093 ***
SD	0.342	0.254	
N	276	276	

Panel B: Entry deal value			
	PBO	SBO	Difference test
	(1)	(2)	(1)-(2)
Mean	257.3	518.5	-12.540 ***
Median	103.1	257.3	-13.998 ***
N	276	276	

Panel C: Holding period			
	PBO	SBO	Difference test
	(1)	(2)	(1)-(2)
Mean	4.31	4.45	-0.792
Median	3.79	4.18	-0.592
N	276	276	

Panel D: Correlation between IRR, entry deal value and holding period			
	(1)	(2)	(3)
(1) (ln) IRR	1.000		
(2) (ln) Entry deal value	-0.376	1.000	
(3) (ln) Holding period	-0.572	0.052	1.000

Table 5: Difference tests for the IRR performance of SBOs and matched PBOs

The table provides summary statistics for the IRRs on secondary and matched primary buyouts, using "PE matching IRR" as a matching procedure. We report mean and median significance tests. The difference in means is estimated by a paired t-test (t) for means. The difference in medians is estimated by a nonparametric Wilcoxon signed-rank test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	PBO (nearest peer)	PBO (median of 5 nearest peers)	SBO	Difference tests	
	(1)	(2)	(3)	(1)-(3)	(2)-(3)
Mean	0.230	0.233	0.239	-0.588	-0.467
Median	0.165	0.175	0.161	0.109	1.476
N	440	440	440		

Table 6: Regression analysis on "groundwork hypothesis"

The table presents results of linear OLS regressions with time (entry year SBO), industry and country fixed effects. The dependent variable is the excess IRR, calculated as the difference in IRRs between SBO and matched PBO peers, using the matching procedures "PE matching IRR" and "PE strategy matching IRR". Standard errors are clustered at the portfolio firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Nearest neighbour matching approach: "PE matching IRR"		
	Dependent variable: Excess IRR	
	Nearest PBO peer	Median of five nearest PBO peers
	(1)	(2)
SBO/SME at the entry of the initial buyout	0.069 **	0.075 ***
	(0.032)	(0.025)
Entry year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Constant	Yes	Yes
N	440	440
Pseudo R^2	0.21	0.22
Nearest neighbour matching approach: "PE strategy matching IRR"		
	Dependent variable: Excess IRR	
	Nearest PBO peer	Median of five nearest PBO peers
	(1)	(2)
SBO/SME at the entry of the initial buyout	0.068 **	0.087 ***
	(0.034)	(0.028)
Entry year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Constant	Yes	Yes
N	389	389
Pseudo R^2	0.18	0.25

Table 7: Overview of operating performance analyses

The table provides an overview of operating performance analyses performed in section 6.

No.	Analysis	Sample	Matching procedure	Type of difference test
1	SBO vs. PBO	"BTB operating sample"	n/a (back-to-back PBO/SBOs)	Paired
2	SBO vs. adjusted PBO peers	"operating sample"	"PE matching acc"	Paired
3	SBO vs. public peers	"operating sample"	"base non-PE matching acc", "extended non-PE matching acc"	Paired
4	(SBO vs public peers) vs. (PBO vs public peers)	"operating sample"	"base non-PE matching acc", "extended non-PE matching acc"	Unpaired
5	(SBO vs public peers) vs. (adjusted PBO peers vs public peers)	"operating sample"	"base non-PE matching acc" + "PE matching acc", "extended non-PE matching acc" + "PE matching acc"	Paired

Table 8: Difference tests for the operating performance of PBOs and consecutive SBOs

The table provides summary statistics for the operating performance on a portfolio firm's primary and consecutive secondary buyouts. We report mean and median significance tests. The difference in means is estimated by a paired t-test (t) for means. The difference in medians is estimated by a nonparametric Wilcoxon signed-rank test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Sales CAGR			
	PBO	SBO	Difference test
	(1)	(2)	(1)-(2)
Mean	0.183	0.081	3.376 ***
Median	0.126	0.081	3.876 ***
SD	0.242	0.095	
N	50	50	
Panel B: EBITDA margin change			
	PBO	SBO	Difference test
	(1)	(2)	(1)-(2)
Mean	0.011	0.002	1.645
Median	0.007	0.001	2.360 **
SD	0.032	0.023	
N	50	50	

Table 9: Difference tests for the operating performance of SBOs and matched PBOs

The table provides summary statistics for the operating performance on secondary and matched primary buyouts, using "PE matching acc" as a matching procedure. We report mean and median significance tests. The difference in means is estimated by a paired t-test (t) for means. The difference in medians is estimated by a nonparametric Wilcoxon signed-rank test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Sales CAGR					
	PBO (nearest peer)	PBO (median of 5 nearest peers)	SBO	Difference tests	
	(1)	(2)	(3)	(1)-(3)	(2)-(3)
Mean	0.091	0.086	0.092	-0.079	-0.521
Median	0.063	0.075	0.069	0.027	0.647
N	140	140	140		
Panel B: EBITDA margin change					
	PBO (nearest peer)	PBO (median of 5 nearest peers)	SBO	Difference tests	
	(1)	(2)	(3)	(1)-(3)	(2)-(3)
Mean	0.000	0.003	0.001	-0.410	0.869
Median	0.000	0.002	0.000	0.071	1.252
N	140	140	140		

Table 10: Difference tests for the operating excess performance of PBOs and SBOs

The table provides summary statistics for the operating excess performance on secondary and primary buyouts, using the matching procedures "base non-PE matching acc" and "extended non-PE matching acc". We report mean and median significance tests. The difference in means is estimated by a two-sample t-test (t) for means. The difference in medians is estimated by a nonparametric two-sample Wilcoxon rank-sum (Mann-Whitney) test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Nearest neighbour matching approach: "base non-PE matching acc"									
Panel A: Sales CAGR									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	PBO	SBO	PBO	SBO	PBO	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.004	0.017	0.022	0.023	0.028	0.019	-0.634	-0.088	0.586
Median	-0.004	0.019	0.006	0.017	0.012	0.015	-0.796	-0.638	0.220
N	507	163	507	163	507	163			
Panel B: EBITDA margin									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	PBO	SBO	PBO	SBO	PBO	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.007	0.006	0.006	0.007	0.006	0.006	0.136	-0.167	-0.171
Median	0.003	0.003	0.003	0.003	0.003	0.004	-0.626	-0.789	-0.799
N	507	163	507	163	507	163			
Nearest neighbour matching approach: "extended non-PE matching acc"									
Panel C: Sales CAGR									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	PBO	SBO	PBO	SBO	PBO	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.025	0.015	0.033	0.032	0.031	0.039	0.070	0.462	-0.440
Median	0.029	0.034	0.017	0.024	0.011	0.027	-0.312	0.151	-0.727
N	474	154	474	154	474	154			
Panel D: EBITDA margin									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	PBO	SBO	PBO	SBO	PBO	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.007	0.004	0.004	0.005	0.004	0.004	0.630	-0.160	0.172
Median	0.003	0.002	0.003	0.003	0.002	0.002	0.385	-0.093	0.241
N	474	154	474	154	474	154			

Table 11: Difference tests for the operating excess performance of SBOs and matched PBOs

The table provides summary statistics for the operating excess performance on secondary and matched primary buyouts, using the matching procedures "PE matching acc", "base non-PE matching acc", and "extended non-PE matching acc". We report mean and median significance tests. The difference in means is estimated by a paired t-test (t) for means. The difference in medians is estimated by a nonparametric Wilcoxon signed-rank test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Nearest neighbour matching approach: "base non-PE matching acc"										
Panel A: Sales CAGR										
	Non-PE (nearest peer)			Non-PE (median of ten nearest peers)			Difference tests			
	PBO (nearest peer)	PBO (median of five nearest peers)	SBO	PBO (nearest peer)	PBO (median of five nearest peers)	SBO				
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(3)	(2)-(3)	(4)-(6)	(5)-(6)
Mean	-0.019	-0.013	0.010	0.005	0.010	0.014	-1.254	-1.343	-0.582	-0.372
Median	0.001	-0.005	0.018	0.005	0.005	0.014	-0.986	-1.814 *	-0.522	-0.302
N	140	140	140	140	140	140				
Panel B: EBITDA margin change										
	Non-PE (nearest peer)			Non-PE (median of ten nearest peers)			Difference tests			
	PBO (nearest peer)	PBO (median of five nearest peers)	SBO	PBO (nearest peer)	PBO (median of five nearest peers)	SBO				
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(3)	(2)-(3)	(4)-(6)	(5)-(6)
Mean	0.003	0.006	0.005	0.004	0.006	0.005	-0.357	0.444	-0.447	0.424
Median	0.000	0.004	0.004	0.004	0.005	0.004	-0.485	-0.218	-0.352	0.572
N	140	140	140	140	140	140				
Nearest neighbour matching approach: "extended non-PE matching acc"										
Panel C: Sales CAGR										
	Non-PE (nearest peer)			Non-PE (median of ten nearest peers)			Difference tests			
	PBO (nearest peer)	PBO (median of five nearest peers)	SBO	PBO (nearest peer)	PBO (median of five nearest peers)	SBO				
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(3)	(2)-(3)	(4)-(6)	(5)-(6)
Mean	0.018	0.001	0.010	0.030	0.023	0.031	0.339	-0.487	-0.034	-0.586
Median	0.030	0.005	0.034	0.019	0.011	0.025	0.400	-0.671	0.319	0.062
N	131	131	131	131	131	131				

Table 11: Difference tests for the operating excess performance of SBOs and matched PBOs (continued)

Nearest neighbour matching approach: "extended non-PE matching acc" (continued)										
Panel D: EBITDA margin change										
	Non-PE (nearest peer)			Non-PE (median of ten nearest peers)			Difference tests			
	PBO (nearest peer)	PBO (median of five nearest peers)	SBO	PBO (nearest peer)	PBO (median of five nearest peers)	SBO				
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(3)	(2)-(3)	(4)-(6)	(5)-(6)
Mean	0.005	0.005	0.003	0.003	0.006	0.004	0.548	0.789	-0.429	0.887
Median	0.004	0.003	0.002	0.005	0.005	0.002	0.087	0.124	0.181	1.146
N	131	131	131	131	131	131				

Table 12: Difference tests for the IRR performance of SBOs and matched PBOs (robust)

The table provides summary statistics for the IRRs on secondary and matched primary buyouts, using "PE loose robust matching IRR" and "PE strict robust matching IRR" matching procedures. We report mean and median significance tests. The difference in means is estimated by a paired t-test (t) for means. The difference in medians is estimated by a nonparametric Wilcoxon signed-rank test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: "PE loose robust matching IRR"					
	PBO (nearest peer)	PBO (median of 5 nearest peers)	SBO	Difference tests	
	(1)	(2)	(3)	(1)-(3)	(2)-(3)
Mean	0.244	0.236	0.250	-0.439	-1.274
Median	0.165	0.153	0.161	-0.415	-0.375
N	485	485	485		
Panel B: "PE strict robust matching IRR"					
	PBO (nearest peer)	PBO (median of 5 nearest peers)	SBO	Difference tests	
	(1)	(2)	(3)	(1)-(3)	(2)-(3)
Mean	0.244	0.240	0.249	-0.292	-0.615
Median	0.188	0.187	0.173	0.410	0.086
N	296	296	296		

Table 13: Difference tests for the operating excess performance of PBOs and SBOs (robust)

The table provides summary statistics for the operating excess performance on secondary and primary buyouts, using the matching procedures "base non-PE robust matching acc" and "extended non-PE robust matching acc". We report mean and median significance tests. The difference in means is estimated by a two-sample t-test (t) for means. The difference in medians is estimated by a nonparametric two-sample Wilcoxon rank-sum (Mann-Whitney) test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Nearest neighbour matching approach: "base non-PE robust matching acc"									
Panel A: Sales CAGR									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	PBO	SBO	PBO	SBO	PBO	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.004	0.006	0.019	0.014	0.026	0.013	0.261	-0.074	0.792
Median	0.002	0.005	0.006	0.003	0.013	-0.001	-0.032	-0.233	0.940
N	503	162	503	162	503	162			
Panel B: EBITDA margin									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	PBO	SBO	PBO	SBO	PBO	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.009	0.008	0.007	0.007	0.006	0.007	0.152	-0.160	-0.111
Median	0.005	0.003	0.003	0.004	0.004	0.005	-0.329	-0.670	-0.566
N	503	162	503	162	503	162			
Nearest neighbour matching approach: "extended non-PE robust matching acc"									
Panel C: Sales CAGR									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	PBO	SBO	PBO	SBO	PBO	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.025	0.043	0.022	0.027	0.021	0.034	-0.705	-0.231	-0.624
Median	0.029	0.014	0.003	0.010	0.001	0.017	-0.505	-0.310	-0.983
N	372	125	372	125	372	125			
Panel D: EBITDA margin									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	PBO	SBO	PBO	SBO	PBO	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.007	0.006	0.006	0.005	0.006	0.005	0.155	0.169	0.101
Median	0.003	0.001	0.003	0.002	0.003	0.001	0.323	0.376	0.329
N	372	125	372	125	372	125			

Appendix A

Figure A1: Plotted IRRs of potential back-to-back PBO/SBOs

The figure presents plotted IRRs of potential back-to-back PBO/SBOs, demonstrating that performance correlation and performance rank order of PBO/SBOs are two different topics: A negative correlation between the IRRs of PBOs and SBOs (ρ = 0,353) is also possible for an (average) SBO outperformance of PBOs ($\overline{IRR(SBO)} = 19{,}6\%$ vs. $\overline{IRR(PBO)} = 14{,}3\%$).

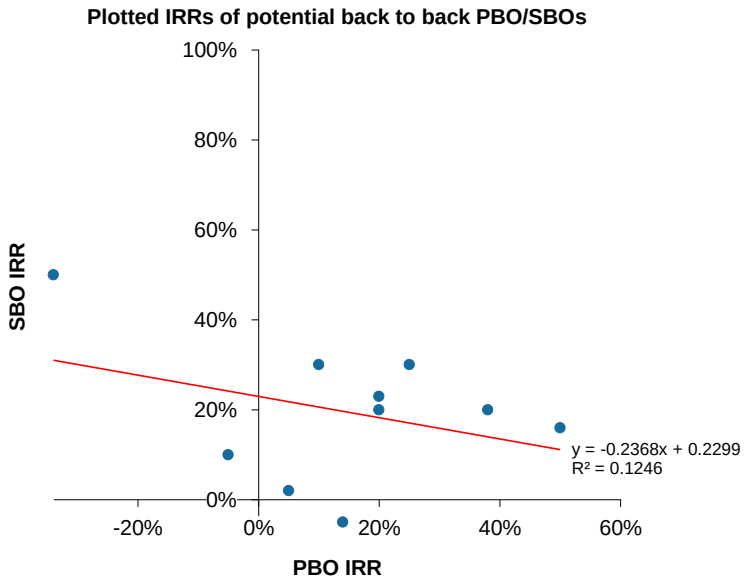


Table A1: Summary statistics of regression determinants

The table presents summary statistics. Variables represent dependent and independent variables used in our regression analysis in section 5.3.

Nearest neighbour matching approach: "PE matching IRR"				
Panel A: Dependent variables				
	N	Mean	SD	Median
Excess IRR (median of five nearest PBO peers as a control group)	440	0.01	0.26	-0.02
Excess IRR (nearest PBO peer as a control group)	440	0.01	0.31	0.00
Panel B: Independent variables				
	N	Mean	SD	Median
SBO/SME at the entry of the initial buyout	440	0.61	0.49	1.00
SBO/SME at SBO entry	440	0.28	0.45	0.00
Nearest neighbour matching approach: "PE strategy matching IRR"				
Panel C: Dependent variables				
	N	Mean	SD	Median
Excess IRR (median of five nearest PBO peers as a control group)	389	0.01	-0.01	0.26
Excess IRR (nearest PBO peer as a control group)	389	0.01	-0.01	0.30
Panel D: Independent variables				
	N	Mean	SD	Median
SBO/SME at the entry of the initial buyout	389	0.61	0.49	1.00
SBO/SME at SBO entry	389	0.28	0.45	0.00

Table A2: Difference tests for the operating excess performance of SBOs

The table provides summary statistics for the operating excess performance on secondary buyouts, using the matching procedures "base non-PE matching acc" and "extended non-PE matching acc". We report mean and median significance tests. The difference in means is estimated by a paired t-test (t) for means. The difference in medians is estimated by a nonparametric Wilcoxon signed-rank test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Nearest neighbour matching approach: "base non-PE matching acc"							
Panel A: Sales CAGR							
	Non-PE (nearest peer)	Non-PE (median of five nearest peers)	Non-PE (median of ten nearest peers)	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(1)-(4)	(2)-(4)	(3)-(4)
Mean	0.081	0.075	0.078	0.098	-1.151	-1.921 *	-1.749 *
Median	0.075	0.063	0.075	0.080	-1.041	-1.826 *	-1.321
N	163	163	163	163			
Panel B: EBITDA margin change							
	Non-PE (nearest peer)	Non-PE (median of five nearest peers)	Non-PE (median of ten nearest peers)	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(1)-(4)	(2)-(4)	(3)-(4)
Mean	-0.004	-0.004	-0.004	0.003	-1.959 *	-3.216 ***	-3.084 ***
Median	-0.004	-0.004	-0.003	0.001	-2.545 **	-3.070 ***	-3.216 ***
N	163	163	163	163			
Nearest neighbour matching approach: "extended non-PE matching acc"							
Panel C: Sales CAGR							
	Non-PE (nearest peer)	Non-PE (median of five nearest peers)	Non-PE (median of ten nearest peers)	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(1)-(4)	(2)-(4)	(3)-(4)
Mean	0.077	0.061	0.054	0.093	-0.963	-2.566 **	-3.221 ***
Median	0.061	0.045	0.049	0.075	-1.545	-2.126 **	-2.447 **
N	154	154	154	154			
Panel D: EBITDA margin change							
	Non-PE (nearest peer)	Non-PE (median of five nearest peers)	Non-PE (median of ten nearest peers)	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(1)-(4)	(2)-(4)	(3)-(4)
Mean	-0.002	-0.003	-0.002	0.002	-1.148	-1.677 *	-1.302
Median	-0.003	-0.002	-0.002	0.000	-1.190	-2.010 **	-1.635
N	154	154	154	154			

Table A3: Difference tests for the operating excess performance of PBOs by exit type

The table provides summary statistics for the operating excess performance on primary buyouts by exit type (secondary buyout vs trade sale), using the matching procedures "base non-PE matching acc" and "extended non-PE matching acc". We report mean and median significance tests. The difference in means is estimated by a two-sample t-test (t) for means. The difference in medians is estimated by a nonparametric two-sample Wilcoxon rank-sum (Mann-Whitney) test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Nearest neighbour matching approach: "base non-PE matching acc"									
Panel A: Sales CAGR									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	SBO	TS	SBO	TS	SBO	TS		Difference tests	
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.023	-0.014	0.043	0.001	0.047	0.009	1.677 *	2.393 **	2.327 **
Median	0.031	-0.025	0.027	-0.010	0.025	-0.002	2.178 **	2.865 ***	2.630 ***
N	245	262	245	262	245	262			
Panel B: EBITDA margin									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	SBO	TS	SBO	TS	SBO	TS		Difference tests	
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.010	0.004	0.010	0.003	0.010	0.002	1.058	2.406 ***	2.184 ***
Median	0.005	0.001	0.004	0.000	0.004	0.001	1.182	2.783 ***	2.270 ***
N	245	262	245	262	245	262			
Nearest neighbour matching approach: "extended non-PE matching acc"									
Panel C: Sales CAGR									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	SBO	TS	SBO	TS	SBO	TS		Difference tests	
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.051	0.002	0.064	0.005	0.062	0.002	2.200 *	3.221 ***	3.400 ***
Median	0.051	-0.009	0.046	-0.013	0.042	-0.013	2.389 **	3.508 ***	3.766 ***
N	230	244	230	244	230	244			
Panel D: EBITDA margin									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	SBO	TS	SBO	TS	SBO	TS		Difference tests	
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.006	0.007	0.006	0.003	0.006	0.002	-0.229	0.884	1.078
Median	0.003	0.003	0.004	0.002	0.003	0.002	-0.474	0.892	1.127
N	230	244	230	244	230	244			

Table A4: Regression analysis on back-to-back IRRs (robust)

The table presents results of the linear OLS regression with time, industry and country fixed effects. The dependent variable is the log scaled IRR for the primary buyout of the portfolio firm. Control variables include indicator variables for the HEC Dow Jones ranking (top 20) of the PE firm in the secondary buyout, which acts as a proxy for past performance, and for the PEI ranking (top 50) of the PE firm in the secondary buyout, which acts as a proxy for reputation and fund size, as well as categorical variables (small and mid) for deal value as a proxy for portfolio firm size. In addition, the entry channel PBO, exit channel SBO and the log scaled ratio between the holding period for the primary and for the secondary buyout are included as control variables. Standard errors are clustered at the country level and shown in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: PBO IRR (log scaled)
	(1)
SBO IRR (log scaled)	-0.053
	(0.14)
Time FE (Entry year PBO x Entry year SBO)	Yes
Industry FE	Yes
Country FE	Yes
Constant	Yes
Controls	Yes
N	259
Pseudo R^2	0.72

Table A5: Regression analysis on IRR pitfalls (robust)

The table presents the linear OLS regression results with time, industry, and country fixed effects based on our "BTB IRR sample". The dependent variable is the log scaled internal rate of return (IRR). Control variables include indicator variables for the HEC Dow Jones ranking (top 20) of the PE firm in the secondary buyout, which acts as a proxy for past performance, and for the PEI ranking (top 50) of the PE firm in the secondary buyout, which acts as a proxy for reputation and fund size. Standard errors are clustered at the country level and shown in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: PBO IRR (log scaled)
	(1)
Entry deal value (log scaled)	-0.295 ***
	(0.01)
Holding period (log scaled)	-1.078 ***
	(0.04)
Time FE (Entry year PBO x Entry year SBO)	Yes
Industry FE	Yes
Country FE	Yes
Constant	Yes
Controls	Yes
N	533
Pseudo R^2	0.56

Table A6: Regression analysis on "groundwork hypothesis" (robust)

The table presents results of linear OLS regressions with time (entry year SBO), industry and country fixed effects. The dependent variable is the excess IRR, calculated as the difference in IRRs between SBO and matched PBO peers, using the matching procedures "PE matching IRR" and "PE strategy matching IRR". Standard errors are clustered at the portfolio firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Nearest neighbour matching approach: "PE matching IRR"		
	Dependent variable: Excess IRR	
	Nearest PBO peer	Median of five nearest PBO peers
	(1)	(2)
SBO/SME at SBO entry	0.080 *	0.070 **
	(0.041)	(0.034)
Entry year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Constant	Yes	Yes
N	440	440
Pseudo R^2	0.21	0.21
Nearest neighbour matching approach: "PE strategy matching IRR"		
	Dependent variable: Excess IRR	
	Nearest PBO peer	Median of five nearest PBO peers
	(1)	(2)
SBO/SME at SBO entry	0.092 **	0.072 *
	(0.041)	(0.037)
Entry year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Constant	Yes	Yes
N	389	389
Pseudo R^2	0.18	0.20

Table A7: Difference tests operating performance of SBOs and matched PBOs (robust)

The table provides summary statistics for the operating performance on secondary and matched primary buyouts, using "PE robust matching acc" as a matching procedure. We report mean and median significance tests. The difference in means is estimated by a paired t-test (t) for means. The difference in medians is estimated by a nonparametric Wilcoxon signed-rank test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Sales CAGR					
	PBO (nearest peer)	PBO (median of 5 nearest peers)	SBO	Difference tests	
	(1)	(2)	(3)	(1)-(3)	(2)-(3)
Mean	0.088	0.088	0.089	-0.070	-0.038
Median	0.072	0.082	0.081	-0.114	0.782
N	86	86	86		
Panel B: EBITDA margin change					
	PBO (nearest peer)	PBO (median of 5 nearest peers)	SBO	Difference tests	
	(1)	(2)	(3)	(1)-(3)	(2)-(3)
Mean	0.001	0.001	0.002	-0.284	-0.541
Median	0.003	0.003	0.001	0.045	0.321
N	86	86	86		

Table A8: Difference tests for the operating excess performance of SBOs (robust)

The table provides summary statistics for the operating excess performance on secondary buyouts, using the matching procedures "base non-PE matching robust acc" and "extended non-PE robust matching acc". We report mean and median significance tests. The difference in means is estimated by a paired t-test (t) for means. The difference in medians is estimated by a nonparametric Wilcoxon signed-rank test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Nearest neighbour matching approach: "base non-PE robust matching acc"							
Panel A: Sales CAGR							
	Non-PE (nearest peer)	Non-PE (median of five nearest peers)	Non-PE (median of ten nearest peers)	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(1)-(4)	(2)-(4)	(3)-(4)
Mean	0.092	0.084	0.084	0.098	-1.220	-0.421	-1.202
Median	0.084	0.079	0.076	0.080	-0.750	-0.309	-0.290
N	162	162	162	162			
Panel B: EBITDA margin change							
	Non-PE (nearest peer)	Non-PE (median of five nearest peers)	Non-PE (median of ten nearest peers)	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(1)-(4)	(2)-(4)	(3)-(4)
Mean	-0.006	-0.005	-0.004	0.003	-2.897 ***	-3.191 ***	-3.191 ***
Median	-0.004	-0.004	-0.004	0.001	-2.967 ***	-3.359 ***	-3.591 ***
N	162	162	162	162			
Nearest neighbour matching approach: "extended non-PE robust matching acc"							
Panel C: Sales CAGR							
	Non-PE (nearest peer)	Non-PE (median of five nearest peers)	Non-PE (median of ten nearest peers)	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(1)-(4)	(2)-(4)	(3)-(4)
Mean	0.051	0.066	0.060	0.093	-2.457 **	-1.967 *	-2.517 **
Median	0.064	0.065	0.061	0.081	-2.009 **	-1.292	-1.960 **
N	125	125	125	125			
Panel D: EBITDA margin change							
	Non-PE (nearest peer)	Non-PE (median of five nearest peers)	Non-PE (median of ten nearest peers)	SBO	Difference tests		
	(1)	(2)	(3)	(4)	(1)-(4)	(2)-(4)	(3)-(4)
Mean	-0.003	-0.002	-0.002	0.003	-1.805 *	-1.961 *	-2.046 **
Median	-0.001	-0.001	-0.001	0.001	-1.125	-1.595	-1.630
N	125	125	125	125			

Table A9: Difference tests for the operating excess performance of SBOs and matched PBOs (robust)

The table provides summary statistics for the operating excess performance on secondary and matched primary buyouts, using the matching procedures "PE matching acc", "base non-PE robust matching acc", and "extended non-PE robust matching acc". We report mean and median significance tests. The difference in means is estimated by a paired t-test (t) for means. The difference in medians is estimated by a nonparametric Wilcoxon signed-rank test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Nearest neighbour matching approach: "base non-PE robust matching acc"										
Panel A: Sales CAGR										
	Non-PE (nearest peer)			Non-PE (median of ten nearest peers)			Difference tests			
	PBO (nearest peer)	PBO (median of five nearest peers)	SBO	PBO (nearest peer)	PBO (median of five nearest peers)	SBO				
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(3)	(2)-(3)	(4)-(6)	(5)-(6)
Mean	-0.029	-0.014	-0.005	0.003	0.005	0.008	-1.051	-0.568	-0.358	-0.212
Median	-0.006	-0.024	-0.007	0.001	0.006	0.004	-1.013	-0.906	-0.132	0.254
N	139	139	139	139	139	139				
Panel B: EBITDA margin change										
	Non-PE (nearest peer)			Non-PE (median of ten nearest peers)			Difference tests			
	PBO (nearest peer)	PBO (median of five nearest peers)	SBO	PBO (nearest peer)	PBO (median of five nearest peers)	SBO				
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(3)	(2)-(3)	(4)-(6)	(5)-(6)
Mean	0.005	0.008	0.007	0.006	0.007	0.007	-0.314	0.400	-0.173	0.666
Median	0.007	0.005	0.003	0.004	0.006	0.004	0.580	0.730	0.282	1.142
N	139	139	139	139	139	139				
Nearest neighbour matching approach: "extended non-PE robust matching acc"										
Panel C: Sales CAGR										
	Non-PE (nearest peer)			Non-PE (median of ten nearest peers)			Difference tests			
	PBO (nearest peer)	PBO (median of five nearest peers)	SBO	PBO (nearest peer)	PBO (median of five nearest peers)	SBO				
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(3)	(2)-(3)	(4)-(6)	(5)-(6)
Mean	0.010	0.001	0.037	0.004	-0.002	0.030	-0.978	-1.624	-1.112	-1.927 *
Median	0.015	0.016	0.006	-0.003	-0.006	0.020	-1.044	-1.739 *	-0.999	-1.423
N	88	88	88	88	88	88				

Table A9: Difference tests for the operating excess performance of SBOs and matched PBOs (robust) (continued)

Nearest neighbour matching approach: "extended non-PE robust matching acc" (continued)										
Panel D: EBITDA margin change										
	Non-PE (nearest peer)			Non-PE (median of ten nearest peers)			Difference tests			
	PBO (nearest peer)	PBO (median of five nearest peers)	SBO	PBO (nearest peer)	PBO (median of five nearest peers)	SBO				
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(3)	(2)-(3)	(4)-(6)	(5)-(6)
Mean	0.008	0.007	0.005	0.006	0.007	0.004	0.516	0.492	0.372	0.941
Median	0.006	0.006	0.001	0.004	0.006	0.002	0.645	1.090	0.745	1.689 *
N	88	88	88	88	88	88				

Table A10: Difference tests for the operating excess performance of PBOs by exit type (robust)

The table provides summary statistics for the operating excess performance on primary buyouts by exit type (secondary buyout vs trade sale) using the matching procedures "base non-PE robust matching acc" and "extended non-PE robust matching acc". We report mean and median significance tests. The difference in means is estimated by a two-sample t-test (t) for means. The difference in medians is estimated by a nonparametric two-sample Wilcoxon rank-sum (Mann-Whitney) test (z) for unreported medians. We report t-values for the difference in mean tests and z-values for the differences in median tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Nearest neighbour matching approach: "base non-PE robust matching acc"									
Panel A: Sales CAGR									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	SBO	TS	SBO	TS	SBO	TS		Difference tests	
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.019	-0.009	0.036	0.002	0.042	0.011	1.304	1.964 *	1.894 *
Median	0.031	-0.025	0.020	-0.016	0.027	-0.013	2.008 **	2.469 **	2.265 **
N	243	260	243	260	243	260			
Panel B: EBITDA margin									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	SBO	TS	SBO	TS	SBO	TS		Difference tests	
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.012	0.007	0.011	0.002	0.010	0.003	1.058 **	2.406 **	2.184 **
Median	0.007	0.002	0.005	0.001	0.005	0.002	1.182 *	2.783 ***	2.270 **
N	243	260	243	260	243	260			
Nearest neighbour matching approach: "extended non-PE robust matching acc"									
Panel C: Sales CAGR									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	SBO	TS	SBO	TS	SBO	TS		Difference tests	
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.053	-0.003	0.055	-0.010	0.054	-0.012	2.104 **	2.986 ***	3.041 ***
Median	0.040	0.016	0.038	-0.015	0.024	-0.020	1.756 *	2.946 ***	3.155 ***
N	186	186	186	186	186	186			

Table A10: Difference tests for the operating excess performance of PBOs by exit type (robust) (continued)

Nearest neighbour matching approach: "extended non-PE robust matching acc" (continued)									
Panel D: EBITDA margin									
	Non-PE (nearest peer)		Non-PE (median of five nearest peers)		Non-PE (median of ten nearest peers)				
	SBO	TS	SBO	TS	SBO	TS	Difference tests		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(2)	(3)-(4)	(5)-(6)
Mean	0.008	0.005	0.007	0.004	0.008	0.004	0.456	0.590	0.857
Median	0.003	0.002	0.004	0.001	0.004	0.001	0.201	1.064	1.352
N	186	186	186	186	186	186			