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Second hand or second generation? The performance of secondary buyouts

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Abstract

Secondary buyouts (SBOs) appear paradoxical because the surge in SBO activity is met with scepticism from the public and investors regarding their performance. In this paper, we undertake a comprehensive analysis of SBO performance through two distinct lenses: First, we address the prevailing notion of SBOs as “lemons”. These are perceived as opportunities that, following a successful primary buyout (PBO), seemingly leave little room for further value creation. To investigate this “negative correlation hypothesis”, we employ a unique back-to-back sample of 276 cases involving the same firm in both a PBO and an SBO. Analysing the correlation between the internal rate of returns (IRRs) of back-to-back PBO/SBOs, our results do not support the “negative correlation hypothesis”. Second, we directly compare the deal performance of the two related back-to-back buyout rounds. For our back-to-back sample, we find that PBOs display significantly higher IRRs than SBOs. However, after performing a matched comparison adjusting for size and holding period differences, which are two well-known pitfalls of IRR rank orders, our findings suggest that there is no systematic outperformance of SBOs against their PBO comparables. Finally, we analyse differences in operating performance between PBOs and SBOs. Our results do not indicate a significant difference, either based on the back-to-back sample or when comparing PBOs and SBOs against matched public peers. In the light of our findings, we advocate for a reevaluation of the current perception of SBOs. Rather than being dismissed as “second-hand” opportunities, they should be recognised as “second-generation” opportunities deserving closer consideration.

Keywords Private equity · Secondary buyouts · Value creation · IRR · Operating performance

JEL Classification G23 · G24 · G32 · G34

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. In this market environment, secondary buyouts (SBOs), i.e. one PE firm selling a portfolio firm to another PE firm, have evolved from a rarity in the 1990s to a critical entry and exit option of PE firms (Bonini 2015; Strömberg 2007). Despite its importance, SBOs are often met with scepticism by practitioners and researchers. The 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 could only be successful if second-round buyers acquire poor-performing first-round deals. This perception suggests a negative correlation between the performance of two back-to-back deals, 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 high data requirements to establish robust and conclusive samples of back-to-back transactions with meaningful data on deal performance (IRRs).³

Overcoming the limitations of past studies, we establish 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 annualized growth rate of a portfolio firm’s enterprise value to approximate deal IRRs, we do not find a significant correlation between the IRRs of back-to-back PBOs and SBOs and therefore reject the “negative correlation hypothesis”.

Despite being frequently directly connected by public opinion (and the quotes above), performance correlation and rank order of performance in back-to-back deals are two different topics. While the statements above relate to SBO performance conditional on (positive) PBO performance, they do not allow for any

¹ See the article “Circular Logic” in the 27 February 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), analysing 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 unrealized SBOs. Eschenröder et al. (2019) had to rely on self-estimated entry and exit deal values, using trading multiples instead of realized prices, and only considered buyouts with portfolio firms headquartered in the United Kingdom (UK). See also Eschenröder (2020).

⁴ This is equivalent to a sample of 552 stand-alone buyouts.

conclusion of the unconditional rank order of PBO and SBO performance: Negatively correlated IRRs can easily be combined with SBO IRRs being higher than PBO IRRs at the same time and vice versa. Thus, even after rejecting the “negative correlation hypothesis”, it is still an open question whether or not PBOs outperform SBOs. The majority of studies analysing this question finds significantly lower IRRs of SBOs compared to PBOs and only marginal improvements in the operating performance of portfolio firms during a SBO (e.g. Bonini 2015; Degeorge et al. 2016; Sousa & Jenkinson 2012; Wang 2012). In this study as a first step we directly compare PBO and SBO performance of deals from our back-to-back sample and obtain results similar to the studies cited above: SBOs display significantly lower IRRs than PBOs. We also find SBOs being larger and having a longer holding period than the related PBOs. As these differences are well known to distort IRR-related rank orders (see Phalippou (2008) for a review), we compare in a second step the performance of SBOs against the one of matched PBO peers of similar size and holding period in a larger non-back-to-back sample (the “full sample”); after this adjustment we do not find significant differences between both buyout rounds. Thus, we conclude that comparable buyouts generate comparable investor returns regardless of the specific buyout round involved.

When investigating the sources of SBO performance, we find properties of the preceding PBO positively affecting the performance of the consecutive buyout: SBO excess return is significantly higher, if the first round deal was a small or medium sized enterprise (SME). Our interpretation of this result is that PE firms as owners of the corresponding first round deal are supporting the SBO’s performance by setting up efficient organizational structures and professionalizing the asset.

Finally, we broaden the scope of our analysis to include operating performance and investigate if sales CAGR and EBITDA margin change differ between both buyout rounds. When directly comparing SBOs against the PBOs in our operating back-to-back sample, we find significantly higher sales growth rates for the latter; again, after matching SBOs against PBO peers of similar size and holding periods in our larger full operating sample, there are no significant differences in performance.

Our general conclusion is thus that PE ownership is likely to trigger significant changes in the characteristics of a portfolio firm. This transforms a company at PBO entry to another, “new” company at SBO entry. This “second generation” firm is, despite the identical legal entity no longer comparable to its original image.

Our paper makes several contributions to existing literature.

First, we contribute to the discussion around the relationship between PBO and SBO deal performance by highlighting the distinction between negative correlation and outperformance. Whereas the correlation hypothesis is conditional on the (positive) PBO performance, it does not allow for conclusions of the unconditional rank order of PBO and SBO performance. Our results underscore this distinction as in the back-to-back analysis PBOs outperform SBOs despite a zero correlation between the IRRs of the two rounds.

Second, we add to the analysis of SBO performance by showing that a direct comparison of back-to-back PBO vs. SBO performance measured by IRR is potentially distorted by significant differences in size and holding period. Removing this bias and comparing SBOs with PBO peers of similar size and holding period, we

find the performance gap shown in previous studies (e.g. Bonini 2015) to disappear. These findings have also implications on the methodology when comparing the operating performance between different buyout rounds. While several past studies base their operating performance comparison on back-to-back deals (e.g. Bonini 2015), we suggest including all PBOs independent of the exit channel to avoid selection bias.⁵

Third, our results contribute to the general discussion on SBO performance. Based on a significantly larger sample on back-to-back cases, we reject the “negative correlation hypothesis”, whereas past studies based on significantly smaller samples assume a negative correlation between the performance of back-to-back deals (Bonini 2015; Degeorge et al. 2016; Wang 2012).

The remainder of this paper is structured as follows. Section 2 discusses the theoretical background and related literature and derives our hypotheses. In Sect. 3, we explain the sample construction process and present summary statistics. Section 4 discusses the correlation analysis of back-to-back deals and shows the results on comparing deal performance analysis based on IRR. In Sect. 5, we expand our analysis to operating performance. Section 6 shows robustness tests for the results of Sects. 4, 5 and 6. Section 7 concludes.

2 Theoretical background and hypotheses

2.1 Performance and risk profile of SBOs

The increase of SBOs raises questions about the motivations of such deals and their potential to create value for its investors (Cumming et al. 2007; Strömberg 2007; Wright et al. 2009). 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. This is, however, only a steep one-off change in performance, i.e. once agency problems are resolved, there might be only minor, if any, “low hanging fruits” left that a PE firm can easily capture during a buyout (Wright et al. (2009)). Academic literature thus in general is sceptical as to whether any further value can be realized in an SBO. (Achleitner & Figge 2014; Bonini 2015; Jenkinson & Sousa 2015; Wang 2012; Wright et al. 2009). The literature on SBOs points to two potential 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 creation potential of a portfolio firm (Jenkinson & Sousa 2015). This may especially be the case for “roll up” buy and build strategies where a number of similar companies is acquired as “add-on” and combined with the (buyout) platform company; at the end of the funds lifetime, there still may be many potential target companies left as add ons for the new owner when continuing this strategy. (Hammer et al. 2022). Second, some PE firms may only capture a particular share of value, given a lack

⁵ We exclude buyout backed IPOs and receiverships in our analysis; see Sect. 3.1 for further details.

of skills and knowledge. Thus, complementary skill sets between buyer and seller may allow SBOs to extract a competitive value by relying on other sources of value creation (Degeorge et al. 2016; Wang 2012). These skill sets relate to specializations in industries or geographies (Rigamonti et al. 2016), or the experience with different business models or stages of the business cycle of a portfolio firm (Jenkinson & Sousa 2015). Further value can be generated in an SBO by implementing new strategies and investing into the portfolio company, e.g. by supporting an internationalization strategy, product portfolio expansion, or switching to a buy-and-build strategy via add-on acquisitions.⁶

Empirical studies supporting the “lemon” hypothesis do so by directly comparing PBO and SBO performance, finding a significant underperformance of this deals (e.g. Bonini 2015; Sousa & Jenkinson 2012; Wang 2012). While lower risk of SBO might serve as a potential reason for the lower return, Degeorge et al. (2016) find this not to offer a satisfactory explanation for the difference in the performance patterns. Other studies are inconclusive with their findings on risk adjusted performance of SBOs: 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.

2.2 Hypotheses

2.2.1 Deal performance

2.2.1.1 Performance correlation Our analysis of the “negative correlation hypothesis” is based on our large sample of back to back buyouts, referred to as “back to back IRR sample”.⁷ The realized entry and exit values for both buyout rounds allow to directly address the “lemon” argument of SBOs: if true, only low performing PBOs with correspondingly low exit- (and entry-) valuation will allow for high IRRs of the SBO. We employ the enterprise value IRR of the deal 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 annualized growth rate of the portfolio firm’s enterprise value of buyout i from entry to exit, x 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 .

Our first hypothesis is thus:

⁶ See Perembetov et al. (2014) for a breakdown of value creation drivers in leveraged buyouts.

⁷ Table 14 in the Appendix gives an overview over the different sample definitions used in our analysis.

H1: There is a significant negative correlation between the IRRs of Back-to-back PBOs and SBOs.

2.2.1.2 Outperformance The “negative correlation hypothesis” is just making a statement about the SBO deal performance conditional on the realized performance of the corresponding PBO: In case of a high PBO performance the SBO performance will be low and vice versa. Thus, this analysis does not allow for any conclusions for the unconditional rank order of the deal performance between the two buyout rounds, i.e. the question whether the (average) IRR of all PBOs is higher than the one of all SBOs. Based on EV deal IRRs, our second hypothesis thus analyses the unconditional relationship between the deal performance of PBOs and SBOs:

H2a: The IRRs of SBOs are significantly lower than the IRRs of the corresponding back-to-back PBOs.

However, a direct comparison does not control for potential differences between the two buyout rounds. SBOs in our sample are larger and, at the same time, display a longer holding period 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 rank orders based on IRR (see, e.g. Phalippou (2008) for a review). In our sample, 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 and thus distort the direct comparison. (see Panel D of Table 4). We extend our observations by including non-back-to-back deals into the analysis and control for these differences between both buyout rounds in our full IRR sample by matching SBOs with PBOs of the same size and holding period and analyse the hypothesis H2b⁸:

H2b: The IRRs of SBOs are significantly lower than the IRRs of matched PBOs.

2.2.1.3 Impact factors on SBO outperformance Compared to SBOs PBOs, by definition, involve no prior PE-ownership; these portfolio firms were owned by other types of shareholder before the buyout. When looking for reasons explaining the performance differences between the two buyout rounds, the “earlier” change in ownership from non-PE to PE in the initial buyout is a valid starting point. PBOs typically focus on establishing efficient organizational structures, professionalizing the 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). SBOs, by contrast, take over portfolio firms that have most likely been already professionalized in the initial buyout and thus allow for more complex value creation strategies directly at buyout entry (Meuleman et al. 2009; Wright et al. 2009). We thus hypothesize that SBOs benefit from the initial buyout by finding an already professionalized asset with existing efficient organizational structures. This may particularly hold for smaller and fast growing portfolio firms as it is more resource and time consuming to establish professional

⁸ See Sects. 4 and 5 for the different matching criteria. An overview is also given in Table 15 in Appendix.

structures; this will increase the value in the initial buyout for the buyer in the SBO (e.g. Hellmann & Puri 2002). Especially under a buy and build strategy, the acquisition and integration of add-on targets into the platform company requires a particular set of organizational skills and practice. We therefore hypothesize that SBOs outperformance against similar PBO peers is higher, if the portfolio firm was a “small and medium-sized enterprise” (SME) at the entry of the initial buyout. In this case, the PBO may leave enough untapped value creation potential for the buyer in the SBO. Our hypothesis states thus that SBO outperformance against matched PBO peers is significantly positive affected by the portfolio firm being a “small and medium-sized enterprise” (SME) at the entry of the initial buyout (“groundwork hypothesis”). We analyse this hypothesis again based on our “full IRR sample” including non-back-to-back deals.

H3: The excess IRRs of SBOs over matched PBOs is significantly higher if the corresponding first round buyout was a SME.

In order to capture the impact of a buy and build strategy on growth and performance of the deal we expand the matching criteria for the peer selection by including this strategy.

2.2.1.4 Operating performance We also compare the two buyout rounds with respect to their operating performance. Relying on EBITDA margin change and sales CAGR as indicators for the operating performance of a portfolio firm, we calculate sales CAGR as the average annual growth rate of a portfolio firm’s sales from buyout entry to exit and the corresponding EBITDA margin change as

$$Y_i = \frac{x_{i,j} - x_{i,t}}{j - t} \quad (2)$$

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.

The logic behind the analysis of the operating performance is similar to the one above: First round deals may allow to reap “low hanging fruits” as operating improvements by taking over a less professionalized asset; in contrast, the second round buyer will be left with less potential for further improvement. We thus test the following hypothesis H4a based on our back-to-back operating sample:

H4a: The operating performance of SBOs is significantly lower than the one of back-to back PBOs.

As differences in size and holding periods may also affect operating performance and thus distort the comparison of the performance of PBOs against SBOs, we also extend our operating sample by including non-back-to-back deals and perform our analysis based on matched PBOs based on the full operating sample.

H4b: The operating performance of SBOs is significantly lower than the one of matched PBOs.

Finally, following past studies (e.g. Bonini 2015) we use public peers as a control group for the analysis of SBO and PBO performance and derive the outperformance of both buyout groups against their corresponding benchmark. Our final hypothesis then compares the two excess performance measures:

H4c: The operating excess performance of SBOs against matched public peers is significantly lower than the excess performance of PBOs matched against public peers.⁹

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 sponsored 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 Reuters's deal database "Preqin"—only new deals have been included.¹⁰

In the second step, we only select PBOs and SBOs¹¹ and exclude receiverships and deals exited via IPO: 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 a 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.¹² We refer to this sample as the "Full IRR sample". Finally, we only select deals for which the primary

⁹ See Sect. 5.3. for the matching criteria for the public peers. An overview is also given in Table 15 in Appendix.

¹⁰ The entire database covers 33,956 buyouts, thereof 16,841 exited and 17,115 not exited buyouts.

¹¹ We know the deal type for 9604 buyouts out of the 16,841 exited buyouts. We count 7291 PBOs, 1970 SBOs, and 343 tertiary, quaternary, and quinary buyouts.

¹² The fraction of manually complemented observations is around 5% of our sample.

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 collect accounting data from Bureau van Dijk’s “Orbis”: (i) EBITDA and (ii) sales. Only deals with relevant accounting data available at buyout entry and exit were selected. We define entry and exit years as the fiscal years of a portfolio firm closest to the actual buyout dates. Manually complementing missing accounting data from CapitalIQ, MergerMarket, and a portfolio firm’s website, we refer to this sample as the “full operating sample”; it comprises 671 deals in total, thereof 508 PBOs and 163 SBOs. Similarly 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.¹³ 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.

3.2.2 Operating samples

Table 2 Panel A shows 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. The distribution by ff10 industry sector is displayed in Panel B of Table 2. Manufacturing (19.8%), followed by High-Tech (16.5%) and Shops (15.9%), account for the majority of buyouts (excluding Others). The 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

¹³ We base our industry sectors on the Fama and French classification scheme, similarly to Wang (2012); see Fama & French (1997) for a definition of industry sectors.

accounting data using Orbis as the primary source for EBITDA and sales figures at buyout entry and exit.¹⁴ Our sample is in line with the sample distribution of Bonini (2015).

4 Summary statistics

Table 3 contains summary statistics for all samples used in this study. Panel A and B provide key statistics for both samples on IRR, i.e. “Full IRR sample” and “BTB IRR sample”, respectively, as well as Panel C and D for both samples on operating values, i.e. “Full 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 have a shorter holding period than SBOs in both back-to-back samples, and a significantly lower entry deal value. 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 in 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 “Full 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.

5 Results on deal performance

5.1 Correlation of deal performance

We start our analysis with the “negative correlation hypothesis” H1. 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.

Figure 1 shows the IRRs of both rounds original and winsorised on the 1% level.¹⁵ The scatter plots do not allow to identify any pattern between the IRRs of both buyout rounds. The correlation coefficients of 0.0512 and 0.0603 are positive and close to 0, for the unadjusted and the 1% winsorised IRRs, respectively, the IRRs of back-to-back PBOs and SBOs are not negatively correlated to each other. Thus, significant positive returns in SBOs should also be achievable when acquiring well-performing PBO targets, and the argument that solid returns in SBOs can only be realized if poor-performing assets were acquired does not hold. Consequently, we reject our “negative correlation hypothesis” H1.

¹⁴ 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.

¹⁵ Compared against removal of outliers this has the benefits to keep the observations in the analysis. For our econometric analyses, we only rely on the original data.

Table 1 IRR sample distribution

Panel A: Distribution by deal entry (exit) year

| Year | “Full IRR sample” | | | | | | “BTB IRR sample” | |
|-------|-------------------|------------|-----------|------------|---------|-------------|-------------------|-------------|
| | Total (PBO & SBO) | | PBO | | SBO | | Total (PBO & SBO) | |
| | 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) |
| 1994 | 0 (0) | 0.0 (0.0) | 0 (0) | 0.0 (0.0) | 0 (0) | 0.0 (0.0) | 0 (0) | 0.0 (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

| | “Full 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 |

Table 1 (continued)

Panel B: Distribution by ff10 industry sector

| | “Full IRR sample” | | | | | | “BTB IRR sample” | |
|----------|-------------------|-------|-------|-------|-----|-------|-------------------|-------|
| | Total (PBO & SBO) | | PBO | | SBO | | Total (PBO & SBO) | |
| | N | % | N | % | N | % | N | % |
| 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

| | | | | | | | | |
|---------------------|------|-------|------|-------|-----|-------|-----|-------|
| United King- dom | 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 | 2020 | 100.0 | 1534 | 100.0 | 486 | 100.0 | 552 | 100.0 |

The table presents distributions of both IRR-based samples. The “Full 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 and 2016

5.2 Rank order deal performance

5.2.1 Comparing SBOs against back-to-back PBOs

We start by directly comparing the IRRs between back-to-back PBOs and SBOs and 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).

We find IRRs in the PBO to be significantly higher than in the consecutive SBO. PBOs generate an IRR of 33.6% on average, whereas SBOs only display an IRR of 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. We thus find support for hypothesis H2a in this first analysis. 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).

5.2.2 Comparing SBOs against matched PBOs

Recognizing the drawbacks of IRR-related rank orders, we follow Boucly et al. (2011) and compare each SBO of our “Full IRR sample” with PBO peers of similar size and holding period. A matching deal (a “matched PBO”) meets the three following criteria: (i) entry deal value is in the $\pm 50\%$ bracket of the entry deal value of the SBO, (ii) holding period is in the $\pm 50\%$ bracket of the holding period of the SBO but not longer or shorter than two years away, and (iii) identical entry year of both buyouts. 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

$$Y_{j,t} = \sqrt{\sum_{i=1}^n \left(\frac{x_{i,j} - x_{i,t}}{\max x_i - \min x_i} \right)^2} \quad (3)$$

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 .¹⁶

We refer to this matching procedure as “PE matching IRR”.¹⁷ The $\pm 50\%$ bracket follows previous literature (Bonini 2015; Boucly et al. 2011; Guo et al. 2011) and is

¹⁶ We calculate the scaled Euclidean distance between the buyout of interest and each control peer and select those five peers with the shortest distances. 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 distances, e.g. standardized Euclidean distances or propensity scores (see Table 13).

¹⁷ In our “full IRR sample” we find 5 (3) or more peers for 61% (80%) of the sample firms with “PE matching IRR”.

Table 2 Operating sample distribution

Panel A: Distribution by deal entry (exit) year

| Year | “Full operating sample” | | | | | | “BTB operating sample” | |
|-------|-------------------------|-------------|---------|-------------|---------|------------|------------------------|-------------|
| | Total (PBO & SBO) | | PBO | | SBO | | Total (PBO & SBO) | |
| | N | % | N | % | N | % | N | % |
| 1997 | 25 (0) | 3.7 (0.0) | 22 (0) | 4.3 (0.0) | 3 (0) | 1.8 (0.0) | 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

| | “Full 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 | 2020 | 100.0 | 1534 | 100.0 | 486 | 100.0 | 552 | 100.0 |

Table 2 (continued)

Panel C: Distribution by country of headquarters

| | | | | | | | | |
|----------------|-----|-------|-----|-------|-----|-------|-----|-------|
| 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 |

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

a trade-off between matching accuracy and the need to get a control firm for as many SBOs as possible.

Performing a paired t test for equality of means and a nonparametric Wilcoxon signed-rank test for equality of medians we follow Barber & Lyon (1996) and compare each SBO with the nearest and median of the five nearest PBO peers.

The results of Table 5 suggest that the mean and median IRRs between SBOs and matched PBO peers of similar size and holding period are not significantly different. We thus reject H2b for our sample of SBO and matched PBOs.

5.2.3 Impact factors on SBO outperformance

H3 relates to a potential spillover effect between PBO and SBO; PBOs may support SBO performance by providing valuable “groundwork” in setting up efficient organizational structures and processes. We use linear regression analysis to analyse H3 on our “full IRR sample”; 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

$$Y_i = x_i - p_i \quad (4)$$

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 .¹⁸

¹⁸ 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.

Table 3 Summary statistics

| | Total (PBO and SBO) | | | | PBO | | | | SBO | | | |
|---|---------------------|-------|---------|--------|-------|-------|---------|--------|-----|-------|---------|--------|
| | N | Mean | SD | Median | N | Mean | SD | Median | N | Mean | SD | Median |
| <i>Panel A: "Full IRR sample"</i> | | | | | | | | | | | | |
| Entry deal value (<i>in m USD</i>) | 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 (<i>in m USD</i>) | 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 (<i>in years</i>) | 2,020 | 4.5 | 2.3 | 4.1 | 1,534 | 4.5 | 2.3 | 4.1 | 486 | 4.5 | 2.2 | 4.2 |
| <i>Panel B: "BTB IRR sample"</i> | | | | | | | | | | | | |
| Entry deal value (<i>in m USD</i>) | 552 | 387.9 | 540.1 | 170.0 | 276 | 257.3 | 377.2 | 103.1 | 276 | 518.5 | 640.2 | 257.3 |
| Exit deal value (<i>in m USD</i>) | 552 | 710.2 | 872.9 | 397.2 | 276 | 518.5 | 640.2 | 257.3 | 276 | 901.8 | 1,023.4 | 531.7 |
| Holding period (<i>in years</i>) | 552 | 4.4 | 2.1 | 4.0 | 276 | 4.3 | 2.0 | 3.8 | 276 | 4.5 | 2.1 | 4.2 |
| <i>Panel C: "Full operating sample"</i> | | | | | | | | | | | | |
| Entry sales (<i>in m USD</i>) | 671 | 112.0 | 262.2 | 45.2 | 508 | 102.0 | 269.3 | 39.0 | 163 | 143.3 | 236.8 | 69.9 |
| Exit sales (<i>in m USD</i>) | 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 (<i>in years</i>) | 671 | 4.3 | 2.3 | 4.0 | 508 | 4.3 | 2.4 | 4.0 | 163 | 4.3 | 2.1 | 4.0 |
| <i>Panel D: "BTB operating sample"</i> | | | | | | | | | | | | |
| Entry sales (<i>in m USD</i>) | 100 | 133.2 | 188.7 | 76.0 | 50 | 100.2 | 136.8 | 58.1 | 50 | 166.2 | 225.8 | 96.0 |
| Exit sales (<i>in m USD</i>) | 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 (<i>in years</i>) | 100 | 4.1 | 2.1 | 4.0 | 50 | 3.6 | 1.7 | 3.0 | 50 | 4.6 | 2.4 | 4.5 |

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

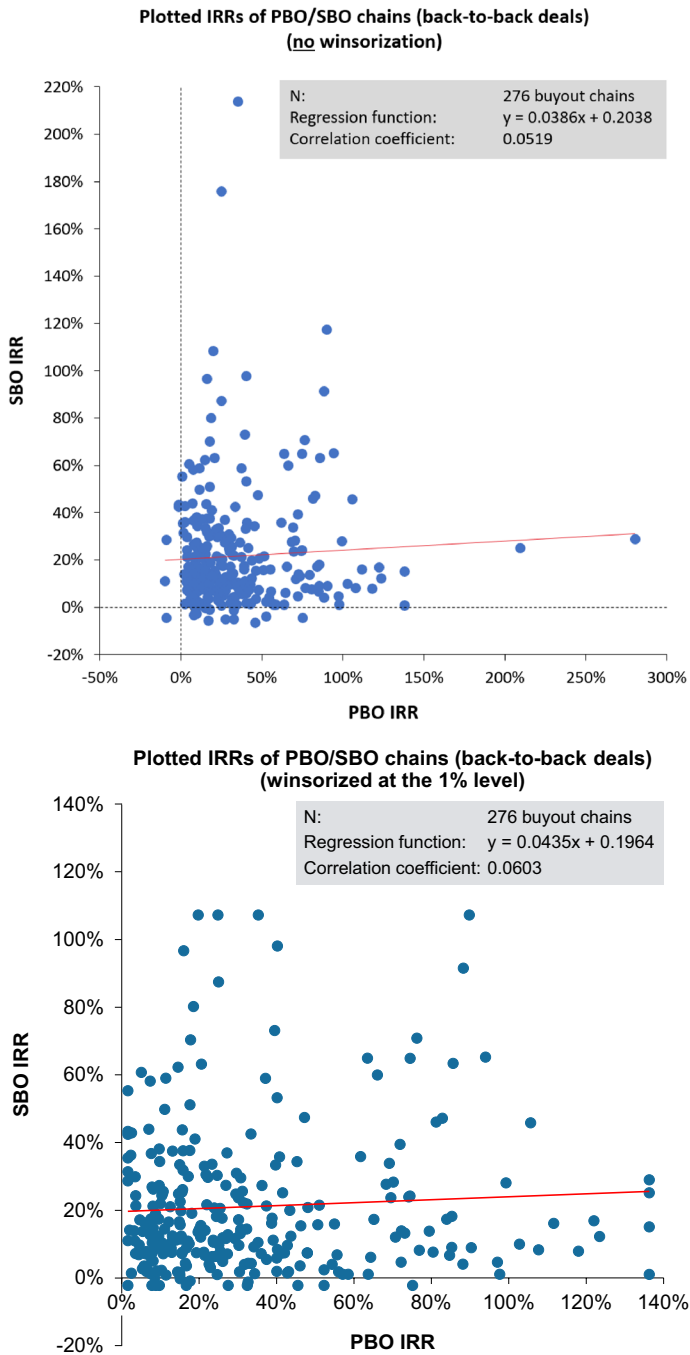


Fig. 1 Plotted IRRs of PBO/SBO chains (back-to-back deals). The figure presents plotted IRRs of back-to-back deals. N=552 buyouts / 276 PBO/SBO chains in “BTB IRR sample”

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

| | PBO | SBO | Difference test | |
|---|-------------------------------|---------|-----------------|-------|
| | (1) | (2) | (1)–(2) | |
| <i>Panel A: IRR</i> | | | | |
| Mean | 0.336 | 0.217 | 4.784 | *** |
| Median | 0.231 | 0.144 | 5.093 | *** |
| SD | 0.342 | 0.254 | | |
| N | 276 | 276 | | |
| <i>Panel B: Entry deal value</i> | | | | |
| Mean | 257.3 | 518.5 | − 12.540 | *** |
| Median | 103.1 | 257.3 | − 13.998 | *** |
| N | 276 | 276 | | |
| <i>Panel C: Holding period</i> | | | | |
| 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) | IRR (log-scaled) | 1.000 | | |
| (2) | Entry deal value (log-scaled) | − 0.376 | 1.000 | |
| (3) | Holding period (log-scaled) | − 0.572 | 0.052 | 1.000 |

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 analyzed by a paired t test (t) for means. The difference in medians is analyzed 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”

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 (B&B) value creation strategies.¹⁹ According to Nikoskelainen & Wright (2007), Valkama et al. (2013) and Hammer et al. (2022), buyouts with add-on acquisitions generate higher IRRs than those without. The implementation of buy & build strategies requires particular organizational structures and skills. According to our arguments in 2.2.2., we hypothesize that implementing and professionalizing this strategy already in the PBO allows the owner in the SBO to reap particular benefits when continuing the inorganic growth strategy. We refer to this matching procedure as “PE strategy matching IRR”.²⁰

¹⁹ 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.

²⁰ In our “full IRR sample” we find 5 (3) or more peers for 33% (60%) of the sample firms with “PE strategy matching IRR”.

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

| | PBO (nearest peer) | PBO (median of five 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 | | |

The table provides summary statistics for the IRRs on secondary and matched primary buyouts, using “PE matching IRR” as a matching procedure: A matching deal (a “matched PBO”) meets the three following criteria: (i) entry deal value is in the $\pm 50\%$ bracket of the entry deal value of the SBO, (ii) holding period is in the $\pm 50\%$ bracket of the holding period of the SBO but not longer or shorter than two years away, and (iii) identical entry year of both buyouts. We report mean and median significance tests. The difference in means is analyzed by a paired t test (t) for means. The difference in medians is analyzed 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

Our independent variable of interest is *SBO/SME at the entry of the initial buyout*; it 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.²¹

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 other studies on PE deal performance (e.g. Achleitner et al. 2012; Arcot et al. 2015; Bonini 2015; Hammer et al. 2017).

Table 6 presents the results of our regression analysis.

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 thus support H3, suggesting that SBOs benefit from the prior PE-ownership and PE “groundwork” in the initial buyout by building on a professionalized asset. At the same time, similar PBO peers have to professionalize an asset themselves and thus have less time and resources to execute more complex value creation strategies. As smaller and fast growing portfolio firms presumably require more

²¹ The cut-off value of USD 350 m is based as 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 initial buyout.

resources and time to get professionalized, the effect of “groundwork” increases, yielding an outperformance of SBOs over similar PBO peers. By contrast, larger portfolio firms are more likely to already show a higher degree of professionalization at entry of the first buyout thus mitigating the effect of “groundwork”.

Extending our analysis we check whether our “groundwork hypothesis” H3 also holds for portfolio firms that are still an SME at SBO entry and again find a significant positive impact of our SME variable.²²

6 Results on operating performance

6.1 Comparing SBOs against back to back PBOs

We start by directly comparing the operating performance of PBOs and consecutive SBOs based on our back-to-back “BTB operating sample”.

Table 7 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 Sect. 4.2) by lending support to H4a of SBO underperformance. However, this direct comparison analysis may again be exposed to distortions by differences in size and holding period.

6.2 Comparing SBOs against matched PBOs

In order to address systematic differences between the two buyout rounds we include non-back-to-back deals in our analysis and compare SBOs with PBO matched peers of similar size and holding period based on the “full operating sample”. A matching deal (a “matched PBO”) meets the three following criteria: (i) entry sales are in the $\pm 50\%$ 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 $\pm 50\%$ bracket of the holding period of the SBO but not longer or shorter than two years away.²³ We refer to this procedure as “PE matching operating”.²⁴ If there are more than five control firms, we keep the five neighbours nearest to the target.

Table 8 provides the results of the comparison between SBOs and matched PBO controlling for size and holding period. We do not find significant differences between the performance of both buyout types. SBO, nearest PBO peer and median of the five

²² Results are available from the authors on request.

²³ In contrast to “PE matching IRR”, we exclude the criterion same entry year of both buyouts in order not to reduce our sample size too sharply.

²⁴ In our “full operating sample” we find 5 (3) or more peers for 54% (69%) of the sample firms with “PE matching operating”.

Table 6 Regression analysis outperformance SBO (“groundwork hypothesis”)

| | Dependent variable: Excess IRR | | | |
|--|--------------------------------|----|----------------------------------|-----|
| | Nearest PBO peer | | Median of five nearest PBO peers | |
| | (1) | | (2) | |
| <i>Nearest neighbour matching approach: “PE matching IRR”</i> | | | | |
| SBO/SME at the entry of the initial buyout | 0.069 (0.032) | ** | 0.075 (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 | |
| <i>Nearest neighbour matching approach: “PE strategy matching IRR”</i> | | | | |
| SBO/SME at the entry of the initial buyout | 0.068 (0.034) | ** | 0.087 (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 | |

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”. For “PE matching IRR” a matching deal (a “matched PBO”) meets the three following criteria: (i) entry deal value is in the $\pm 50\%$ bracket of the entry deal value of the SBO, (ii) holding period is in the $\pm 50\%$ bracket of the holding period of the SBO but not longer or shorter than two years away, and (iii) identical entry year of both buyouts. “PE strategy matching IRR” additionally includes “inorganic growth strategy y/n” as criterion. Standard errors are clustered at the portfolio firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively

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. Based on this results, we reject hypothesis H4b.²⁵

²⁵ 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

Table 7 Difference tests for the operating performance of PBOs and consecutive SBOs

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

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 analyzed by a paired t test (t) for means. The difference in medians is analyzed 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

6.3 Comparing outperformance vs. matched public peers of SBOs against PBOs

Following Bonini (2015) we calculate excess operating performance each of SBOs and PBOs against public peers as a control group and compare the respective operating outperformance against each other. The matching procedures with similar public peers are adapted as follows: In the baseline matching, a public firm needs (i) to be listed at entry and exit date of the resp. buyout, (ii) the sales shall be in the $\pm 50\%$ bracket of sales in the buyouts' entry year, (iii) the EBITDA margin shall be in the ± 10 ppt. bracket of margin in the buyouts' entry year and (iv) the peer shall be in the same FF5 industry as the buyout. We refer to this as "base non-PE matching operating".^{26, 27} In the extended matching, a control firm's headquarters needs to belong to the same country instead of the same region. All other criteria remain the same. We refer to this as "extended non-PE matching operating".

Footnote 25 (continued)

consider the entire holding period of buyouts (similarly 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).

²⁶ For the PBO and SBO in our "full operating sample" we find 5 or more public peers for all the sample firms with "base non-PE matching operating".

²⁷ Matching procedures of previous studies also include a stricter industry fitting. Bonini (2015) requires peers to belong to the same four-digit Standard Industrial Classification (SIC) code. The Fama French industry classification scheme is based on SIC codes; see Fama & French (1997) for details.

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

| | PBO (nearest peer) | PBO (median of five nearest peers) | SBO | Difference tests | |
|--------------------------------------|--------------------------|---------------------------------------|-------|------------------|---------|
| | (1) | (2) | (3) | (1)–(3) | (2)–(3) |
| <i>Panel A: Sales CAGR</i> | | | | | |
| 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 | | |
| <i>Panel B: EBITDA margin change</i> | | | | | |
| 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 | | |

The table provides summary statistics for the operating performance on secondary and matched primary buyouts, using “PE matching operating” as a matching procedure. A matching deal meets the three following criteria: (i) entry sales are in the $\pm 50\%$ 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 $\pm 50\%$ bracket of the holding period of the SBO but not longer or shorter than two years away. We report mean and median significance tests. The difference in means is analyzed by a paired t test (t) for means. The difference in medians is analyzed 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

Comparing the operating excess performance between both buyout rounds against public peers, our results are shown in Table 9.

In contrast to Bonini (2015), we do not find a relative underperformance of SBOs compared to PBO; for both matching procedures, there is no significant difference in the operating excess performance against public peers between both buyout rounds. We thus reject hypothesis H4c.

7 Robustness analysis

Our results are in contrast to some previous studies on the relative performance of SBOs. Therefore, we run several tests to confirm the robustness of our results.

7.1 Selection effects

There is a potential selection effect affecting the interpretation of our results, if the profitability of the PBO has an impact on the choice of the exit channel bias: If very profitable or very unprofitable PBOs systematically prefer the PBO exit channel SBO, the performance comparison between the two buyout rounds could

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

Nearest neighbour matching approach: “base non-PE matching operating”

Panel A: Sales CAGR

| | Non-PE (nearest peer) | | Non-PE (median of five nearest peers) | | Non-PE (median of ten nearest peers) | | Difference tests | | |
|--------|-----------------------|-------|---------------------------------------|-------|--------------------------------------|-------|------------------|---------|---------|
| | PBO | SBO | PBO | SBO | PBO | SBO | (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

| | | | | | | | | | |
|--------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| 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 operating”

Panel C: Sales CAGR

| | | | | | | | | | |
|--------|-------|-------|-------|-------|-------|-------|--------|-------|--------|
| 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

| | | | | | | | | | |
|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 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 | | | |

The table provides summary statistics for the operating excess performance on secondary and primary buyouts, using the matching procedures “base non-PE matching operating” and “extended non-PE matching operating”. For “base non-PE matching operating”, the three following criteria have to be met: (i) entry deal value is in the $\pm 50\%$ bracket of the entry deal value of the SBO, (ii) holding period is in the $\pm 50\%$ bracket of the holding period of the SBO but not longer or shorter than two years away, and (iii) identical entry year of both buyouts. “Extended non-PE matching” requires additionally that both firms are from the same country. We report mean and median significance tests. The difference in means is analyzed by a two-sample t test (t) for means. The difference in medians is analyzed 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

be affected. We thus analyse the operating performance of PBOs over different exit channels. Our results are presented in Table 10.

We find the operating performance of PBOs with SBO exits to be significantly higher than the ones exited by trade sales. When PE funds use SBO as an entry channel and acquire portfolio companies of other PE funds, they seem to select companies with a higher operating performance out of the universe of PBOs as potential targets. On the other hand we do not observe an operating outperformance when comparing SBOs against matched PBO peers (see Table 7). When interpreting these

Table 10 Difference tests for the operating excess performance of PBOs by exit type

Nearest neighbour matching approach: "base non-PE matching operating"

Panel A: Sales CAGR

| | Non-PE (nearest peer) | | Non-PE (median of five nearest peers) | | Non-PE (median of ten nearest peers) | | Difference tests | | | | |
|--------|-----------------------|--------|---------------------------------------|--------|--------------------------------------|--------|------------------|---------|---------|-------|-----|
| | SBO | TS | SBO | TS | SBO | TS | | | | | |
| | (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

| | | | | | | | | | | | |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-----|-------|-----|
| 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 operating"

Panel C: Sales CAGR

| | | | | | | | | | | | | |
|--------|-------|--------|-------|--------|-------|--------|-------|----|-------|-----|-------|-----|
| 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

| | | | | | | | | | |
|--------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| 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 | | | |

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 operating" and "extended non-PE matching operating". We report mean and median significance tests. The difference in means is analyzed by a two-sample t test (t) for means. The difference in medians is analyzed 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

findings we need to keep in mind that our operating performance measures relate to growth rates of operating figures. Thus, one interpretation of this result is that PE funds are selecting PBO target companies with higher growth rates and that they are able to generate comparable size-, holding period- and strategy adjusted growth rates in the second buyout round.²⁸

²⁸ This result may be especially driven by the same strategy as a matching requirement, as buy and build strategies presumably yield significantly higher growth rates. As we do not have detailed information on the number and the size of add-on acquisitions in our sample, we are unable to perform a deeper analysis on this relationship.

Table 11 Difference tests for the IRR performance of SBOs and matched PBOs extended (robustness)

| | PBO (nearest peer) | PBO (median of five nearest peers) | SBO | Difference tests | |
|--------|--------------------------|---------------------------------------|-------|------------------|---------|
| | (1) | (2) | (3) | (1)–(3) | (2)–(3) |
| Mean | 0.236 | 0.233 | 0.247 | –0.427 | –0.666 |
| Median | 0.191 | 0.188 | 0.157 | 0.654 | 0.735 |
| N | 296 | 296 | 296 | | |

The table provides summary statistics for the IRRs on secondary and matched primary buyouts, using the matching procedure “PE strategy matching IRR”. We report mean and median significance tests. The difference in means is analyzed by a paired t test (t) for means. The difference in medians is analyzed 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

7.2 Performance analysis of PBOs and SBOs

7.2.1 IRR difference tests

To check for robustness we introduce a modification of our matching procedure “PE matching IRR”; given the significant impact of buy and build strategies on deal performance we require that both buyouts execute a similar value creation strategy by differentiating between organic and inorganic (B&B) value creation strategies.²⁹ Our results are shown in Table 11.

The results presented in Table 11 are again in line with our original findings; there is no significant difference between PBO and SBO deal performance. In order to further corroborate our results, we rerun our analysis on further modifications by adding (same industry (FF5)) or relaxing (same entry year) requirements to our matching procedure; still we do not find a significant difference in deal performance of the two buyout rounds.³⁰

7.2.2 Operating performance difference tests

In a further analysis, we require PBOs and SBOs compared not only to be matched with their public peers, but additionally to be matched against each other; our results are shown in Table 12.

Still we do not find any significant differences of the buyouts’ outperformances against their peers. As for our deal performance analysis, we also rerun our analysis with different requirements for our public peer matching (industry matching FF10

²⁹ 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.

³⁰ Results are available on request from the authors.

instead of FF5, additionally headquarters in the same country) and still find support for our main finding: operating (excess) performance of SBOs is not different from operating (excess) performance of PBOs.³¹

7.2.3 Propensity score matching

To further allay any potential concerns on the selection of control peers, we establish in a last robustness check a propensity score matching (PSM). We first run a probit regression with an indicator variable for an SBO, the treatment effect, as dependent variable and the following covariates that may affect the treatment outcome but are unaffected by the treatment itself as independent variables: entry size, i.e. entry deal size for the “Full IRR sample” as well as entry sales and entry EBITDA margin for the “Full operating sample”, holding period, entry year, ff5 industry sector, country. The regression results provide us with propensity scores. Next, we match each SBO in our samples with similar observations, i.e. PBOs with similar propensity scores, to check for the existence of any significant treatment effect, calculated as the mean difference in IRRs between SBOs and matched PBO peers. Table 13 presents the average treatment effects on the treated (ATET) using robust Abadie–Imbens standard errors and varying numbers of matches per observation.

The results confirm our previous findings and again lead us to reject hypotheses H2b and H4b of SBO underperformance. For the dependent variable IRR, we find an average treatment effect of -2 to -3 pts, which is, however, statistically insignificant in all variations in the number of matched PBOs. For the CAGR and EBITDA margin change, average treatment effects range from -1 to 3 pts and 0.1 to 0.5 pts, respectively, and are even selectively statistically significant in favour of SBOs.

The presented matching procedures of this analysis and the previous sections consider differences in the size, holding period, timing, industry, and country characteristics of consecutive buyout rounds. We apply different matching procedures, different distance measures and varying numbers of control peers to compare the performance between similar buyouts of consecutive buyouts rounds. All results of our robustness checks lead us to confirm the results of the preceding analysis: there is no significant underperformance of SBOs.

8 Conclusion

The surging increase in SBO activity in the past has attracted academic interest in the performance of this deals. The majority of empirical studies on this topic found a lower deal and operating performance of SBOs compared to PBOs. The main (“lemon”) interpretation of this result is that first-round buyers would leave at best only limited potential for further value creation on the table for the SBO investor.

³¹ Results are available on request from the authors.

Table 12 Difference tests for the operating excess performance of SBOs and matched PBOs

| Nearest neighbour matching approach: “base non-PE matching operating” | | | | | | | | | |
|---|--------|-------|--------------------------------------|-------|-------|------------------|---------|---------|---------|
| 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) | | | | | | |
| (1) | (2) | (3) | (4) | (5) | (6) | (1)–(3) | (2)–(3) | (4)–(6) | (5)–(6) |
| Mean | –0.019 | 0.010 | 0.005 | 0.010 | 0.014 | –1.254 | –1.343 | –0.582 | –0.372 |
| Median | –0.005 | 0.018 | 0.005 | 0.005 | 0.014 | –0.986 | –1.814 | –0.522 | –0.302 |
| N | 140 | 140 | 140 | 140 | 140 | | | | |
| Panel B: EBITDA margin change | | | | | | | | | |
| Mean | 0.003 | 0.005 | 0.004 | 0.006 | 0.005 | –0.357 | 0.444 | –0.447 | 0.424 |
| Median | 0.000 | 0.004 | 0.004 | 0.005 | 0.004 | –0.485 | –0.218 | –0.352 | 0.572 |
| N | 140 | 140 | 140 | 140 | 140 | | | | |
| Nearest neighbour matching approach: “extended non-PE matching operating” | | | | | | | | | |
| Panel C: Sales CAGR | | | | | | | | | |
| Mean | 0.018 | 0.010 | 0.030 | 0.023 | 0.031 | 0.339 | –0.487 | –0.034 | –0.586 |
| Median | 0.030 | 0.034 | 0.019 | 0.011 | 0.025 | 0.400 | –0.671 | 0.319 | 0.062 |
| N | 131 | 131 | 131 | 131 | 131 | | | | |
| Panel D: EBITDA margin change | | | | | | | | | |
| Mean | 0.005 | 0.003 | 0.003 | 0.006 | 0.004 | 0.548 | 0.789 | –0.429 | 0.887 |
| Median | 0.004 | 0.002 | 0.005 | 0.005 | 0.002 | 0.087 | 0.124 | 0.181 | 1.146 |
| N | 131 | 131 | 131 | 131 | 131 | | | | |

The table provides summary statistics for the operating excess performance on secondary and matched primary buyouts, using the matching procedures “PE matching operating”, “base non-PE matching operating”, and “extended non-PE matching operating”. We report mean and median significance tests. The difference in means is analyzed by a paired t test (t) for means. The difference in medians is analyzed 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

Table 13 Estimators

| | Dependent variable: IRR | Dependent variable: sales CAGR | Dependent variable: EBITDA margin change |
|-------------------|-------------------------------|--------------------------------------|--|
| | (1) | (2) | (3) |
| ATET with NN = 1 | −0.025 (0.023) | 0.033 ** (0.015) | 0.001 (0.005) |
| ATET with NN = 2 | −0.310 (0.021) | 0.012 (0.015) | 0.002 (0.003) |
| ATET with NN = 3 | −0.026 (0.018) | 0.004 (0.015) | 0.003 (0.003) |
| ATET with NN = 4 | −0.024 (0.019) | 0.003 (0.014) | 0.003 (0.003) |
| ATET with NN = 5 | −0.031 (0.019) | −0.004 (0.015) | 0.003 (0.003) |
| ATET with NN = 10 | 0.021 (0.017) | −0.007 (0.014) | 0.004 * (0.002) |
| ATET with NN = 15 | −0.020 (0.016) | −0.004 (0.014) | 0.004 * (0.002) |
| ATET with NN = 25 | −0.024 (0.018) | 0.001 (0.013) | 0.005 ** (0.002) |

The table presents the average treatment effect on the treated (ATET) for propensity score matching (PSM) estimators. We use varying numbers of nearest neighbours (NN). The dependent variables are the IRR (“Full IRR sample”) as well as sales CAGR and EBITDA margin change (“Full operating sample”). Robust Abadie–Imbens standard errors are reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively

Only if the initial buyer were not able to extract all untapped value, second round buyouts might perform well.

In this paper, we differentiate between hypotheses linked to the SBO performance conditional on the performance of the PBO (“negative correlation”) and hypotheses on unconditional comparisons between SBO and PBO performance (“outperformance”).

The “negative correlation hypothesis” is analysed based on a large back-to-back sample of 276 PBO/SBO chains. We do not find a negative correlation between the deal performance of PBOs and SBOs of back-to-back deals and thus reject the corresponding hypothesis.

With respect to the outperformance hypotheses, we compare SBO performance directly against PBO performance, using our “full IRR sample” of 1,534 PBOs and 486 SBOs for deal IRRs and our “full operating sample” of 508 PBOs and 163 SBOs for operating performance. When directly comparing the IRRs between back-to-back deals, our results suggest that SBO performance is inferior compared to the

analyses are exposed to a potential selection bias caused by different exit channels. This needs to be taken into account when analysing the performance of SBOs.

Finally, we point out some limitations of our work and highlight potential extensions of the analyses: First, our deal performance measure rests on enterprise value IRRs, not on equity IRRs; thus, we cannot rule out that differences in leverage ratios and leverage dynamics between the two buyout rounds may affect our findings of no outperformance for PBOs over SBOs. Second, our analysis rests on IRRs before fees and thus ignores potential differences between the net-of-fees performance between PBOs and SBOs. And finally, our results on operating performance are limited to the European buyout market, as there are no data available for US privately held companies.

We consider the analysis of the growing number of tertiary, quaternary and further buyout rounds a fruitful extension of our study. As the number of different strategies of value creation for the same asset and/or the timeframe for continuing the preceding strategy is limited (e.g. for a rollup buy&build strategy by the number of potential add-on acquisitions), one might expect a decreasing importance of higher order buyouts as an exit channel. If higher order buyouts happen, the level and the composition of its performance may be significantly different to the earlier buyout rounds. Thus, it might also be worthwhile to analyse the performance pattern of higher order buyouts. As our results suggest, at least for SBOs, the current perception of SBOs should be revised and turn from “second hand” deals to “second generation” deals, providing investors with a well-performing alternative to PBOs.

Appendix

See Tables 14 and 15.

Table 14 Sample definitions

| Sample | Selection criteria | Observations |
|-------------------------------------|---|-------------------|
| Back to back (BTB) IRR Sample | Only deals with IRR available for the same firm in PBO and SBO | 276 PBO, 276 SBO |
| Full IRR sample | All PBOs and SBOs available | 1534 PBO, 486 SBO |
| Back to back (BTB) operating Sample | Only deals with necessary operating data available for the same firm in PBO and SBO | 50 PBO, 50 SBO |
| Full operating Sample | All PBO and SBO available | 508 PBO, 163 SBO |

The table presents the different samples used in the analysis and their selection criteria

Table 15 Matching procedures

| Matching Procedure/Strategy | Requirements for peers to be included |
|---|--|
| <i>Panel A: Comparing PBO vs. SBO</i> | |
| PE matching IRR | Entry value $\pm 50\%$ of the entry values of the SBO Holding period $\pm 50\%$ of holding period of the SBO, absolute difference $< 2y$ Same entry year as the SBO |
| PE strategy matching IRR | Entry value $\pm 50\%$ of the entry values of the SBO Holding period $\pm 50\%$ of holding period of the SBO, absolute difference $< 2y$ Same entry year as the SBO B&B strategy |
| PE matching operating | Entry sales are in the $\pm 50\%$ bracket of the entry sales of the SBO, EBITDA margin is in the ± 10 pts bracket of the entry EBITDA margin, Holding period is in the $\pm 50\%$ bracket of the holding period of the SBO but not longer or shorter than two years away |
| <i>Panel B: Comparing PBO vs. public peers and SBO vs. public peers</i> | |
| Base non-PE matching operating | listed at entry and exit date of the resp. buyout, The sales in the $\pm 50\%$ bracket of sales in the buyouts' entry year, The EBITDA margin in the ± 10 ppt. bracket of margin in the buyouts' entry year In the same FF5 industry as the buyout |
| Extended non-PE matching operating | Listed at entry and exit date of the resp. buyout, The sales in the $\pm 50\%$ bracket of sales in the buyouts' entry year, The EBITDA margin in the ± 10 ppt. bracket of margin in the buyouts' entry year In the same FF5 industry as the buyout Headquarter in the same country |

The table presents the different matching strategies used in the analysis and the requirements for the peer companies to be included.

one in the initial buyout. However, when controlling for size and holding period, we do not find a significant difference either in investors returns or in the operating performance between PBOs and SBOs of a portfolio firm. Our results also suggest that SBOs benefit from first round PE ownership by building on an already professionalized asset, which particularly holds for smaller portfolio firms.

We thus conclude that PE ownership significantly changes a portfolio firm in terms of product, geographical and industry coverage, amongst others. Although it is the same legal entity at PBO and SBO entry, in practice the firm evolves to a different firm, the “second generation”, in practice.

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. With deal performance, the distortion is due to the well-known shortcomings of using IRR as a performance measure; in operating back-to-back

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