The Post-Exit Operating Performance of Buy-and-Build Firms

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Abstract

This thesis studies the impact of the exit route on operating performance of buy-and-build firms after the private equity firm has exited. I analyse an unique dataset of 127 European buy-and-build firms that are exited through an IPO, secondary buyout, or strategic sale between 2000 and 2015, using information on private equity firm and portfolio company characteristics, as well as debt and equity market conditions. Although operating performance improves following buy-and-build strategies relative to industry-median firms, I find no evidence of superior post-exit operating performance using a propensity score matched sample of non-buy-and-build firms as a benchmark. I find that the post-exit operating performance of buy-and-build firms does not depend on the chosen exit route. My results show that a buy-and-build strategy significantly increases the probability to be sold to another private equity firm relative to a sale to a strategic buyer.

JEL classification: G24, G34

Keywords: buy-and-build, exits, private equity, operating performance

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The exit of a portfolio company is one of the most critical aspects in private equity because both the future of the portfolio company and the returns to the private equity investors depend on the exit. Since private equity funds are closed-end vehicles[1], investors capitalize their returns after a liquidity event: a company exit. Kaplan and Schoar (2005) find that private equity (PE) investors earn slightly less than investors in the Standard and Poor's (S&P) 500 index net of fees but outperform the S&P 500 index gross of fees (when fees are added back). Those returns suggest private equity firms (or General Partners (GPs)) add value to its investments during the holding period. Practitioners and researchers argue on the long-term effects of private equity involvement after the investors exit. The long-term value-added hypothesis predicts firms to continue to benefit from the private equity involvement after the exit. Existing literature suggests that private equity firm create value on a company-level by applying financial, governance, and operational engineering to their portfolio companies (e.g. Jensen, 1989; Kaplan, 1989; Kaplan and Stromberg, 2009). The short-term value-added hypothesis expects GPs to focus on maximizing their returns, even if this results in unfavourable effects for the portfolio firm in the long-term (Degeorge and Zeckhauser, 1995; Cao, 2011). In this thesis, I study whether the choice of the exit route has an effect on firm performance after the exit.

Traditionally, private equity firms enhance value of their portfolio companies by financial and governance engineering (Kaplan, 1989; Kaplan and Stromberg, 2009; Gompers, Kaplan, and Mukharlyamov, 2016). However, since the financial crisis these value creation levers have come under pressure. The increased capital committed to private equity, combined with healthy mergers and acquisitions (M&A) markets, have led to intense competition for assets and hence rising valuations, which make it difficult for GPs running private equity funds to achieve excess returns by multiple expansion at the exit. The easy access to credit due to low interest rates results in higher deal leverage and risk of overpayment, which is not in the interest of the investors (or Limited Partners, LPs) (Axelson et al., 2013). In addition, there are less opportunities for governance improvement as the governance standards of many companies have advanced since the early years of the private equity industry (Hammer et al., 2017). Therefore, there is an increasing focus of GPs on the value enhancement of portfolio companies as source of returns. A recently evolving value creation strategy is the so called "buy-and-build" strategy[2], in which a portfolio company that has been acquired through a leveraged buyout serves as a platform for subsequent add-on acquisitions (Smit, 2001).

[1] In a closed-end fund, contrary to, for example a mutual fund, investors cannot withdraw their money until the fund is terminated.

[2] The Dutch soft drinks manufacturer Refresco (included in my sample) is an example of a firm following a strong buy-and-build strategy. The firm was acquired in an initial buyout by the private equity firm 3i in 2003. In 2006, Refresco was involved in a secondary buyout when 3i sold the company to a consortium of Icelandic private equity firms. In 2010, 3i again acquired a minority stake in Refresco to support the company's buy-and-build strategy. During the investment period, Refresco demonstrated a strong growth due to international acquisitions in Germany, Italy, and Poland. The firm acquired large competitors as Gerber Emig in 2013 and recently Cott. Throughout the holding period, the company acquired on average one company every year. In 2015, 3i and the Icelandic consortium exited Refresco through an initial public offering (IPO) on the Amsterdam stock exchange. This year, the French private equity firm PAI Partners aims to take Refresco private again. Between 2003 and 2016 Refresco's operating revenue increased from $0.6bn in 2003 to $2.1bn in 2016.

A study by the Boston Consulting Group and HHL Leipzig Graduate School of Management shows that the share of private equity deals that include add-on acquisitions increased from 20% in 2000 to 53% in 2012[3]. Despite the relevance of buy-and-build strategies for the private equity industry, there is very little research conducted on this topic. The few existing studies focus on the return of add-on acquisitions (Nikoskelainen and Wright, 2007), the drivers of a buy-and-build strategy (Hammer, Hinrichs, and Schweizer, 2016; Hammer et al., 2017), or the valuation of buy-and-build strategies by real options and game theory (Smit, 2001). While these studies provide evidence of the attractiveness of following a buy-and-build strategy, no study to date, to the best of my knowledge, has yet analysed the persistence of the value created by an inorganic growth strategy after the private equity investors exit.

The existing literature on private equity investments provides significant evidence that private equity investors enhance the operating performance of their portfolio companies during the holding period (e.g. Kaplan, 1989; Smith, 1990; Guo, Hotchkiss, and Song, 2011). In research to the long-term effect of private equity investment on firm performance after the private equity firm exits, the majority of studies examines the persistence of firm performance conditional on one exit type (e.g. Degeorge and Zeckhauser, 1995; Jain and Kini, 1995; Wang, 2012). However, the exit decision is one of the most critical choices faced by private equity firms. The common exit routes for a private equity investor are an initial public offering (IPO), sale to a strategic buyer (strategic sale), and a sale to another private equity fund (secondary buyout). Some companies are more suited to a particular exit route. Larger companies are more likely to exit through an IPO because these companies are more able to bear the high fixed costs of an IPO process (Pagano, Panetta, and Zingales, 1998; Cumming and MacIntosh, 2003). Companies generating high cash flows that are able to make high interest payments may be suitable for a secondary buyout (Jenkinson and Sousa, 2015). In addition, Wang (2012) suggests secondary buyouts can serve as alternative exits when other exit routes become less attractive as a result of unfavourable equity market conditions and loose credit constraints. Many researchers focus on the performance of private equity investments exiting through an IPO (Muscarella and Vetsuypens, 1990; Megginson and Weiss, 1991; Degeorge and Zeckhauser, 1995; Holthausen and Larcker; Jain and Kini, 1995; Cao, 2011), although the IPO is a marginal exit route for private equity investors. According to Jenkinson and Sousa (2015) studying 1 022 private equity exits between 2000 and 2014, 14% of the investments are exited through a public offering. The sale of a portfolio company to another financial sponsor has increased in popularity relative to IPOs and sales to corporate acquirers, and so does the research to operating performance of secondary buyouts (e.g. Wang, 2012; Smit and Volosovych, 2013; Bonini, 2015). Exiting literature provides evidence of PE-backed firms going public exhibiting better operating performance than non-PE backed firms, although the operating performance declines post-issuance (Degeorge and Zeckhauser, 1995; Holthausen and Larcker; Jain and Kini, 1995). Firms exited through a secondary buyout show no improvement in operating performance relative to non-PE backed firms (Wang, 2012; Smit and Volosovych, 2013; Bonini, 2015). There is limited research to

[3] See the 2016 BCG report *The Power of Buy and Build*. Available online.

the persistence of the effect of private equity investments performance across various exit routes. As an exception, Meles, Montferrà, and Verdoliva (2014) study the post-exit operating performance of Italian private equity investments and find that firms exited through an IPO underperform relative to firm sold to a corporate acquirer or financial sponsor.

In this thesis, I study the impact of the exit strategy on the post-exit operating performance of firms following a buy-and-build strategy. Specifically, this thesis contributes to the existing literature by answering the question: What is the impact of the exit route on the post-exit operating performance of private equity investments following a buy-and-build strategy? I examine the impact of the exit route on performance from an ex-post perspective and I investigate whether the post-exit operating performance depends on the predicted exit route.

To answer my research question, I analyse the operating performance of 127 European private equity investments that followed a buy-and-build strategy and are exited through an IPO, secondary buyout, or strategic sale between 2000 and 2015. I construct a control sample of exited firms that did not follow a buy-and-build strategy using propensity-score-matching. I test the robustness of my results using industry median performance as a benchmark. I first examine whether a buy-and-build strategy results in superior operating performance after the exit, using median performance changes, difference-in-difference analysis, and panel regressions. I do not find evidence of firms generating better performance following add-on acquisitions relative to both benchmarks. Furthermore, I am interested what factors determine the exit decision for buy-and-build firms. Contrary to previous findings, I do not find evidence of buy-and-build strategies increasing the probability of an exit through an IPO. The results suggest that a buy-and-build strategy increases the probability to be sold to another private equity firm relative to a sale to a strategic buyer. I find that firms are more likely to go public under favourable equity market conditions, measured by local IPO volume. This finding does not hold for buy-and-build firms. Furthermore, my results suggest the exit decision does not depend on debt market conditions.

I find that both the level and the change in post-exit operating performance do not depend on the exit route of the private equity firm, independent of the used benchmark. The results suggest that private equity firms choose the route and timing of exit that maximizes their return. It is likely that the choice of the exit route changes during the holding period. A two-step approach enables me to evaluate the impact of a maximum-likelihood exit route on operating performance. I first estimate the predicted exit strategy using a multinomial logistic regression. I include the estimated parameters of the predicted exit route as independent variables in OLS panel regressions on post-exit operating performance. I find that the change in post-exit operating performance is significantly higher for buy-and-build firms relative to the benchmark after a predicted IPO and significantly lower after a predicted trade sale. The difference in impact of the actual and predicted exit route hints the presence of other, unobserved drivers of the exit decision.

This thesis adds to the existing literature in two regards. First, my thesis helps to fill the gap in the literature on buy-and-build strategies, using a unique dataset to evaluate the impact of buy-and-build strategies on operating performance after the private equity firms exit. Second, my

findings add to the literature regarding the exit decision. I analyse the drivers of the exit decision and test operating performance of firms exited via three common exit routes (i.e. IPO, secondary buyout, and strategic sale).

1. Post-exit Operating Performance of Buy-and-Build Firms

1.1. The buy-and-build strategy

In the last decades, the buy-and-build strategy has evolved as a common used value creation strategy. The buy-and-build strategy is an inorganic growth strategy in which a private equity investor acquires a company through an initial buyout and uses it as a platform for subsequent acquisitions (Smit, 2001). Value is created through the consolidation of add-on acquisitions that can both accelerate revenue growth and increase in profitability margins by realizing synergies. In addition, a buy-and-build strategy can create expectations of continued growth and margin improvements, which may lead to higher exit valuations.

Private equity firms can generate positive returns without making any operational improvements by multiple arbitrage, selling a portfolio company at a higher valuation multiple than that at which they bought it. Multiple arbitrage is the private equity equivalent of a free lunch. Large companies generally have higher multiples than smaller ones. Multiple arbitrage is realized in an inorganic growth strategy if the multiples of the add-on acquisitions are lower than the exit multiple of the buy-and-build firm and hence the private equity firm is able to sell the portfolio company for a greater value than the sum of its parts.

According to Smit (2001), a buy-and-build strategy enhances value in two ways. First, there is a financial leverage effect, which also applies to traditional buyouts. Typically, private equity investments are financed through an excessive amount of debt, which creates valuable tax shield of debt. In addition, the high leverage limits managers' ability of investing free cash flows in unprofitable investments, urges the manager to improve efficiency and cash flow, and therefore reduces agency costs. Second, there is a synergistic effect. Traditional synergy levers result from the increase in size, such as economies of scale in procurement and in selling, general, and administrative expenses. According to Smit (2001), the private equity investor may have more attractive exit opportunities if the portfolio firm becomes larger and more mature. The added value of the buy-and-build strategy is equal to the amount by which the exit value of the buy-and-build firm exceeds the sum of the cost of the add-on acquisitions and the cost of organic growth in each of the firms.

There is little academic attention to the effect of add-on acquisitions on operating performance of PE-backed firms. Guo, Hotchkiss, and Song (2011) touch upon the topic briefly in their study to the relationship between operating performance of leveraged buyouts and four factors expected to be related to operating gains: management incentives, benefits of increased debt, improved governance and monitoring, and other activities during the holding period including add-on acquisitions. They find no effect of acquisition behaviour during the holding period on the level of return on assets and return on sales, nor on the change of both performance measures. Previous studies to the

effect of corporate acquisitions on operating performance generate mixed findings. Healy, Palepu, and Ruback (1992) find an abnormal increase in operating performance of firms following acquisitions relative to their industries. According to Ghosh (2001), studying operating performance relative to industry medians generates biased results. Therefore, Ghosh uses firms matched on size and performance as a benchmark and finds no evidence of improvements in post-acquisition operating performance. In contrast, Powell and Stark (2005) find a modest improvement in operating performance after acquisition activities using both a regression-based methodology and a change model. I, therefore, test the following hypothesis:

Hypothesis 1: the post-exit performance of buy-and-build firms is superior relative to non-buy-and-build firms

1.2. Exit routes for buy-and-build firms

The exit decision is an important aspect of the private equity investment process. The distribution of exit routes varies over time. Kaplan and Stromberg (2009) study 17 171 worldwide leveraged buyout transactions between 1970 and 2007 and find that the sale of the portfolio company to a strategic buyer is the most common exit route over the whole period. The second most common exit route is a secondary buyout, which has become a more popular exit channel over time. Going public has considerably decreased in relative importance over time. Between 1970 and 1984 28% of the exited firms went public, compared to 1% in their last observation year. In academic literature, an exit through an IPO is called a "reverse leveraged buyout" (RLBO) (e.g. by Degeorge and Zeckhauser, 1993; Holthausen and Larcker, 1996; Cao and Lerner, 2009) if the portfolio company had already been listed before it was taken private through an initial buyout or "public-to-private" deal. In general, an IPO of a PE-backed firm initially results in a partial exit for the private equity investor, as many IPOs feature a lock-up provision (Cumming and MacIntosh, 2003). A lock-up is a contractual caveat that prohibits corporate insiders from selling their entire stake during a period of time after the IPO, usually 90 to 180 days. The private equity investors retain significant ownership and control of the public corporation. Cao and Lerner (2009) find that the ownership stake of private equity investors typically decreases from 59% before the IPO to 40% after the public offering. In a strategic sale the acquirer typically operates in the same industry as the target. A trade sale or sell-out is a strategic sale in which the acquirer is a public company and an alternative method by which privately owned assets move to public ownership (Poulsen and Stegemoller, 2008). In a secondary buyout, or sponsor-to-sponsor exit, the private equity investors sell the portfolio firm to another private equity firm, instead of selling it back to the public market (Wang, 2012). Secondary buyouts have historically been seen as a last resort, as successful deals would exit through IPOs or trade sales (Bonini, 2015). Nevertheless, secondary buyouts have increased in popularity over the last years. Different specializations and fund sizes of private equity firms may explain the recent secondary buyout wave. Some GPs are specialized in early-stage, small firm investments, whereas others on later-stage investments. If a portfolio firm owned by a small private equity fund has increased in size as a result of a buy-and-build strategy, the fund

may lack the economic resources for further expansion. A sale to a larger private equity fund may be an interesting exit option to further employ the inorganic growth strategy. Consistent with this rationale, Wang (2012) states private equity firms have a different skill-set to create value to their investments.

Some studies suggest a pecking order of exit routes in which an IPO is the preferred exit route for private equity firms because this route provides the most return potential (Sudarsanam, 2005; Nikoskelainen and Wright, 2007; Cao and Lerner, 2009). However, for a private equity investor, a sale to a strategic buyer or other financial sponsor may be more attractive than a public offering because of the certainty and speed of sale. Reviewing the existing literature, I identify three set of factors determining the exit decision: portfolio characteristics, investment and investor characteristics, and market conditions.

Some portfolio companies are more suited to a particular exit route. Pagano, Panetta, and Zingales (1998) show that large companies are more likely to go public. Only firms above a certain threshold size are expected to exit through an IPO (Cumming and MacIntosh, 2003; Sudarsanam, 2005). A strategic sale is more likely to be used as an exit for smaller portfolio firms with lower margins, whereas the attractiveness of a secondary buyout increases for companies with significantly high margins. Firms exited through a secondary buyout show better operating performance in the year before the exit (Sudarsanam, 2005; Jenkinson and Sousa, 2015). Companies that are able to operate with a large amount of debt, due to high cash flows, may be particularly suitable for an exit through a secondary buyout.

Hammer et al. (2017) are the first to study a relationship between buy-and-build strategies and exit decisions using a comprehensive sample of 9 548 buyouts. They find that add-on acquisitions during the holding period increase the probability to exit through an IPO. Since the portfolio company becomes larger as a result of the buy-and-build strategy, it may be more able to bear the high fixed costs of an IPO. Furthermore, Hammer et al. (2017) find that the probability for a secondary buyout increases if there is left-over add-on potential for the subsequent owner, so it is able to continue the inorganic growth strategy. If the portfolio firm operates in a market that is fragmented with many small players, there will be ample room for industry consolidation and hence a buy-and-build strategy.

Hypothesis 2: a buy-and-build strategy increases the probability of choosing an IPO as the exit route.

Ideally, private equity firms hold their portfolio companies until the maximum payoff could be achieved. However, the longer the firm has been the held, the closer the fund is to its finite life. Private equity investors face a liquidity pressure as their funds approach maturity. In addition, GPs have incentives to exit to show proceeds to their LPs when raising a new fund. When the end of the fund approaches or the private equity firm is raising a subsequent fund but equity market conditions are unfavourable, a secondary buyout might be a quicker way out than a trade sale or an IPO. Firms are more likely to exit through secondary buyouts if the private equity firms face a higher pressure to exit (Sudarsanam, 2005; Axelson, Stromberg and Weisbach, 2009; Wang,

2012; Jenkinson and Sousa, 2015). The experience of the GP also tends to have an impact on the exit decision. Jenkinson and Sousa (2015) find that the probability that a portfolio firm is exited through a trade sale is higher relative to a secondary buyout if the private equity firm is more experienced. An IPO may be used by young private equity firms as a marketing device to establish a reputation and successfully raise capital for subsequent funds (Gompers, 1996; Jenkinson and Sousa, 2015).

According to existing literature, debt and equity market conditions are the main drivers of the exit decision (e.g. Cao, 2011; Wang, 2012; Jenkinson and Sousa, 2015). Firms are more likely to exit through a secondary buyout if the equity market does not perform well and when debt market conditions are favourable (Wang, 2012). Favourable credit conditions may increase the amount of leverage used by private equity investors, resulting in higher transaction prices at the cost of fund returns (Axelson et al., 2013). An exit through an IPO is more likely under favourable equity market conditions, even if it harms the long-term performance of the portfolio firm (Lerner, 1994; Cao 2011; Jenkinson and Sousa, 2015). Therefore, it is worthwhile to investigate the impact of debt and equity market conditions on the exit decision.

Hypothesis 3a: buy-and-build firms are more likely to exit through an IPO under favourable equity market conditions.

Hypothesis 3b: buy-and-build firms are more likely to exit through a secondary buyout under favourable debt market conditions.

1.3. Exit routes and post-exit operating performance

Improvements in operating performance of PE-backed firms include improvements in cash flow that result from the growth of sales, financial restructuring, and optimization of working capital (Kaplan, 1989). Meles Monferrà, and Verdoliva (2014) find that the change in performance is lower for PE-backed firm that have gone public compared to firms sold to a strategic or financial buyer. Jelic and Wright (2011) examine the post-exit abnormal operating performance of 1 255 UK buyouts between 1980 and 2009 and find a decline in operating performance following an exit through an IPO, whereas firms sold to a financial sponsor show performance improvements in the years after the secondary buyout. These findings suggest that post-exit operating performance is dependent on the type of exit. Nevertheless, the majority of literature studies the long-term effects of private equity investments on operating performance for a single type of exit. Although a small portion of PE-backed companies is exited through an IPO, a substantial body of empirical work is based on post-issue operating performance of IPO firms.

In general, the IPO literature provides evidence that the operating performance of PE-backed firms improves in the year prior to an IPO and declines post-issuance (Degeorge and Zeckhauser, 1993; Holthausen and Larcker, 1996). Performance timing may explain this pattern, with private equity investors exiting through an IPO when they see a temporary performance improvement (Degeorge and Zeckhauser, 1993). According to Cao (2011), the deterioration in operating per-

formance in post-IPO years is affected by market timing, as private equity investors time their exit along debt and equity market conditions to maximize their returns. Although IPOs exhibit a decline in operating performance, PE-backed firms have better operating performance than non-PE-backed firms, both before and after going public (Muscarella and Vetsuypens, 1990; Degeorge and Zeckhauser, 1993; Jain and Kini, 1995; Holthausen and Larcker, 1996). Previous literature suggests that private equity firms provide post-divestment value-added services (Megginson and Weiss, 1991; Meles, Monferrà, and Verdoliva, 2014).

As a secondary buyout has become increasingly popular as an exit route, so does the interest in secondary buyouts of academia increased over the recent years. Both practitioners and scholars have discussed the economic rationale of secondary buyouts. The operating performance potential of secondary buyouts may be limited because the initial private equity firm had likely implemented improvements with the largest impact on operating performance (Cumming and MacIntosh, 2003). Furthermore, the growth in volume of secondary buyouts is simultaneous to the growing liquidity in the debt market rather than being driven by improvements in operating performance (Smit and Volosovych, 2013). Achleitner and Figge (2014) find evidence that secondary buyouts are 6-9% more expensive than other buyouts and attribute this premium to the seller's market timing and negotiation skills. In contrast to these views, private equity firms may exit their portfolio company even if there is still significant operating performance improvement potential if the fund approaches the end of its lifetime (Jelic and Wright, 2011; Wang, 2012; Axelson, Stromberg, and Weisbach, 2013). Private equity investors may have different skills and can add a different type of value to the portfolio company (Acharya et al., 2012; Wang, 2012). Nevertheless, the existing literature finds no improvement in operating performance of secondary buyouts relative to the used benchmark (Wang, 2012; Smit and Volosovych, 2013; Bonini, 2015).

Hypothesis 4: the chosen exit route has an impact on the post-exit operating performance of buy-and-build companies

If the post-exit operating performance depends on the exit route and one of the exit routes results in superior performance, the market will react on the expected performance following the exit and the chosen exit route will be reflected in price. In pursuing a value-maximizing strategy, private equity firms should always choose the exit route generating the highest return and hence the highest post-exit operating performance. Existing literature finds evidence of private equity firms time the exit decision to maximize returns to their LPs. Under the performance timing hypothesis, private equity investors take advantage of a temporary improvement in operating performance that results in a high equity valuation, as suggested by Degeorge and Zeckhauser (1993). In contrast, under the market timing hypothesis, the private equity investors time the exit and take advantage of the debt and equity market conditions, by exiting through an IPO when the equity market conditions are favourable and exit through a secondary buyout if the equity market is "cold" (Cao, 2011; Wang, 2012; Axelson et al., 2013).

The existing literature provides drivers of the exit decision. These drivers allow predicting the exit route. The exit decision may be affected by factors other than market conditions, investor and

investment characteristics. It is possible that there are no potential buyers corresponding to the predicted exit route or this type of acquirer does not offer the highest bid. Firms may lack the attention of potential buyers due to market imperfections. This phenomenon is suggested by the increasing popularity of dual-track exits, in which a firm is sold to a strategic or financial buyer after a partial exit through an IPO. Moreover, irrational decision making may have an impact on the exit. For instance, a management team that wants to keep its seat after the exit but a sale to a strategic buyer eliminates its job, may guide the firm to an IPO or secondary buyout. The actual chosen exit route may differ from the predicted exit route. By analysing the performance after the predicted exit route, I am able to test whether the ex-ante exit route is legitimate.

Hypothesis 5: the predicted exit route has an impact on the post-exit operating performance of buy-and-build companies

Other factors that may have an impact on the post-exit operating performance are the holding period, the number of private equity investors holding an equity stake in the portfolio company, the experience of the private equity firm, and the industry the portfolio firm is active in. A private equity firm may hold the investment if a larger return is expected by holding it longer. However, private equity firms earn carried interest if the fund exceeds a hurdle rate expressed in terms of the whole fund internal rate of return (IRR) and a shorter holding period increases the IRR. Meles Monferrà, and Verdoliva (2014) find an inverted U-shaped relationship between the holding period and the post-exit operating performance. According to Cao and Lerner (2009), a shorter holding period leads to more deterioration in operating performance after the company goes public. Overall, the predicted relationship between the length of investment and operating performance is ambiguous. Smit and Volosovych (2013) find no significant correlation between club private equity participation and operating performance, while Meles, Monferrà, and Verdoliva (2014) report a positive and significant association between the number of private equity investors with equity positions and the post-exit operating performance. I control for these factors in my analyses.

2. Data and Methodology

2.1. Sample selection and data sources

I collect my sample of add-on acquisitions completed between 1997 and the end of 2014 using Bureau van Dijk's Zephyr database[4]. The initial sample includes all completed and confirmed deals in Scandinavia and the United Kingdom classified as build-up by Zephyr. I find 1 115 add-on acquisitions in Denmark (66), Finland (123), Norway (62), Sweden (153), and the United Kingdom

[4] Bureau van Dijk's Zephyr database contains comprehensive mergers and acquisition-, IPO- and private equity data from over 1.5 million deals worldwide dating from 1997. Zephyr is used by former research on private equity (e.g. Wang, 2012; Smit and Volosovych, 2013; Jenkinson and Sousa, 2015). Two advantages of using Zephyr are: i) Zephyr covers many small deals in Europe compared to other databases, since it requires no minimum deal value. Its extensive coverage minimizes the potential selection bias due to non-random missing observations as it is likely that add-on acquisitions are relatively small. ii) Zephyr recognizes deals as a build-up if the acquiring company is owned by a private equity firm.

(711) by 778 PE-backed firms. The geographical limitation accounts for the target companies of the add-on acquisitions. As a result of cross-border transactions my sample includes platform companies and private equity firms from the rest of the world.

Zephyr distinguishes deals between acquisitions, mergers, institutional buyouts, management buy-ins, management buyouts, IPOs, and share buy-backs. I use the unique Bureau van Dijk identification numbers (BvD IDs) of the acquirer in the build-up deals to identify the platform companies. I search in Zephyr for transactions classified as institutional buyouts (IBO), management buyouts and buy-ins (MBO, MBI), in which the platform company is the target. A transaction completed prior to the add-on acquisition is seen as the initial buyout of the platform. To find the corresponding exit, I search for all completed deals in the Zephyr database in which the platform company is the target. I consider the first completed deal after the build-up deal as the exit. In the majority of these deals the sub-deal type is classified as an exit by Zephyr, otherwise I verify if it is the right exit by reading the deal comments. I find an exit for 368 of the 778 platform companies. I check on a case-by-case basis whether the platform companies exhibit an exit transaction or are still in the portfolio using sponsor websites and press releases. Furthermore, I crosscheck the sample with the data set of my thesis supervisor and add another 82 exits. I am left with 450 exits. I categorize the exit routes to suit the sample to the purpose of my analysis. I label exits classified as acquisitions and mergers by Zephyr as trade sales. I make no distinction between sales to publicly-listed or private companies. An acquisition by a PE-backed company is classified as a secondary buyout. I further group institutional buyouts, management buy-ins, and management buyouts in the category of secondary buyouts. For simplicity, the category secondary buyouts includes tertiary buyouts, quaternary buyouts, and quinary buyouts. IPOs remain the same and I drop share buy-back as this exit route rarely happens and may be used as a subsequent exit after a public offering. I do not include unsuccessful exits such as liquidations and write-off because these firms do not show any performance after the exit. As a consequence, my results suffer from survivorship bias. I drop partial exits, except for exits through an IPO because of the required lock-up period.

For my sample of 450 firms with known entries and exits, I use the names and corresponding BvD IDs to collect pre- and post-exit financial statements from Bureau van Dijk's Orbis database. Orbis provides company financials of both public and private firms. In a typical private equity deal, the acquirer will create a chain of holding companies to separate the senior lenders, the junior lenders, and the equity shareholders (Smit and Volosovych, 2013). There may be at least three tiers of shell special purpose companies, called "Newcos": Bidco, Midco, and Topco. Bidco is a special acquisition vehicle formed to acquire the target and pays the acquisition price out of the loans provided by senior banks and subordinated mezzanine lenders. Midco owns Bidco and provides the rest of the financing out of shareholder loans. The private equity fund and management will hold their equity in Topco, which owns Midco and is on top of the chain of holding companies[5]. After the acquisition, all proceeds from the targets are consolidated under the Topco. It is likely that

[5] According to reports of Allen & Overy (2010) *Leveraged Mergers & Acquisitions*, and Deloitte (2017) *Private Equity Demystified*. Available online.

the acquirers in my sample of add-on acquisitions are Bidco's, while their performance is included in the Topco. Therefore, I first have to identify the various entities. Figure 1 shows a typical deal structure in a private equity transaction.

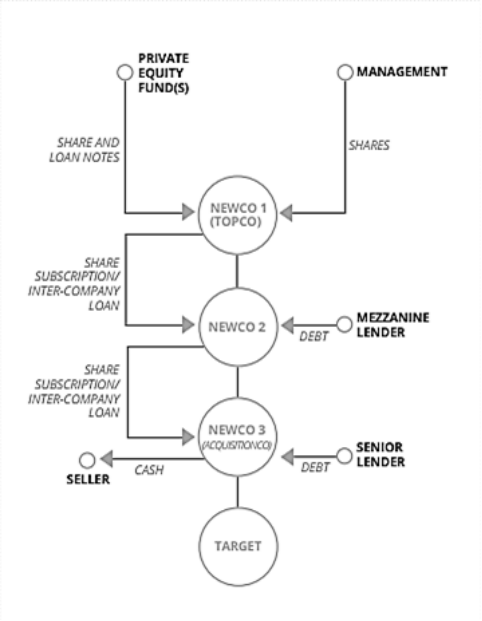

Fig. 1. Newco structure private equity deals. This figure shows a typical deal structure in private equity deals.[7]

Following Smit and Volosovych (2013), I use consolidated statements of the ultimate holding companies. A consolidated statement integrates the proceeds from its subsidiaries, which is of vital importance when researching buy-and-build companies. However, using consolidated statements may yield inaccurate comparisons if the firm is exited through a trade sale or secondary buyout in which the firm is an add-on acquisition for the buyers' portfolio company. Post-exit consolidated accounting numbers would then contain information of the acquiring corporate or portfolio company. Therefore, I allow unconsolidated statements for exits through a trade sale or secondary buyout but only if the firm has no consolidated companion in Orbis.

To perform a robust analysis of the performance of the exited companies, I only include platform companies headquartered in Western Europe (Denmark, Finland, France, Germany, the Netherlands, Norway, Spain, Sweden, and the United Kingdom) to limit the accounting and macroeconomic differences. Therefore, I exclude 21 US companies. I classify a company headquartered in Gibraltar as UK. I exclude 16 finance and insurance companies (NAIC 2012 basis code 52) because the complex regulations regarding their exits and their interest-bearing nature complicates the measurability of the operating performance. I exclude 286 platform companies of which there is no financial information available from the year before the exit to one year after the exit. Data availability poses the biggest challenge for studying the performance of private equity. One of the issues

[7] Source: Deloitte (2017) *Private Equity Demystified*. Available online.

is the delay in the data providers' collection process. Companies file financial statements for any given year with local authorities the next fiscal year. At the end of the filing year, data providers as Bureau van Dijk collect the financial information that becomes available to database users one year later. Besides, Orbis limits the data availability to a maximum of nine years before the last available date. For example, a company exited in 2000 which most recent financial statement is disclosed in 2015, does not have financial information available in Orbis within my performance windows. As a consequence, a methodological issue is the selection of the event window. Ideally, I collect data on as many as fiscal years as possible following the exit. However, if I expand the event window, this severely reduces the number of observations for which I have performance data more than one year after the exit. Although this limits the inferences on long-term performance, I am still able to compare the differences between firms that conducted a buy-and-build strategy and firms that did not. My final sample consists of 127 European buy-and-build firms in 11 countries[8] exited through an IPO (21), secondary buyout (68), or trade sale (38) between 2000 and 2015. The distribution of the sample by year is consistent with the comprehensive sample of European private equity exits of Jenkinson and Sousa (2015).

Table 1: Sample selection

Selection criteria	Number of remaining observations
Build-up deals between 1997 and 2017 in Scandinavia and the UK	1,115
Identified platforms	778
Identified exits	450
Exclude companies with missing names	441
Exclude financial companies	425
Exclude exits with missing dealyear	402
Exclude deals completed after 2016	401
Exclude US companies	380
Exclude companies with missing financials	127
Final sample	127

This table shows the number of buy-and-build firms that remain in the sample after performing the corresponding selection steps.

I hand-collect information of the private equity firms from their respective websites. I use the acquirer and vendor provided by Zephyr in the deal information of the initial buyout and exit respectively to identify the sponsors. If this information is not given by Zephyr, I use press sources to identify the private equity firms. I check the transactions case-by-case and standardize names of private equity firms because Zephyr reports names inconsistently. I use the current names of the private equity firms even if it differs from their name at the exit[9]. I collect IPO volume from Zephyr. Data of the proxies for the debt and equity market conditions come from the International Monetary Fund's International Financial Statistics and Thomson Reuters' DataStream.

[8] The countries included in the final sample are: Denmark (3), Finland (6), France (4), Germany (1), the Netherlands (3), Norway (4), Spain (1), Sweden (22), and the United Kingdom (82).

[9] For example, HSBC Private Equity changed its name into Montagu Private Equity in 2003.

2.1.1. Benchmark

Another critical issue in studying private equity is finding the appropriate benchmark. In previous studies to post-exit performance of PE-backed firms, portfolio firm performance is compared to either industry-median performance (e.g. by Kaplan, 1989; Jain and Kini 1994; Holthausen and Larcker, 1996; Wang, 2012; Smit and Volosovych, 2013) or against a matched sample of non-PE-backed companies (e.g. by Muscarella and Vetsuypens, 1990; Megginson and Weiss, 1991; Jain and Kini, 1995; Poulsen and Stegemoller, 2008; Meles, Monferrà, and Verdoliva, 2014; Bonini, 2015; Hammer, Hinrichs, and Schweizer, 2016). Moreover, researchers studying operating performance following corporate acquisitions emphasize the importance of choosing the right benchmark (e.g. Ghosh, 2001; Powell and Stark, 2005). Barber and Lyon (1996) compare nine different models of expected operating performance and find that models based on size matching and pre-event performance matching yield well-specified test statistics. Furthermore, Barber and Lyon (1996) find that results of testing performance against industry-medians will be biased if the sample firms systematically outperform the industry-median firms over the pre-event years as a result of permanent or temporary factors. This is likely to be the case in my sample because of the skill of private equity firms to select firms of high quality. In addition, Ghosh (2001) finds that firms undertake acquisitions following a period of superior performance and therefore performance comparisons with industry-median firms will lead to biased results, which is applicable to my sample of firms following an inorganic growth strategy.

I use a control sample of 2 031 PE-backed firms that did not follow an inorganic growth strategy during the holding period. The firms in the control sample are exited through an IPO, trade sale, or secondary buyout between 1997 and 2015 and active in the same industries and countries as the target sample. It is unlikely that a buy-and-build strategy is randomly assigned to firms. Therefore, I use the propensity score matching (PSM) method of Rosenbaum and Rubin (1983) to construct a matched sample. Hammer, Hinrichs, and Schweizer (2016) employ this method in their study to buy-and-build strategies. The propensity score is the conditional chance the observation is part of the treatment group, the buy-and-build firms, using observable firm characteristics. The propensity score is minimized to construct an optimal benchmark group of non-buy-and-build firms. The PSM estimator uses the sample of non-buy-and-build firms to estimate a mean outcome the buy-and-build firm would have experienced without treatment, which I compare to the actual outcomes. I use propensity score matching on the five nearest neighbours. For the estimation of the propensity scores, I run a probit regression on the full sample of buy-and-build and non-buy-and-build firms:

$$BB_i = \alpha + \beta_1 Sales_i + \beta_2 Size_i + \beta_3 Y_e + \beta_4 Y_c + \beta_5 Y_n + \epsilon, \tag{1}$$

where BB_i is a binary indicator that equals one if firm i conducted add-on acquisitions during its holding period, and zero otherwise. $Sales_i$ and $Size_i$ are sales and total assets of firm i in the pre-exit year, respectively. Y_e, Y_c, and Y_n are vectors for exit route, country, and industry (two-digit NAIC 2012) fixed effects, respectively. ϵ is a random error term. The estimator uses

Abadie-Imbens standard errors.

To ensure that my results are independent from the chosen benchmark, I test the performance adjusted by industry-medians as robustness. I collect financials of all companies from Orbis that have an operating revenue and EBIT not equal to zero and are active in the same country and industry as the 127 sample firms. I retrieve 1 131 883 firm year observations and construct the industry-median operating performance based on the four-digit NAIC 2012 code for each year and country. Using industry-adjusted performance yields results that are similar to those obtained through propensity score matching.

2.2. Summary statistics

Table 2 compares the distribution of exit routes of the original sample with the final sample. Since the sample is restricted to portfolio companies with financial information after the exit, the sample may be subject to selection bias. Most of the exits are secondary buyouts, followed by trade sales. Only a small fraction of firms is exited through an IPO. The distribution of the final sample of buy-and-build firms combined with the control sample consists of 228 IPOs, 687 secondary buyouts, and 1 243 trade sales and is comparable to the sample of Kaplan and Stromberg (2009) and the most recent private equity report of Bain[10]. The discrepancy in the distribution of exit routes between the combined sample and the sample of buy-and-build firms may be driven by the fact that the earnings of firms sold to a strategic buyer are typically consolidated under the acquirer and, therefore, do not show performance after the exit.

Table 2: Exit route distribution

	Original sample		Final sample		Combined sample	
	N	Percentage	N	Percentage	N	Percentage
IPO	55	12%	21	17%	228	11%
Secondary buyout	214	48%	68	54%	687	32%
Trade sale	181	40%	38	30%	1,243	58%
Total	450	100%	127	100%	2,158	100%

This table reports the distribution of exits. *Original sample* represents all buy-and-build firms between 2000 and 2015 with an identified exit. *Final sample* reports the number of firms in the final sample. *Combined sample* is the sample of buy-and-build firms in the final sample and combined with the control sample.

Figure 2 shows none of the firms in my sample exits through an IPO during years of crisis[11]. The absence of public exits during crisis years suggests that it is unlikely to exit through an IPO under unfavourable market conditions and, therefore, hints the presence of market timing. Appendix A1 shows the nationality (Panel A) and the industry (Panel B) of my sample of buy-and-build firms. The United Kingdom accounts for the majority of the portfolio companies with 83 firms.

I conduct univariate analyses to validate the matching quality. Table 3 reports the univariate

[10] See the Bain & Company *Global Private Equity Report 2017*. Available online

[11] Dot-com bubble of 2000, global financial crisis of 2008, and following European sovereign debt crisis.

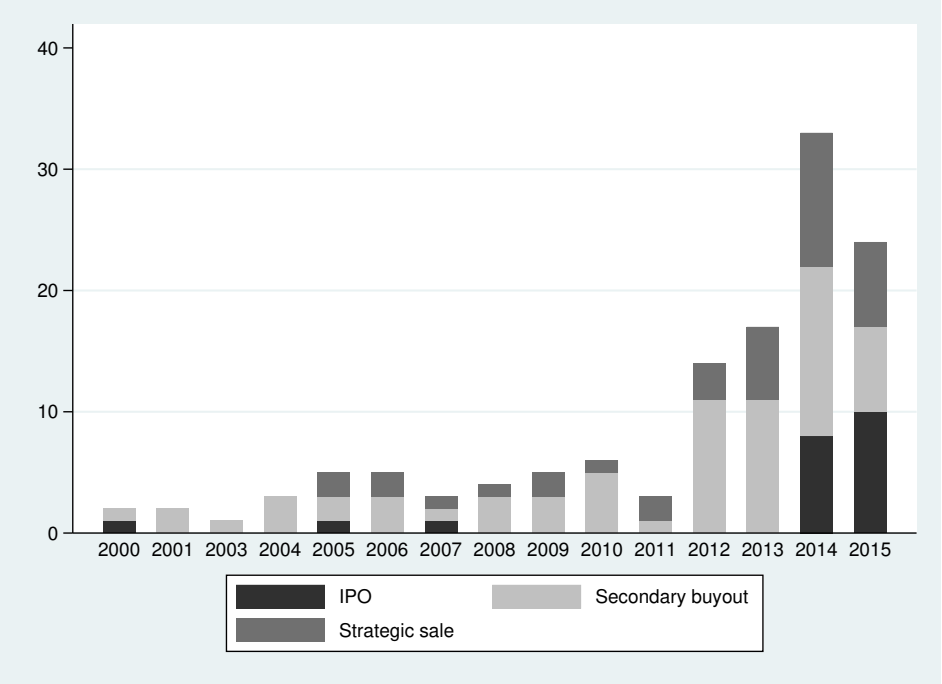

Fig. 2. Exit distribution by route and by year. This figure shows my sample of 127 buy-and-build firm exits by route and by year.

differences in size and operating performance between buy-and-build and non-buy-and-build firms in the year before the exit. Table 3 shows that, before matching, the buy-and-build firms and non-buy-and-build firms are significantly different in size, in the level of earnings before interest, tax, depreciation and amortization (EBITDA), and in EBITDA margin, calculated as EBITDA over sales. After propensity score matching, the buy-and-build and non-buy-and-build firms do not significantly differentiate in size and in level of EBITDA. The PSM approach reduces the differences in observable variables, i.e. limits the effects of confounding. The results in Table 3 underscore the importance of appropriately matching the sample.

Table 3: Summary statistics of buy-and-build and non-buy-and-build firms

	Buy-and-build firms			Non-buy-and-build firms (unmatched)				Non-buy-and-build firms (PSM)			
	Average	Median	Obs.	Average	Median	Obs.	z	Average	Median	Obs.	z
Panel A: Size measures											
Total assets	566.0	85.4	126	180.2	17.2	1,968	-9.09***	323.9	103.2	117	0.71
Fixed assets	347.4	49.3	125	120.5	4.8	1,913	-8.85***	274.5	74.5	117	0.50
Sales	277.4	76.8	117	161.2	30.0	1,617	-5.33***	233.5	98.8	117	-0.93
Panel B: Operating performance measures											
EBITDA	37.8	9.2	111	20.1	2.5	1,545	-5.66***	49.9	9.8	107	-0.91
EBITDA/sales	0.09	0.12	107	-2.66	0.08	1,470	-3.67***	-0.77	0.07	107	4.64***
EBITDA/total assets	0.11	0.11	111	0.18	0.11	1,544	-0.79	0.07	0.11	107	1.33
ROA	0.05	0.06	123	0.09	0.06	1,661	-0.30	0.05	0.07	117	-0.37

This table shows summary statistics of size and operating performance measures in the year before the exit for the sample of buy-and-build firms and the control sample (dollars in millions). *Unmatched* includes the full control sample of non-buy-and-build firms, whereas *PSM* includes the sample of non-buy-and-build firms matched by propensity score matching. Return on assets (ROA) is calulated as earnings before interest and tax (EBIT) over total assets. In the last two cases, the table reports the differences to the sample of buy-and-build firms. Wilcoxon rank-sum (Mann-Whitney) test is performed for the median difference between buy-and-build and non-buy-and-build firms. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4 reports summary statistics of the 127 buy-and-build firms and market conditions distinguished over the exit routes. Panel A presents descriptive statistics on portfolio firm characteristics prior to the exit. Portfolio companies that exit through an IPO are significantly larger in terms of sales, EBITDA, and total assets. The firms do not differentiate significantly in pre-exit profitability, measured by return on assets and return on sales. Panel B reports that the holding period in months is not different across the exit routes. The firms' age may be underestimated due to the new established entities in private equity investments. Panel B also shows the experience of the private equity firm at the time of exit. Private equity firms that exit through an IPO have on average, on the time of exit, around 31 years of experience. Panel C summarizes market conditions in the year of exit. Contrary to findings in existing literature (Wang, 2012; Jenkinson and Sousa, 2015), the results in Table 4 suggest the market conditions do not differ across the exit routes.

Table 4: Summary statistics for each exit route

	TS ($N = 38$)		IPO ($N = 21$)			SBO ($N = 68$)		
	Average	Median	Average	Median	z	Average	Median	z
Panel A: Portfolio firm characteristics								
ROA	5%	5%	3%	5%	-0.08	6%	8%	0.88
ROS	0%	12%	6%	11%	0.59	15%	12%	0.91
Operating revenue	71.5	35.5	975.5	464.7	4.35***	156.6	77.0	1.93
EBITDA	9.2	4.9	107.0	50.2	4.49***	28.8	8.2	1.24
Total assets	124.4	64.6	1,269.0	523.1	4.30***	596.1	77.9	1.22
Portfolio company age	18.4	12.5	15.7	7.0	-1.29	11.9	8.0	-1.47
Capital productivity	1%	0%	0%	0%	-4.21***	0%	0%	-0.85
Labour productivity	16%	5%	3%	0%	-3.59***	24%	5%	-0.21
Panel B: Deal characteristics								
Holding period	66.4	63.0	64.2	69.9	0.08	62.4	62.4	-0.45
Deal value	377.2	169.4	610.2	285.8	0.70	442.9	170.9	-0.10
Private equity firm age	23.9	18.0	30.6	31.0	1.51	21.7	15.5	-0.46
Panel C: Market conditions								
Local IPO volume	101.2	90.0	103.9	90.0	0.10	103.6	98.0	-0.04
Local stock index return	6%	8%	6%	5%	-0.50	7%	10%	0.55
Euro high-yield spread	5.48	4.45	5.11	5.38	-0.11	6.00	4.97	0.80

This table shows summary statistics for each exit subsample. This table reports portfolio firm characteristics in the year before the exit, deal characteristics and market conditions in the year of the exit for the 127 buy-and-build firms exited through a trade sale, IPO, or secondary buyout (SBO), between 2000 and 2015 (dollars in millions). Return on assets (ROA) is calculated as earnings before interest and tax (EBIT) over total assets. Return on sales (ROS) is calculated as earnings before interest, tax, depreciation, and amortisation (EBITDA) over sales. In the last two cases, the table reports the differences to the sub-sample of firms exited through a trade sale. Wilcoxon rank-sum (Mann-Whitney) test is performed for the median difference between buy-and-build and non-buy-and-build firms. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

2.3. Methodology

2.3.1. Performance measures

To measure the operating performance, I use two accounting-based performance measures: the operating return on assets (ROA) and the return on sales (ROS). These performance measures have been widely used in previous research to both operating performance of PE-backed firms (e.g. by Kaplan, 1989; Jain and Kini, 1994; Jain and Kini, 1995; Wang, 2012; Smit and Volosovych, 2013; Meles et al., 2014) and post-acquisition operating performance (e.g. by Healy et al., 1992; Ghosh, 2001). I calculate ROA as earnings before interest and taxes (EBIT) divided by total assets and ROS as EBITDA deflated by sales. ROA and ROS measure the efficiency of the company in using assets or sales. Both numerator and denominator of these ratios are reported as of the end of the year in Orbis. Dividing the cash-flow variables by total assets or by annual sales partially controls for post-exit divestment and differences in growth compared to the control firms. For most add-on acquisitions, the platform's fixed assets and goodwill are revalued and their book values written up to reflect the price that is paid for the target's assets. Subsequently, this revaluation results in increases in depreciation and amortization, which reduces the income. Therefore, I divide EBIT by total assets. As stated by Healey et al. (1992), EBITDA is unaffected by the method of accounting for an acquisition and the method of financing. As a result, the EBITDA to sales ratio or EBITDA margin is a proper measure to compare the profitability across firms that completed one or more add-on acquisitions.

In the panel regressions, the dependent variables are the level of post-exit operating performance or the percentage change in performance measures in the first three fiscal years after the exit (years +1, +2, and +3) compared to the last fiscal year before the exit. According to Barber and Lyon (1996), using the change in a firm's operating performance relative to an appropriate benchmark consistently yields more powerful test statistics than those based on a firm's level of operating performance relative to the same benchmark. I exclude results for year 0, the year of the exit, as this year includes both pre- and post-exit operations which makes it difficult to interpret the performance. The difference in ROA between the post-exit period and the fiscal year before the exit is given by:

$$\Delta ROA_{i,t} = ROA_{i,t}/ROA_{i,-1} - 1, \tag{2}$$

where i denotes a firm ($i = 1, 2, \ldots, 127$), t represents the first, second, or third fiscal year after the exit. ROS is defined analogously.

To test the post-exit operating performance of a buy-and-build firm relative to its non-buy-and-build counterpart, I adjust the performance with the percentage change in performance of its matched firm, as in:

$$\Delta Adj.ROA_{i,t} = (ROA_{i,t}/ROA_{i,-1} - 1) - (ROA_{m,t}/ROA_{m,-1} - 1), \tag{3}$$

where i denotes a B&B firm ($i = 1, 2, \ldots, 127$), m denotes a matched firm ($m = 1, 2, \ldots, 2\,031$), and t remains the same.

2.3.2. Market conditions

I use two proxies for equity market conditions. Following Cao (2011) and Wang (2012), I use the natural logarithm of IPO volume in the same country and year of the exit as a measure for the liquidity of the equity market. The higher the IPO volume, the better the equity market performs. The second proxy for equity market conditions is the return of the local stock market index[12], as used by Jenkinson and Sousa (2015). To measure the condition of the debt market, I follow Wang (2012) and Axelson et al. (2013) and use the spread between the interest rate of the Bank of America Merrill Lynch Euro High-Yield Index and the six-month EURIBOR rate. This high yield spread indicates the cost of capital for private equity firms when leveraging their investment. The correlation matrix in Appendix A2 shows only the proxies for debt and equity markets are highly correlated. The negative correlation is intuitive, as the high yield spread and stock markets typically interact.

2.3.3. Control variables

Following Sudarsanam (2005) and Wang (2012), I define the holding period as the logarithm of number of months between the first buyout and the exit of the firm, a month based on 30 days. The log of the age in years of the private equity firm at the exit is a proxy for the experience of the private equity firm. If more than one private equity firm is involved as vendor in the same exit, the number of years experience of the private equity firms is averaged. Furthermore, I control for firm-specific characteristics. I define firm size as the natural logarithm of the firm's total assets. I calculate the firm's age by using the natural logarithm of the firm's age at exit. I use labour productivity, calculated as the ratio of log of sales to the number of employees, and capital productivity, i.e. log of sales divided by fixed assets, as proxies for firm productivity. Because outliers affect the coefficient estimates, I follow Barber and Lyon (1996) and Bonini (2015), and winsorize data at the first and 99th percentiles of the observations of every accounting ratio for each year.

2.3.4. Statistical tests

I first test whether an inorganic growth strategy improves the post-exit operating performance of PE-backed firms, addressing *Hypothesis 1*. Following Guo, Hotchkiss, and Song (2011), I examine year-by-year median performance changes within four event windows around the exit to test the efficiency gains of buy-and-build firms. I use median percentage changes because of the sample size. I test the median percentage changes in size and operating performance measures for the last

[12] Although it is possible for a portfolio company to list on a foreign stock market, the local stock market is normally the first choice. As local stock market I use the OMX Copenhagen for Denmark, OMX Helsinki for Finland, CAC 40 for France, DAX 30 for Germany, AEX-Index for the Netherlands, OSL OBX for Norway, IBEX 35 for Spain, SMI for Switzerland, and FTSE All Share for the United Kingdom.

two years before the exit (year -3 to -1), from year -1 to the first and third year after the exit, and from two years before the exit to two years after the exit (-2 to $+2$). The event windows minimize potential noise from using a longer event window, while still allowing enough time to examine the trend prior to and following the exit. To control for industry-wide effects, I compute industry-adjusted median percentage change as the median change for the exited firm minus the median change for a sample of firms with the same two-digit NAIC 2012 industry classification and same country of origin for a given fiscal year. The reported significance tests are based on Wilcoxon test statistics. According to Barber and Lyon (1996), non-parametric Wilcoxon test statistics are uniformly more powerful than parametric t-statistics, due to the existence of extreme observations in the distribution of operating performance measures. In addition, I analyse the differences in operating performance changes between buy-and-build firms and non-buy-and-build firms. I subtract the median percentage change in operating performance measure of exited firms that did not conduct add-on acquisitions from the performance change of buy-and-build firms. Hence, a positive number implies more efficiency gains for buy-and-build firms, and a negative number indicates the opposite. I compare the change in performance with the full sample of 2 031 firms exited through an IPO, secondary buyout or trade sale that did not conducted add-on acquisitions during the holding period based on both raw and industry-adjusted operating performance. By using a matched-pair methodology I am able to focus more closely on the effect of add-on acquisitions on operating performance. Therefore, I further match on two sets of criteria: i) I use the propensity score matched sample and ii) as a robustness check, I exactly match buy-and-build firms to non-buy-and-build firms on exit route, country, two-digit NAIC 2012 code, sales value between $\pm 50\%$ of that of the buy-and-build firm and the closest EBITDA level in the fiscal year prior to the exit to account for exit route, country, industry, and firm size difference. I am able to match 72 firms by propensity score matching and 56 by the matched-pair methodology. Compared to Ordinary Least Squares, which is highly sensitive to outliers, by investigating median percentage changes I focus on actual changes in operating performance.

I construct a difference-in-difference matching estimator in which the percentage change in operating performance is the dependent variable. I use propensity score matching, similar to Hammer, Hinrichs, and Schweizer (2016), to test the average treatment effect on the one, five, and ten nearest neighbours. I match the nearest neighbours on exit route, two-digit NAIC 2012 industry code, and country. I control for firm-specific characteristics. The estimator uses robust Abadie-Imbens standard errors.

Next to the difference-in-difference analysis, I construct a panel regression model, following Bonini (2015) and Hammer, Hinrichs, and Schweizer (2016). I use firm, year, industry, and country fixed effects to control for unobservable effects. I restructure the sample into firm years and estimate the following model:

$$\Delta PERF_{i,t} = \alpha + \beta_1 BB_i + \beta_2 Post \times BB_i + \beta_3 Y_e + \beta_4 Y_c + \beta_5 Y_n + \delta X_i + \epsilon, \tag{4}$$

where $\Delta PERF_i, t$ is the yearly change in either return on assets or return on sales. BB_i is a binary

indicator that equals one if firm i completed add-on acquisitions during the holding period, and zero otherwise. $POST$ is a dummy variable that is equal to one in the years after the exit, and zero otherwise. The interaction term $POST \times BB_i$ estimates the effect of the buy-and-build strategy after the exit. In further regressions I split the post-exit interaction variable into $POST1 \times BB_i$, $POST2 \times BB_i$, and $POST3 \times BB_i$ which represent the effect of an inorganic growth strategy in the first, second, and third year after the exit, respectively. Y_e, Y_c, and Y_n are vectors for exit route, country, and industry (two-digit NAIC 2012 code) fixed effects, respectively. X_i denotes time-invariant firm specific effects and ϵ is a random error term.

I am interested whether a buy-and-build strategy affects the choice of the exit route. I follow Hammer et al. (2017) and perform multinomial logit regressions on my sample of exits of buy-and-build and non-buy-and-build firms. I use the exit strategy as the dependent variable with trade sale as the base category. My main explanatory variable of interest is BB, a binary variable indicator for add-on acquisitions during the holding period. I control for the pre-exit levels of ROA, ROS, and the natural logarithm of total assets, the logarithm of age at the year of exit, and market conditions as well as for industry and country fixed effects.

$$\begin{aligned} Exit\ Route_i = \alpha + \beta_1 BB_i + \beta_2 ROA_{i,-1} + \beta_3 ROS_{i,-1} + \beta_4 Size_{i,-1} + \beta_5 Age_{i,-1} \\ + \beta_6 IPO\ Volume_t + \beta_7 Equity\ Market_t + \beta_8 Debt\ market_t + \delta X_i + \epsilon \quad (5) \end{aligned}$$

To test the effect of the exit type on post-exit operating performance, I analyse the sample of the buy-and-build firms only. I construct dummy variables for each exit strategy. IPO is set 1 if the portfolio company is divested through an initial public offering, and 0 otherwise. SBO is 1 if the firm is sold to a financial sponsor, and 0 otherwise. I use the sale to a strategic buyer as the base group. Following Guo, Hotchkiss, and Song (2011), and Smit and Volosovych (2013), I construct two OLS regression models controlling for investment characteristics, type of investor, and market conditions:

$$\begin{aligned} PERF_{i,t} = \alpha + \beta_1 IPO_i + \beta_2 SBO_i + \beta_3 Adj.PERF_{i,-1} + \beta_4 PERF_{m,t} + \beta_5 Addons_i + \beta_6 Holding\ period_i \\ + \beta_7 PE\ firm\ age_{i,t} + \beta_8 Number\ of\ PE\ investors_i + \beta_9 IPO\ Volume_t \\ + \beta_{10} Equity\ Market_t + \beta_{11} Debt\ market_t + \delta X_i + \epsilon \quad (6) \end{aligned}$$

$$\begin{aligned} \Delta Adj.PERF_{i,t} = \alpha + \beta_1 IPO_i + \beta_2 SBO_i + \beta_3 Adj.PERF_{i,-1} + \beta_4 Addons_i + \beta_5 Holding\ period_i \\ + \beta_6 PE\ firm\ age_{i,t} + \beta_7 Number\ of\ PE\ investors_i + \beta_8 IPO\ Volume_t \\ + \beta_9 Equity\ Market_t + \beta_{10} Debt\ market_t + \delta X_i + \epsilon, \quad (7) \end{aligned}$$

where $PERF_{i,t}$ is the level of either return on assets or return on sales of firm i (i = 1, 2, ..., 127) at time t (t = 1, 2, 3). $Adj.PERF_{i,-1}$ is the pre-exit performance of firm i adjusted by the pre-exit performance of its propensity score matched firm. $PERF_{m,t}$ is the performance of the

propensity score matched firm in year t. $Addons_i$ is the number of add-on acquisitions completed by firm i during the holding period. $\Delta Adj.PERF_{i,t}$ denotes the change in operating performance of the buy-and-build firm between the year prior to the exit and the first, second, and third year (t = 1, 2, 3) after the exit adjusted by the change in performance of its matched firm. Xi is a vector for firm fixed effects. ϵ is a random error term. All other variables are described above. Model (6) shows the correlation of explanatory variables with company performance in the year after the exit, conditional on a benchmark in the last year. I expect a positive coefficient β_3 because pre-exit performance may have a positive impact on further performance. In Model (7) I examine the change in operating performance relative to the trend of the firm's abnormal performance relative to its propensity score matched non-buy-and-build firm. I expect negative β_3 in this model by mathematical definition and because firms with lower pre-exit performance may experience the fastest improvements on performance.

A problem in the above models is the issue of selection. The models test the effect of exit type on post-exit performance from an ex-post perspective, since the exit route can only be identified if the firm has exited. However, previous research shows that the exit decision depends on investor and investment characteristics, and debt and equity market conditions (Sudarsanam, 2005; Cao, 2011; Wang, 2012; Jenkinson and Sousa, 2015). Although the private equity investor may already investigate the exit opportunities when acquiring the portfolio company, it is highly unlikely that the exit route is determined at the start of investment and held constant over the holding period. Since the exit decision is a crucial choice, it seems likely that private equity investors time the exit of portfolio firms so returns will be maximized. The timing and type of exit may change over the investment period along the firm-specific and market conditions. Consequently, my sample is not randomly selected which makes the sample subject to a selection bias. The selection bias limits the explanatory power of my estimations of the relationship between the post-exit performance and the exit route.

To overcome this methodological weakness, I use a two-step approach to evaluate the impact of a maximum-likelihood exit route on operating performance after the exit. First, I use a trinomial logistic model to predict exit routes. I include the estimated parameters of the predicted exit routes as independent variables in OLS panel regressions on post-exit operating performance for each exit route. This approach enables me to draw inferences on the relationship between the predicted exit strategy and post-exit operating performance. I hypothesize that the choice of the exit route depends on three sets of variables relating to the portfolio company, investment and investor characteristics, and market conditions. Following Jenkinson and Sousa (2015), I test the impact of these sets of factors using a trinomial logistic regression model:

$$Exit\ Route_i = A_i\theta_i + B_i\lambda_i + C_i\mu_i + \epsilon, \tag{8}$$

where i denotes a firm ($i = 1, 2, \ldots, 127$). The A variables include portfolio company characteristics: the logarithm of the age of the portfolio company at the exit date, company size (measured by the logarithm of total assets in the fiscal year before the exit), and the return on assets and return on

sales in the year prior to the exit (as a proxy for performance). The B variables include the number of add-on acquisitions completed during the holding period, the logarithm of the holding period in months, the logarithm of the age of the private equity firm at the exit date (as a proxy for private equity firm experience), and the number of private equity investors holding an equity share in the portfolio company. The equity and debt market conditions are represented by the C variables. I cluster the standard errors by industry.

The second step is to examine the effect of the predicted exit route on post-exit operating performance. Again, I use two OLS regression models, including the estimated parameters for each exit route. I run a separate regression for each predicted exit type.

$$PERF_{i,t} = \alpha + \beta_1 Predicted\ exit\ route_i + \beta_2 Adj.PERF_{i,-1} + \beta_3 PERF_{m,t} + \delta X_{i,t} + \epsilon \quad (9)$$

$$\Delta Adj.PERF_{i,t} = \alpha + \beta_1 Predicted\ exit\ route_i + \beta_2 Adj.PERF_{i,-1} + \delta X_{i,t} + \epsilon, \quad (10)$$

where $PERF_{i,t}$ is the return on total assets or EBITDA over sales, $\Delta Adj.PERF_{i,t}$ denotes the buy-and-build firm's change in operating performance adjusted by that of its matched firm as defined above, i denotes a firm ($i = 1, 2, \ldots, 127$), t represents the time window, and *Predicted exit route* is the estimator from Model (8). $X_{i,t}$ is a vector of firm-specific time-varying control variables and ϵ is a random error term.

3. Empirical Results

3.1. Buy-and-build strategies and operating performance

I first test the unadjusted median percentage change in size and operating performance. Table 5 reports the unadjusted median percentage changes in the buy-and-build firm's size and operating performance measures. Panel A shows a significant positive change in total assets and sales of buy-and-build firms. The results suggest that add-on acquisitions generate an increase in size prior to the exit, consistent with my expectations. In the first year after the exit, total assets and sales continue to grow at a rate of 7.1% and 9.4% respectively. The increase in total assets of buy-and-build firms persists until the third year after the exit, exhibiting a significant increase of 29.9%. The EBITDA of buy-and-build firms increases at a rate of 11.1%, 37%, and 8.9% at one, two, and three years after the exit, respectively. Industry-adjusted EBITDA exhibits the largest increase of 66.5% between two years before and after the exit. Add-on acquisitions provide inorganic increases in total assets, sales, and EBITDA. However, raw operating performance, measured by EBITDA/sales, EBITDA/total assets, and ROA, reports no significant positive change. Industry-adjusted percentage changes for operating performance measures are positive prior to the exit as well as in the first, second, and third year following the exit. These results suggest that add-on acquisitions do not improve the efficiency of PE-backed firms but these firms do outperform their industry peers.

As buy-and-build firms show an increase in the level of EBITDA but a decrease a when EBITDA

Table 5: Changes in operating performance of buy-and-build firms

Panel A: All buy-and-build firms				
	Buy-and-build firms (*N=127*) from year i to year j			
	−3 to −1	−1 to + 1	−2 to + 2	−1 to + 3
A.1. Size measures				
Total assets	At year −1	85.4		
Median change	8.8%***	7.1%***	20.1%***	29.9%***
Industry-adjusted change	11.2%***	7.5%**	19.8%***	11.2%*
Fixed assets	At year −1	49.3		
Median change	0.2%	-2.9%	10.6%***	13.0%**
Industry-adjusted change	5.9%**	4.9%***	19.3%***	21.8%*
Sales	At year −1	76.8		
Median change	24.2%***	9.4%***	33.8%***	15.2%***
Industry-adjusted change	16.3%***	13.0%***	25.6%***	4.3%
A.2. Operating performance measures				
EBITDA	At year −1	9.2		
Median change	21.0%**	11.1%*	37.0%***	8.9%
Industry-adjusted change	40.4%***	27.7%***	66.5%***	16.5%
EBITDA/sales	At year −1	0.12		
Median change	-0.8%	-3.5%	-1.8%	-8.1%
Industry-adjusted change	17.2%	13.3%*	25.1%***	8.8%
EBITDA/total assets	At year −1	0.11		
Median change	-2.0%	3.9%	-3.1%	-10.9%
Industry-adjusted change	17.7%**	28.3%***	37.4%***	21.7%
ROA	At year −1	0.06		
Median change	-9.2%	-8.0%	-10.9%	-30.6%
Industry-adjusted change	30.6%*	19.7%	39.7%*	17.7%

(continued on next page)

is scaled by sales or total assets, the lack of efficiency gains could be provided by firms reaching decreasing economies of scale. To test this effect, I divide the sample into *Large* and *Small* firms using the median value of total assets in the fiscal year prior to the exit as the cut-off point. Panel B of Table 5 shows results inconsistent with decreasing economies of scale. The results suggest the opposite is true. Large firms show positive percentage changes in EBITDA adjusted by total assets, whereas small firms tend to decrease in efficiency before and after the exit. Large firms seem to be more able to generate efficiency gains following a buy-and-build strategy than small firms. Both large and small buy-and-build firms outperform their industry medians. In Appendix A3, I differentiate the percentage changes between firms located in the United Kingdom and the rest of Europe. UK firms show significant increases in size and leve of EBITDA, whereas the firms from the rest of Europe do not. Efficiency gains do not vary across countries.

Table 5: Changes in operating performance of buy-and-build firms — *continued*

Panel B: Large vs. small firms								
	Large (*N=64*) from year i to year j				Small (*N=63*) from year i to year j			
	−3 to −1	−1 to + 1	−2 to + 2	−1 to + 3	−3 to −1	−1 to + 1	−2 to + 2	−1 to + 3
B.1. Size measures								
Total assets	At year −1	271.1			At year −1	32.9		
Median change	0.3%*	0.2%	10.8%**	15.5%*	14.8%***	16.8%***	38.4%***	44.0%***
Industry-adjusted change	7.1%	-0.1%	2.1%	8.7%	14.3%***	17.8%***	49.7%***	15.3%
Fixed assets	At year −1	199.5			At year −1	12.2		
Median change	2.3%	-4.6%	8.3%*	12.7%*	-1.8%	-1.5%	26.0%	15.4%**
Industry-adjusted change	3.1%	6.0%**	10.3%**	27.4%**	10.4%**	4.3%	41.0%**	-4.3%
Sales	At year −1	172.8			At year −1	36.8		
Median change	23.9%***	6.3%**	40.7%***	15.7%**	24.5%***	10.5%***	22.8%**	14.7%**
Industry-adjusted change	16.7%***	14.2%***	29.4%***	4.3%	16.8%**	16.6%**	13.5%	14.5%
B.2. Operating performance measures								
EBITDA	At year −1	29.0			At year −1	4.0		
Median change	37.3%***	5.5%	33.7%***	9.4%	15.8%	27.8%*	37.0%	-0.1%
Industry-adjusted change	40.4%***	23.2%**	71.0%***	18.2%	49.5%	44.1%**	76.4%**	14.8%
EBITDA/sales	At year −1	0.16			At year −1	0.10		
Median change	-0.4%	-5.1%	-1.8%	-8.1%	-2.8%	-2.5%	-4.3%	-7.5%
Industry-adjusted change	15.1%	12.8%	22.7%**	-3.8%	17.3%	15.6%*	26.9%**	24.0%
EBITDA/total assets	At year −1	0.10			At year −1	0.13		
Median change	1.6%	5.7%	23.8%*	-5.3%	-3.0%	-0.9%	-11.8%	-21.9%**
Industry-adjusted change	17.7%***	26.5%**	54.9%***	20.4%	19.6%	28.0%**	21.1%*	22.9%
ROA	At year −1	0.04			At year −1	0.08		
Median change	-4.1%	-0.7%	13.9%	-30.6%	-16.2%*	-15.0%	-19.4%	-30.2%**
Industry-adjusted change	23.8%	16.2%	80.2%***	-4.8%	28.7%	26.4%	34.3%	27.5%

This table shows the raw and industry-adjusted median changes in size and operating performance measures for buy-and-build firms from year i to year j. Industry-adjusted percentage changes are calculated as the performance change for buy-and-build firm minus the median percentage change for a sample of firms in the same industry and country for a given year. Whether firms operate in the same industry is determined according to the two-digit NAIC 2012 industry code. Years 1, 2, and 3 represent the first, second, and third fiscal year prior to (indicated by '−') or after (indicated by '+') the exit year, respectively. *At year −1* represents the median value at the fiscal year prior to the exit year. Return on assets (ROA) is calculated as earnings before interest and tax (EBIT) over total assets. Panel A shows the full sample of 127 exits of buy-and-build firms. Panel B shows the median percentage changes for *Large* and *Small* firms. The median value of total assets in the fiscal year before the exit year is used as the cut-off point for *Large* and *Small* firms. Appendix A3 provides the split in UK firms and the rest of Europe. Wilcoxon signed-rank tests are performed to test whether the percentage changes are significantly different from zero. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Differences in operating performance changes between buy-and-build firms and non-buy-and-build firms

	Buy-and-build firms vs. all firms From year i to year j				Buy-and-build firms vs. PSM firms From year i to year j				Buy-and-build firms vs. matched firms From year i to year j			
	−3 to −1	−1 to + 1	−2 to + 2	−1 to + 3	−3 to −1	−1 to + 1	−2 to + 2	−1 to + 3	−3 to −1	−1 to + 1	−2 to + 2	−1 to + 3
A.1. Size measures												
Total assets												
Median change	-1.4%	-1.9%	0.5%	12.4%	2.5%	-0.1%	28.9%	15.3%	3.7%	-12.5%	-3.0%	8.5%
Industry-adjusted change	4.3%	4.1%	12.0%	9.0%	5.2%	1.7%	20.9%	-37.9%	6.7%	-6.5%	14.0%	-16.1%
Fixed assets												
Median change	-1.8%	-4.2%	3.2%	6.1%	8.4%	-1.2%	21.9%	20.5%	-2.7%	-3.3%	-15.2%	15.0%
Industry-adjusted change	3.7%	2.5%	17.1%	17.7%	17.2%	-6.3%	29.2%	-9.0%	0.0%	-7.5%	-21.1%	2.5%
Sales												
Median change	7.6%	0.8%	15.3%	3.1%	-1.2%	1.3%	4.2%	-11.7%	10.8%	3.4%	7.4%	-29.6%
Industry-adjusted change	5.3%	4.7%	10.0%	-5.5%	9.3%	3.0%	25.7%	0.5%	10.2%	4.4%	12.3%	-19.7%
A.2. Operating performance measures												
EBITDA												
Median change	11.3%	16.3%**	37.1%**	22.4%	9.3%	2.1%	-3.9%	-40.1%	-18.0%	10.8%	-10.2%	4.8%
Industry-adjusted change	6.7%	17.8%**	41.3%**	19.8%	15.6%	-6.8%	10.0%	-29.9%	-14.8%	12.2%	23.2%	-1.6%
EBITDA/sales												
Median change	4.3%	7.7%**	11.1%	16.1%	7.9%	0.6%	-7.0%	3.6%	-21.0%	3.5%	4.2%	18.2%
Industry-adjusted change	-0.7%	12.6%*	16.4%	18.4%	21.0%	-2.9%	-3.7%	2.0%	-23.9%	-1.1%	13.8%	17.4%
EBITDA/total assets												
Median change	-1.3%	20.2%***	18.3%**	18.9%	-3.1%	17.3%	-11.3%	24.2%	-13.4%	7.6%	-5.6%	25.5%
Industry-adjusted change	-11.1%	27.7%***	23.2%**	29.0%	4.9%	23.9%	1.4%	52.3%	-19.9%	9.5%	14.3%	39.2%
ROA												
Median change	1.2%	14.4%	23.9%*	9.8%	-1.0%	8.0%	-7.0%	-9.5%	-16.7%	2.8%	2.3%	2.3%
Industry-adjusted change	1.3%	9.2%	32.6%*	11.8%	-2.6%	17.3%	-26.9%	48.4%	-22.5%	-3.2%	5.5%	-7.5%
Buy-and-build firms	127				72				56			
Non-buy-and-build firms	2,031				72				56			

This table shows the difference in median changes in size and operating performance measures for buy-and-build firms and non-buy-and-build firms. Differences are calculated as the median changes for buy-and-build firms from year i to year j minus the median changes for non-buy-and-build firms from corresponding years. A positive number indicates that the change for buy-and-build firms is larger than it is for non-buy-and-build firms. Return on assets (ROA) is calculated as earnings before interest and tax (EBIT) over total assets. *Buy-and-build firms vs. all firms* shows the difference between buy-and-build firms and the full sample of non-buy-and-build firms. *Buy-and-build firms vs. PSM firms* presents the difference between buy-and-build firms and a sample of non-buy-and-build firms matched through propensity score matching. *Buy-and-build firms vs. matched firms* shows matched results based on the same exit route, country, two-digit NAIC 2012 classification, sales value between ±50% of that of the buy-and-build firm in the year before the exit. This matched-pair methodology results in nine benchmark firms being matched with multiple buy-and-build firms. For those multiple matches, firms closest in EBITDA the year prior to the exit are chosen, resulting in 56 unique firms being matched. Wilcoxon rank-sum test is performed for the median difference between buy-and-build and non-buy-and-build firms. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

When comparing buy-and-build firms with the full sample of non-buy-and-build firms, differences in both the raw and industry-adjusted changes show that buy-and-build firms generate higher EBITDA, both in level as scaled by the size of the firm. Also, buy-and-build firms show higher return on assets compared to non-buy-and-build firms, significant for the change between two years before and two years after the exit. Contrary to what I expected, the change in size for buy-and-build firms is not significantly larger than it is for non-buy-and-build firms. There are no significant differences in performance changes for firms matched either by propensity score matching or on exit route, country, industry, and size. The result in Table 6 suggest that buy-and-build firms do not significantly outperform non-buy-and-build firms when matched accurately.

Table 7: Propensity score matching estimator

Panel A: Return on assets				
	-3 to -1	-1 to +1	-2 to +2	-1 to +3
ATET NN=1	-0.554	-0.112	0.0581	-0.311
	(0.400)	(0.201)	(0.450)	(0.459)
ATET NN=5	-0.565	-0.220	0.341	0.164
	(0.350)	(0.163)	(0.357)	(0.343)
ATET NN=10	-0.561*	-0.213	0.275	0.0157
	(0.330)	(0.160)	(0.344)	(0.344)
N	796	1,227	728	662
Panel B: Return on sales				
	-3 to -1	-1 to +1	-2 to +2	-1 to +3
ATET NN=1	0.0211	-0.0558	-0.00926	0.343
	(0.109)	(0.175)	(0.196)	(0.283)
ATET NN=5	-0.0402	-0.0551	-0.0226	0.0854
	(0.160)	(0.144)	(0.149)	(0.205)
ATET NN=10	-0.0137	-0.0123	0.123	0.0302
	(0.155)	(0.133)	(0.171)	(0.183)
N	732	1,143	652	605

This table shows average treatment effects (ATET) for a propensity score matching (PSM) estimator with the nearest one, five, and ten neighbours. In Panel A the dependent variable is the percentage change in return on assets (ROA) between i and j. In Panel B the dependent variable is the percentage change in return on sales (ROS) between i and j. N indicates the number of possible observations for the matching process. Abadie-Imbens standard errors in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7 presents results for the difference-in-difference matching estimator. Table 7 shows the average treatment effect on the one, five, and ten nearest neighbours. I find no significant effect of buy-and-build strategies on post-exit operating performance, both in terms of ROA and ROS.

Table 8 shows the panel OLS estimates of yearly changes in ROA and ROS. The results indicate no significant superior performance of buy-and-build firms compared to non-buy-and-build firms. Overall, I can reject *Hypothesis 1.* Contrary to my expectations, buy-and-build firms do not have superior performance compared to their non-buy-and-build counterparts, although they do out-

perform their industry peers. This result suggests private equity firms conducting buy-and-build strategies are not able to enhance the efficiency of their portfolio firms. A possible explanation is that GPs are not capable to fully integrate the add-on acquisitions in the platform company. Another reason could be that private equity firms are interested in their returns rather than operating performance on a portfolio company level. Following a buy-and-build strategy, private equity firms may have more attractive exit opportunities because the portfolio firms has become larger and more mature, as stated by Smit (2001).

Table 8: Panel estimates of yearly changes in operating performance

	(1) ROA	(2) ROA	(3) ROS	(4) ROS
BB	1.090	1.100	0.348	0.348
	(14.37)	(14.37)	(1.667)	(1.668)
BB × POST	-1.350		0.101	
	(16.34)		(1.897)	
BB × POST1		0.216		0.176
		(18.80)		(2.176)
BB × POST2		-2.562		0.135
		(20.67)		(2.381)
BB × POST3		-3.111		-0.139
		(24.20)		(2.789)
N	3,874	3,874	3,652	3,652
Country fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Wald test		0.998		0.999

This table shows panel regressions on the percentage change in return on assets and return on sales with country, industry, and year fixed effects. *BB* is a dummy variable equal to one if the firm is a buy-and-build firm and zero otherwise. The coefficient of the interaction term *BB* × *Post* captures the effect of the buy-and-build strategy on operating performance after the exit. *POST* is a dummy variable that is equal to one in the years after the exit and zero otherwise. *POST1*, *POST2*, and *POST3* are equal to one in the first, second, and third year after the exit, respectively, and zero otherwise. Wald test is performed to test the joint significance. Country fixed effects control for exits in Denmark, Finland, France, Germany, the Netherlands, Norway, Spain, Sweden, and the United Kingdom. Industry fixed effects control for industries classified by two-digit NAIC 2012 industry code. Standard errors in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

3.2. Drivers of the choice of the exit route

The results in Table 9 indicate that when following an inorganic growth strategy, firms have significantly higher probability to be sold to a financial sponsor relative to a strategic buyer (the base category), consistent with Hammer et al. (2017). The effect on secondary buyouts may be driven by financial sponsor that continue the buy-and-build strategy in the subsequent buyout. Contrary

to the findings of Hammer et al. (2017), I find that buy-and-build firms are not significantly more likely to exit through an IPO compared to trades sales, rejecting *Hypothesis 2*. The results show that a favourable equity market, measured by high IPO volume in the firm's country in the year of the exit, increases the probability of an IPO significantly. This result is in line with previous research that shows the decision to exit through an IPO relates to the performance of the IPO market (Cao, 2011). The second proxy for equity market conditions, the return on the local stock market, does not have an impact on the chosen exit route. The debt market condition is economically and statistically insignificant related to both exit routes. This result is inconsistent with the finding of Wang (2012) that secondary buyouts are more likely when the debt market performs well. As the sample in Table 9 includes both buy-and-build firms and the control sample, I am not yet able to draw inferences on *Hypothesis 3a* and *Hypothesis 3b*.

3.3. The exit route and post-exit operating performance

To test whether post-exit operating performance is a function of the chosen exit route, I generate multivariate OLS regressions on the sample of buy-and-build firms only.

Table 10 reports the regression results for the for the level of the two measures of post-exit operating performance as well as changes in operating performance adjusted by the change in performance of its propensity score matched non-buy-and-build firm between the fiscal year prior to the exit and the first, second, and third year after the exit. Table 10 shows that the post-exit operating performance, both in level and in change, of firms exited through an IPO or secondary buyout do not significantly differ from firms sold to a strategic buyer. The lack of a statistical significant relationship between the chosen exit route and post-exit operating performance implies that *Hypothesis 4* is not supported by the data. The independency of firm performance from the chosen exit route may justify private equity firms to choose an exit route that maximizes their returns. The effect of choosing a secondary buyout is also economically insignificant related to the level of ROA and ROS. This result is in line with the findings of Wang (2012) and Smit and Volosovych (2013) that secondary buyouts do not improve the efficiency of portfolio companies. The negative coefficient of IPO for the level of ROA and ROS is consistent with the performance timing hypothesis of previous empirical literature (e.g. Degeorge and Zeckhauser, 1993; Jain and Kini, 1994). Under the performance timing hypothesis, private equity investors use their private information to time the decision of going public. As a consequence, the portfolio firms exhibit performance deterioration after the IPO.

In columns (1) and (3), performance shows a significant and positive correlation with the adjusted performance in the year before the exit. This positive correlation suggests that the company's performance prior to the exit is an important covariate of post-exit operating performance. The table reports no significant relation between PSM firm performance and company performance after the exit. The result in column (1) suggests that a longer holding period significantly improves the level of ROA after the exit, as reported by Meles et al., (2014). A longer holding period may be correlated with the firm's restructuring efforts. Another reason could be that private equity funds

Table 9: Drivers of the choice of the exit route

	(1) Exit Strategy	
	IPO	SBO
BB	-0.141	0.795***
	(0.402)	(0.263)
ROA at year -1	-0.202	1.255***
	(0.417)	(0.323)
ROS at year -1	-0.142**	0.112
	(0.0709)	(0.105)
LN(pre-exit PC age)	-0.344***	0.0867
	(0.102)	(0.0698)
LN(pre-exit total assets)	0.702***	0.0822**
	(0.0667)	(0.0405)
LN(local IPO volume)	1.001***	-0.0166
	(0.170)	(0.0924)
Local stock index return	0.566	-0.0595
	(0.885)	(0.589)
Euro high-yield spread	-0.0131	0.000847
	(0.0358)	(0.0232)
N	1,359	
Country fixed effects	Yes	
Industry fixed effects	Yes	
Chi^2	474.1	

This table shows the results from the multinomial logit regression on the sample of buy-and-build firms and non-buy-and-build firms. The dependent variable is the exit route and trade sale is the base category. *BB* is a binary variable indicator that equals one for buy-and-build firms, and zero otherwise. Return on assets (ROA) is calculated as earnings before interest and tax (EBIT) over total assets. Return on sales (ROS) is calculated as earnings before interest, tax, depreciation, and amortisation (EBITDA) over sales. Country fixed effects control for exits in Denmark, Finland, France, Germany, the Netherlands, Norway, Spain, Sweden, and the United Kingdom. Industry fixed effects control for industries classified by two-digit NAIC 2012 industry code. Standard errors in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 10: Effect of exit route on post-exit operating performance

	(1) ROA	(2) Δ Adj.ROA	(3) ROS	(4) Δ Adj.ROS
IPO	-0.0576	-0.638	-0.244	1.018
	(0.0478)	(1.729)	(0.346)	(1.766)
SBO	0.00542	1.288	-0.0986	-0.238
	(0.0352)	(1.262)	(0.259)	(1.306)
Adj.ROA at year -1	0.383***	-5.891*		
	(0.0971)	(3.452)		
PSM firm's ROA	-0.0643			
	(0.0682)			
Adj.ROS at year -1			0.651**	-1.282
			(0.256)	(1.304)
PSM firm's ROS			-0.183	
			(0.232)	
Nr. of add-on acquisitions	0.0000974	-0.0179	-0.0409	-0.202
	(0.00560)	(0.198)	(0.0419)	(0.209)
LN(holding period)	0.110***	-0.126	0.0493	0.343
	(0.0361)	(1.295)	(0.266)	(1.351)
LN(PE firm age)	0.0185	0.155	0.238	0.910
	(0.0195)	(0.702)	(0.147)	(0.744)
LN(Nr. of PE investors)	-0.00752	3.901***	0.435	-1.738
	(0.0383)	(1.376)	(0.279)	(1.416)
LN(local IPO volume)	-0.000350	0.00447	-0.0276	0.348
	(0.0127)	(0.454)	(0.0956)	(0.475)
Local stock index return	-0.150	-1.231	0.863	-5.843
	(0.150)	(5.356)	(1.116)	(5.589)
Euro high-yield spread	0.00212	-0.00787	0.0558	-0.327
	(0.00579)	(0.207)	(0.0429)	(0.215)
LN(PC age)	-0.0137	1.555**	0.0956	0.574
	(0.0209)	(0.761)	(0.149)	(0.782)
LN(total assets)	0.0149	-0.267	-0.176**	-0.555
	(0.0106)	(0.386)	(0.0757)	(0.396)
Capital productivity	0.837***	-2.493	5.837***	-3.286
	(0.256)	(9.382)	(1.761)	(9.237)
Labour productivity	-0.0714	-1.233	-6.073***	-8.692***
	(0.0794)	(2.902)	(0.551)	(2.944)
N	205	205	205	205
Firms	101	101	101	101

Notes on next page[13]

hold their better performing portfolio companies in anticipation for favourable market conditions. Consistent with the findings of Guo et al., (2011) and Meles et al., (2014), I find that the change in adjusted ROA is significantly greater for portfolio companies involving more than one private equity firm. When private equity investors form a syndicate, the portfolio company may benefit from the heterogeneous skills of the private equity firms. Column (2) shows the coefficient pre-exit adjusted ROA is negative and significant, which is consistent with the hypothesized faster improvements of firms that underperform prior to the exit. None of the proxies for market conditions is related to the performance after the exit.

Overall, the results suggest that post-exit operating performance does not depend on the chosen exit route. This result is intuitively: if one of the exit routes would result in superior performance, the market will notice this exit route as a sign for performance. When exiting through other routes than the one generating superior post-exit operating performance, the private equity firm will not be able to find buyers for the portfolio company. A possible explanation is that private equity firms time the exit of the portfolio company to maximize returns for their investors. GPs are incentivized to generate a high IRR as they earn carried interest if they beat the hurdle rate based on IRR. In addition, private equity firms typically require management to make an investment in the portfolio company with an envy that gives management a large equity upside at the time of the exit. As a consequence, key players in the exit decision may be interested in exit returns rather than portfolio firm performance after the exit. The statistically significant positive relation between the holding period and the post-exit operating performance suggests that private equity firms hold their better performing portfolio companies waiting for a more attractive exit, consistent with the performance timing hypothesis.

As a robustness check, I use median performance of the matching four-digit NAIC 2012 industry as a benchmark. Appendix A4 reports the regressions on industry adjusted operating performance. The results are similar to using a propensity score matched sample but the effect of pre-exit performance on ROS is economically stronger for industry-adjusted performance. I further test for non-crisis years only[14]. Appendix A5 shows that the firms exiting through an IPO in non-crisis years exhibit a decrease in the level of ROA and ROS post-issuance. The performance deterioration is consistent with private equity firms timing IPOs. Private equity firms seem to choose to exit through an IPO during economic recovery at the cost of post-exit operating performance of the portfolio company.

I differentiate the percentage change in the firm's size and operating performance between

[13]Table 10 shows the results from the multivariate regressions on the sample of buy-and-build firms. Return on assets (ROA) is calculated as earnings before interest and tax (EBIT) over total assets. Return on sales (ROS) is calculated as earnings before interest, tax, depreciation, and amortisation (EBITDA) over sales. The change in adjusted ROA and ROS is the percentage change between the year before the exit and the first, second, and third year after the exit adjusted by the performance change of its propensity score matched firms. IPO is a dummy variable that equals one if the firm exited through an IPO, and zero otherwise. SBO is a dummy variable that equals one if the firm exited through a secondary buyout, and zero otherwise. Trade sale is the base category. Appendix A5 reports the robustness check on industry-medians. Standard errors in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

[14] I define 2002 until 2007 and 2014 until 2017 as non-crisis years.

the exit routes. Table 11 shows a variation in size and performance measures across the exit routes. Buy-and-build firms sold to a financial or strategic buyer increase in total assets prior to the exit. After a secondary buyout, firms continue to grow in size and the level of EBITDA. For instance, between two years prior to and two years after the exit, the level of EBITDA for buy-and-build firms exited through a secondary buyout increases by 54.3%, significant at the 0.01 level. Possibly, the acquiring sponsor continues to employ a buy-and-build strategy, as suggested by Hammer et al. (2017). Firms involved in a secondary buyout show mixed performance change in terms of EBITDA/total assets and ROA. Except for the time window from two years before to two years after the exit the median percentage change is negative. This is in line with the results of Smit and Volosovych (2013) who find secondary buyouts are not associated with a significant improvement in operating performance. However, the buy-and-build firms do outperform their industry peers. These results suggest that financial sponsors intend to increase the level of EBITDA of their portfolio companies to obtain a high exit valuation and equity return. The results for firms exited through an IPO are mixed too. Two years prior to the exit the firm does not increase in terms of total assets, while the median percentage change of sales is 28.4% significant at the 0.05 level. The number of observations for IPO exits is small. The significant increase in the level of EBITDA in the first year after the exit is in line with existing literature (Degeorge and Zeckhauser, 1993; Holthausen and Larcker, 1996; Cao, 2011). The volatility in size and performance measures cannot be observed from OLS regressions.

Table 11: Changes in operating performance of buy-and-build firms for each exit route

	Trade sale (*N=38*) From year i to year j				Initial Public Offering (*N=21*) From year i to year j				Secondary buyouts (*N=68*) From year i to year j			
	-3 to -1	-1 to + 1	-2 to + 2	-1 to + 3	-3 to -1	-1 to + 1	-2 to + 2	-1 to + 3	-3 to -1	-1 to + 1	-2 to + 2	-1 to + 3
A.1. Size measures												
Total assets												
Median change	13.3%**	4.3%	34.4%*	-7.7%	-0.5%	-1.4%	-24.7%	79.9%	8.8%***	14.3%***	25.2%***	29.9%***
Industry-adjusted change	6.4%*	4.8%	25.9%*	-3.9%	-9.6%	-0.8%	-3.7%	-60.8%	14.3%***	12.3%**	23.0%***	20.9%**
Fixed assets												
Median change	-3.2%	-8.3%	13.7%	2.0%	-11.3%	-1.6%	-15.3%	88.5%	7.8%	-0.7%	14.6%	17.8%
Industry-adjusted change	1.7%	1.6%	9.4%	7.1%	0.4%	7.5%**	7.4%	-38.3%	12.9%***	4.6%**	25.7%***	27.4%**
Sales												
Median change	10.7%	8.7%	-0.5%	0.2%	28.4%**	-2.0%	13.3%	96.1%	26.5%***	15.2%***	42.2%***	20.3%***
Industry-adjusted change	7.9%	19.3%	-3.5%	2.9%	24.2%**	6.2%*	29.6%**	-22.5%	18.8%***	13.4%***	34.8%***	20.5%*
A.2. Operating performance measures												
EBITDA												
Median change	31.8%	-7.6%	-3.6%	-32.7%	6.8%	10.6%**	-5.0%	269.6%	20.1%	12.0%*	54.3%***	9.4%
Industry-adjusted change	41.5%	14.1%	6.3%	3.2%	7.6%	28.9%***	35.0%	136.8%	52.1%***	43.1%***	93.6%***	29.3%
EBITDA/sales												
Median change	-7.5%	-11.8%	-8.0%	-18.2%	-15.1%	4.7%	-29.1%	5.2%	5.1%	-4.3%	7.3%	-10.9%
Industry-adjusted change	26.1%	-2.6%	3.7%	7.6%	-7.5%	19.2%***	-4.1%	39.5%	22.9%	13.1%	30.3%***	16.8%
EBITDA/total assets												
Median change	-4.9%	16.8%	-29.2%	-8.6%	-0.8%	14.0%	-14.6%	63.0%	0.9%	-3.4%	22.7%	-25.9%*
Industry-adjusted change	11.2%	21.3%	6.5%	26.1%	10.5%	36.5%***	40.1%	119.9%	37.3%***	19.3%**	58.1%***	16.4%
ROA												
Median change	2.5%	-10.5%	-36.0%**	-90.4%	-16.4%	3.2%	-29.7%	-38.5%	-14.1%	-12.0%	19.1%	-28.6%
Industry-adjusted change	10.8%	24.6%	14.7%	-36.5%	5.1%	37.0%	37.8%	75.9%	35.4%	22.6%	75.0%***	28.3%
Observations	22	35	17	12	8	21	6	4	44	66	45	35

This table shows the raw and industry-adjusted median changes in size and operating performance measures for 127 buy-and-build firms from year i to year j for each exit route. Industry-adjusted percentage changes are calculated as the performance change for buy-and-build firm minus the median percentage change for a sample of firms in the same industry and country for a given year. Whether firms operate in the same industry is determined according to the two-digit NAIC 2012 industry code. *At year −1* represents the median value at the fiscal year prior to the exit year. Return on assets (ROA) is calculated as earnings before interest and tax (EBIT) over total assets. Wilcoxon signed-rank tests are performed to test whether the percentage changes are significantly different from zero. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

3.4. The predicted exit route

To mitigate the effects of selection bias in the ex-post analysis of exit routes, I use a two-step approach to evaluate the impact of an ex-ante exit route on operating performance after the exit. I first predict the exit route using the portfolio company characteristics, investment and investor characteristics, and market conditions as drivers.

Table 12: The predicted exit route

	(1) Exit Strategy		(2) Exit Strategy		(3) Exit Strategy		(4) Exit Strategy	
	IPO	SBO	IPO	SBO	IPO	SBO	IPO	SBO
ROA at year -1	-2.466	1.464					-6.411*	0.500
	(6.785)	(2.705)					(3.852)	(2.505)
ROS at year -1	0.0318	0.829					-0.272	0.851
	(2.993)	(0.652)					(0.551)	(0.923)
LN(pre-exit PC age)	-0.285	-0.259					-0.429	-0.388
	(0.659)	(0.314)					(0.485)	(0.293)
LN(pre-exit total assets)	1.458***	-0.140					1.265***	0.0722
	(0.538)	(0.230)					(0.352)	(0.176)
Nr. of add-on acquisitions			0.0521	-0.0492			0.120	-0.0824
			(0.157)	(0.0963)			(0.129)	(0.0999)
LN(holding period)			0.104	-0.266			0.334	0.00401
			(0.932)	(0.618)			(1.101)	(0.626)
LN(PE firm age)			0.450	-0.534			-0.279	-0.485
			(0.770)	(0.348)			(0.557)	(0.342)
LN(Nr. of PE investors)			0.285	-1.709**			0.198	-14.46
			(0.395)	(0.829)			(0.813)	(1107.6)
LN(local IPO volume)					-0.159	-0.0592	-0.256	0.0155
					(0.195)	(0.160)	(0.319)	(0.209)
Local stock index return					-2.236	1.777	-5.207	1.388
					(2.600)	(2.119)	(4.878)	(2.546)
Euro high-yield spread					-0.202*	0.0939	-0.342	0.0692
					(0.111)	(0.0826)	(0.334)	(0.0991)
N	106		126		126		106	
Country fixed effects	Yes		Yes		No		No	
Industry fixed effects	Yes		Yes		Yes		Yes	

This table shows the results from the multinomial logit regressions on the sample of buy-and-build firms. The dependent variable is the exit route and trade sale is the base category. The coefficients reflect the probability of an IPO to the probability of a trade sale and the probability of a secondary buyout (SBO) to the probability of a trade sale. Return on assets (ROA) is calculated as earnings before interest and tax (EBIT) over total assets. Return on sales (ROS) is calculated as earnings before interest, tax, depreciation, and amortisation (EBITDA) over sales. Standard errors in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 12 shows the results of the trinomial model estimating the maximum-likelihood exit routes. The exit through a trade sale is the comparison class. The model allows to draw inferences

on the sign of the coefficient but the magnitude of the coefficient cannot be directly interpreted. A positive coefficient associated to any independent variable means that as the independent variable increases, the probability of an IPO (or secondary buyout) increases relative to the probability of a trade sale. By contrast, a negative coefficient means the probability of a trade sale related to the probability of an IPO (or secondary buyout) increases as the exogenous variable increases. Industry fixed effects are included in each column. Country effects are included in columns (1) and (2) only, since columns (3) and (4) include country-specific variables. I first include each set of variables separately. The results in Table 12 show that an exit through an IPO is more likely relative to a trades sale for larger firms. I also find that the probability of choosing an IPO as an exit, over a trade sale, is lower when the high yield spread increases. I find no evidence for favourable equity market conditions increasing the probability of buy-and-build firms exiting through of an IPO, rejecting *Hypothesis 3a*. The proxy for debt market condition is not statistically significant correlated with the probability of exiting through a secondary buyout, contrary to *Hypothesis 3b*. The absence of an effect of debt and equity market on the chosen exit route may be affected the data. As I use yearly data on IPO volume, stock index return, and high-yield spread, the predictions may be less accurate. The probability of a secondary buyout relative to a trade sale decreases if more than one private equity fund is holding an equity share in the firm. I combine the three sets of explanatory variables in column (4). This model suggests than the probability of an IPO decreases with portfolio company operating performance (as measured by return on assets), which contradicts the assertion of literature that states IPOs are associated with "successful" exits (e.g. the pecking order theory of Sudarsanam (2005)). I find the number of add-on acquisitions during the holding period to be unrelated with the choice of the exit route.

Table 13 shows the results of the OLS panel regressions on post-exit operating performance using the exit types predicted by the trinomial logistic regression. Table 13 reports that the change in adjusted return on sales is significant positively related with the predicted IPO and negatively associated with a predicted trade sale. The results in Table 13 indicate that the ex-ante exit route has an impact on firm performance after the exit, confirming *Hypothesis 5*. This finding supports the assertion that private equity firms cater the exit route to their returns at the cost of long-term performance. The difference between the predicted and the actual exit route indicates the presence of other factors predicting the exit route than those included in the model. The post-exit operating performance shows a significant and positive correlation with the adjusted performance the fiscal year prior to the exit. This finding suggests that the company's performance right before the exit is an important predictor of performance after the exit. As expected, the pre-exit operating performance is negatively related to the change in operating performance after the exit, although insignificant. Capital productivity is positively and significant correlated with the level of post-exit operating performance but negatively insignificant correlated with the change in operating performance after the exit. Labour productivity is negatively correlated with post-exit operating performance across all predicted exit types.

Table 13: Effect of predicted exit route on post-exit operating performance

	(1) ROA	(2) Δ Adj.ROA	(3) ROA	(4) Δ Adj.ROA	(5) ROA	(6) Δ Adj.ROA
Predicted IPO	-0.106	-0.420				
	(0.0816)	(2.864)				
Predicted SBO			0.118	0.248		
			(0.0746)	(2.636)		
Predicted TS					-0.0652	0.245
					(0.113)	(3.981)
Adj.ROA at year -1	0.366***	-4.423	0.361***	-4.360	0.409***	-4.260
	(0.0999)	(3.471)	(0.0985)	(3.455)	(0.0943)	(3.298)
PSM firm's ROA	-0.0597		-0.0563		-0.0452	
	(0.0685)		(0.0681)		(0.0682)	
LN(PC age)	0.0114	1.633**	0.0204	1.656**	0.0189	1.623**
	(0.0192)	(0.684)	(0.0194)	(0.699)	(0.0211)	(0.749)
LN(total assets)	0.0221*	0.00575	0.0186*	-0.0241	0.00764	-0.0321
	(0.0130)	(0.464)	(0.0106)	(0.381)	(0.0104)	(0.368)
Capital productivity	0.809***	-0.835	0.816***	-0.881	0.794***	-0.947
	(0.257)	(9.285)	(0.256)	(9.281)	(0.257)	(9.255)
Labour productivity	-0.0147	0.418	-0.00748	0.415	-0.0214	0.363
	(0.0776)	(2.779)	(0.0776)	(2.795)	(0.0776)	(2.775)
N	205	205	205	205	205	205
Firms	101	101	101	101	101	101

(continued)

Table 13: Effect of predicted exit route on post-exit operating performance — *continued*

	(1) ROS	(2) Δ Adj.ROS	(3) ROS	(4) Δ Adj.ROS	(5) ROS	(6) Δ Adj.ROS
Predicted IPO	0.822	5.532**				
	(0.550)	(2.790)				
Predicted SBO			-0.504	-1.992		
			(0.521)	(2.641)		
Predicted TS					-0.556	-6.939*
					(0.817)	(4.097)
Adj.ROS at year -1	0.813***	-0.546	0.799***	-0.759	0.753***	-1.010
	(0.249)	(1.262)	(0.251)	(1.285)	(0.249)	(1.255)
PSM firm's ROS	-0.148		-0.165		-0.194	
	(0.227)		(0.228)		(0.227)	
LN(PC age)	0.155	0.732	0.110	0.507	0.175	1.150
	(0.135)	(0.691)	(0.137)	(0.714)	(0.148)	(0.760)
LN(total assets)	-0.244***	-1.036**	-0.190**	-0.552	-0.177**	-0.685*
	(0.0881)	(0.462)	(0.0744)	(0.391)	(0.0728)	(0.374)
Capital productivity	5.414***	-4.464	5.511***	-3.077	5.711***	-2.188
	(1.735)	(9.038)	(1.745)	(9.157)	(1.740)	(9.007)
Labour productivity	-6.022***	-9.620***	-6.011***	-9.347***	-5.907***	-8.661***
	(0.529)	(2.791)	(0.534)	(2.846)	(0.532)	(2.795)
N	205	205	205	205	205	205
Firms	101	101	101	101	101	101

This table shows the results from the multivariate regressions on the sample of buy-and-build firms. Return on assets (ROA) is calculated as earnings before interest and tax (EBIT) over total assets. Return on sales (ROS) is calculated as earnings before interest, tax, depreciation, and amortisation (EBITDA) over sales. The change in adjusted ROA and ROS is the percentage change between the year before the exit and the first, second, and third year after the exit adjusted by the performance change of its propensity score matched firms. *Predicted IPO*, *Predicted SBO*, and *Predicted TS* denote the maximum-likelihood estimates for an exit through an IPO, secondary buyout, and trade sale, respectively. The estimated parameters of the predicted exit routes are obtained from the multinomial logit regression model of Table 12. Appendix A6 reports the robustness check on industry-medians. Standard errors in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

As a robustness check, I test the effect of the predicted exit route on post-exit operating performance, using the median performance of the firm's corresponding four-digit NAIC 2012 code as a benchmark. Appendix A6 shows that adjusted ROS before the exit remains positively and significant correlated with post-exit ROS, while the coefficients of pre-exit ROA lose their significance. I find that the predicted IPO is significant negatively related to post-exit ROA but positively related to EBITDA margin. I also find an opposite result for the predicted SBO: a significant positive effect on ROA but negative on ROS. The predicted exit through a trade sale is negatively correlated with industry adjusted ROA as well as industry adjusted ROA, both statistically and economically significant.

4. Conclusions

Over the last decades, the buy-and-build strategy has increased in popularity as a value creation lever for private equity firms. In this thesis I attempt to shed a light on the performance of buy-and-build firms after the private equity firm has exited the investment. Although the operating performance of buy-and-build firms improves relative to industry-median firms, I find no evidence of buy-and-build firms generating superior post-exit operating performance using a propensity score matched sample as a benchmark. The size of a portfolio company increases following add-on acquisitions. However, I do not find evidence that a buy-and-build strategy increases the probability to exit through an IPO. My results show a buy-and-build strategy increases the probability to be sold to another private equity firm relative to the sale to a corporate acquirer. PE-backed companies seem to be more likely to go public under favourable equity market conditions, measured by local IPO volume. However, my results suggest this finding does not hold for buy-and-build firms. Furthermore, I find that the post-exit operating performance of buy-and-build does not depend on the chosen exit route. Since the chosen exit routes are not randomly assigned, I test the effect of a predicted exit route on post-exit operating performance to mitigate the effects of this methodological weakness. I find that the ex-ante exit route has an impact on the post-exit operating performance. My results support the notion that private equity firms choose the exit route which maximizes the returns of their investors but this may be at the cost of long-term performance of the portfolio company. Private equity firms tend to be interested in returns rather than the performance of portfolio companies after their exit.

A limitation to my findings is the loss and quality of my data. My empirical analyses regarding the performance of exited buy-and-build firms may suffer from selection bias since I only consider realized investments with available financial information after the exit. As a consequence, I have a small number of observations that reduces the explanatory power of my results. Because of the short event window, I am not able to draw inferences about the long-term economic impact of buy-and-build strategies. Investigating a longer time period or wider a geographical base may generate more observations and enable to more general findings. Furthermore, specifying to monthly data may yield a more reliable estimate of the predictive power of debt and equity market conditions.

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Appendix A. Appendix

Table A.1: Sample characteristics

	Exit routes			
Panel A: Country	IPO	SBO	TS	Total
Denmark	0	3	0	3
Finland	2	2	2	6
France	0	3	1	4
Germany	0	1	0	1
Netherlands	1	2	0	3
Norway	1	1	2	4
Spain	1	0	0	1
Sweden	5	9	8	22
United Kingdom	11	47	25	83
Panel B: NAIC 2012 Industry classification	IPO	SBO	TS	Total
Accommodation and Food Services	1	2	1	4
Administrative and Support and Waste Management and Remediation Services	3	5	2	10
Agriculture, Forestry, Fishing and Hunting	0	1	0	1
Arts, Entertainment, and Recreation	2	0	0	2
Construction	1	1	1	3
Educational Services	1	0	1	2
Health Care and Social Assistance	2	5	3	10
Information	2	7	3	12
Management of Companies and Enterprises	0	22	5	27
Manufacturing	1	5	5	11
Mining, Quarrying, and Oil and Gas Extraction	0	0	1	1
Other Services (except Public Administration)	1	4	1	6
Professional, Scientific, and Technical Services	3	11	10	24
Real Estate and Rental and Leasing	0	2	0	2
Retail Trade	1	1	1	3
Transportation and Warehousing	2	1	2	5
Utilities	1	0	0	1
Wholesale Trade	0	1	2	3

This table shows details about the 127 European buy-and-build firms exited between 2000 and 2015. Panel A shows the distribution of the firms by country (according to the location of their headquarters) and by whether the firm exited through an IPO, secondary buyout (SBO), or trade sale (TS). Panel B shows the distribution of the firms by industry (according to the two-digit NAIC 2012 industry classification) and by exit route.

Table A.2: Correlation matrix

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	Nr. of add-on acquisitions	1										
(2)	LN(holding period)	-0.00205	1									
(3)	LN(PE firm age)	-0.117*	0.145**	1								
(4)	LN(Nr. of PE investors)	-0.0671	-0.0666	0.0163	1							
(5)	LN(local IPO volume)	0.0609	-0.0889	-0.0847	0.0588	1						
(6)	Local stock index return	-0.0106	0.137**	0.155**	-0.157***	-0.107*	1					
(7)	Euro high-yield spread	0.0263	-0.193***	-0.0959*	-0.0572	-0.0333	-0.650***	1				
(8)	LN(PC age)	0.0827	0.343***	0.0813	0.0497	0.0122	-0.0586	0.0468	1			
(9)	LN(total assets)	-0.0120	0.0174	0.234***	0.0737	0.0382	0.0278	-0.0945*	-0.0443	1		
(10)	Capital productivity	0.000306	0.0290	0.00946	0.364***	0.0150	-0.0120	-0.0238	0.0386	-0.225***	1	
(11)	Labour productivity	0.0414	0.0574	0.0412	0.000712	-0.0563	0.0230	-0.0272	-0.0777	-0.0915	0.0632	1

This table shows the correlation coefficients between the independent variables. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.3: Changes in operating performance of buy-and-build firms — United Kingdom vs. rest of Europe

	UK (*N=83*) from year i to year j				Rest of Europe (*N=44*)from year i to year j			
	−3 to −1	−1 to + 1	−2 to + 2	−1 to + 3	−3 to −1	−1 to + 1	−2 to + 2	−1 to + 3
A.1. Size measures								
Total assets	At year −1	80.5			At year −1	116.1		
Median change	15.3%***	16.1%***	37.8%***	45.7%***	0.1%	-4.8%	-15.5%	6.3%
Industry-adjusted change	14.2%**	14.9%**	37.1%***	20.9%**	9.6%	-0.9%	-8.2%	-10.4%
Fixed assets	At year −1	49.3			At year −1	50.3		
Median change	4.6%**	-0.2%	18.7%***	17.8%**	-12.5%	-10.1%	-14.7%	3.7%
Industry-adjusted change	8.7%**	6.2%**	34.0%***	23.3%*	0.4%	2.5%	3.2%	6.6%
Sales	At year −1	63.4			At year −1	108.2		
Median change	26.5%***	19.1%***	48.6%***	27.6%***	6.8%	-2.8%	0.1%	-0.6%
Industry-adjusted change	22.1%***	19.6%***	47.0%***	16.1%	10.1%	2.5%	5.7%	-0.8%
A.2. Operating performance measures								
EBITDA	At year −1	8.4			At year −1	10.4		
Median change	26.4%**	23.8%***	57.4%***	13.7%*	18.4%	-9.1%	1.6%	-31.6%
Industry-adjusted change	36.7%**	36.5%***	93.4%***	36.8%*	49.5%*	3.4%	25.9%**	-1.2%
EBITDA/sales	At year −1	0.16			At year −1	0.06		
Median change	-2.8%	-1.7%	-0.7%	-4.8%	0.2%	-8.7%*	-2.4%	-25.1%*
Industry-adjusted change	12.7%	18.7%**	26.4%**	15.9%	26.5%*	9.5%	23.1%*	4.7%
EBITDA/total assets	At year −1	0.12			At year −1	0.10		
Median change	-1.8%	6.9%	-9.3%	-10.7%	-2.0%	-0.1%	-0.8%	-22.0%
Industry-adjusted change	16.6%*	38.5%***	39.6%***	23.5%	19.6%*	19.8%	23.7%***	17.4%
ROA	At year −1	0.07			At year −1	0.04		
Median change	-7.3%	-6.5%	-10.5%	-28.6%	-11.1%	-9.0%*	-11.3%	-63.3%*
Industry-adjusted change	28.9%	27.2%	49.0%**	26.2%	30.6%	14.9%	36.0%	-17.1%

This table shows the raw and industry-adjusted median changes in size and operating performance measures for buy-and-build firms from year i to year j for the United Kingdom and rest of Europe. Industry-adjusted percentage changes are calculated as the performance change for buy-and-build firm minus the median percentage change for a sample of firms in the same industry and country for a given year. Whether firms operate in the same industry is determined according to the two-digit NAIC 2012 industry code. Years 1, 2, and 3 represent the first, second, and third fiscal year prior to (indicated by '−') or after (indicated by '+') the exit year, respectively. *At year −1* represents the median value at the fiscal year prior to the exit year. Return on assets (ROA) is calculated as earnings before interest and tax (EBIT) over total assets. Wilcoxon signed-rank tests are performed to test whether the percentage changes are significantly different from zero. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.4: Effect of exit route on post-exit operating performance using industry-medians as benchmark

	(1) ROA	(2) Δ Ind.Adj.ROA	(3) ROS	(4) Δ Ind.Adj.ROS
IPO	-0.0666	0.883	0.182	1.199
	(0.0533)	(1.229)	(0.352)	(1.126)
SBO	0.0232	1.117	-0.172	0.698
	(0.0369)	(0.854)	(0.243)	(0.767)
Ind.Adj.ROA at year -1	0.0575	-0.196		
	(0.0377)	(0.857)		
Ind.Adj.ROS at year -1			2.028***	-1.553
			(0.414)	(1.296)
Industry ROA	0.0947			
	(0.294)			
Industry ROS			0.121	
			(1.533)	
Nr. of add-on acquisitions	-0.0000953	-0.00913	-0.0464	-0.111
	(0.00624)	(0.145)	(0.0388)	(0.121)
LN(holding period)	0.0777**	-0.797	-0.0484	-0.0520
	(0.0391)	(0.897)	(0.254)	(0.800)
LN(PE firm age)	0.0175	-0.960*	0.372***	0.0428
	(0.0230)	(0.532)	(0.144)	(0.453)
LN(Nr. of PE investors)	0.0102	-1.750*	0.305	-1.548*
	(0.0407)	(0.940)	(0.264)	(0.834)
LN(local IPO volume)	-0.0211	0.335	-0.104	0.619**
	(0.0146)	(0.336)	(0.0977)	(0.308)
Local stock index return	-0.134	-2.050	0.0450	-2.412
	(0.163)	(3.762)	(1.047)	(3.301)
Euro high-yield spread	0.00155	-0.145	0.0209	-0.103
	(0.00643)	(0.148)	(0.0412)	(0.130)
LN(PC age)	0.000729	0.521	0.0271	-0.412
	(0.0215)	(0.491)	(0.138)	(0.444)
LN(total assets)	0.0102	-0.217	-0.282***	-0.396
	(0.0117)	(0.268)	(0.0791)	(0.255)
Capital productivity	0.556*	-5.352	5.980***	-5.968
	(0.296)	(6.173)	(1.676)	(5.394)
Labour productivity	-0.00453	-4.165***	-6.186***	-7.598***
	(0.0392)	(0.878)	(0.524)	(1.718)
N	210	210	190	190
Firms	106	106	95	95

See notes Table 10.

Table A.5: Effect of exit route on post-exit operating performance — non-crisis years only

	(1) ROA	(2) Δ Adj.ROA	(3) ROS	(4) Δ Adj.ROS
IPO	-0.173***	0.575	-0.864**	0.455
	(0.0571)	(1.914)	(0.339)	(2.481)
SBO	-0.0209	0.786	-0.215	0.370
	(0.0488)	(1.645)	(0.292)	(2.133)
Adj.ROA at year -1	0.389***	-4.469		
	(0.124)	(3.988)		
PSM firm's ROA	-0.0625			
	(0.105)			
Adj.ROS at year -1			0.609***	-1.781
			(0.225)	(1.645)
PSM firm's ROS			0.0228	
			(0.291)	
Nr. of add-on acquisitions	0.00154	0.574	-0.00365	0.0131
	(0.0166)	(0.571)	(0.101)	(0.728)
LN(holding period)	0.120**	-0.277	0.147	0.0843
	(0.0478)	(1.578)	(0.283)	(2.090)
LN(PE firm age)	0.0204	1.919**	0.326*	1.866
	(0.0278)	(0.922)	(0.175)	(1.302)
LN(Nr. of PE investors)	0.0158	3.625**	0.502*	1.206
	(0.0468)	(1.554)	(0.277)	(2.036)
LN(local IPO volume)	-0.00410	0.331	0.0312	-0.381
	(0.0169)	(0.548)	(0.103)	(0.744)
Local stock index return	-0.444*	9.865	0.384	-7.340
	(0.256)	(8.500)	(1.538)	(11.37)
Euro high-yield spread	0.0293	-1.307	-0.0326	-1.755
	(0.0281)	(0.957)	(0.170)	(1.232)
LN(PC age)	-0.0106	2.593***	0.0254	0.643
	(0.0255)	(0.856)	(0.154)	(1.122)
LN(total assets)	0.0473***	-1.029*	0.0163	-0.623
	(0.0174)	(0.591)	(0.104)	(0.755)
Capital productivity	0.772***	-0.768	5.044***	-6.337
	(0.277)	(9.726)	(1.658)	(11.64)
Labour productivity	-0.559**	-2.951	-10.38***	-12.52
	(0.233)	(8.120)	(1.470)	(10.32)
N	96	96	96	96
Firms	58	58	58	58

See notes Table 10.

Table A.6: Effect of predicted exit route on post-exit operating performance using industry-medians as benchmark

	(1) ROA	(2) Δ Ind.Adj.ROA	(3) ROA	(4) Δ Ind.Adj.ROA	(5) ROA	(6) Δ Ind.Adj.ROA
Predicted IPO	-0.207**	0.252				
	(0.0922)	(2.163)				
Predicted SBO			0.197**	3.524*		
			(0.0848)	(1.998)		
Predicted TS					-0.0414	-8.179***
					(0.130)	(2.887)
Ind.Adj.ROA at year -1	0.0158	0.565	0.0158	0.160	0.0372	0.404
	(0.0362)	(0.835)	(0.0360)	(0.825)	(0.0356)	(0.780)
Industry ROA	-0.164		-0.0796		-0.0508	
	(0.300)		(0.296)		(0.305)	
LN(PC age)	0.0102	0.434	0.0258	0.584	0.0195	1.060**
	(0.0210)	(0.499)	(0.0211)	(0.493)	(0.0235)	(0.525)
LN(total assets)	0.0329**	-0.440	0.0232*	-0.138	0.00619	-0.748***
	(0.0150)	(0.351)	(0.0120)	(0.281)	(0.0118)	(0.262)
Capital productivity	0.787***	-4.020	0.745**	-2.582	0.647**	-4.194
	(0.304)	(6.431)	(0.300)	(6.315)	(0.305)	(6.136)
Labour productivity	-0.0195	-5.517***	-0.00776	-4.956**	-0.0290	-4.938***
	(0.0848)	(1.976)	(0.0848)	(1.954)	(0.0866)	(1.903)
N	193	193	193	193	193	193
Firms	97	97	97	97	97	97

(continued)

Table A.6: Effect of predicted exit route on post-exit operating performance using industry-medians as benchmark — *continued*

	(1) ROS	(2) Δ Ind.Adj.ROS	(3) ROS	(4) Δ Ind.Adj.ROS	(5) ROS	(6) Δ Ind.Adj.ROS
Predicted IPO	1.829***	1.572				
	(0.569)	(1.878)				
Predicted SBO			-1.672***	1.361		
			(0.552)	(1.800)		
Predicted TS					-0.105	-5.416**
					(0.811)	(2.442)
Ind.Adj.ROS at year -1	2.270***	-1.469	2.351***	-2.268*	1.823***	-2.222*
	(0.397)	(1.274)	(0.412)	(1.317)	(0.397)	(1.178)
Industry ROS	0.851		0.828		0.358	
	(1.502)		(1.507)		(1.541)	
LN(PC age)	0.0946	-0.558	-0.0422	-0.507	0.0650	-0.150
	(0.126)	(0.415)	(0.129)	(0.428)	(0.147)	(0.451)
LN(total assets)	-0.431***	-0.561*	-0.345***	-0.239	-0.206***	-0.577***
	(0.0955)	(0.317)	(0.0793)	(0.260)	(0.0736)	(0.224)
Capital productivity	5.185***	-5.726	5.292***	-4.574	5.905***	-5.299
	(1.648)	(5.433)	(1.652)	(5.424)	(1.714)	(5.274)
Labour productivity	-6.312***	-8.323***	-6.377***	-7.932***	-6.082***	-7.855***
	(0.500)	(1.675)	(0.505)	(1.689)	(0.522)	(1.634)
N	190	190	190	190	190	190
Firms	95	95	95	95	95	95

This table shows the results from the multivariate regressions on the sample of buy-and-build firms. Return on assets (ROA) is calculated as earnings before interest and tax (EBIT) over total assets. Return on sales (ROS) is calculated as earnings before interest, tax, depreciation, and amortisation (EBITDA) over sales. The change in Ind.Adj ROA and ROS is the percentage change between the year before the exit and the first, second, and third year after the exit adjusted by the change in industry-median firm performance. *Predicted IPO*, *Predicted SBO*, and *Predicted TS* denote the maximum-likelihood estimates for an exit through an IPO, secondary buyout, and trade sale, respectively. The estimated parameters of the predicted exit routes are obtained from a multinomial logit regression model. Standard errors in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.