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Can Private Equity Funds Act as Strategic Buyers? Evidence from Buy-and-Build Strategies

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Can Private Equity Funds Act as Strategic Buyers?

Evidence from Buy-and-Build Strategies*

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Abstract

By holding assets longer and increasingly focusing on growth strategies private equity firms enter the territory of strategic buyers. In one such strategy, a private equity firm buys a company and then builds on that “platform” through add-on acquisitions. We ask whether such serial (buy-and-build) acquisition strategies deliver operating synergies, as expected from strategic buyers, or rather are a form of “window-dressing.” We collect a sample of buy-and-build strategies from seven major European markets and find that the profitability of these strategies improves more than that of the comparable strategies, constructed by us from stand-alone companies. We analyze a number of operating outcomes across various strategy sub-types and confirm that these operational improvements are consistent with the synergy interpretation.

Key Words: Private Equity, Leveraged Buyouts, Buy-and-Build, Operating Performance, Synergies

JEL Codes: L2, G24, G34

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1 Introduction

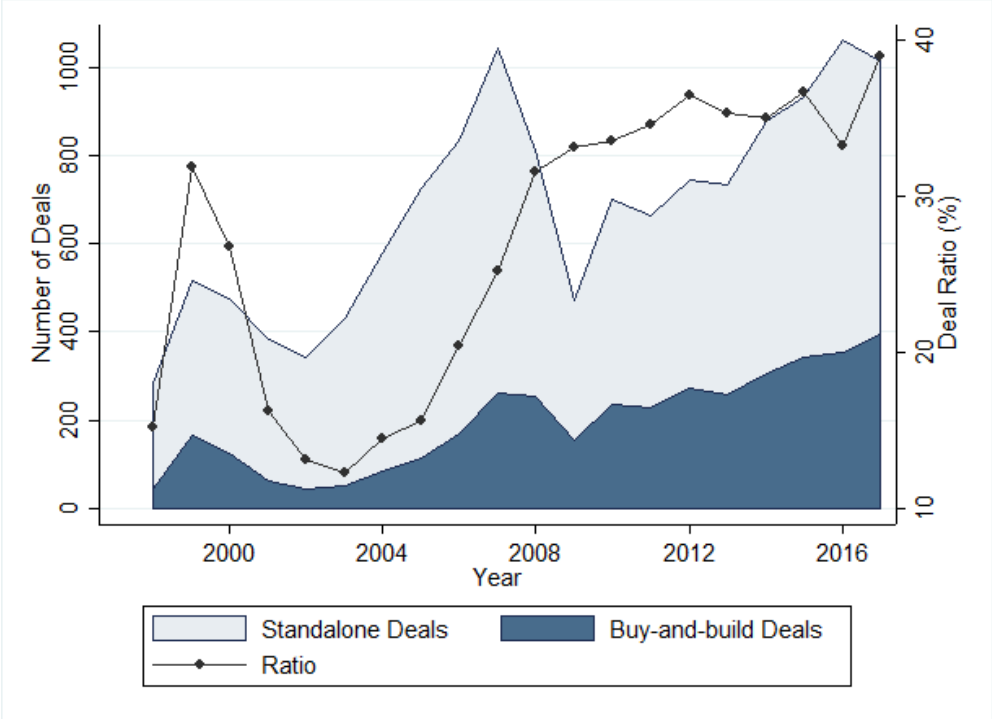
Two main types of buyers in the market for corporate control had traditionally pursued quite diverse strategies. Strategic buyers—the companies in a related type of business, such as competitors, suppliers, or customers—would integrate targets into their own business in order to realize long-term operational synergies and, thus, enhance their existing operations or market position. Financial buyers, such as private equity (PE) firms, are presumed to be more interested in the return from acquisition. The PE buyers typically use a large amount of debt to take over the undervalued targets with a potential to generate high cash flow, restructure them, and sell once exit opportunities become sufficiently appealing (Kaplan, 1989b; Kaplan and Strömberg, 2009). In this paper, we challenge this prior distinction and study a hybrid buy-and-build acquisition strategy, in which PE firms promise to introduce operational improvements to their portfolio companies through add-on acquisitions.

The fierce competition for deals among private equity firms disrupts their traditional business model since traditional benefits of leveraged buyouts (LBO) have become “common goods” (Sensoy et al., 2014; Braun et al., 2017). PE firms hold companies longer, and a number of fund managers surveyed by Gompers et al. (2016) name growth as a key value driver, while cost cutting lost its importance.¹ By now, up to a half of all global PE deals involve acquisitions into buy-and-build strategy (see Bain&Company, 2018, and Figure 1 based on our European data). But the literature still lacks the systematic evidence on whether this strategy delivers on the stated goal of long-term growth. Or—as critics say—PE firms use these transactions to window dress their track records, raise more capital, or justify spending already committed capital, without operational improvements (Phalippou and Morris, 2019). The buy-and-build business model is defined by operating improvements, therefore, this paper aims to investigate whether we would find operating improvements in the combined entities of buy-and-builds, leaving other potential sources of value beyond the scope of our study.

We define buy-and-build as a hybrid strategy in private equity that combines the deal structure of LBOs with the long-term synergy focus of serial acquisitions of strategic buyers. The strategy typically involves buying a “platform” company, building its scale and scope through purchases of the “follow-on” companies and organic growth, possibly integrating,

¹The financial press started to notice that buyout groups start to hold assets for way more than a decade, preparing their clients to a bit lower but stable and less risky returns (Espinoza, 2018). Some funds have an evergreen structure that allow them to follow the longer-term strategies.

Figure 1: Buy-and-build and standalone deals and over time. This figure presents the deal count (left vertical axis) of standalone private equity deals (light-shaded area) and buy-and-build deals, including both platforms and follow-ons (dark-shaded area). The ratio (right vertical axis) presents the percentage of buy-and-build deals to the total private equity deal market, including standalone and buy-and-builds.



and eventually exiting the combined entity. We find improvements of sales and profitability of these combined entities and argue that these improvements are consistent with the operating synergy interpretation and not the result of inorganic acquisitive growth. We provide extensive evidence to support our interpretation of this main result and the positive view that PE firms act similarly to strategic buyers by taking the long-term view and aiming for operating synergies.

In order to fix ideas, consider an example strategy in our sample. On 11 February 2011, the French PE firm Activa Capital has acquired a majority stake in Primavista, a provider of photographic services. In 2012, Primavista bought two French companies: Secret de Polichinelle, an online retailer and the manufacturer of invitations to marriage and birth celebrations, and Cadeaux Naissance, an online service provider for family planning and parenting. From the deal descriptions we learned that by building a combined entity from these three companies Activa hoped to achieve better operating results than what each of them obtain individually. The strategy fits our definition of buy-and-build, with Primavista considered the platform and the other two companies considered follow-ons, but this distinction is not important because our analysis is at the strategy level, which includes all

three companies. Our goal is to measure the operating results of the combined entity, *in addition* to “inorganic” growth due to simply adding-up companies. In order to tease out this additional growth, we find a comparable company for each of these three companies using the propensity score matching techniques, construct an artificial entity (“placebo strategy”) by adding-up the financials of these matched peers at the years of acquisitions by Activa, and compare the performance of the actual entity built by Activa to this artificial strategy past acquisition by the diff-in-diff regressions. We interpret these additional operating results as operating synergies, either positive or negative, because synergies are commonly understood as the relative performance of merged companies compared to non-acquired companies. Matching at the level of individual companies follows this conceptual definition and aims to mitigate the issue of non-random selection of targets into these strategies, while by constructing the placebo strategies we deal with the issue of absence of the comparison unit and account for inorganic acquisitive growth.² To the best of our knowledge, such quasi-experimental design at strategy level has not yet been applied in the M&A literature.

We collect our data using Zephyr and Orbis databases by Bureau van Dijk that have some attractive unique features for our research question.³ We use Zephyr to search for all add-on deals, where the PE acquirer explicitly claims to have a goal of the “long term synergetic growth”—this goal fits our conceptual definition of buy-and-build. And we forensically search through the elaborate ownership structure of the add-on companies in Orbis in order to find the platform company. Then we combine the platform with the related follow-on acquisitions into a single entity aiming to exploit some form of synergetic relationship. The result is 818 strategies, resulting from 818 platform and 1,346 follow-on acquisitions completed over the 1997–2016 in seven major European PE markets.⁴ Finally, we use Orbis to collect the financials of this combined entity and use the universe of non-acquired companies to achieve the high-quality matching in order to ensure that our placebo strategies

²We acknowledge from the onset that we cannot unambiguously conclude that private equity firms cause the combined entities to increase revenues and profitability, since selection into buy-and-builds is not random. We follow the literature and use matching methods in an attempt to alleviate these concerns, although we do not rely on a clear source of exogenous variation for identification.

³Orbis is global nationally representative database on firms’ financial and productive activities from balance sheets and income statements and detailed information on firms’ domestic and international ownership structure for over 200 million public and private companies across the world, sourcing from the business registries and other sources. Zephyr is the database focusing on transactions, from the minority stake acquisitions to the majority take-overs, IPOs, etc., across the globe. The databases are described in and validated by Kalemli-Ozcan et al. (2015).

⁴The countries of our platforms and follow-ons are Denmark, Finland, France, Norway, Spain, Sweden, and the United Kingdom. The choice for the European market is driven by the availability of private company financials in this geography, due to the stringent company data filing requirements in these countries.

are as similar as possible to actual strategies.

Using our data we establish several new facts about buy-and-build strategies. First, an average holding period of the strategies in our sample of over five years, a longer time horizon than in a typical LBO, with large variation from one to more than ten years to exit. Second, there is a visible clustering of deals in service sector and manufacturing. Third, less than half of the deals in our dataset are in the same narrow industry, against the common perception that buy-and-build mostly consolidate industries by horizontal deals (see Bain&Company, 2018, pp. 31–36). The non-horizontal deals combine companies who are in supplier-customer relationship or even from unrelated industries (in product market sense). It looks like these strategies span various industries and strategy configurations, and our data have enough variation to investigate our research question in a comprehensive regression framework.

In the largest sample, buy-and-build strategies show significantly higher return on sales (ROS) compared to the placebo control strategies. This result supports the positive view that PE funds are acting similarly to strategic buyers that aim to realize operating synergies. The effect is economically meaningful. Compared to pre-deal mean, ROS of all strategies increases by, on average, 27 percent over the first five years (or exit if earlier).⁵

Having found evidence of improved profitability of the combined entities we build the case for synergies as a partial motivation for these strategies. First, if the notion of “success” of buy-and-build strategy includes operating synergies we should see operating improvements in, primarily, completed strategies. We find that strategies with known exit show improvements of profitability, while non-exited strategies underperform compared to control strategies. We realize that the exit decision is endogenous to the success of the strategy in, for example, maximizing internal rate of return. Our results mean that a buy-and-build strategy is likely motivated by synergies. We confirm this interpretation by using the duration analysis and showing that the probability of exit increases with time and measured operating synergies.

Second, realizing synergies is a difficult process and might take long. Could this be the motivation for generally longer holding periods in buy-and-build strategies? We categorize the completed strategies into two groups, split by the sample average time to exit, and find improved profitability and other outcomes in both groups. But the harder operational improvements (such as labor productivity) are indeed seen in the longer-held strategies,

⁵The pre-treatment ROS has the mean of 0.056 percent with the standard deviation of 0.086. The estimate of the coefficient of ROS is 0.0154, significant at 5%.

suggesting that some types of synergies take time to realize.

Third, we ask if there are larger operating improvements where the synergies are theoretically expected to be larger. For this, we introduce the triple interactions into our diff-in-diff regressions. We may expect synergies in capital intensive industries because these industries have generally a greater need for external funds, and financial intermediation is one source of value creation by PE firms (Ivashina and Kovner, 2011). The shorter-held capital-intensive strategies grow sales faster, compared to other shorter-held buy-and-build strategies, but without superior profitability. We find that the longer-held strategies with the above median capital intensity dispose of the redundant capacity and improve profitability more than in the other buy-and-build strategies with the same time to exit. These results may suggest that excess capacity in the capital intensive industries can be managed, redeployed, or disposed of more easily, as in the assets redeployability hypothesis advanced by Williamson (1988) and Shleifer and Vishny (1992) and the corroborating evidence in Fidrmuc et al. (2012). In addition, we directly test whether operational benefits are brought by heavily publicized horizontal buy-and-builds, likely motivated by industry consolidation, or the benefits come from the acquisition of suppliers or customers in vertical acquisitions. Following the literature, we identify the relative position of a portfolio company in the production value chain using its 4-digit industry and a detailed input-output (I-O) table from the U.S.⁶ Against the common belief, we do not find that horizontally related follow-ons significantly change the operating performance of the combined entity. In contrast, profitability, sales-to-assets, and labor productivity increase in strategies that combine vertically related companies. Zooming in on the configuration of vertical relationships, we discover that the latter results are mostly driven by the follow-ons from upstream (supplier) industries.

To further add credence to our analysis and interpretation we perform several robustness checks. In particular, we do not find the consistent evidence that the operating improvements materialize in uncompleted (non-exited) strategies in the settings where they are more likely to occur (the capital intensive and vertical strategies). Looking at the splits of the strategies by the overall size of the strategy and the relative size of the follow-ons to platform, we see that the largest operating improvements are realized in the strategies with

⁶We consider the acquisitions of platforms and follow-ons in the same 4-digit NACE sector as horizontal. A close customer is the follow-on whose 4-digit industry sources from the industry of the platform according to the I-O table but is within the *same* 2-digit industry; the “other” customer is a sourcing company in a *different* 2-digit industry than the platform. We define the close or other suppliers of platforms similarly based on existing I-O supply relationship from the industry of follow-on to industry of the platform. Alternatively, we define close suppliers or customers based on the volume (the top quartile) of the I-O trade, with qualitatively similar results.

relatively small follow-ons, consistent with the efficient transformation of smaller targets. In contrast, strategies with large follow-ons grow assets at the expense of profitability, confirming difficulty to transform and integrate larger companies. Finally, our results are robust to two alternative definitions of a buy-and-build strategy.

This paper contributes to several bodies of literature. The literature on mergers and acquisitions has long named synergy as a key driver of M&As (see surveys by Andrade et al., 2001; Betton et al., 2008; and evidence in Hoberg and Phillips, 2010; Bena and Li, 2014). At the same time, the danger of “empire building” in public markets is well-established (Masulis et al., 2007) and may be present in serial acquisitions (Fuller et al., 2002). In the PE context, agency problems manifest themselves as the “window-dressing” for fundraising, justification of spending the committed capital, and other issues (Phalippou and Morris, 2019).⁷ We find that an increasingly popular serial buy-and-build acquisition strategy can successfully blend the traditional restructuring expertise of private equity and the long-term focus of strategic buyers, and deliver the stated goal of the long-term synergetic growth.

This paper contributes to the somewhat limited literature on serial acquisition strategies by private equity. A large body of PE research focuses on the drivers of the operating improvements of individual portfolio companies but not at the level of strategies with multiple companies.⁸ Our paper is closely related to the studies by Boucly et al. (2011) and Gompers et al. (2016) by focus on the increased attention by PE firms on operating improvements and growth as the way to create value, and the paper of Acharya et al. (2013) by bringing attention to M&A-driven, “inorganic” strategies by PE.⁹ We define buy-and-build as a

⁷This behavior has been documented for the “pressured” purchases or sales in secondary LBOs (Arcot et al., 2015; Degeorge et al., 2016) or for younger funds that try to establish track record (Ljungqvist et al., 2020). The other examples range from inflated accounting valuations and sizeable and cryptic PE fees (Phalippou and Gottschalg, 2009; Robinson and Sensoy, 2013; Phalippou et al., 2018; Brown et al., 2019), to organizational diseconomies (Holmström and Roberts, 1998; Lopez-de-Silanes et al., 2015), to inequalities in the distribution of carried interest within the fund (Ivashina and Lerner, 2019).

⁸The non-exhaustive list of works on operating results of portfolio companies in LBOs includes Nikoskelainen and Wright (2007), Kaplan and Strömberg (2009), Boucly et al. (2011), Lerner et al. (2011), Cornelli et al. (2013), Guo et al. (2011), Cohn et al. (2014), Davis et al. (2014), Bharath et al. (2014), Harris et al. (2014), Bernstein and Sheen (2016), and Antoni et al. (2019). The related literature on private equity returns argues that private equity outperforms public equity markets even net of fees and after adjusting for risk (Kaplan, 1989a; Kaplan and Schoar, 2005; Sensoy et al., 2014; Robinson and Sensoy, 2016; Korteweg and Sorensen, 2017), sometimes using political connections (Faccio and Hsu, 2017) and favorable industry and debt market conditions (Gompers and Lerner, 2000; Wang, 2012; Axelson et al., 2013; Jenkinson and Sousa, 2015).

⁹Acharya et al. (2013) focus is on the match between the PE partner background (financial or operating) and the nature of the deal in Western Europe (the deals with the M&A events during the private phase and “organic” deals without M&A event). Valkama et al. (2013) demonstrate that the inorganic transactions positively influence the internal rate of return in LBOs in the UK. Hammer et al. (2017) focus on factors explaining the probability of individual acquisitions undertaken by the PE portfolio companies during the holding period.

series of buyout transactions that have a common stated goal of synergetic growth and we separate the transaction and synergetic growth using the replicated strategies constructed from matched peers of portfolio companies. We contribute to both literatures by finding the evidence of operating improvements in serial buy-and-build strategies by PE using the strategy-level analysis.

The third related literature is on asset complementarities in mergers (Rhodes-Kropf and Robinson, 2008). Fan and Goyal (2006) and Ahern and Harford (2014) demonstrate the importance of vertical firm relationships for M&A waves and merger outcomes. We show that similar motivations partially drive the serial acquisitions by private equity. Among all our strategies, even larger operational benefits accrue in capital-intensive strategies and in the strategies built along the production value chain, rather than in horizontal strategies. This reinforces our interpretation of these operating results as synergies.¹⁰

The rest of paper is organized as follows. In section 2 and 3 we discuss the empirical methodology and the data. Section 4, 5 present the main analysis and robustness checks. Section 6 concludes.

2 Empirical Methodology

Our goal is to investigate whether buy-in-build strategy enhances operating results of consolidated entities built by a series of acquisitions, not the component parts. Before discussing our methodology, we would like to define some terms related to buy-and-builds. In this strategy, PE firms *buy* “follow-on” assets that are then added on to “platform” companies in order to *build* (consolidate) a larger entity, which is eventually exited. We define a platform as an entity whose core competencies or efficiencies can be transferred onto follow-on acquisitions and change the strategic position of the combined company. We define follow-ons (also known as “add-ons” or “bolt-ons”) as other companies that can be merged with the platform to increase the overall value of the combined company. Platforms can be built from multiple small companies or acquired as an existing company. Our broad definition of this strategy encompasses a number of existing variations (Smit, 2001): quick roll-ups aiming to turn investments around in a shorter-term or sequential strategies with a longer planning horizon; horizontal buy-and-builds to consolidate industries or vertical buy-and-

¹⁰If the goal of horizontal strategies in a narrow industry is to eliminate the small firm discount and sell the combined larger company at higher multiple we might not necessarily detect any meaningful operating changes. Studying the exit multiples of these strategies is beyond the scope of this paper.

builds aiming at integration along the value chain. We follow these conceptual definitions to collect the data for buy-in-builds (see Section 3 and Appendix A for more details).

To provide evidence consistent with causal effect of this strategy we have to confront a dual problem of non-random selection into this strategy and lack of the comparison unit (the counterfactual) at the strategy level. To alleviate these concerns we borrow the empirical methodology from the literature (see Roberts and Whited, 2013, for review) but adapt it for our strategy-level analysis. In a nutshell, we use a difference-in-differences estimation to compare the performance of acquired entities with the performance of the comparable non-acquired entities over time after the acquisition. In standard M&A context, the “entity” would refer to a single company, while in our context it is the *combined entity* including a platform and all related follow-ons. For this reason, we construct the comparable entity for diff-in-diff from the peers of buy-and-build companies, found by the propensity score matching techniques. Even though we go a great length in establishing causal effect, we recognize that matching methods do not rely on a clear source of exogenous variation for identification and does require knowledge and measurement of the relevant covariates that determine selection into the strategy. To the extent it is possible with our data we attempt to alleviate these concerns by using a large set of potential controls, matching on many pre-deal variables, controlling for various macro trends, and exploiting heterogeneity of our strategies.

Matching. The first issue is well-known in empirical research and, in our case, stems from the fact that “buy-in-build treatment” is not randomly assigned, either because the companies self-select into the acquisitions or because PE firms are professional investors who carefully select their acquisition targets. To mitigate (but not solve) this concern, we follow the literature and match each acquired platform and follow-on company to similar non-acquired companies on pre-acquisition company-level observables. We use the entire population of non-acquired companies in Orbis from our sample countries as potential controls. We motivate the choice of this control group rather than, for instance, acquisitions of strategic buyers or other control groups as follows. First, conceptually, we measure whether the buy-and-build strategies create operating synergies in the first place, and not whether these strategies are doing better (or worse) than acquisitions by strategic buyers. Comparing to, for example, serial acquisitions by the strategic buyers is an interesting but different research question. Second, theoretically, Wang (2018) argues that the market cannot perfectly observe the probability of a firm acquiring or merging with another and learns more

about the target fundamentals and re-evaluates its stand-alone value only after the M&A announcement. A priori, any stand-alone company can, therefore, be selected into buy-and-build. And third, from the practical viewpoint, to achieve good match we have to draw from a large pool of controls (the potential targets). Other controls, such as serial acquisitions by strategic buyers, are relatively rare that makes good matching infeasible.

Matching is done by estimating the probability (the “propensity score”) of being acquired into a buy-and-build strategy and selecting a subset of acquired and non-acquired firms with similar probabilities. Based on the general advice of Roberts and Whited (2013), our probability (probit) model includes a number of pre-acquisition explanatory variables, to ensure the observational equivalence of the matched companies, and lagged values of the dependent variable, in order to hedge against the regressions spuriously picking up pre-existing trends with the acquisition variables. We match the firms based on this propensity score within the same country, two-digit industry, and year to account for the omitted third (macro) factors, such as country-level changes in economic policies or the business climate or the PE targeting some sectors across different markets. For each acquired company we keep five closest non-acquired neighbors, resulting in one-to-many match.¹¹

Placebo strategies. The second issue with the lack of the comparison unit is crucial. We use the companies that we matched to our platforms and follow-ons and construct the portfolios that resemble (similar based on the financial variables that we use to match) our actual strategies. We randomly select one of the five matched peers of the companies within an observed strategy and combine the financials of these peers similarly to how we assign financials within the observed strategies (see details in Appendix A). We refer to these artificial counterfactual strategies as “placebo strategies.”¹² We repeat the process and construct five placebo strategies for each observed strategy.

¹¹Appendix B provides more details on the implementation of matching and its quality, in particular, the usual diagnostics of the covariates balancing and the parallel trends assumption.

¹²Hochberg and Fehder (2019) use an alternative quasi-experimental design based on the synthetic control method (Abadie et al., 2010) to study the spillover effects of seed accelerator programs for technology entrepreneurship activity in the U.S. metro areas. Their results from the synthetic control approach are similar to the results obtained using matching with the diff-in-diff techniques. In the synthetic control method one constructs a (synthetic) control unit as a convex combination of observed companies. The results are reported graphically as the plots and significance tests of the average observed outcomes of interest in treatment and synthetic control units in the pre- and post-treatment period. The method attempts to improve the match to the treated company and potentially account for the time-varying treatment effects at different time horizons. The latter properties are attractive but the method is difficult to apply for our purposes because we conduct the analysis at the level of strategies while the method computes the average lead-specific treatment effect and does not specify the existing non-acquired companies from which we can build the comparable strategies.

Outcomes of interest and empirical specification. Our performance measures include the natural logarithm of sales and total assets, to verify whether the strategies grow faster; EBIT or EBITDA over total assets (return on assets, ROA) and EBIT or EBITDA over operating revenue (return on sales, ROS), to see whether the strategies show better profitability; and the operating leverage and cash holdings over assets to analyse the change in financial constraints (Erel et al., 2015). Finally, we test whether these strategies are associated with efficiency improvements, measured by revenue over total assets (the asset turnover ratio, ATR) and revenue over the number of employees (labor productivity). Using the sample of observed strategies (treated) and placebo strategies (controls), we estimate the following specification:

$$Y_{s,t} = \alpha + \beta_1 Post_{s,t} + \beta_2 Post_{s,t} \times BB_s + \eta_s + \eta_t + \epsilon_{s,t}, \quad (1)$$

where $Y_{s,t}$ are different outcomes for a treated or control strategy s in the year t . For actual strategy s and its placebo strategies, the $Post_{s,t}$ is equal to one for the years after the platform of s was acquired, and zero otherwise. It accounts for any common trend affecting both the treatment and control group. The BB_s is our treatment indicator, equal to one for the observed buy-and-build strategies. The β_2 is our main coefficient of interest, identified from the post-buyout performance of actual strategies compared to performance of observationally equivalent “artificial counterfactual” strategies, constructed by us. We control for unobserved *time-invariant* differences between strategies (actual or placebo) by strategy fixed effects η_s , and we include year fixed effects η_t to control for common time trends across countries.

Finally, we introduce the triple difference into our regressions by interacting the $Post_{i,t} \times BB_i$ term with several strategy characteristics that in theory should be conducive to higher synergies. If we find the positive significant interaction term this will be *consistent with* causal interpretation.

3 Data

At the time of writing, researchers have access to reasonably comprehensive and reliable data on net cash flows at the level of PE funds. But the data on operating performance of individual companies held by PE funds (referred to as deal-level data) is still a major challenge for research on private equity because in most countries outside of EU the level of disclosure is much lower than it is for quoted companies (e.g., in the U.S., Securities

and Exchange Commission does not require private companies to file detailed financial records). We collect our data from several databases by the Bureau van Dijk (BvD) that have some attractive features for our purposes. The BvD *Zephyr* database focuses on ownership change and contains information on transactions from the minority stake acquisitions to the majority takeovers, IPOs, etc., across the globe. The BvD *Orbis* database provides information on firms' financing and real activities from financial statements, together with detailed information on firm ownership structure for over 200 million public and private companies across the world in a standardized and internationally comparable format. Deals in *Zephyr* can be merged to company information in *Orbis* by a common identifier. The databases are validated against the official sources and described in Kalemli-Ozcan et al. (2015). We select the deals in seven advanced economies in Europe (Denmark, Finland, France, Norway, Spain, Sweden, and the UK) that represent the most active PE markets outside of the U.S. and, in contrast to North America, have the stringent requirements for data reporting.

Appendix A describes our methodology to identify buy-and-build strategies from BvD databases and assign their financials in detail. The internal organization of the databases defines our data collection strategy. The key challenge is that no database identifies the buy-and-build strategies—only the potential follow-on deals.¹³ In short, we start by selecting the follow-on deals from *Zephyr*, use detailed company ownership information to find the platforms and define strategies as a platform and all the relevant follow-ons. Then we assemble the financials of all companies in the identified strategies from *Orbis* financials as recommended in Kalemli-Ozcan et al. (2015) in order to reduce the survivorship bias present in direct *Orbis* downloads.¹⁴ In total, we identify 818 strategies with unique platforms located in these seven European countries with a total of 1,346 follow-on acquisitions.

¹³To our knowledge, the three other commercial databases that cover alternative investments, Preqin, Capital IQ, and Pitchbook, have recently introduced the flags broadly consistent with the follow-on deals. Capital IQ has the “consolidation/roll up,” Pitchbook has the “add-on” and the “platform creation” but they do not seem to be for PE specifically. More generally, Preqin has investments by PE in a portfolio company, and by reading the profile details of the deal one can find the “add-on investments” by the company in which the PE firm invested.

¹⁴The online version of *Orbis* only contains the 10 most recent year of financials of a company. Older deals are more likely to be excluded due to missing financials. To overcome this problem, we follow Kalemli-Ozcan et al. (2015) and access the historic vintages of *Orbis* to collect financials for targets in these older deals.

3.1 Characteristics of buy-and-build strategies

Table 1 presents some descriptive statistics of the sample. In panel A, we report the number of acquisitions by year. The number of platforms and strategies is the same because each strategy has a single platform. The number of completed buy-and-build acquisitions was relatively small up to 2004 but strongly increased in the second half of the 2000s, prior to the Global Financial Crisis in 2007-08. After a short set-back, the number of acquisitions returned to their pre-crisis levels in 2010, and the low numbers in the last two years are due to delays with the inclusion of later deals into the databases. Figure 1 presents this trend visually in absolute terms (dark-blue shaded area, left axis) and relative to the total number of LBOs, including buy-and-builds (solid line, right axis). Together with the large volume of these transactions, the uninterrupted upward trend in the share of M&As into this strategy from 2003 onward shows their growing importance in the PE market.

In panel B, we report the number of follow-on acquisitions per buy-and-build strategy. Most strategies have acquired either 1 or 2 follow-on companies, with an average of 1.7 follow-ons. Noteworthy, a few buy-and-build strategies, while designated in deal descriptions as such, have not acquired any follow-on companies. buy-and-build strategies with 4 or more acquisitions are less common, although one strategy in our sample consists of an impressive 34 follow-on companies. Our unit of observation is a firm (a legal entity) and by examining our follow-ons we found that some included a large number of establishments, which might partially explain why our average number of follow-ons is lower than commonly thought about the buy-and-builds. We conduct a robustness analysis with two alternative definitions of the serial buyouts by PE, and confirm the general conclusions from our main approach (see Section 5.3 for details).

Panel C shows that out of our 818 strategies, 240 were still active (no exit) and 33 had unclear status as of August 2017. We consider the latter two types of strategies uncompleted because any PE strategy should, in principle, end in an exit. Of note, if our source explicitly mentions that the companies went bankrupt we consider it an exited strategy. The average length of the exited buy-and-build strategies in our sample is more than 5 years, confirming our expectation that buy-and-builds are indeed longer-term strategies. This is new, because a typical PE transaction takes 3-4 years to exit, while most of the research focuses on portfolio performance in the first three years post acquisition. Nevertheless, our sample also includes some “quick-flips” in which the strategy took less than a year to complete. On the

Table 1: Characteristics of buy-and-build strategies in our sample.

<i>Panel A: Buy-and-build acquisitions by year</i>			
Deal year	Strategies (Platforms)	Follow-ons	Total
1997	4	0	4
1998	10	4	14
1999	26	24	50
2000	22	30	52
2001	16	20	36
2002	11	10	21
2003	26	12	38
2004	36	26	62
2005	55	49	104
2006	92	55	147
2007	94	121	215
2008	74	136	210
2009	39	74	113
2010	79	121	200
2011	90	127	217
2012	69	174	243
2013	42	176	218
2014	29	187	216
2015–16	4	0	4
Total	818	1,346	2,164

<i>Panel B: Composition of buy-and-build strategies</i>			
Number of follow-ons per strategy	Number of strategies	Percent	Cum.
0	37	4.5	4.5
1	486	59.4	63.9
2	204	24.9	88.9
3	47	5.8	94.6
4	15	1.8	96.5
5	10	1.2	97.7
6 and more	19	2.3	100
Total number of strategies	818		
Average number of follow-ons	1.7		
Maximum number of follow-ons	34		

<i>Panel C: Status and length of buy-and-build strategies</i>	
Number of completed (exited) strategies	545
Number of strategies still active	240
Strategies without clear exit	33
Average strategy length (days)	1,987
Minimum length (days)	44
Maximum length (days)	5,369

other side of the spectrum, we also have strategies that took more than 10 years from the platform acquisition to exit. Finally, out 37 strategies with no follow-ons, two went bankrupt and a majority (29) exited without failure. We retain such “degenerate” strategies in our analysis that stacks cards against us finding the synergetic effects of serial acquisitions.

3.2 Sectoral Patterns

The PE industry and existing theoretical literature mentions industry consolidation in the local market as the primary goal of buy-and-build strategy (see Smit, 2001; Bain&Company, 2018). Through consolidation, the combined company could obtain economies of scale or a stronger market position towards suppliers and buyers, which has been shown for horizontal mergers in general (Singh and Montgomery, 1987; Bhattacharyya and Nain, 2011). If true, we would expect that most follow-on acquisitions are within the same industry. In Figure 2 we present the volume of acquisitions by the industry combination of the platform and their follow-ons, using the European 4-digit NACE classification. The sector of main activity of the platform are plotted on the vertical axis and the sector of its follow-ons on the horizontal axis, and the size of the circles represents the number of follow-ons in this industry combination. In panel A, we plot the deals where platform and follow-ons belong to the same 4-digit sector (or horizontally related) and in panel B the deals *outside* the same 4-digit sector. The graph shows clustering of deal activity in certain industries. The horizontal acquisitions in panel A are especially visible in services industry (the industry numbers 6xxx and up). Panel B demonstrates that there are numerous strategies in which the follow-ons are active in a different industry than the platform, even a different 1-digit industry (see also Figure OA.1 at 1-digit level in online appendix). Here, the deals cluster in services and manufacturing (between the red dashed lines). Otherwise, the graph demonstrates that the PE not only seek to consolidate the industries, as is commonly believed, but also exploit other goals. Still, the majority of the deals in panel B are clustered around the 45-degree line, where close but not the same narrow sector combinations line-up.

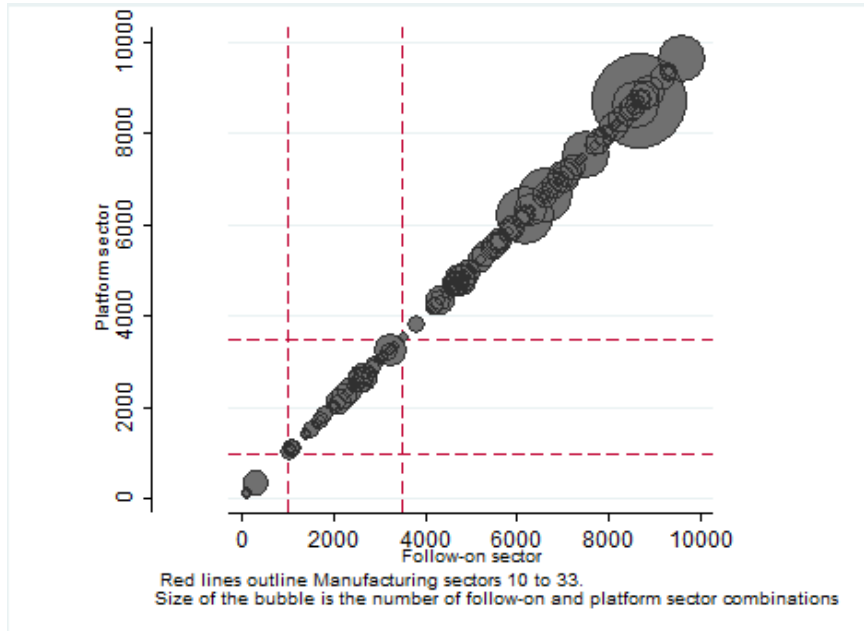
What could be the reason for non-horizontal deals depicted in panel B? The industrial organization literature has a long tradition investigating the so called “vertical linkages,” where the companies might be related along the production value chain through the supplier-user linkages. Acquiring own suppliers could give the company more control on the speed of the production process and on the quality and reliability of the inputs (Barrot and Sauvagnat, 2016).¹⁵ Acquirers can “learn” from their subsidiaries who are downstream customers (Javorcik, 2004) or have an easier access to business-relevant information in the economy, relative to specialized firm (Anjos and Fracassi, 2015).¹⁶ The intensity of the

¹⁵Barrot and Sauvagnat (2016) show that the firm-level supplier shocks from natural disasters propagate in production networks and impose substantial output losses leading to lower market share on their customers, especially when they produce specific inputs.

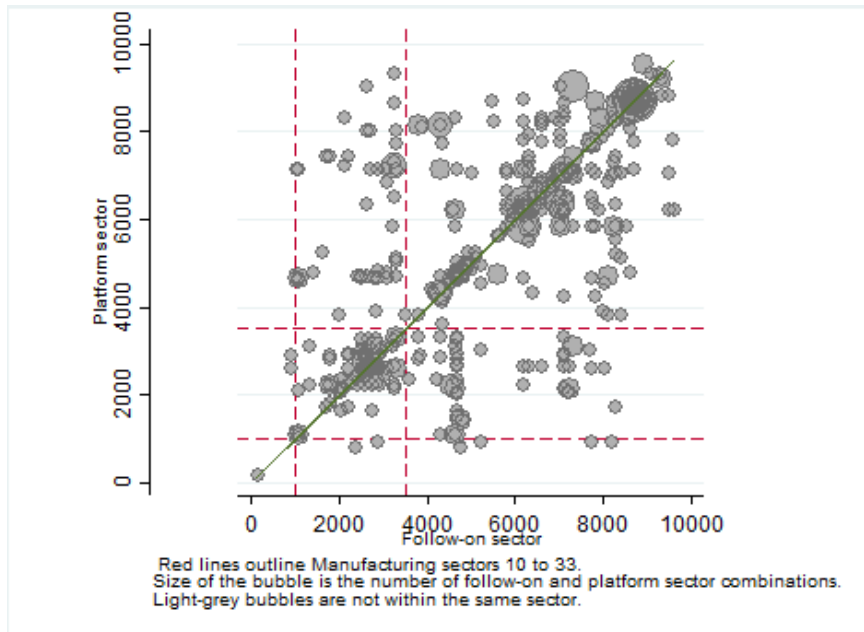
¹⁶Javorcik (2004) found the evidence of productivity spillovers from multinationals to domestic firms

Figure 2: Horizontal and other industry combinations.

This figure presents the deal activity by industry combinations. The number of 4-digit NACE revision 2 sector of the platform is on the vertical axis, and the number of the sector of the follow-on is on the horizontal axis. Points on the 45-degree line indicate that the platform and follow-on belong to the same industry. The size of the ball is proportional to the deal count for that combination. In panel A, platform and follow-ons belong to the same 4-digit NACE sector; in panel B they belong to a different 4-digit sectors.



Panel A: Follow-ons per horizontal combination

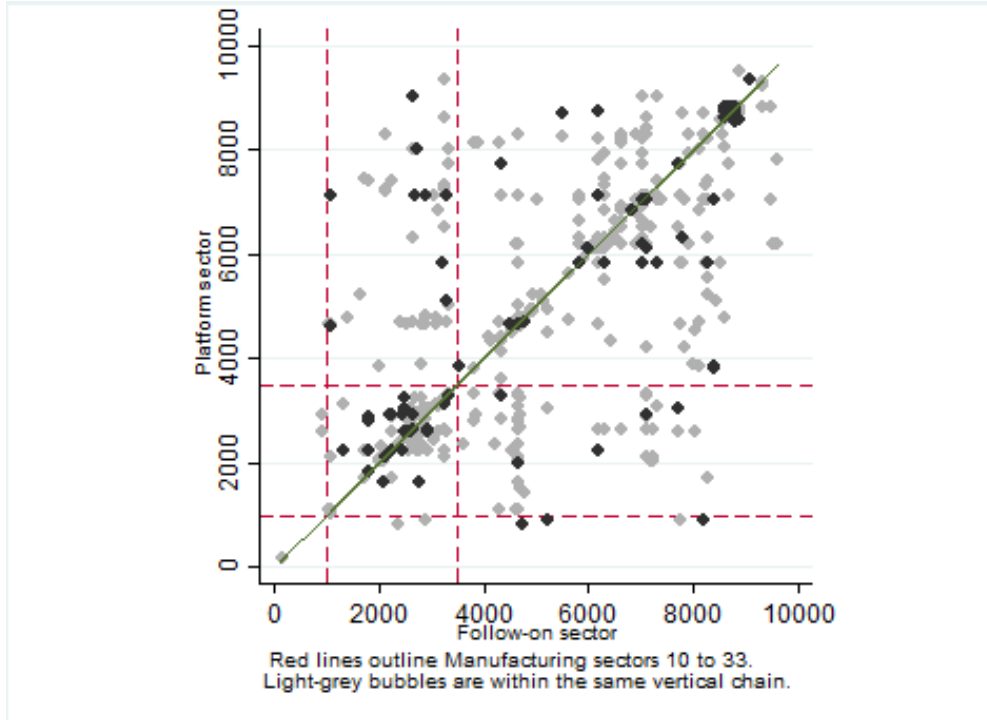


Panel B: Follow-ons per vertical combinations

through customer-supplier relationships between domestic firms and their multinational downstream customers or upstream suppliers. Anjos and Fracassi (2015) provide evidence that vertically-integrated firms overcome the informational frictions and combine cross-industry knowledge better than specialized companies. Access to the internal capital markets within a conglomerate is well-established benefit of corporate

Figure 3: Input-output relations of industry combinations in different sectors.

This figure presents supplier-customer relations according to the input-output table between the industry combinations that do not belong to the same 4-digit NACE sector. Light-gray circles indicate that the platform and follow-on share a supplier-customer relation. Dark-grey circles indicate that the platform and follow-on do not share a customer-supplier relation. On the vertical axis and horizontal axis the 4-digit NACE code of respectively the platform and follow-on is presented. The green 45-degree line indicates combinations in which the platform and follow-on belong to the same industry.



supplier-customer linkages is typically measured by the coefficients from the input-output (I-O) tables that show the fraction of each sector output supplied to or sourced from all other sectors in an economy, either intermediate inputs or final products (see early work by Lemelin, 1982; Caves and Bradburd, 1988; and in finance literature by Fan and Lang, 2000). We construct the I-O coefficients at the 4-digit industry level using the most detailed to date input-output table for the U.S. from 2007, compiled by the Bureau of Economic Analysis.¹⁷ In Figure 3 the light-gray dots indicate the deals where the platform is a direct

diversification (Hubbard and Palia, 1999; Khanna and Tice, 2001). A newer work stresses the reallocation of workers, or the internal labor markets (Tate and Yang, 2015). Benefits from internal reallocation of capital or labor might also work for horizontal M&As.

¹⁷Statistics prepared at the 389-industry level of aggregation was available until very recently only for estimate year 2007, which is a mid-year of our sample. The table “Use Tables/After Redefinitions/Producer Value” is available at <https://www.bea.gov/industry/input-output-accounts-data> (accessed 21/3/2017). Recently the 2012 estimates were released. Using the U.S.-based measures implicitly assumes that the patterns of input flows in the advanced European countries of our sample are close to those of the United States. If the U.S. production and input structures are imperfect for European countries, we are introducing random error in the measurement of our regressors and, therefore, reducing the probability of finding statistically significant results. The alternative is the World Input-Output Database (WIOD) that provides time-series of I-O tables for forty countries but at the less detailed 2-digit industry level.

supplier to or consumer of the follow-on; the black circles indicate that there is no direct I-O relation. The figure shows that the majority of the deals do indeed have a direct I-O (product market) relation, however, there are numerous combinations in which the nature of relation between the platform and follow-on is unclear. Either type of non-horizontal acquisitions can potentially be motivated by the economies of scope. One potential source of value in the absence of the I-O links is technological relatedness and learning.¹⁸ We exploit the relatedness of the companies in product space in the empirical analysis.

4 Results

4.1 Buy-and-builds and operating improvements

We begin our empirical analysis by estimating the model in Eq. (1) at the strategy level over up to five-year time horizon, clustering the standard errors two-ways, over the strategy and year. As the result, we include most of the longer-term exited strategies and non-exited strategies because the average length of our buy-and-build strategies, from the platform acquisition to exit, is slightly above three years. This time horizon resonates with the arguments from the PE industry that buy-and-build is a long-run strategy because there are multiple companies in portfolio that need to be restructured and integrated. The after-event indicator *Post* takes the value of zero at $t-1$ and one for the period $t+1$ up to $t+5$ where t is the company acquisition year.¹⁹ The coefficient of the interaction $Post \times BB$ shows the difference in the outcome between the observed strategies and the placebo control strategies during the years after the acquisition. A positive significant coefficient is consistent with the notion that this strategy brings the synergetic benefits. The results in Table 2 show that over five years buy-and-build strategies are associated with significantly higher return of sales but the rest of operating outcomes remain at the levels of the comparable artificial strategies. The coefficient of 0.0154 implies that the effect, if causal, is economically meaningful; compared to the pre-deal mean of 5.6 percent, ROS on average increases by 27 percent over the first five years (or exit if earlier).²⁰

Exited and Non-exited Strategies. The large sample in Table 2 includes exited and non-

¹⁸Bloom et al. (2013) show that firms learn from the technological innovation of firms that are close in technology space. Acemoglu et al. (2016) argue that technological progress is not only a cumulative process, with new technologies building on existing knowledge, but also a process where innovation in one firm affects firms in technologically close fields. Fons-Rosen et al. (2017) show that positive knowledge spillovers from MNCs can happen without input-output linkages as long as the firms produce in technologically close

Table 2: Performance of the strategies relative to the placebo strategies over the long-run: All strategies.

This table shows the performance of buy-and-build strategies compared to placebo control strategies over the first five years following the platform acquisition. The sample includes strategies with known exit and non-exited strategies. *Post* is an indicator equal to zero for t-1 and one for the period t+1 up to t+5 (or exit, whichever is earlier), where t indicates the year of the acquisition of the strategy’s platform. For the control sample, *Post* takes on the respective values of the treated company to which the control is matched. *BB* is an indicator for the treated sample. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1) ln Assets	(2) ln Sales	(3) ROA	(4) ROS	(5) ATR	(6) Leverage	(7) Cash/Assets
BB×Post	-0.114 (-0.74)	0.073 (0.76)	0.007 (1.26)	0.015** (2.65)	0.045 (0.81)	0.023 (1.57)	-0.009 (-1.21)
Post	-0.074 (-1.38)	-0.114* (-2.08)	-0.004 (-0.84)	-0.003 (-0.67)	0.027 (0.81)	-0.019 (-1.65)	-0.006 (-0.91)
Observations	4,534	4,511	4,531	4,503	4,526	4,131	4,348
Year FE	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓
Adj. R ²	0.880	0.870	0.594	0.576	0.827	0.721	0.664

exited strategies, and the former could be considered completed. If we see operating improvements concentrated in exited strategies this would provide evidence that the strategy is (partially) motivated by synergies. The other metrics of “success” could be maximizing internal rate of return (IRR), multiple arbitrage without operating improvements, or elimination of small firm discount. We split our sample into completed (exited) and uncompleted strategies and repeat the analysis, keeping the time period at five years since the portfolio acquisition. The results in Table 3 show improvements in sales and profitability in completed strategies, compared to the matched control strategies, while the strategies that are still private in our sample underperform, even over such a long period as five years.

Endogeneity of exit decision. The limited life of the PE partnership in general implies that the exit will happen at some point in the future—our sample simply does not span enough time in order to observe all exits. The combined entity would be an appealing target for a strategic buyer or would succeed with the IPO if it performs better than what the strategic buyer or the market can obtain itself. That is, the decision to exit might depend on realization of synergies and the observations for non-exited strategies in our sample may be considered right censored. We verify this conjecture by using the survival (or duration) analysis that is an appealing alternative to the common statistical methods in this context.

sectors.

¹⁹If a strategy exits before the first five years the *Post* is equal to one up to and including its exit year.

²⁰The standard deviation of the pre-deal mean is 8.6.

Table 3: Performance of the strategies relative to the placebo strategies: Completed and uncompleted strategies.

Panel A shows the performance of buy-and-build strategies with known exit compared to placebo control strategies; this panel replicates Table 2 excluding the strategies which are still active or with unknown status. Panel B only includes the strategies which are still active or have unknown status. The *Post* is an indicator equal to zero for t-1 and one for the period t+1 up to t+5 (or exit, whichever is earlier), where t indicates the year of the acquisition of the strategy's platform. For the control sample, *Post* takes on the respective values of the treated company to which the control is matched. *BB* is an indicator for the treated sample. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln Assets	ln Sales	ROA	ROS	ATR	Leverage	Cash/Assets
<i>Panel A: Exited strategies, t-1 to t+5</i>							
BB×Post	-0.056 (-0.36)	0.196* (1.83)	0.016** (2.29)	0.023*** (3.51)	0.062 (0.82)	0.008 (0.43)	-0.001 (-0.16)
Post	-0.068 (-0.93)	-0.117* (-1.83)	-0.009 (-1.52)	-0.008* (-1.85)	0.009 (0.23)	-0.017 (-1.34)	-0.007 (-0.76)
Observations	3,394	3,377	3,391	3,372	3,389	3,068	3,247
Adj. R ²	0.872	0.877	0.606	0.595	0.823	0.706	0.663
<i>Panel B: Non-exited strategies, t-1 to t+5</i>							
BB×Post	-0.267 (-1.47)	-0.338** (-2.40)	-0.026* (-1.92)	-0.014 (-1.25)	-0.021 (-0.33)	0.069* (1.91)	-0.035 (-1.71)
Post	-0.183 (-0.89)	-0.183 (-0.61)	0.016 (1.25)	0.016 (1.11)	0.102* (2.04)	-0.028 (-1.44)	-0.001 (-0.04)
Observations	1,137	1,131	1,137	1,128	1,134	1,062	1,098
Adj. R ²	0.901	0.841	0.554	0.526	0.833	0.766	0.664
Year FE	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓

We model the probability that an strategy will experience an exit at time t , knowing that it has not exited (or “survived to”) up to t . With non-exited strategies, this probability (or the “hazard rate”) is unobserved, and it reflects both the occurrence and the timing of the exit. In Table 4 we report the raw coefficients from several duration models where the dependent variable is the time to the exit, calculated as the time (in years) between the year of the acquisition of the strategy’s platform. We condition on the total asset growth and the “abnormal” asset growth (the variable *Asset growth (abnormal)*), defined as the growth of the strategy assets minus the growth of the placebo control strategy assets. The latter is our proxy of the accumulated (growth) synergies. We also include the abnormal ROA and sales growth, defined similarly. We estimate the “dynamic” models over the full panel structure and a “static” model where the time interval to the exit is fixed at the first 5 years from the platform acquisition and the explanatory variables are cumulated over the corresponding time interval. We adjust for unobserved heterogeneity (frailty) where the frailty parameter is significant. The results show that the probability of exit increases significantly with larger synergies, represented by abnormal return on assets and robust to specifications. We also see that the hazard shape parameter is above unity, with point estimates around 2.5, which implies that the probability of exit increases over time (Figure OA.2 in online appendix shows this visually). These results are fully consistent with the results in Table 2 in that the PE seem to decide to exit when it demonstrates some “success” realizing sufficient operating improvements over the comparable placebo portfolio.

Short-term and long-term strategies. The realization of synergies used to be the area where the strategic buyers would excel because the operating synergies might be take time to realize and this requires the long-run focus, typically associated with strategic M&As. We categorize all the exited strategies into two groups, split by the sample average time to exit of three years (this cutoff coincidentally matches the time horizon to measure the performance of acquisitions by the M&A literature) and re-estimate the model for these sub-groups. We report the results for the short-term exited strategies in Table 5, panel A (at most four years to exit or less, three on average) and for the long-term exited strategies in panel B (at least five years to exit).²¹ Remarkably, we find improved operations in both groups, which in our view suggests that synergies is an inherent part of even shorter-held

²¹When implementing propensity score matching in the sample in panel A, we require our controls to have at least three years of data post-buyout, while in samples like panel B in Table 5 and in Table 2 and the other long-run specifications, we require our controls to have at least five (instead of three) years of data post-buyout.

Table 4: Operating performance and strategy exit rates: Duration analysis.

The table reports the raw coefficients from the duration models explaining the relationship between the probability that a buy-and-build strategy exits at time t having lasted up to time t and operating performance. The dependent variable is the time to the exit, calculated as the time (in years) from the year of the acquisition of the strategy's platform. Strategies which have not exited during the sample period are considered censored observations. The *Asset growth (total)* is the growth rate of total strategy assets (the platform and all follow-ons) from the year before the platform acquisition, while the *Asset growth (abnormal)* is the growth of the strategy assets minus the growth of the placebo control strategy assets. The variables *ROA (abnormal)* and *Sales growth (abnormal)* are defined similarly from the level of Return on Assets and growth of operating revenue. For the control sample, the variables take the respective values of the control companies to which the treated is matched. The models marked "Dynamic" use the full panel structure, while in the models marked "Static" the time interval to the exit (the failure) is fixed at the first 5 or 3 years from the platform acquisition (or exit, whichever is earlier) and the explanatory variables are cumulated over the corresponding time interval. The results are calculated using a parametric a Weibull survival-time model in columns (1)–(4) and (7), the exponential model with a more flexible baseline hazard parametrized with the duration dummies in column (5), and the non-parametric Cox proportional hazards model in column (6). For static model in columns (7), we adjust for unobserved heterogeneity (frailty) assuming the inverse-Gaussian distribution of frailty; in the other models the frailty parameter is not significant. Standard errors are clustered at the year level. P-values are included in the brackets. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Estimation	Dynamic	Dynamic	Dynamic	Dynamic	Dynamic	Dynamic	Static 5 years
Asset growth (total)	0.229*** (0.002)	0.238* (0.081)	0.114 (0.545)	0.105 (0.601)	0.214 (0.283)	0.083 (0.637)	-0.064 (0.896)
Asset growth (abnormal)	-0.018 (0.857)	0.004 (0.975)	0.018 (0.895)	0.030 (0.846)	0.096 (0.530)	0.088 (0.638)	-0.050 (0.395)
ROA (abnormal)	3.511*** (0.009)	3.380** (0.017)	3.246** (0.020)	3.345** (0.013)	3.662*** (0.002)	2.941* (0.052)	5.393*** (0.000)
Sales growth (abnormal)				-0.005 (0.967)	-0.046 (0.684)	-0.097 (0.485)	0.067 (0.568)
Model	Weibull	Weibull	Weibull	Weibull	Exp	Cox	Weibull
Hazard shape parameter p	2.469	2.469	2.469	2.478	-	-	2.395
Frailty	None	None	None	None	None	None	Inv. Gauss
Duration Dummies					✓		
Observations	503	503	503	493	493	493	93
Year FE	✓	✓	✓	✓	✓	✓	✓
Country FE		✓	✓	✓	✓	✓	✓
Industry FE			✓	✓	✓	✓	✓

strategies in our sample.²²

Table 5: Performance of the strategies relative to the placebo strategies: Short- and Long-term completed strategies.

Panel A shows the performance of BB strategies includes exited strategies with up to 4 years to known exit (the short-term strategies). Panel B includes exited strategies with 5 years or more to known exit (the long-term strategies). In Panel A, the *Post-Short* is an indicator equal to zero for $t-1$ and one for the period $t+1$ up to $t+3$ (or exit, whichever is earlier), where t indicates the year of the acquisition of the strategy's platform. In Panel B, the *Post* is an indicator equal to zero for $t-1$ and one for the period $t+1$ up to $t+5$ (or exit, whichever is earlier). For the control sample, *Post* takes on the respective values of the treated company to which the control is matched. *BB* is an indicator for the treated sample. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1) ln Assets	(2) ln Sales	(3) ROA	(4) ROS	(5) ATR	(6) Leverage	(7) Cash/Assets
<i>Panel A: Short-term exited strategies, t-1 to t+3</i>							
BB×Post-Short	0.240** (2.38)	0.139 (1.14)	0.017 (1.46)	0.022* (2.11)	-0.166* (-1.79)	-0.025 (-1.27)	0.011 (0.56)
Post-Short	-0.076 (-0.81)	-0.036 (-0.25)	-0.025** (-2.75)	-0.019** (-2.23)	0.069 (1.32)	0.022 (0.96)	-0.033*** (-3.33)
Observations	1,252	1,251	1,251	1,248	1,251	1,118	1,189
Adj. R ²	0.867	0.864	0.651	0.608	0.818	0.727	0.648
<i>Panel B: Long-term exited strategies, t-1 to t+5</i>							
BB×Post	-0.172 (-0.80)	0.202 (1.49)	0.019** (2.35)	0.023** (2.20)	0.169 (1.59)	0.024 (1.16)	-0.015 (-1.02)
Post	-0.076 (-0.96)	-0.117 (-1.01)	-0.013* (-2.10)	-0.006 (-1.05)	-0.034 (-1.19)	-0.011 (-0.87)	-0.013 (-1.35)
Observations	2,434	2,389	2,431	2,385	2,401	2,157	2,330
Adj. R ²	0.850	0.849	0.611	0.631	0.803	0.701	0.663
Year FE	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓

Comparing panel A and B we find a difference in focus depending on the length of the strategy. In short-term exited strategies (panel A) the focus is on growing assets with some weak evidence of improvements in profitability, while the long-term exited strategies (panel B) achieve significantly higher profitability but the sales and assets are comparable to the outcomes of the control strategies. These effects are economically meaningful. The effects imply that an average short-term strategy shows close to 41 percent improvement of ROS over the average pre-acquisition ROS, while over five years the increase of the ROS of the long-term strategies is 55 percent.²³ In online appendix Table OA.1 we show how the

²²In unreported results where we observe the strategies until the actual time of exit (if available) we find improvements in sales, profitability (both return on assets and sales), and improvements in labour profitability and productivity.

²³The average pre-treatment ROS in the sample of long-term strategies in Table 3 is about 6.2 percent

synergies develop in the long-term strategies *within* the five-year horizon by splitting the the *Post* dummy into two sub-periods: the *Post-Short* taking the value of one in the first three years after the platform acquisition and the *Post-Long* equal to one thereafter. The results indicate that the significant synergies in terms of larger sales arrive later, in the year 4 and 5, while the profitability increases throughout but the effect grows over time.²⁴

Employment and Labor Productivity. The impact of private equity on employment has been a topic of an intense debate among politicians and academics for a long time. The typical critique is to note that when private equity companies are focused on cost reduction cutting the labor force can be the easiest way to reduce the expenses. Davis et al. (2014) challenge this view. Using establishment level data from the U.S., they find that the net effect on employment is small but there is a sizable reallocation of labor between the establishments from within the firms and associated productivity gains. Antoni et al. (2019) find that PE buyouts in Germany are more negative for workers, resulting in lower overall employment, an increase in employee turnover, and earnings declines over five years, especially for older employees. Although they provide some evidence of growth in jobs with IT skills. In building the case that the performance improvements that we find in buy-and-builds are evidence of synergies we look at such “real outcomes” as employment and labor productivity. We report the results in Table 6. We do not see any changes in employment or gains in labor productivity in short-term completed strategies (panel A). Turning attention to the long-term strategies in panel B we do not find any significant changes in employment but see the significant improvement in EBITDA/employment (column 2) and in labor productivity (column 3) throughout five years after acquisition. Together, the evidence of growth of sales and profitability, no changes in employment, and a higher labor productivity in long-term strategies is consistent with the mechanism of Davis et al. (2014) where PE achieves productivity gains by reallocating labor to the most productive use within the portfolio.

with the standard deviation of 9.2 percent. For short-term strategies, the pre-treatment ROS has the mean of 5.6 percent with the standard deviation of 8.5.

²⁴Based on the coefficients in this table, the ROS of the long-term strategies increases by, on average, 2 percentage points over the first three years and by additional 1.3 percentage points in the following two years, compared to pre-treatment level. The short-run effect on profitability is comparable to the 2.3 percent increase in ROS of short-term strategies documented in panel A of Table 3.

Table 6: Employment and labor productivity.

This table measures the impact on employment and labor productivity. Panel A shows the performance of the exited strategies with up to 4 years to known exit (the short-term strategies) over the first three years following the platform acquisition. Panel B includes exited strategies that took at least 5 years to exit (the long-term strategies) over the first five years following the platform acquisition. The *Post-Short* is an indicator equal to zero for $t-1$ and equal to one for the periods $t+1$ to $t+3$, where t indicates the year of the acquisition (or exit, whichever is earlier), where t indicates the year of the acquisition of the strategy's platform. The *Post* is an indicator equal to zero for $t-1$ and one for the period $t+1$ up to $t+5$ (or exit, whichever is earlier). For the control samples, *Post-Short* and *Post* take on the respective values of the treated company to which the control is matched. *BB* is an indicator for the treated sample. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1) ln Employment	(2) Return per Employee	(3) Sales per Employee
<i>Panel A: Short-term exited strategies, t-1 to t+3</i>			
BB×Post-Short	-0.001 (-0.01)	0.001 (0.14)	-0.020 (-0.52)
Post-Short	0.197 (1.65)	-0.006* (-2.06)	-0.013 (-1.04)
Observations	1,059	1,033	1,033
Adj. R ²	0.822	0.685	0.844
<i>Panel B: Long-term exited strategies, t-1 to t+5</i>			
BB×Post	-0.012 (-0.10)	0.037* (1.93)	0.009*** (3.23)
Post	-0.091 (-1.25)	-0.024 (-1.54)	-0.002 (-1.13)
Observations	2,073	2,043	2,044
Adj. R ²	0.874	0.621	0.794
Year FE	✓	✓	✓
Strategy FE	✓	✓	✓

4.2 Heterogeneity of buy-and-builds and channels of operating improvements

Our results so far show that the PE investors exit after having achieved significant operating results, compared to the comparable placebo strategy. But what is being done? In the previous section we show that the long-term strategies improve the productivity of labor, while the short-term strategies focus on sales growth. Figure 2 and Figure 3 revealed a great heterogeneity in the type of the companies entering the strategy as platforms or follow-ons. To reinforce the interpretation of results as the realisation of synergies by PE we ask whether we see even larger operational improvements in the strategies where the theory predicts the larger potential synergies. For this, we introduce the triple interactions into our diff-in-diff regressions in order to explore what kinds of company characteristics are likely to deliver the larger benefits compared to the baseline.

Capital-intensive strategies. One of the claimed sources of synergies in M&As is the economies of scale. Larger firms achieve operating efficiency by pooling resources together or become more competitive by capturing a larger market share. Most of our buy-and-build targets are clustered in manufacturing or services. From an operational point of view it is easier to realize the economies of scale in capital intensive industries, such as manufacturing. We could then expect that the PE could make a company more profitable by cutting redundant capacity when the returns to capital are decreasing in scale for very capital intensive companies. Firms in capital intensive industries are generally have greater need for external funds, and gains on the operating side may also result from PE firms relaxing their capital constraints as in Ivashina and Kovner (2011). Alternatively, Fidrmuc et al. (2012) show that in the U.S. over 1997-2006, the strategic buyers would typically buy listed targets with higher market-to-book ratios and more specific assets (firms with high R&D or intangible assets) while the PE buyers target firms with lower market-to-book ratios. They interpret this finding as evidence of Shleifer and Vishny (1992)'s theory who argue that it is strategic buyers who can put very specific assets to their best use while PE prefer more generic, or redeployable, assets that they can manage or dispose of more easily.²⁵ Such interpretation implies that the PE buyers are industry outsiders who cannot put the

²⁵This is also consistent with the transaction-cost theory in Williamson (1988), who argues that assets (or projects) with higher redeployability can be financed at better terms and with more debt, which makes them the attractive LBO targets. He also suggests that asset tangibility is not the same as redeployability but there is a positive correlation between the two. Gorbenko and Malenko (2014) show that strategic buyer tend to value research and development expenses and intangible assets such as growth options.

assets to the best use and is against our hypothesis that the PE companies engaging in buy-and-build strategy *are* well-positioned to identify and exploit synergies and, therefore, close to the strategic buyers.

Table 7: Performance of the exited strategies relative to the placebo strategies: Capital intensive strategies.

This table shows the performance of exited buy-and-build strategies compared to placebo control strategies. Panel A includes strategies with up to 4 years to known exit (the short-term strategies) and the *Post-Short* is an indicator equal to zero for t-1 and one for the period t+1 up to t+3, where t indicates the year of the acquisition of the strategy's platform. Panel B includes strategies with 5 years or more to known exit (the long-term strategies) and the *Post* is an indicator equal to zero for t-1 and one for the period t+1 up to t+5, where t indicates the year of the acquisition of the strategy's platform. For the control samples, *Post-Short* and *Post* dummies take on the respective values of the treated company to which the control is matched. *BB* is an indicator for the treated sample. *K Intensity* is an indicator variable equal to one for strategies of which the platform had a fixed assets to employees ratios that was higher than the sample median in the pre-deal year. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1) ln Assets	(2) ln Sales	(3) ROA	(4) ROS	(5) ATR	(6) Leverage	(7) Cash/Assets	(8) ln Empl.	(9) Sales/Empl.
<i>Panel A: Short-term exited strategies, t-1 to t+3</i>									
BB×Post-Short×K Intensity	-0.165 (-0.64)	0.486* (1.78)	0.024 (1.23)	-0.008 (-0.36)	0.344* (1.95)	-0.018 (-0.43)	0.018 (0.45)	-0.176 (-0.42)	0.025 (0.43)
BB×Post-Short	0.330 (1.67)	-0.038 (-0.28)	0.006 (0.50)	0.025* (1.78)	-0.315* (-2.11)	-0.017 (-0.60)	0.002 (0.06)	0.127 (0.90)	-0.029 (-0.95)
Post-Short×K Intensity	-0.101 (-1.23)	-0.083 (-0.68)	0.013 (1.50)	0.008 (1.00)	0.100 (1.52)	-0.025 (-1.46)	0.022* (1.81)	0.280* (2.10)	-0.010 (-0.54)
Post-Short	-0.082 (-0.92)	-0.027 (-0.18)	-0.029** (-2.71)	-0.023** (-2.15)	0.043 (0.67)	0.035 (1.39)	-0.040*** (-3.66)	-0.012 (-0.09)	-0.009 (-0.57)
Observations	1,239	1,238	1,238	1,235	1,238	1,104	1,180	1,045	1,021
Adj. R ²	0.876	0.867	0.650	0.599	0.819	0.721	0.648	0.825	0.842
<i>Panel B: Long-term exited strategies, t-1 to t+5</i>									
BB×Post×K Intensity	-0.914** (-2.67)	-0.454* (-1.83)	0.056*** (4.52)	0.074*** (4.50)	0.307* (1.83)	-0.095* (-2.12)	0.065** (2.23)	-0.512*** (-3.15)	0.122** (2.76)
BB×Post	0.290 (1.54)	0.392* (2.08)	-0.008 (-0.77)	-0.011 (-0.99)	0.006 (0.04)	0.071*** (3.53)	-0.038 (-1.76)	0.216 (1.55)	-0.016 (-0.75)
Post×K Intensity	-0.250*** (-3.25)	-0.090 (-1.21)	0.017*** (3.67)	-0.002 (-0.36)	0.202*** (4.47)	-0.004 (-0.24)	0.004 (0.57)	0.011 (0.13)	-0.028 (-1.62)
Post	0.028 (0.31)	-0.084 (-0.73)	-0.020*** (-3.31)	-0.006 (-0.91)	-0.121*** (-3.74)	-0.009 (-0.83)	-0.015 (-1.62)	-0.098 (-1.07)	-0.017 (-1.11)
Observations	2,434	2,389	2,432	2,385	2,401	2,156	2,330	2,071	2,042
Adj. R ²	0.860	0.856	0.614	0.564	0.807	0.702	0.628	0.875	0.793
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

Either way, what we try to verify is whether the strategy performance depends on the degree of capital intensity of underlying companies. The results are reported in Table 7. The *K Intensity* is a dummy variable equal to one for the strategies in which the platform had the fixed assets to employees higher than the sample median in the pre-deal year.²⁶ For the short-term exited strategies in panel A, the interaction is not significant, except for

²⁶We experimented with the definition of capital intensity based on the split below/above the median sales to assets ratio within either the treatment or control group in the pre-deal year and obtained qualitatively similar results.

sales and asset turnover. The short-term strategies in capital intensive industries grow sales more than the average short-term strategies.²⁷ For the long-term exited strategies in panel B, results in column 1-2 imply that the strategies with more capital intensive platforms cut back their assets and sales more than other buy-and-builds with the same time to exit. They also rely less on external debt, hold more cash, and cut the workforce, as shown in column 6-8. At the same time, these strategies show significant improvement in profitability in terms of ROA and ROS (column 3-4), efficiency measured by the assets turnover (column 5), and labor productivity (column 9).²⁸ These findings are consistent with, but not prove, the assets redeployability hypothesis advanced by Shleifer and Vishny (1992). PE owners engaging into longer-term buy-and-build strategies in capital intensive industries dispose of the redundant capacity and improve profitability and labor productivity.

Horizontal and vertical strategies. A strategic buyer is buying the company in light of how it will enhance their existing operations by horizontal expansion (into new geographic markets or product lines) or the vertical merger (with the customer or supplier). By acquiring a rival the company increases its market share, which provides a stronger market position within the industry and towards customer and supplier industries. The vertical acquisitions could improve the quality of products or production efficiency.²⁹ Through these channels and by merely eliminating the duplicate functions the strategic buyers hope to realize synergistic benefits, and we examine whether the buy-and-build strategies with these kinds of relatedness between the platform and follow-on companies obtain significant operating improvements. We classify our strategies by the degree of relatedness between follow-ons and the platform in the product value chain. The acquisitions within the same 2-digit NACE (or comparable) sector are defined in the literature as horizontal; the vertical acquisitions would be outside of the acquirers own 2-digit sector, as long as one can identify the supplier or customer relatedness, typically with the input-output (I-O) tables. We prefer a more detailed 4-digit NACE codes in order to classify the company relatedness more precisely and enhance the definition using the I-O table from the U.S. for the benchmark year 2007

²⁷Notice that the coefficient to $BB \times Post-Short$ in column (4) for ROS is significant positive with point estimate comparable to the similar regression in column (4), panel C Table 3, as it should be.

²⁸In online appendix Table OA.2 we split the *Post* dummy into *Post-Short* and *Post-Long* to check the timing of these benefits. We find that all the effects we document in Table 7 occur from right after the acquisition and grow over time.

²⁹The early paper which suggests that horizontal buy-and-build strategies may be motivated by industry consolidation is Smit (2001). The vertical M&As can be explained by the decreasing industry dependence, better control over the product quality, or by improving the negotiation position by learning about the market of the supplier (Porter, 1980).

that is detailed enough to identify customer-supplier linkages on a 4-digit industry level.³⁰ Specifically, the variable *Horizontal* is the *proportion* of follow-ons in a given year in the same 4-digit NACE sector as the platform as the ratio of all follow-ons acquired as of this year. The variable *Vertical* is the proportion of follow-ons in a given year outside of the 4-digit NACE sector of the platform, but that have either a supplier or customer relation based on the I-O table, as the ratio of all follow-ons acquired as of this year. For the control samples, the relatedness measures are defined similarly. Because in our sample the follow-ons are being acquired starting in the first year after the acquisition of the portfolio the coefficients of these proportions capture the development of the given outcome relative to the pre-acquisition year for treated and control observations, much like the shifter *Post* in all the previous regressions. Therefore, we do not include the *Post* and $BB \times Post$ in our regressions.³¹

The results are in Table 8. Contrary to expectations, we do not find that horizontally related follow-ons significantly change the operating performance of the strategies. Only the long-term horizontal strategies seem to secure higher leverage (column 6 in panel B). One possibility behind the lack of relationship between operating outcomes and the “horizontalness” measure is that horizontal buy-and-builds are focusing on the multiple expansion as a possible goal of serial acquisitions in the same narrow industry. If the key goal of the horizontal strategies to eliminate the small firm discount and sell the combined larger company at higher multiple *without meaningful operating changes* we will not capture this effect in our operating outcomes.³² In contrast, profitability seem to increase in the long-term strategies that combine vertically related companies. The long-term vertical strategies are more efficient by increasing sales-to-assets and labor productivity. Finally, all vertical buy-and-build strategies are associated with higher leverage (column 6 in both panes).

We explore further what lies behind our results in Table 8 by measuring *closeness* of the I-O relations because the acquisitions of closely-related business could lead to more knowledge spillovers and more efficient integration. For that, we decompose the *Vertical*

³⁰The input-output coefficients derived from the I-O table record the fraction of its own output that a given 4-digit sector $s4$ supplies to or sources from each given sector $\tilde{s}4$. To construct our measure at the four-digit level, we use the U.S. input-output table from the Bureau of Economic Analysis (BEA). Using the U.S.-based measures implicitly assumes that the patterns of input flows in the countries of our sample are close to those of the United States. If the U.S. production and input structures are imperfect for advanced European countries, we are introducing random error in the measurement of our regressors and, therefore, reducing the probability of finding statistically significant results.

³¹We verified that the results do not change on inclusion of these terms.

³²Studying the exit multiples of these strategies is a possible extension of this paper.

Table 8: Performance of the exited strategies relative to the placebo strategies: Horizontal and vertical strategies.

This table shows the performance of exited buy-and-build strategies compared to placebo control strategies, depending on product-market relatedness of companies. Panel A includes strategies with up to 4 years to known exit (the short-term strategies); Panel B includes strategies with 5 years or more to known exit (the long-term strategies). *BB* is an indicator for the treated sample. *Horizontal* is the proportion of follow-ons in a given year in the same 4-digit NACE sector as the platform, as the ratio of all follow-ons acquired as of this year. *Vertical* is the proportion of follow-ons in a given year with the identified input-output relationship, outside of the 4-digit NACE sector of the platform, as the ratio of all follow-ons acquired as of this year. For the control samples, the relatedness measures take the respective values of the treated company to which the control is matched. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ln Assets	ln Sales	ROA	ROS	ATR	Leverage	Cash/Assets	ln Empl.	Sales/Empl.
<i>Panel A: Short-term exited strategies, t-1 to t+3</i>									
BB×Horizontal	0.054 (0.25)	-0.160 (-0.80)	-0.001 (-0.04)	-0.009 (-0.45)	-0.085 (-0.43)	0.016 (0.30)	-0.036 (-1.05)	0.054 (0.25)	-0.041 (-0.96)
BB×Vertical	0.137 (0.58)	-0.315 (-0.98)	-0.006 (-0.34)	-0.006 (-0.30)	-0.299** (-2.72)	0.090** (2.29)	0.005 (0.13)	0.137 (0.58)	-0.018 (-0.43)
Horizontal	-0.006 (-0.04)	-0.011 (-0.08)	-0.021* (-2.11)	-0.020** (-2.30)	0.009 (0.15)	-0.007 (-0.51)	-0.011 (-0.91)	-0.006 (-0.04)	-0.002 (-0.13)
Vertical	0.314* (2.10)	0.292 (1.54)	0.007 (0.55)	0.005 (0.69)	0.070 (0.80)	0.022 (1.03)	-0.034* (-1.81)	0.314* (2.10)	-0.023 (-0.67)
Observations	2,344	2,073	2,432	2,385	2,401	2,157	2,330	2,434	2,044
Adj. R ²	0.825	0.877	0.612	0.563	0.805	0.704	0.630	0.855	0.793
<i>Panel B: Long-term exited strategies, t-1 to t+5</i>									
BB×Horizontal	-0.334 (-0.97)	0.243 (1.00)	0.034 (1.58)	0.028 (1.09)	0.178 (0.84)	0.088** (2.25)	0.003 (0.06)	0.020 (0.11)	-0.000 (-0.03)
BB×Vertical	-0.172 (-1.72)	0.115 (1.33)	0.006 (1.32)	0.009** (2.27)	0.106** (2.30)	0.011* (1.93)	0.002 (0.53)	-0.031 (-0.64)	0.005** (2.46)
Horizontal	0.084 (1.00)	0.093 (1.06)	-0.012 (-1.50)	-0.012 (-1.49)	-0.051 (-1.41)	-0.003 (-0.21)	-0.009 (-0.79)	0.034 (0.30)	-0.004* (-1.80)
Vertical	0.018 (0.63)	-0.000 (-0.01)	0.001 (0.35)	0.002 (1.23)	-0.011 (-0.71)	-0.002 (-0.60)	0.001 (0.55)	0.015 (0.54)	-0.000 (-0.38)
Observations	2,434	2,389	2,432	2,385	2,401	2,157	2,330	2,073	2,043
Adj. R ²	0.852	0.850	0.613	0.562	0.805	0.702	0.630	0.874	0.624
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

measure by exploring if i) the place in the value chain and ii) the degree of closeness of vertical relation matters for strategy performance. We define a close customer (or supplier) as a customer that has a trading relation with the platform and lies outside the same 4-digit industry, but within the same 2-digit industry. The idea is that in addition to sharing an input-output relation, such companies are closer in terms of product similarities. The “other” customers (or suppliers) are those who still have trade linkages but are outside of the platform’s 2-digit NACE sector. To accommodate all these possibilities in our triple diff-in-diff regressions, we redefine the variables characterizing the type or relatedness between the companies in our strategies as the 0/1 indicators that take the value of one in the year when the strategy acquired a follow-on that is either a (close/other) supplier or customer of the platform based on I-O relationship, and remain one hence. We interact all these I-O indicators with our *BB* treatment indicator to represent the performance of buy-and-build strategies with particular type of relatedness relative to their placebos. The *BB*×*Post* is included in this specification and represents the relative performance of the strategies where platforms and follow-ons do not have any I-O relationship.

We report the results in Table 9, suppressing the terms not interacted with our treatment indicator *BB* to save space. We see the significant improvement in sales in the short-term strategies involving less related supplier (panel A, column 2) but at the expense of profitability on sales (column 4). Most of the positive results is seen in the strategies with companies that do not share any I-O relationship, consistent with insignificant results in Table 8. In long-term strategies (panel B), we find that strategies focusing on not so close suppliers of the platforms tend to reduce overall assets but acquiring *close* suppliers improves growth of sales and profitability of the strategy. In addition, such strategies improve labor productivity. Interactions with horizontal or customer dummies are not significant.³³

The overall conclusion from our triple diff-in-diff analysis is that longer-term completed strategies in capital-intensive industries and those exploiting vertical relationships show improvements in profitability and efficiency. Since these are the settings where one would expect operating synergies this reinforces our interpretation that buy-and-builds by PE do deliver operating synergies.

³³As robustness check, we measure closeness as the intensity of the trade as seen in the input-output table, defining close customers (suppliers) to be the follow-ons in industries in the top quartile in trade intensity and other customers (suppliers) to be in industries in the bottom quartile in trade intensity. The omitted category are suppliers (customers) with intermediate relatedness. With this definition, we still find the positive effects of strategies focused on close suppliers on profitability (measured by ROA) and labor productivity. At the same time these strategies reduce employment and total assets. See online appendix Table OA.3.

Table 9: Performance of the exited strategies relative to the placebo strategies: Product closeness and type of follow-on acquisition.

This table shows the performance of exited buy-and-build strategies compared to placebo control strategies following the platform acquisition, depending on product-market relatedness of companies. Panel A includes strategies with up to 4 years to known exit (the short-term strategies); Panel B includes strategies with 5 years or more to known exit (the long-term strategies). *BB* is an indicator for the treated sample. *Post* is an indicator equal to zero for t-1 and one for the period t+1 up to t+3 in Panel A and up to t+5 in Panel B, where t indicates the year of the acquisition of the strategy's platform. *Horizontal* is an indicator equal to one for the years when the strategy acquired an add-on in the same 4-digit NACE sector as the platform. *Close Customer* is an indicator equal to one for the years when the strategy acquired an add-on with customer relation within the 2-digit NACE sector but outside of the 4-digit NACE sector of the platform. *Other Customer* is an indicator equal to one for the years when the strategy acquired an add-on with customer relation but outside of the 2-digit NACE sector of the platform. *Close Supplier* and *Other Supplier* dummies are defined similarly based on supplier relationships. For the control samples, *Post* and relatedness dummies take the respective values of the treated company to which the control is matched. The variables non-interacted with *BB* are included but suppressed to save the space. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1) ln Assets	(2) ln Sales	(3) ROA	(4) ROS	(5) ATR	(6) Leverage	(7) Cash/Assets	(8) ln Empl.	(9) Sales/Empl.
<i>Panel A: Short-term exited strategies, t-1 to t+3</i>									
BB×Horizontal	-0.194 (-0.79)	-0.261 (-1.16)	-0.009 (-0.58)	-0.023 (-1.25)	0.066 (0.38)	0.022 (0.48)	-0.031 (-1.27)	-0.194 (-0.79)	-0.035 (-0.76)
BB×Close Supplier	-0.224 (-0.35)	-0.563 (-0.95)	-0.031 (-1.38)	-0.035 (-0.91)	-0.349 (-1.27)	0.141 (1.26)	0.016 (0.26)	-0.224 (-0.35)	-0.089 (-1.14)
BB×Close Customer	-0.260 (-0.84)	-0.738* (-1.83)	-0.028 (-1.46)	-0.026 (-1.01)	-0.160 (-1.05)	0.024 (0.52)	-0.004 (-0.09)	-0.260 (-0.84)	-0.020 (-0.38)
BB×Other Supplier	0.404 (1.49)	0.602** (2.31)	-0.022 (-1.50)	-0.047*** (-3.80)	0.138 (1.19)	0.119*** (6.28)	-0.004 (-0.18)	0.404 (1.49)	0.007 (0.16)
BB×Other Customer	0.126 (0.71)	0.110 (0.69)	-0.014 (-0.47)	-0.009 (-0.73)	0.036 (0.44)	0.051 (1.20)	0.006 (0.18)	0.126 (0.71)	-0.068 (-0.90)
BB×Post	0.309** (2.60)	0.277** (2.19)	0.024* (1.83)	0.032** (2.59)	-0.158 (-1.63)	-0.042 (-1.60)	0.019 (0.92)	0.309** (2.60)	-0.006 (-0.13)
Observations	1,252	1,251	1,251	1,248	1,251	1,118	1,189	1,059	1,033
Adj. R ²	0.909	0.905	0.754	0.722	0.869	0.808	0.749	0.876	0.893
<i>Panel B: Long-term exited strategies, t-1 to t+5</i>									
BB×Horizontal	-0.258 (-1.02)	0.004 (0.01)	0.024 (1.45)	0.017 (0.81)	0.063 (0.40)	0.058* (1.94)	-0.004 (-0.14)	-0.003 (-0.02)	0.031 (1.13)
BB×Close Supplier	-0.732 (-0.93)	1.639*** (3.95)	0.121* (2.09)	0.176*** (8.63)	1.199 (1.27)	-0.034 (-0.95)	0.020 (0.40)	-0.339 (-1.56)	0.438** (2.95)
BB×Close Customer	0.096 (0.17)	1.115 (1.08)	-0.034 (-1.27)	-0.031 (-1.30)	0.112 (0.39)	0.078 (1.42)	0.060 (1.66)	0.063 (0.28)	0.052 (1.25)
BB×Other Supplier	-1.165** (-2.26)	-0.657 (-1.28)	0.034 (1.06)	0.027 (0.97)	0.307 (1.44)	-0.026 (-0.32)	0.002 (0.06)	-0.588 (-1.54)	0.036 (1.08)
BB×Other Customer	-2.175* (-2.14)	-0.669 (-0.95)	0.003 (0.15)	-0.010 (-0.71)	1.174* (1.89)	-0.069 (-0.54)	0.073 (1.70)	-0.328 (-0.43)	-0.049 (-0.53)
BB×Post	0.130 (0.86)	0.187 (1.20)	0.007 (1.07)	0.013 (1.37)	0.034 (0.33)	0.012 (0.50)	-0.022 (-1.66)	0.077 (0.58)	0.010 (0.45)
Observations	2,434	2,389	2,432	2,385	2,401	2,157	2,330	2,073	2,044
Adj. R ²	0.873	0.868	0.657	0.612	0.818	0.728	0.648	0.822	0.845
Non-interacted terms	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

5 Robustness checks

5.1 Non-exited strategies

We saw in the data that achieving the operational improvements is one of the determinants of the decision by PE to complete the strategy and exit. By the laws of formal logic, a conditional statement is true if, and only if, its contraposition is true. In our context, we should see *no* consistent evidence of operational improvements while the strategies are *not* exited. We saw this in all non-exited strategies (Table 3). To check the robustness of that result, we verify the performance of uncompleted strategies in the settings considered in Section 4.2. As seen in Table 10 Panel A, the uncompleted strategies in capital intensive industries decrease sales more than the average uncompleted strategies, but that this is not accompanied by improvements in profitability. Strategies with horizontally related follow-ons only increase leverage (Panel B). Inspecting the type of follow-ons of unexited strategies more closely in Table 11, we find that the acquisition of close customers is followed by slashing assets, which benefits the asset profitability and sales efficiency (asset turnover). Employment goes down too. We cannot rationalize why the acquisition of other customers increases sales. The acquisition of suppliers does not show any positive effects. Combined, we cannot see these results as supportive of the operating synergy interpretation in the non-exited strategies; the evidence is in favor of the contrapositive statement. A caveat to this interpretation lies in the fact that these are the strategies that have yet to be completed and we cannot be sure on whether they are the strategies with most difficult potential synergies, other goals (e.g., multiple explanation), or truly poorly-performing strategies. In either case, we would need to observe the exit from these strategies to sort this out.

5.2 Size and the configuration of buy-and-build portfolios

So far we tried to understand the performance of buy-and-build strategies by focusing on the operational characteristics of the companies within the strategy or their relatedness in the input-output space. These “channels” of value creation directly relate to the conceptual notion of operational synergies we are after. Our previous results are consistent with the view that integration of the multiple companies is a difficult process since the operating improvements in more complicated strategies take time to realize and only seen in long-term buy-and-build strategies. But it is not obvious what *configuration* of a portfolio of a given

Table 10: Performance of the non-exited strategies relative to the placebo strategies: Channels I.

This table shows the performance of the strategies which are still active or have unknown status compared to placebo control strategies over the first five years from the acquisition of the platform. *Post* is an indicator equal to zero for t-1 and one for the period t+1 up to t+5, where t indicates the year of the acquisition of the strategy's platform. For the control samples, *Post* dummies take on the respective values of the treated company to which the control is matched. *BB* is an indicator for the treated sample. In Panel A, we look at the relative performance of capital intensive non-exited strategies. *K Intensity* is an indicator variable equal to one for strategies of which the platform had a fixed assets to employees ratios that was higher than the sample median in the pre-deal year. The overall sample trends *Post* and *Post*×*K Intensity* are included but not reported to save space. Panel B, reports the relative performance of non-exited strategies depending on product-market relatedness of companies. *Horizontal* is the time-varying proportion of follow-ons in a given year in the same 4-digit NACE sector as the platform, as the ratio of all follow-ons acquired as of this year. *Vertical* is the time-varying proportion of follow-ons in a given year with the identified input-output relationship, outside of the 4-digit NACE sector of the platform, as the ratio of all follow-ons acquired as of this year. For the control samples, the relatedness measures take the respective values of the control company to which the treated is matched. Non-interacted relatedness measures are included but not reported to save the space. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ln Assets	ln Sales	ROA	ROS	ATR	Leverage	Cash/Assets	ln Empl.	Sales/Empl.
<i>Panel A: Non-exited capital intensive strategies, t-1 to t+5</i>									
BB×Post×K Intensity	-0.412 (-1.44)	-0.698* (-2.17)	0.005 (0.18)	-0.009 (-0.30)	0.017 (0.10)	0.094 (1.77)	0.070* (2.04)	-0.169 (-0.48)	-0.117* (-1.91)
BB×Post	-0.025 (-0.13)	0.029 (0.15)	-0.028 (-1.10)	-0.006 (-0.37)	-0.004 (-0.04)	0.040 (1.18)	-0.063* (-1.98)	0.039 (0.24)	-0.013 (-0.62)
Observations	1,134	1,128	1,134	1,125	1,131	1,060	1,095	897	881
Adj. R ²	0.907	0.844	0.552	0.526	0.840	0.768	0.664	0.891	0.750
<i>Panel B: Non-exited horizontal and vertical strategies, t-1 to t+5</i>									
BB× Horizontal	-1.595 (-1.25)	-1.386 (-1.43)	-0.033 (-1.12)	-0.032 (-1.00)	0.024 (0.10)	0.065** (2.96)	-0.018 (-0.40)	-1.595 (-1.25)	-0.191 (-1.34)
BB× Vertical	-0.084 (-0.94)	-0.038 (-0.36)	-0.003 (-0.65)	-0.000 (-0.03)	0.048 (1.52)	-0.005 (-0.20)	-0.011 (-0.97)	-0.084 (-0.94)	0.009 (1.25)
Observations	2,344	2,073	2,432	2,385	2,401	2,157	2,330	2,434	2,044
Adj. R ²	0.825	0.877	0.612	0.563	0.805	0.704	0.630	0.855	0.793
Non-interacted terms	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 11: Performance of the non-exited strategies relative to the placebo strategies: Channels II.

This table shows the performance of the strategies which are still active or have unknown status compared to placebo control strategies over the first five years from the acquisition of the platform. *BB* is an indicator for the treated sample. *Post* is an indicator equal to zero for t-1 and one for the period t+1 up to up to t+5, where t indicates the year of the acquisition of the strategy's platform. *Horizontal* is an indicator equal to one for the years when the strategy acquired an add-on in the same 4-digit NACE sector as the platform. *Close Customer* is an indicator equal to one for the years when the strategy acquired an add-on with customer relation within the 2-digit NACE sector but outside of the 4-digit NACE sector of the platform. *Other Customer* is an indicator equal to one for the years when the strategy acquired an add-on with customer relation but outside of the 2-digit NACE sector of the platform. *Close Supplier* and *Other Supplier* dummies are defined similarly based on supplier relationships. For the control samples, *Post* and relatedness dummies take the respective values of the treated company to which the control is matched. The variables non-interacted with *BB* are included but suppressed to save the space. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1) ln Assets	(2) ln Sales	(3) ROA	(4) ROS	(5) ATR	(6) Leverage	(7) Cash/Assets	(8) ln Empl.	(9) Sales/Empl.
<i>Non-exited strategies, t-1 to t+5</i>									
BB×Horizontal	-1.020 (-0.97)	-0.718 (-0.87)	-0.018 (-0.63)	-0.024 (-1.18)	-0.003 (-0.01)	0.024 (0.50)	0.033 (0.94)	-1.020 (-0.97)	-0.055 (-0.44)
BB×Close Supplier	1.170* (1.95)	0.804 (1.27)	-0.065*** (-3.25)	-0.068 (-1.77)	0.134 (0.97)	0.037 (0.58)	-0.079 (-0.90)	1.170* (1.95)	0.100 (1.04)
BB×Close Customer	-1.255*** (-6.70)	-0.218 (-1.23)	0.093** (2.61)	-0.001 (-0.05)	1.278*** (11.30)	-0.444*** (-7.77)	0.108*** (4.66)	-1.255*** (-6.70)	0.117* (2.19)
BB×Other Supplier	-3.452*** (-12.48)	-3.207*** (-13.36)	0.004 (0.12)	-0.010 (-0.52)	0.156 (0.97)		0.043 (1.38)	-3.452*** (-12.48)	-0.006 (-0.09)
BB×Other Customer.	0.154 (0.45)	0.800** (2.60)	-0.029 (-0.40)	0.014 (0.14)	0.189 (0.93)	0.218*** (3.42)	-0.055 (-0.92)	0.154 (0.45)	0.091 (1.52)
BB× Post	0.007 (0.03)	-0.225 (-1.11)	-0.019 (-0.91)	-0.005 (-0.40)	-0.098 (-1.23)	0.062 (1.43)	-0.041 (-1.62)	0.007 (0.03)	-0.083 (-1.52)
Observations	1,137	1,131	1,137	1,128	1,134	1,062	1,098	1,137	883
Adj. R ²	0.906	0.848	0.562	0.538	0.835	0.775	0.665	0.906	0.751
Non-interacted terms	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

size is more conducive to achieving larger operational improvements, either growing the business or improving profitability: the one with many small acquisitions (“stringing beads”) or the one with a few large targets. On the one hand, integration of many small targets may be difficult because they are organized and operate less professionally and efficiently (Mulherin and Boone, 2000; Fuller et al., 2002). For a PE acquirer, putting together a certain portfolio size, needed to generate synergies, from smaller companies would be more demanding on its human capital because more targets should be found, acquired, monitored, and integrated (see Lopez-de-Silanes et al., 2015, for the evidence on organizational diseconomies of scale in PE). On the other hand, the acquisition of larger targets is rare because it requires more skill and experience due to the higher integration costs (see Aktas et al., 2013, and references therein) or simply difficult to finance.

The *size of the overall strategy* may be important for operating outcomes too. Assembling a large portfolio of companies may lead to economies of scale (Stigler, 1958; Lambrecht, 2004) or, depending the distribution of firm sizes within an industry, may lead to market power.³⁴ For example, by bundling many small companies into a larger entity a consolidator may obtain (local) market power in highly fragmented markets, and thereby offset some of the negative implications of having to identify, complete, and integrate many targets.

We test whether the *size within strategies* and *of the strategies* matter for their operating performance by putting all the strategies into the two-by-two grid of the *relatively* small follow-ons (denoted “SmF-O”) or the relatively large follow-ons (“LrgF-O”), assembled into either the small portfolios (“SmPrtf”) or the large portfolios (“LrgPrtf”). The split is based on the sample medians of 1) the average assets of follow-ons relative to assets of their platform within a strategy and 2) the total assets of the strategy (platform and all follow-ons).³⁵ Then we interact our diff-in-diff estimator $Post \times BB$ with the indicator variables constructed as the combination of these two dimensions; for example the $Str[SmF-O, SmPrtf]$ is equal to one for the strategies with relatively small follow-ons and small total strategy size, and zero otherwise, and so on. In Table 12, we report the regression coefficients of our diff-in-diff estimator $Post \times BB$ and the trends for placebo strategies, interacted with the indicators of four strategy types, suppressing for brevity the other terms. The strategies

³⁴In the model of Gorton et al. (2009), managers race to increase firm size through mergers in order to retain control (and private benefits) over firm, as long as the firm remains independent. Consolidation may be a response to shocks to the industry (see Mitchell and Mulherin, 1996; Harford, 2005) or to industry consolidation along the supply chain (Ahern and Harford, 2014).

³⁵In a robustness analysis, we measure the size of the acquired portfolio as the sum of the total assets of follow-ons only. Results are similar.

Table 12: Strategy total size and composition by company size.

This table shows the performance of exited buy-and-build strategies, compared to placebo control strategies following the platform acquisition, depending on the size configuration of the companies within the strategy. We include strategies with at least one follow-on. The *Post* is an indicator equal to zero for $t-1$ and one for the period $t+1$ up to $t+5$ (or exit, whichever is earlier), where t indicates the year of the acquisition of the strategy’s platform. For the control sample, *Post* takes on the respective values of the treated company to which the control is matched. *BB* is an indicator for the treated sample. The diff-in-diff estimator $Post \times BB$ is estimated for four strategy types, as the combination of two dimensions: 1) the *relatively* small follow-ons (denoted “SmF-O”) or relatively large follow-ons (“LrgF-O”), using the sample median of the average assets of the follow-ons relatively to their platform, and 2) the small portfolio (“SmPrtf”) or the large portfolio (“LrgPrtf”), using the sample median of the platform and follow-ons (total portfolio). The category with relatively small follow-ons and large total size (“SmF-O,LrgPrtf”) is the the omitted group (its coefficients are in the row one). All specifications include firm and year fixed effects and other terms non-interacted with *BB* or *Post*. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1) ln Assets	(2) ln Sales	(3) ROA	(4) ROS	(5) ATR	(6) ln Empl.	(7) Sales/Empl.
<i>Baseline strategy type, SmF-O,LrgPrtf</i>							
BB×Post	-0.640** (-2.52)	0.459 (1.29)	0.028** (2.47)	0.024* (1.69)	0.431*** (3.22)	0.030 (0.24)	0.058 (1.58)
<i>Growth of the other strategy types, relative to the baseline</i>							
BB×Post×Str[SmF-O,SmPrtf]	0.287 (0.86)	-0.536 (-0.96)	-0.006 (-0.22)	-0.007 (-0.28)	-0.038 (-0.15)	0.144 (0.52)	-0.091* (-1.73)
BB×Post×Str[LrgF-O,LrgPrtf]	0.747** (2.31)	-0.689* (-1.72)	0.002 (0.12)	0.008 (0.36)	-0.520*** (-2.86)	-0.492** (-2.44)	0.014 (0.31)
BB×Post×Str[LrgF-O,SmPrtf]	0.926*** (2.68)	-0.426 (-0.88)	-0.049*** (-2.89)	-0.034* (-1.71)	-0.696*** (-4.01)	0.385 (1.14)	-0.162*** (-2.92)
Post	-0.208** (-2.40)	-0.143 (-1.51)	-0.010 (-1.25)	0.003 (0.50)	0.006 (0.10)	-0.129 (-1.26)	-0.014 (-0.91)
Post×Str[SmF-O,SmPrtf]	-0.009 (-0.08)	-0.089 (-0.66)	-0.006 (-0.62)	-0.011 (-1.23)	0.072 (0.92)	-0.012 (-0.08)	0.013 (0.64)
Post×Str[LrgF-O,LrgPrtf]	0.220* (1.71)	0.208 (1.60)	-0.014 (-1.18)	-0.022* (-1.84)	0.077 (1.10)	0.356*** (3.07)	-0.035* (-1.67)
Post×Str[LrgF-O,SmPrtf]	0.442*** (3.59)	0.195 (1.52)	-0.005 (-0.58)	-0.013 (-1.54)	-0.090 (-1.36)	0.206* (1.72)	-0.013 (-0.78)
Observations	2,748	2,733	2,746	2,729	2,743	2,364	2,353
Adj. R ²	0.839	0.844	0.618	0.602	0.792	0.840	0.801
Group intercepts	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓

with large total size consisting of the relatively small follow-ons (the “SmF-O,LrgPrtf” in our notation) are the baseline category. They are the closest to the conceptual definition of a buy-and-build strategy, and we would like to compare other strategy configurations to these ones. Therefore, the coefficients in the first row show the outcomes for the base strategy “SmF-O,LrgPrtf” relative to the corresponding placebo strategy, as in the most of the paper. The coefficients in the next three rows show the differences in growth of a given strategy type (relative to its placebo) and growth of the baseline strategy “SmF-O,LrgPrtf” (relative to its placebo). Combining a large portfolio of relatively small follow-ons is associated

with decrease in assets but increase in profitability (columns 3,4) and efficiency (column 5), relative to the placebo strategies. We saw similar profitability gains in Table 2 for all completed strategies, but here the better profitability coincides with downsizing relative to the placebo portfolios. Strategies in which the follow-ons are small and the total portfolio is small (row 2), do not show significantly different growth rates than the baseline strategies, except for somewhat inferior labor productivity. Since the trends for the two strategy types are not significantly different, row 1–2 imply that all strategies with relatively small follow-ons show profitability improvements over time. The strategies including large follow-ons have strong increase in assets relative to the baseline, regardless of the total strategy size (column 1 in row 3–4). Otherwise, the strategies in this sub-group that are overall large (row 3) underperform the baseline buy-and-build’s in terms of growth of sales, growth of employment, and efficiency of sales, although the profitability is not significantly different than the baseline group. Finally, the small strategies acquiring relatively large follow-ons (row 4) perform worse than the baseline in all profitability and efficiency measures.

Overall, we conclude that buy-and-build strategies focusing on “stringing beads”, in which the follow-ons are relatively small compared to the platform, improve profitability—consistent with efficient transformation of smaller targets and operating synergies interpretation. In contrast, strategies with large follow-ons show inefficient integration. At best, such strategies may result in an increase of market power due to larger assets, but our analysis cannot prove this conjecture.

5.3 Alternative definition of strategies

Recall, that we construct the buy-and-build sample by first, collecting the follow-ons using the deal tag “build-up” from Zephyr and, second, by using the ownership structure and deal description to find the platform associated this particular follow-on or follow-ons (see Appendix A). The concern might be that we miss some follow-ons not captured by Zephyr, especially taking into account relatively small number of follow-ons in an *average* strategy (Table 1). Although the variation of the number of follow-on acquisitions per strategy is also large and our average number is comparable to what is reported by others, we address this concern in three ways.³⁶

³⁶A study by the Boston Consulting Group with HHL Leipzig Graduate School of Management reports that the average number of add-on acquisitions per deal grew from 1.3 in 2000 to 2.7 in 2012 in the sample of 800+ deals designated by them as buy-and-build from the U.S., Western Europe, and the UK (Brigl et al., 2016). The data needed to compute deals performance (internal rate of return) was only available for

First, we remind the reader that the build-up tag is assigned to deals that matches the conceptual definition of buy-and-build, and we further scrutinize the textual information from deal description to make sure we collect all the companies that belong to a strategy with a common goal. We also prefer using consolidated financial statements, including all subsidiaries. Aware of the concerns of missing some follow-ons, we verified and confirmed that a given follow-on deal often consists of more than one firm or establishment. In this case, an acquisition of several operations from the news or the deal prospectus would be featured in Zephyr database as the acquisition of a single *legal* entity. For example, Zephyr reports a “build-up” deal from March 2006 where three PE companies, the Dutch Ackermans&van Haaren NV, and the Belgian Tikehau Capital Partners and Compagnie Nationale a Portefeuille SA, used their subsidiary GIB Group SA to acquire the Financiere Flo and the Groupe Flo SA, the western Paris-based restaurant chain. The GIB Group was bought by AvH and CNP in 2002 and used as the platform in the 2006 deal. In our data, the strategy consists of a platform and two follow-ons, but from the company websites we learned that the Groupe Flo is an leader in themed catering in France with 171 restaurants Hippopotamus, Grandes Brasseries, and Flo Concessions. So, in fact, the deal involved a highly publicised acquisition of a large number of establishments.³⁷

Second, we use an alternative definition of buy-and-build strategies, supplementing the sample from our main analysis with additional acquisitions by the entities from the ownership structure of follow-ons shown schematically in Figure A.1. Specifically, in our main sample of the platform and follow-on deals we check whether *any* company from their ownership structure—up to, but excluding, the private equity fund—is identified by Zephyr as an acquirer. Most of these intermediate companies are acquisition vehicles or the platform company itself. As the result, we include the deals related to our buy-and-build sample via the ownership structure, but the descriptions of these acquisitions do not explicitly specify the operating synergies, growth, or other motivations characteristic of buy-and-builds. If they would, they would make to our main sample. We reconstruct the placebo strategies for these new portfolios. In Panel A of Table 13, we present the results for this definition

48 deals.

³⁷Likewise, we find in Zephyr that on October 14, 2010 the Brdigepoint and Apax Partners acquired Histoire d’Or and Marc Orian, two French jewelry retailers, “that will be merged together to form a single entity led by Histoire d’Or’s management team.” In our data, the strategy consists of one platform and one follow-on (we did not find any other platform deal and judge that one of these companies was used as platform). Further investigation revealed that at the time of the deal Marc Orian had 105 jewelers throughout France and Histoire d’Or had 207 outlets, partially acquired through previous M&As, including 22 in Italy and 15 in Belgium.

Table 13: Performance of the strategies relative to the placebo strategies: Alternative definitions of buy-and-build strategies.

This table replicates Table 2 using the alternative definitions of buy-and-build strategies, as detailed in Section 5.3. In Panel A, the sample uses the main sample from this paper plus the acquisitions by all the entities from the ownership structure of follow-ons from the main sample. In Panel B, the sample includes all PE-owned portfolio companies that make an acquisition within five years after becoming PE-owned. The *Post* is an indicator equal to zero for t-1 and one for the period t+1 up to t+5 (or exit, whichever is earlier), where t indicates the year of the acquisition of the strategy's platform. For the control sample, *Post* takes on the respective values of the treated company to which the control is matched. *BB* is an indicator for the treated sample. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln Assets	ln Sales	ROA	ROS	ATR	Leverage	Cash/Assets
<i>Panel A: Acquisitions by all entities from the ownership structure of the main sample</i>							
BB×Post	0.221*** (2.67)	0.205* (1.82)	0.004 (0.68)	0.012* (1.72)	-0.054 (-1.09)	0.033** (2.33)	-0.014 (-1.58)
Post	-0.075 (-1.34)	-0.079 (-1.41)	-0.005 (-0.92)	-0.004 (-0.64)	0.018 (0.53)	-0.021** (-2.22)	-0.003 (-0.40)
Observations	4,101	4,086	4,101	4,086	4,101	3,763	3,921
Adj. R ²	0.930	0.904	0.621	0.592	0.847	0.720	0.669
<i>Panel B: All PE-owned acquirers</i>							
BB×Post	0.176*** (3.08)	0.106 (1.38)	0.015*** (3.15)	0.014** (2.79)	-0.058 (-1.21)	0.019 (1.36)	-0.019 (-1.60)
Post	-0.064 (-1.42)	-0.088 (-1.37)	-0.016*** (-3.87)	-0.008 (-1.71)	-0.027 (-1.27)	-0.003 (-0.40)	-0.003 (-0.52)
Observations	5,428	5,416	5,428	5,416	5,428	4,694	5,157
Adj. R ²	0.939	0.907	0.566	0.583	0.811	0.707	0.673
Year FE	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓

for the sample of completed and non-completed strategies, as in Table 2. The extended buy-and-build sample displays some improvement in return on sales—consistent with the results in Table 2. In contrast to our main sample, the sample with “other acquisitions” by their newco’s and holding companies shows higher growth in assets and sales and higher leverage. The result for leverage is not surprising because the PE funds often push some of the debt down into the portfolio companies. The strong result for assets may, on one hand, be due to reallocation of assets from the follow-ons we identify in main sample to those other entities we add to this sample. On the other hand, we cannot rule out the synergetic growth in case our data source does not capture all follow-ons with the “add-on” tag we use. Since we cannot know for sure, we lean toward our main definition of buy-and-builds.

Third, we follow the approach of Hammer et al. (2017) and include all acquisitions by all PE-held companies during their private stage—regardless of the deal rationale. The results in Panel B of Table 13 show positive and highly significant asset growth but not sales growth. Profitability improves regardless of the measure. This sample is likely to be a mixture of more traditional private equity investments and buy-and-build strategies, which may explain why profitability is strongly increasing, but results on sales growth are weaker. All in all, the key result of our paper regarding positive operating results of serial acquisition strategies by private equity is robust to various ways to construct the investment portfolios.

6 Conclusion

We analyze the operating performance of buy-and-builds, a serial hybrid strategy that combines the long-term focus of strategic buyers and of the traditional value drivers of LBOs in private equity. Using matching techniques to construct a counterfactual and difference-in-difference analysis at the strategy level we find evidence that this increasingly popular investment strategy indeed realizes operational improvements, compared to observationally similar strategies constructed by us. We interpret this additional effect as operational synergies, and we support this interpretation by exploiting the heterogeneity within this strategy along several dimensions and by numerous robustness checks. With the limitations of the methodology in mind, the findings of this paper provide a positive view on private equity. It appears that in order to succeed in a modern highly-competitive market environment, PE firms need to target longer-term investment opportunities and carefully select the types of companies in their portfolio, taking into account the entire production value chain.

The scope of this study points to the directions for future research. First, we focus on operating improvements in these strategies. Our evidence suggests that operating synergies is one of the valid “selling points” of buy-and-build strategy. Further research would need to look at whether these operating improvements deliver positive returns to investors, net of fees, and what other factors contribute to investment returns and their persistence (for example, pure multiple arbitrage, elimination of small firm discount, characteristics of the PE firm, corporate governance issues, and so on). Second, our operating results are based on revenues and profitability in monetary terms and can be due to changes in physical output or to changes in prices resulting from higher market power, rivalry restraint, or cost efficiencies of the combined entities. Using a more disaggregated product-level data and matching products to firms may help to uncover the contribution of volume changes and price markups to measured revenue changes.³⁸ Third, in interpreting our results, we adopt a broad view of operating synergies, defining them as *any* statistically significant difference in operating results of strategies, over time, relative to artificial strategies. To the extent it is possible with our data we identify several channels of how these improvements are achieved. A fruitful direction of further inquiry would use survey or case-based data on changes implemented by PE within these strategies.³⁹ Advancing in these directions should further improve our understanding on how modern-day private equity firms affect their portfolio companies through operational changes.

³⁸Fracassi et al. (2020) focus on a competitive consumer goods industry in the U.S., using price and sales data, and show that the manufacturers of consumer goods acquired by PE firms increase sales 50 percent more than matched control firms but prices on existing products increase by mere 1 percent. The revenues are mostly driven by the launch of new products and geographic expansion.

³⁹Examples of this emerging research are Bernstein and Sheen (2016) who document operational changes in restaurant chain buyouts using comprehensive health inspection records and Eaton et al. (2019) who show that takeovers of independent privately owned schools by PE lead to better financial performance but worse student outcomes. More generally, Eliason et al. (2019) show that independent dialysis facilities acquired by large chains increase their revenue or decrease their operating costs but reduce quality of care.

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A Identification of strategies and assigning financials

This appendix provides the details on how we identify buy-and-build strategies and assign their financials using Zephyr and Orbis databases by the Bureau Van Dijk and other sources.

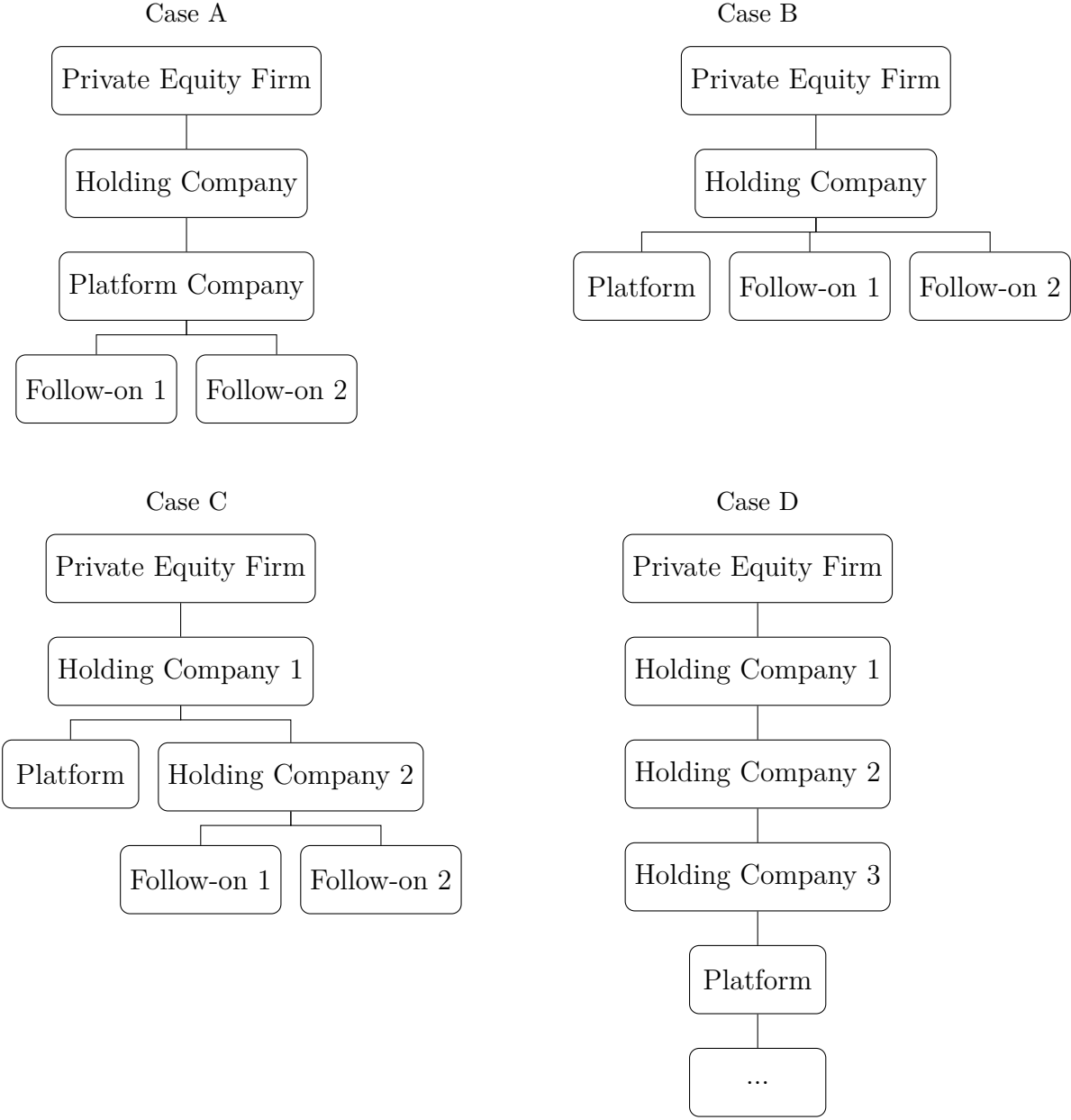
Identification of strategies

We identify buy-and-build strategies from our data sources by first, looking for follow-on companies and second, finding the earlier acquisition of the company under the common ownership structure (considered as the platform), making sure that all these companies are purchased to exploit some form of synergetic relationship according to deal descriptions. This procedure allows us to create a unique dataset of unique buy-and-build strategies consisting of the platform and related follow-ons. We also identify the strategy exits because the strategy is competed when the larger portfolio is disposed of by the PE. We follow two main steps.

Step 1: Collecting follow-ons. There is no direct identifier of buy-and-build strategy or the platform deals in Zephyr—only the follow-on deals are flagged and defined as the deal “when a Private Equity company builds up the company it owns by acquiring other companies to amalgamate into the larger firm, thus increasing the total value of its investments *through synergies between the acquired*” (our italics). This definition fits nicely the conceptual difference between buy-and-builds, which have a clear pre-determined goal, and other inorganic acquisitions by PE. Zephyr uses the sub-deal type “build-up” to refer to the follow-on deals. Therefore, we begin by collecting all follow-on deals from Zephyr, requiring that the deal is a majority stake acquisition, from less than 50% of the target’s equity before the deal to more than 50% after. The average acquired stake in our sample is 97% which is common in the PE market. The time period for the deals is between 1999 (when Zephyr has a relatively good coverage) and 2014. Even though we had a more recent deals (up to 2016 at the time we began the data collection) we stop in 2014 in order to observe the operating performance of the acquired companies for several years after the deal.

Step 2: Identifying individual strategies. Having a sample of follow-ons, we use rich information in the historic vintages of Orbis Ownership database, deal description in Zephyr, and various external sources, such as the websites of PE firms, in order to find the portfolio companies and combine them with relevant follow-ons into unique strategies. This is not trivial because the ownership structure associated with buy-and-build strategy is complex.

Figure A.1: Ownership structures. This figure provides an overview of several examples of ownership structures in buy-and-build strategies in our sample. Case A shows a simple ownership structure in which it is easy to identify the platform from the follow-ons. Cases B–D show more complex structures. The “holding companies” are additional entities which may be created by PE companies as acquisition vehicles for platforms, follow-ons or both.



Several frequently found ownership structures are presented schematically in Figure A.1. The “acquirer” of many follow-on deals mentioned by Zephyr is not necessarily the platform company or the private equity firm, but a different entity that lies somewhere between the follow-on company and private equity firm in the ownership structure. Conversely, the PE firm may be mentioned as the acquirer by Zephyr but the deal is structured such that a separate entity (or multiple entities) is established to allocate the controlling stake in the

target but is itself controlled by the PE firm. We refer to these intermediate companies as the “holding companies.”⁴⁰

Using Orbis Ownership database, we trace the controlling shareholder of every follow-on found in Zephyr and, sequentially, every other entity in the ownership structure that lies between the follow-on and the private equity firm that initiates the deal. These entities are potential platforms or holding companies.

Then we use the names and identifiers of these potential platforms and search *all* the Zephyr deals in the previous years that are *not* identified as “build-up” but in which the target is (similar to) the potential platform found in the previous step. We use the time window of 4–5 years for searching these earlier transactions because it matches the average time to exit of these strategies in our sample. To ensure that we have a unique and relevant platform, we verify whether these earlier transactions were executed by the same PE firm and whether the ownership structure of the potential platforms can be traced to the same PE firm or holding company of the follow-on deal in question. When we are not able to identify platforms or exits solely on the ownership structure, we use additional information from deal comments in Zephyr, news sources, and company websites (of the PE firm and of the potential platform) to identify the platform deal in Zephyr.

Assigning strategy financials from the individual company data

Timing of financials in strategies. Figure A.2 demonstrates how we assign financials to time periods using a hypothetical strategy with a single platform and a follow-on. The platform was acquired in 2006 ($t=0$ in our notation everywhere) and the follow-on in 2007. The “pre-deal” financials, denoted in red italic font, are taken as of two years before the entity was acquired. We use the financials from the year following the acquisition year as the post-deal outcomes because the deals are spread out throughout the acquisition year and we want to analyze the full years of economic activity; these values are denoted by black regular font. The numbers from the acquisition years (marked with “X”) are, thus, excluded from the

⁴⁰In PE industry, these entities are called “bidco,” “midco,” or “topco” reflecting their place in ownership structure between the target and the PE acquirer. Holding companies offer several advantages. First, holding companies can be used as acquisition vehicles to allocate the debt raised for acquisitions. Second, holding companies can be used to create structures with tax benefits. Third, by creating layers of ownership the ultimate owner (the private equity firm) alters the relation between the control (voting) rights and cash flow rights in its favor. Fourth, keeping the companies as a separate legal entities the PE firm ensures that a possible distress of individual companies does not directly influence the other portfolio companies as would be the case were the companies integrated. Furthermore, the exit is streamlined because the sale can be discussed at a single holding company level with less parties involved.

analysis. The financials of strategies pre-deal and in all years up to and including the year when the follow-on was acquired (here, 2007) coincide with the financials of platforms. In the years following the acquisition of a follow-on the strategy financials include the financials of the platform and the follow-on (115+45=160 in 2008, and so on, in the example). We add the financials of subsequent follow-ons similarly.

Figure A.2: Assigning of company financials for strategy-level analysis. This figure presents a hypothetical strategy with one platform and one follow-on. The entries represent the unconsolidated financial data of the platform and follow-on over time. The values in red italics represent pre-deal financials. The consolidated data at strategy level is reported in the third row. Pre-deal, the consolidated financials of the strategy consist of only the financials the platform; the financials of the follow-on are added to the strategy post follow-on acquisition. Under “Placebo Str.” we report the financials of the hypothetical placebo strategies, constructed from the matched peers of the platform and follow-on in actual strategy. The acquisition year (the observations marked by “X”) is excluded in the analysis.

Platform	<i>90</i>	<i>100</i>	105 ^X	110	115	120	130	140
Follow-on		<i>35</i>	<i>38^X</i>	40 ^X	45	45	50	60
Strategy	<i>90</i>	<i>100</i>	105 ^X	110	160	165	180	200
Placebo Str.	<i>90</i>	<i>100</i>	104 ^X	111	158	165	182	201
Year	2004	2005	2006	2007	2008	2009	2010	2011
t=	-2	-1	0	1	2	3	4	5
			⋮	⋮				
			<i>PL Acq.</i>	<i>FO Acq.</i>				

Choice of the companies and company financial statements. We need to make judgement on what entities in the structures created for a given buy-and-build strategy should contribute to the strategy-level financials. In addition, the individual companies in Orbis may report unconsolidated and consolidated financial statements (the latter include operations of subsidiaries). We need to decide what type of statements to choose in order to correctly reflect the changes in outcomes of strategies and avoid double-counting.

For individual companies, we rely on the numbers from unconsolidated statements, unless consolidated statements are available. If acquired follow-on companies become the subsidiaries of a platform one could identify financials of the strategy using the consolidated accounts of the platform in the years following the follow-on acquisition. Platform and follow-on companies are often the same level subsidiaries of a separate holding company (Case B in Figure A.1) or a separate holding company is used to acquire follow-ons (Case C). In such cases, using the consolidated data of the platform will overlook the financials of

the follow-ons because the real activity of the strategy would be reflected in the financials of the holding company. Our ownership data allows differentiating these various ownership structures. By tracing the ownership relationships from each acquisition target to the ultimate acquirer (the PE company) we collect the correct financials and aggregate them in the way avoiding double-counting but accounting the activity of the relevant platforms and follow-ons. With this forensic bottom-up approach we are able to measure the real and financial performance of these strategies more comprehensively than when the data comes from the PE side. The latter data is typically limited to the reported portfolio performance and scant company information.

B Matching Procedure

One-to-many matching at company level. We match the individual companies that are part of the strategy with non-acquired companies in the same country, industry, and acquisition year to control for the common trends in fundamentals. Our controls are non-acquired firms, as motivated in the main text. We require the relevant financials of control companies to be available in Orbis in the two pre-treatment years, where the treatment year refers to the year when the treated company was acquired. Since we study the performance of the strategies over two time horizons (three or five years), we also require that the controls have financial data at least three or five years after the treatment year.

The nature of the traditional LBOs by the PE and the postulated difference between LBOs and buy-and-builds guides our choice of the matching variables. While PE companies traditionally look at firm profitability when selecting the targets, recent claims from the industry suggest that buy-and-build strategy is primarily aimed at sales growth over the long-run, perhaps, at the expense of near-term results. In addition, Roberts and Whited (2013) recommend to include lagged growth rates of outcome of interest to ensure similarity of pre-treatment trends and consistency of the diff-in-diff estimator. Consequently, we match on the return on assets, the return on sales, log of total assets, log of total sales, the squares of both, the growth of sales and of assets, and the changes in return on assets and return on sales, using the *pre-treatment* values to reduce the possibility that the matching variables are affected by the treatment. We use two lags of level and one lag of growth of outcomes, relative to the acquisition year. We winsorize our variables before the matching: assets and sales at 1% and 99% and the profitability measures at 10% and 90% levels. The data

coverage in pre-deal years is limited, and matching on the earlier lags of pre-deal growth would seriously decrease the sample size, which is prohibitive to the quality of match.

We use the Stata's `psmatch2` command written by E. Leuven and B. Sianesi. We match with replacement and make sure that the probability of selection into a strategy of the matched peer differs by at most twenty percentage points (a 0.2 caliper of the propensity score) and drop acquired firms for which the propensity score is higher than the maximum or less than the minimum propensity score of the non-acquired firms (the common support condition). For each treated company we keep the five closest matched controls to balance the accuracy of matching with the precision of the resulting estimates. We match with replacement to have a better match but at the expense of worse power, which is a lesser concern in our large sample. The matched control sample for follow-ons is formed by a similar procedure, using the year when the follow-on was acquired as the deal year but using a less stringent caliper of 0.5. This is because we have many more follow-ons than platforms finding matches for each of them is more difficult.

Matching quality evaluation. In Table B.1 we present the means of financial variables from the matched treated and control group for the pre-deal year, together with the results of the test of difference of means, for platforms (panel A) and follow-ons (panel B). The company size (log Total Assets) is somewhat larger for acquired platforms while the asset turnover is lower, but only at 10% significance level. These differences in level variables, if persistent, would be absorbed in the regression analysis by firm fixed effects. In addition, the magnitude of the difference in log-assets is about 1.5 percent which is economically small. The difference in means of the other matching variables are insignificant at conventional levels. In our case, the parallel trends assumption means that without acquisition the average change in company performance would have been the same for both treated and control firms. As seen, the changes in outcomes are not significantly different between treated and matched controls. Figure B.1 demonstrates that in our largest matched sample of panel A of Table B.1, the “parallel trends” condition is satisfied: in the pre-treatment year, there is no significant differences in growth of key outcomes between treated (acquired into buy-and-build strategy) and control (non-acquired) platform companies. Levels and trends for follow-ons reported in panel B are not significantly different for between treated and matched controls. As a robustness check, we match on just the pre-treatment log of total assets, total sales, the squares of both, return on assets and return on sales. This requires only one year of pre-buyout data and expands the sample by about 12 percent.

This modest increase in sample size does not, in our view, justify the risk of affecting our results due to divergent pre-treatment trends.

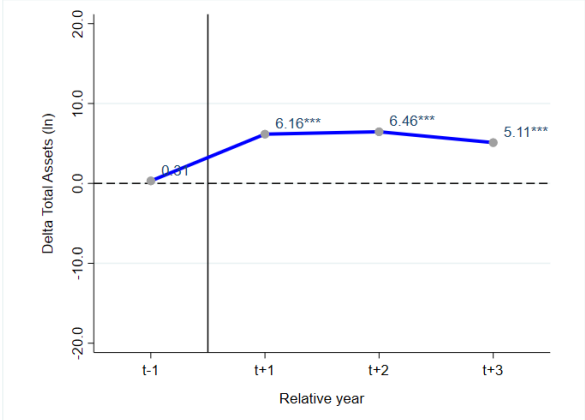
Table B.1: Company statistics in pre-deal year in matched sample (Matching on changes of outcomes). This table presents the means of the outcome variables in the pre-deal year and their difference between the treated and matched controls. The matching is performed on the pre-deal log of total assets, log of total sales, the squares of both, growth of sales, growth of assets, the return on assets, return on sales and changes in return on assets and the return on sales. Panel A presents the data for the platforms; panel B – for the follow-ons. (ln) indicates the logarithmic transformation. *, ** and *** stand for a 10%, 5% and 1% significance level, respectively.

	Treated	Controls	Difference	(T-stat)
<i>Panel A: Platforms</i>				
<i>Matching variables</i>				
ln Assets	17.129	16.889	0.240*	(1.92)
ln Sales	16.567	16.766	-0.198	(-1.39)
Return on Assets	0.087	0.083	0.004	(0.50)
Return on Sales	0.055	0.056	-0.001	(-0.12)
Change in assets	0.073	0.072	0.001	(0.09)
Change in sales	0.080	0.087	-0.007	(-0.48)
Change in ROA	0.003	0.002	0.001	(0.20)
Change in ROS	-0.000	0.001	-0.002	(-0.40)
<i>Other outcomes</i>				
Asset Turnover	1.223	1.345	-0.122*	(-1.77)
Leverage	0.169	0.154	0.015	(0.99)
Cash over Assets	0.113	0.123	-0.010	(-0.95)
<i>Panel B: Follow-ons</i>				
<i>Matching variables</i>				
ln Assets	15.746	15.714	0.031	(0.28)
ln Sales	16.068	16.049	0.018	(0.16)
Return on Assets	0.096	0.089	0.007	(0.93)
Return on Sales	0.064	0.058	0.006	(1.10)
Change in assets	0.045	0.051	-0.006	(-0.46)
Change in sales	0.036	0.043	-0.006	(-0.49)
Change in ROA	-0.003	-0.002	-0.001	(-0.23)
Change in ROS	0.001	0.002	-0.001	(-0.25)
<i>Other outcomes</i>				
Asset Turnover	1.781	1.793	-0.012	(-0.17)
Leverage	0.165	0.163	0.003	(0.18)
Cash over Assets	0.144	0.152	-0.008	(-0.65)

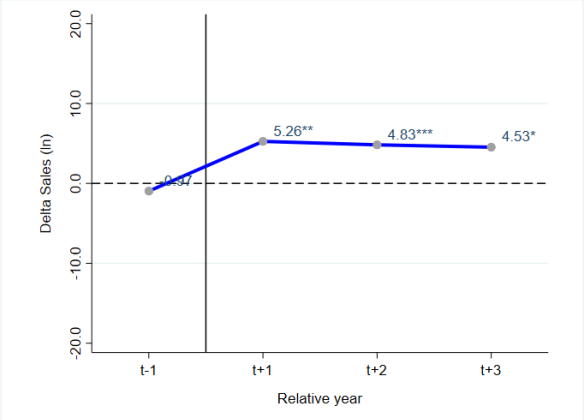
Figure B.1: Growth of selected outcomes in matched sample of acquired platforms in buy-and-build strategies vs. non-acquired companies. This figure reports differences of growth rate of selected outcomes between acquired platforms in buy-and-build strategies and matched non-acquired companies, corresponding to the sample in Panel A, Table B.1. We match on the return on assets, the return on sales, log of total assets, log of total sales, the squares of both, the growth of sales and of assets, and the changes in return on assets and return on sales, using the pre-treatment values of outcomes (two lags for levels, one lag for growth rates). We use a caliper matching procedure with replacement, retaining five closest matched controls (see Appendix B for details). The figure displays the estimated β_t -coefficients from the regression

$$\Delta Y_{i,t} = \alpha + \sum_{\substack{t=-1 \\ t \neq 0}}^3 \beta_t (Acq_{i,t} \times BB_i) + \eta_t + \epsilon_{i,t},$$

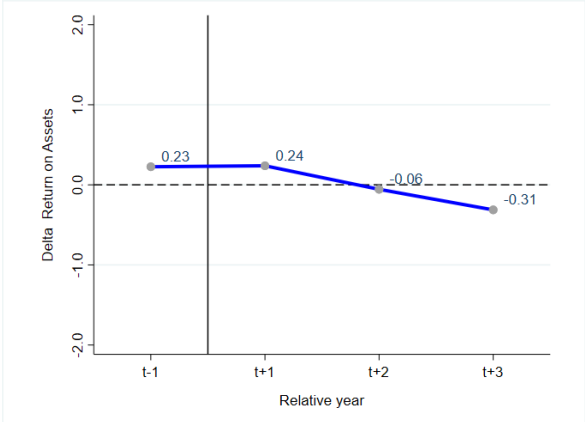
where $\Delta Y_{i,t}$ are changes in outcomes for a company i in the year t and $t=0$ represents the year when the platform was acquired, the $Acq_{i,t}$ are dummy variables equal to one for the observations (treated or controls) in year t and zero otherwise, the BB_i is our treatment indicator, equal to one for targets in buy-and-build strategies, and η_t are year fixed effects. The β_t significantly different from zero at a 10%, 5% and 1% significance level are marked by *, **, and ***, respectively.



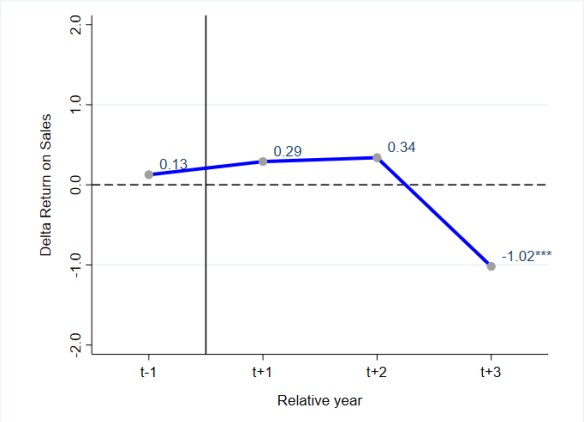
Panel A: Growth in Total assets



Panel B: Growth in Sales



Panel C: Changes in Return on assets



Panel D: Changes in Return on sales

Can Private Equity Funds Act as Strategic Buyers?
Evidence from Buy-and-Build Strategies

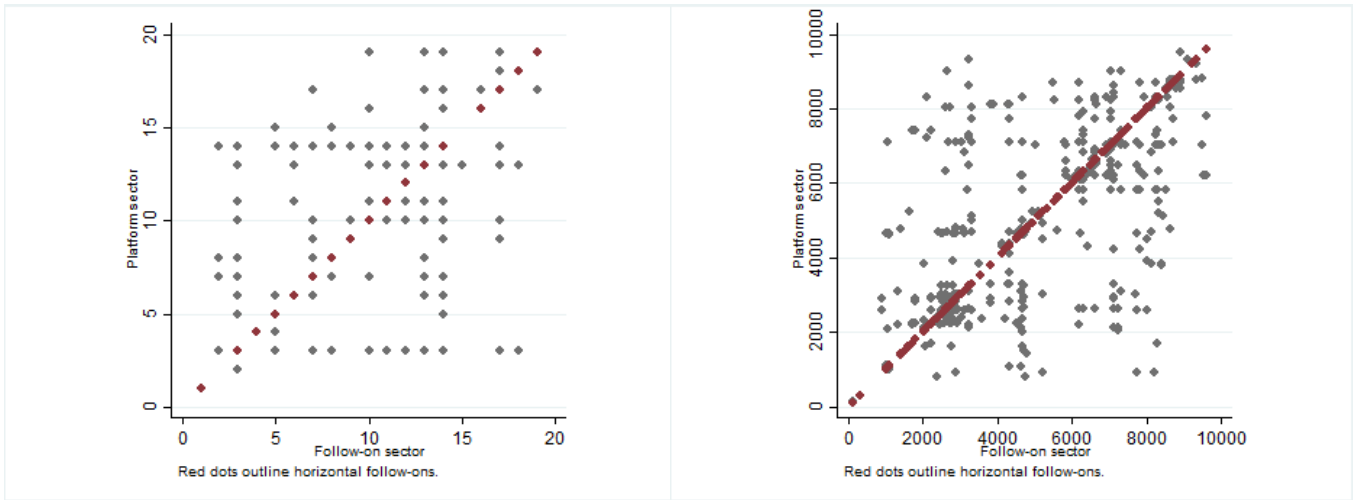
Dyaran S. Bansraj Han T.J. Smit Vadym Volosovych

Online Appendix. Not for Publication

OA Additional tables and figures

This Appendix contains additional figures and tables referred to but not included in the main text.

Figure OA.1: Industry combinations within strategies. This figure plots the sector of main activity of the platform on the vertical axis against the sector of its follow-ons on the horizontal axis, using three levels of sector classification: a large 1-digit sectors in panel A and 4-digit NACE rev. 2 sectors in panel B. The dots on the 45 degree line indicate follow-on targets that are in the same sector as the platform (or horizontally related); the other dots indicate vertically related (suppliers or users) or unrelated acquisitions.



Panel A: Main Sectors

Panel B: NACE 4 digit Sectors

Figure OA.2: Exit rates over time This figure presents the Weibull estimates of the hazard rate (of exit) relative to the year of the platform acquisition, corresponding to the model in column (4) of Table 4 in main text. The numbers on the horizontal axis present the years since the platform acquisitions.

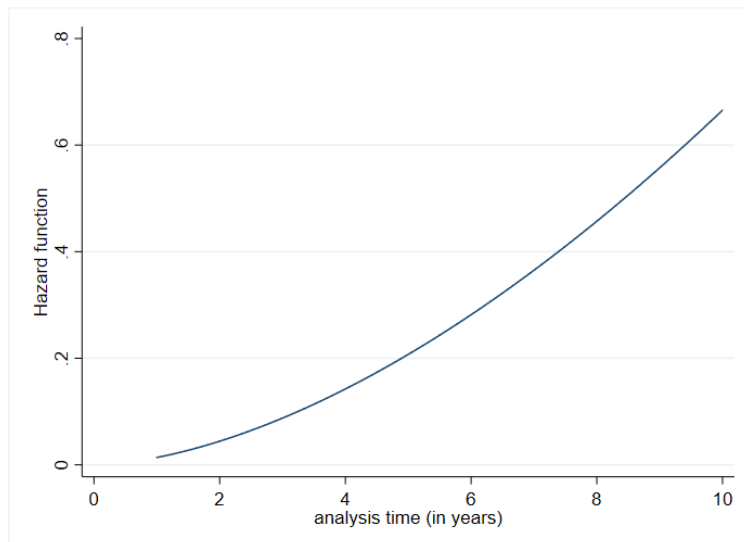


Table OA.1: Performance of the long-term strategies relative to the placebo strategies over short-run and long-run horizon. This table shows the performance of long-term buy-and-build strategies, compared to placebo control strategies, over the short-run horizon and the long-run horizon. We focus on the strategies which exit in at least five years after the platform acquisition. *BB* is an indicator for the treated sample. In panel A, *Post* is an indicator equal to zero for $t-1$ and one for the period $t+1$ up to $t+5$, where t indicates the year of the acquisition of the strategy's platform. Panel A replicates Panel D in Table 3 for convenience. In panel B, *Post-Short* is an indicator equal to zero for $t-1$ and equal to one for the periods $t+1$ to $t+3$. *Post-Long* is an indicator equal to zero for $t-1$ and $t+1$ to $t+3$ and equal to one for the periods $t+4$ to $t+5$. For the control samples, *Post* dummies take on the respective values of the treated company to which the control is matched. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln Assets	ln Sales	ROA	ROS	ATR	Leverage	Cash/Assets
<i>Panel A: Long-term strategies over the long-run horizon $t-1$ to $t+5$</i>							
BB×Post	-0.172 (-0.80)	0.202 (1.49)	0.019** (2.35)	0.023** (2.20)	0.169 (1.59)	0.024 (1.16)	-0.015 (-1.02)
Post	-0.076 (-0.96)	-0.117 (-1.01)	-0.013* (-2.10)	-0.006 (-1.05)	-0.034 (-1.19)	-0.011 (-0.87)	-0.013 (-1.35)
Observations	2,434	2,389	2,431	2,385	2,401	2,157	2,330
Adj. R ²	0.850	0.849	0.611	0.631	0.803	0.701	0.663
<i>Panel B: Long-term strategies over the short-run horizon $t-1$ to $t+3$ and the long-run horizon $t+4$ to $t+5$</i>							
BB×Post-Short	-0.033 (-0.19)	0.167 (1.14)	0.016** (2.27)	0.020** (2.31)	0.119 (1.13)	0.024 (1.22)	-0.014 (-0.99)
BB×Post-Long	-0.208 (-0.82)	0.286* (1.77)	0.024* (2.03)	0.033** (2.45)	0.199 (1.57)	0.035 (1.31)	-0.013 (-0.69)
Post-Short	-0.064 (-0.88)	-0.068 (-0.69)	-0.003 (-0.51)	0.003 (0.51)	-0.051* (-1.83)	-0.015 (-1.34)	-0.009 (-0.89)
Post-Long	0.001 (0.01)	-0.030 (-0.32)	0.009 (1.11)	0.013 (1.47)	-0.094** (-2.47)	-0.023 (-1.69)	-0.005 (-0.36)
Observations	2,433	2,388	2,431	2,384	2,400	2,153	2,328
Adj. R ²	0.855	0.848	0.612	0.559	0.804	0.698	0.628
Year FE	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓

Table OA.2: Performance of the longer-period strategies relative to the placebo strategies over short-run and long-run: Capital intensive strategies This table shows the performance of long-term buy-and-build strategies, compared to placebo control strategies, over the short-run horizon and the long-run horizon, depending on the capital intensity. We focus on the strategies which exit in at least five years after the platform acquisition (the long-term strategies). *BB* is an indicator for the treated sample. *Post-Short* is an indicator equal to zero for t-1 and equal to one for the periods t+1 to t+3, where t indicates the year of the acquisition of the strategy's platform. *Post-Long* is an indicator equal to zero for t-1 and equal to one for the periods t+4 to t+5. *K Intensity* is a dummy variable equal to one for strategies of which the platform had a fixed assets to employees ratios that was higher than the sample median in the pre-deal year. For the control samples, *Post* dummies take on the respective values of the treated company to which the control is matched. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln Assets	ln Sales	ROA	ROS	ATR	Leverage	Cash / Assets
BB×Post-Short×K Intensity	-0.523** (-2.19)	-0.424 (-1.58)	0.042*** (3.50)	0.061*** (3.26)	0.156 (1.15)	-0.071 (-1.47)	0.053* (1.85)
BB×Post-Long×K Intensity	-1.621*** (-3.37)	-0.510* (-1.87)	0.083*** (5.04)	0.098*** (4.19)	0.590** (2.43)	-0.141** (-2.56)	0.088** (2.58)
BB×Post-Short	0.204 (1.13)	0.342* (1.97)	-0.005 (-0.51)	-0.011 (-0.98)	0.033 (0.23)	0.058** (2.78)	-0.034 (-1.69)
BB×Post-Long	0.434* (1.78)	0.475* (2.13)	-0.013 (-0.93)	-0.010 (-0.81)	-0.039 (-0.24)	0.093*** (3.92)	-0.045* (-1.78)
Post-Short×K Intensity	-0.178** (-2.72)	-0.054 (-1.03)	0.017*** (4.00)	-0.000 (-0.07)	0.183*** (4.77)	-0.006 (-0.39)	0.002 (0.27)
Post-Long×K Intensity	-0.356*** (-3.68)	-0.145 (-1.30)	0.018** (2.66)	-0.005 (-0.65)	0.230*** (3.83)	-0.000 (-0.01)	0.007 (0.72)
Post-Short	0.014 (0.17)	-0.056 (-0.57)	-0.011 (-1.72)	0.002 (0.27)	-0.133*** (-4.10)	-0.013 (-1.43)	-0.011 (-1.11)
Post-Long	0.150 (1.61)	0.016 (0.16)	-0.001 (-0.12)	0.012 (1.29)	-0.201*** (-4.17)	-0.023* (-1.88)	-0.009 (-0.69)
Observations	2,434	2,389	2,432	2,385	2,401	2,156	2,330
Year FE	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓
Adj. R-Squared	0.866	0.856	0.616	0.566	0.809	0.703	0.628

Table OA.3: Performance of the longer-period strategies relative to the placebo strategies: Product closeness and type of follow-on acquisition II. This table shows the performance of buy-and-build strategies that exited after five years compared to placebo control strategies over the first five years following the platform acquisition, depending on product-market relatedness of companies. We use the alternative definition of relatedness compared to the measure in Table 9 in main text. We focus on the strategies which exit in at least five years after the platform acquisition. *Horizontal* is an indicator equal to one for the years when the strategy acquired an add-on in the same 4-digit NACE sector as the platform, as in main text. *Close Customer* is an indicator equal to one for the years when the strategy acquired an add-on with an I-O relation and whose industry is in the top quartile based on intensity of trading with the platform industry. *Other Customer* is an indicator equal to one for the years when the strategy acquired an add-on with the I-O relation and whose industry is in the top quartile based on intensity of trading with the platform industry. *Close Supplier* and *Other Supplier* dummies are defined similarly based on supplier relationships. *BB* is an indicator for the treated sample. *Post* is an indicator equal to zero for t-1 and one for the period t+1 up to t+5, where t indicates the year of the acquisition of the strategy's platform. For the control samples, *Post* and relatedness dummies take the respective values of the treated company to which the control is matched. The dummies non-interacted with *BB* are suppressed to save the space. All specifications include firm and year fixed effects. Standard errors are clustered two-ways over the company and year dimension. *, **, and *** stand for a 10%, 5%, and 1% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ln Assets	ln Sales	ROA	ROS	ATR	Leverage	Cash/Assets	ln Empl.	Sales/Empl.
BB×Horizontal	-0.225 (-0.85)	-0.005 (-0.02)	0.022 (1.35)	0.015 (0.74)	0.034 (0.21)	0.061* (2.08)	-0.006 (-0.21)	-0.225 (-0.85)	0.027 (1.03)
BB×Close Supplier	-1.295* (-1.93)	0.321 (0.73)	0.124** (2.34)	0.062 (1.73)	0.969 (1.59)	-0.035 (-1.02)	0.097 (1.62)	-1.295* (-1.93)	0.141* (1.80)
Close Customer	-0.074 (-0.53)	0.048 (0.36)	0.022* (2.08)	0.020* (1.89)	0.158 (1.47)	-0.031 (-0.74)	-0.000 (-0.01)	-0.074 (-0.53)	-0.031 (-1.17)
BB×Close Customer	-0.308 (-0.62)	0.958 (1.07)	-0.017 (-0.79)	-0.017 (-0.76)	0.167 (0.58)	0.080 (1.32)	0.058 (1.40)	-0.308 (-0.62)	0.060 (1.19)
BB×Other Supplier	-0.309 (-0.48)	0.151 (0.13)	0.003 (0.05)	0.055 (0.99)	-0.254 (-1.77)	-0.009 (-0.22)	-0.081 (-1.24)	-0.309 (-0.48)	0.173 (1.11)
BB×Other Customer	-3.233*** (-3.30)	-2.074*** (-4.41)	-0.016 (-0.61)	-0.023 (-1.68)	1.793*** (4.68)	-0.000 (-0.00)	0.064 (1.26)	-3.233*** (-3.30)	-0.152 (-1.27)
BB×Post	0.042 (0.22)	0.180 (1.21)	0.010 (1.46)	0.016 (1.62)	0.099 (0.95)	0.005 (0.26)	-0.018 (-1.39)	0.042 (0.22)	0.018 (0.83)
Observations	2,434	2,389	2,432	2,385	2,401	2,157	2,330	2,434	2,044
Non-interacted terms	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Strategy FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Adj. R ²	0.858	0.852	0.616	0.560	0.813	0.702	0.634	0.858	0.795