The Supply Chain Spillovers of Private Equity Buyouts

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Abstract

The impact of private equity (PE) buyouts on target firms is well-documented, yet empirical evidence on their impact across the supply chain remains scarce. We address this gap by leveraging unique production network data to examine how supply chains contribute to PE investors' ability to create and extract value. We show that, on average, suppliers of PE-backed firms outperform their peers due to increased demand for inputs from PE-backed customers—not due to alternative mechanisms such as knowledge spillovers. In contrast, during economic downturns, while PE-backed firms outperform their peers even more strongly, their suppliers show no signs of outperformance. This can be attributed to PE investors exerting greater pressure on suppliers and more actively reconfiguring supply chains to achieve cost savings for their portfolio companies during periods of economic distress. Finally, beyond their impact on suppliers, we also show that PE buyouts create crowding-out effects for competitors that rely on common suppliers.

JEL Classification: D22, D24, G32, G34
Keywords: Private equity, Supply chains, Spillover effects, Firm growth, Switching costs, Bargaining power

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1. Introduction

The private equity (PE) industry has grown tremendously over the past two decades, reaching more than $4 trillion in assets under management globally by 2023, corresponding to a four-fold increase since 2010. This rapid growth has not gone without criticism; politicians and labor unions increasingly raise concerns about the adverse impact of PE buyouts, prompting legislative responses such as the "Stop Wall Street Looting Act" recently proposed by several U.S. senators. Nevertheless, a growing body of research indicates that PE investors have a positive impact on their portfolio companies. For example, PE buyouts have been documented to improve portfolio companies' total factor productivity (Davis et al. 2014), managerial practices (Bloom et al. 2015), and innovation activities (Lerner et al. 2011).[1]

Firms, however, operate within complex production networks. Yet, we lack evidence on how buyouts ripple through the production network and affect the supply chain partners of PE-backed firms.[2] Addressing this research gap is important for at least two reasons. First, critics often contend that PE funds employ short-term value-creation strategies, which may conflict with the long-term nature of supply chain relationships (Elliott et al. 2022; Grossman et al. 2024; Khanna et al. 2022).[3] Second, and more broadly, examining the supply chain spillovers of PE buyouts can enhance our understanding of the real economic implications of PE ownership, which is crucial for both academics and policymakers.

To date, a lack of granular production network data has constrained efforts to study this question. Although some commercial datasets provide supply chain data for a subset of large, publicly listed firms, over 90% of PE buyouts involve small, privately held companies. In this paper, we overcome these limitations by leveraging unique production network data from Belgium covering all firms—including small, private ones—to examine the role of supply chains in PE investors' ability to create and extract economic value.

Theoretically, the supply chain spillovers of PE buyouts are ambiguous. On the one hand, assuming that PE buyouts create economic value for target firms, there are various ways through which supply chain partners could benefit from a buyout. For instance, if PE buyouts enable target firms to pursue new growth opportunities and expand their activities, suppliers may benefit from increased demand for inputs (Holmström 1988). Moreover, suppliers may capture

[1] While the impact of PE buyouts on firms in the private for-profit sector is generally positive, the evidence is more mixed for firms operating in regulated and subsidized industries, such as healthcare and education (e.g., Duggan et al. 2023; Eaton et al. 2020; Ewens et al. 2022; Gao et al. 2021; Gupta et al. 2024; Howell et al. 2022).

[2] At the same time, there has been growing policy and practitioner interest in the supply chain implications of PE buyouts. For instance, a report from Jabian Consulting (2022) titled "Private Equity Ate My Customer" states that "B2B companies should be familiar with the ways that PE could disrupt their customer base and be prepared to reconsider their customer strategy." Similarly, a report from Alcott Global (2024) highlights that "Private equity firms, with their acute focus on value-creation, are increasingly turning their attention to the supply chain and value chain aspects of their portfolio companies."

[3] Empirical evidence on whether PE firms engage in short-termism is mixed. On the one hand, Eaton et al. (2020) find that PE ownership in higher education leads to higher tuition fees and poorer educational outcomes, while Gupta et al. (2024) show that cost-cutting in PE-owned nursing homes comes at the expense of care quality. On the other hand, Lerner et al. (2011) find that PE-owned firms invest more in long-term innovation, and Cao and Lerner (2009) find that PE-backed IPOs outperform other IPOs.

some of the efficiency gains from the operational improvements or managerial practices that PE firms bring to their portfolio companies (e.g., through knowledge spillovers). On the other hand, even if PE firms create value for their portfolio companies, they may do so at the expense of target firms' supply chain partners (Shleifer and Summers 1988). PE firms may, for example, exert greater pressure on suppliers by renegotiating long-time contracts in order to achieve cost savings for their portfolio companies.

In this paper, we uncover that PE buyouts influence suppliers via both of the aforementioned mechanisms. Our results show that, on average, suppliers of PE-backed firms outperform their peers in terms of sales growth, employment, and profitability, as they benefit from increased demand for inputs from PE-backed customers pursuing new growth opportunities (not through knowledge spillovers). However, this pattern does not persist during economic downturns, when suppliers of PE-backed firms cease to outperform their peers and significantly reduce markups. The latter can be attributed to PE investors exerting greater pressure on the suppliers of their portfolio companies during crisis periods, as they renegotiate existing contracts or switch to alternative suppliers in order to realize short-term cost savings.[4] In addition, beyond their impact on suppliers, we show that PE buyouts create crowding-out effects for competitors that rely on common suppliers. Overall, our study offers novel evidence on the role of supply chains in PE investors' ability to create and extract value and its implications for product market competition.[5]

Our empirical analysis relies on three unique data sources from Belgium which, as explained in detail below, is a representative country in terms of PE activity. Our primary data source is firm-to-firm sales data administered by the National Bank of Belgium, which enables us to construct the network of supply chain relationships for virtually all firms in Belgium. A key advantage of this dataset is that it covers *all* firms as the majority of PE deals, both in Belgium and globally, are private firm buyouts.[6] These data can be linked to detailed firm balance sheet data, which provide information on sales, revenues, and costs of inputs (including capital, labor, and intermediates). Finally, we combine these data with PE deals involving Belgian targets obtained from Orbis M&A and S&P Global. This yields a final dataset that includes approximately 230 thousand firms and nearly 300 PE deals over the period 2002-2022.

Using this dataset, we test for changes in supplier outcomes—such as total sales, profitability,

[4]The fact that PE firms primarily exert more pressure on suppliers during periods of economic distress is consistent with survey evidence showing that PE investors are more engaged with the strategic decision making of their portfolio companies during such periods, as documented by Bernstein et al. (2019) and Gompers et al. (2022). Moreover, we show that the effects are more pronounced for suppliers of PE-backed firms with higher leverage and more stringent debt-servicing obligations, which increase PE firms' cost-cutting incentives during economic downturns (Jensen and Meckling 1976; Kaplan and Strömberg 2009). Nevertheless, as explained below, leverage alone does not account for our findings, highlighting a distinctive role played by PE management.

[5]As explained below, the mechanisms we document differ from those through which mergers, multinational corporations, or superstar firms for instance affect suppliers.

[6]Cohn et al. (2022) for example report that private firm buyouts have outnumbered public firm buyouts by more than thirty to one in the U.S. over the past decade.

employment, and markups—after one of its customers is acquired by a PE firm.[7] In this setting, a common identification challenge is that PE targets are not randomly selected, raising endogeneity concerns. A key advantage of our study, however, is that we do not focus on PE targets, but on the *suppliers* of those firms.[8] Nevertheless, to mitigate any remaining concerns, we follow prior research and carefully construct a control group of comparable firms for the suppliers of each PE-backed firm.

Specifically, we match the suppliers of PE-backed firms with similar suppliers of non-PE-backed firms. The control suppliers are constructed based on a granular match of industry, firm size, leverage, and profitability in the year prior to the PE event (e.g., as in Boucly et al. 2011; Davis et al. 2014). This matching procedure ensures that the control suppliers are comparable to the treated suppliers along key firm characteristics, thereby mitigating concerns about confounding factors. Each of the treatment-control groups represents a cohort, which we track for four years prior to the event until five years after the event. We then stack the cohort-level observations and estimate a generalized difference-in-differences model (Baker et al. 2022). Our regression model also controls for unobserved heterogeneity using firm-by-cohort and year-by-cohort fixed effects. Hence, our identification strategy compares within-firm dynamics of firms that deal with PE targets and control firms with similar observables in the same industry and year. Moreover, as discussed below, we show that our baseline findings also hold for a battery of robustness checks that further mitigate potential concerns about reverse causality or omitted variable bias.

Before addressing our main research question, we assess the validity of our empirical setup by analyzing the impact of PE buyouts on target firms in our data sample. Prior research has argued that private firm buyouts enable target firms to pursue new growth opportunities by providing managerial expertise and access to debt financing, among others (e.g., Boucly et al. 2011; Cohn et al. 2022; Davis et al. 2021; Kaplan and Strömberg 2009).[9] Consistent with this view, we find that PE targets' financial leverage increases significantly after being acquired by a PE firm, and that they grow faster than their matched controls after the buyout. Moreover, consistent with findings by Bernstein et al. (2019), we find that target firms outperform their peers even more strongly during economic downturns, when PE investors' managerial expertise may be particularly valuable. Overall, these results align with earlier studies, supporting the validity of our empirical setup.

We then turn to our main research question and analyze how PE buyouts affect the suppliers of target firms. We find that, in the years following a buyout, suppliers of PE-backed firms outperform their matched controls in terms of sales growth, employment, and profitability.

[7] Markups are estimated following the procedure of De Loecker and Warzynski (2012), as explained in detail below.

[8] Moreover, as discussed below, we do not find evidence that PE investors systematically target firms with a significantly different supplier base, mitigating concerns about selection bias.

[9] Other value-creation mechanisms, such as financial engineering, play a much more limited role in private firm buyouts than in public firm buyouts (also see Cohn et al. 2014; Guo et al. 2011; Jang and Mayer 2025).

These effects are statistically and economically significant. For instance, in the years following a PE deal, sales growth and employment are around 5% higher at suppliers of PE-backed firms relative to comparable suppliers of non-PE-backed firms.

In contrast, while PE targets outperform their peers even more strongly during periods of economic distress, their suppliers show no signs of outperformance during such periods. Instead, we find that suppliers of PE-backed firms significantly reduce their markups by approximately 8% during economic downturns. This pattern indicates that the advantages suppliers gain from serving PE-backed customers in normal times are largely diminished during economic downturns.

To explain the mechanisms behind these results, we exploit heterogeneity in PE target type, customer-supplier relationships, and industry structure. We start by analyzing the mechanism behind the positive effects observed during normal times, and show that this result can be attributed to an increased demand channel. Specifically, we provide three pieces of evidence that, as PE-backed firms expand their activities and pursue new growth opportunities, their suppliers benefit from increased demand for inputs. First, using the granularity of the firm-to-firm sales data, we run customer-supplier level regressions (which allow us to separate demand from supply effects) and show that the increase in sales of affected suppliers is driven by increased purchases of inputs from PE-backed customers rather than other (comparable) clients. Second, we show that the positive effects are larger for suppliers of target firms that had lower leverage prior to the buyout, which were arguably better positioned to pursue growth opportunities and drive higher demand after the buyout. Third, consistent with an increased demand channel, we find that the positive spillovers are larger for suppliers on which target firms are highly dependent for inputs, identified as those that provided a larger fraction of inputs to the targets or those that maintained a longer relationship with the targets pre-buyout.

We also examine alternative channels—such as knowledge spillovers—through which PE-backed firms might benefit their suppliers but find no supporting evidence. For example, while prior research has documented that multinational corporations and superstar firms facilitate technological transfer to their suppliers (Alfaro-Urena et al. 2022; Amiti et al. 2024), we find no comparable effect for suppliers of PE-backed firms.

We then proceed by analyzing why the positive spillovers of PE-backed firms on their suppliers are muted during economic downturns. Consistent with survey and anecdotal evidence (Gompers et al. 2016; The New York Times 2012), we show that this result can be attributed to PE investors exerting greater pressure on suppliers during periods of economic distress by negotiating more favorable terms or switching to alternative suppliers to achieve cost savings.[10]

[10]For instance, survey results from Gompers et al. (2016) indicate that increased bargaining with suppliers to reduce costs is important in 16% of PE deals. The New York Times (2012) reports that Blackstone used its purchasing power to reduce the price of overnight FedEx shipments for its portfolio companies, illustrating how PE firms pressure suppliers to achieve cost savings. Similarly, after Bain Capital and Blackstone acquired Michaels Stores, the largest arts and crafts retailer in North America, they implemented a fierce cost-cutting strategy that included renegotiating supplier contracts and streamlining the distribution network (VM 2024).

Specifically, we show that the muted spillover effects during economic downturns are concentrated among suppliers for whom PE-backed firms face lower switching costs—such as those providing standardized inputs or operating in highly competitive industries (Giannetti et al. 2021)—and when PE firms possess a strong reputation that enhances their bargaining power—such as when PE firms are older or larger (Barber and Yasuda 2017). For these suppliers, we also observe a significant reduction in markups during downturns, suggesting that PE firms enforce price concessions from suppliers. In addition to pressuring specific suppliers, we show that PE-backed firms also restructure their supply chains more actively compared to their peers during economic downturns. This strategy appears to benefit PE firms' portfolio companies, as we find a significant reduction in portfolio companies' input costs during periods of economic distress. Overall, our findings support the view that PE investors exert greater pressure on suppliers and reconfigure supply chains more aggressively to support their portfolio companies during downturns.

Importantly, our finding that PE investors seek cost savings by exerting pressure on suppliers during economic downturns aligns with survey evidence from Bernstein et al. (2019), who show that PE firms become more involved in the strategic decision-making of their portfolio companies during crisis periods. Industry reports further indicate that downturns both necessitate and facilitate PE investors' cost-saving pressures on suppliers, highlighting that actions such as renegotiating prices and switching suppliers are particularly attractive during recessions due to their rapid implementation and immediate savings (Arthur D. Little 2008). A complementary explanation is the high leverage typical of PE transactions, which makes downturns especially perilous for PE firms, creating strong incentives to cut costs and preserve liquidity (Jensen and Meckling 1976; Kaplan and Strömberg 2009). Consistent with the latter, we observe that the cost-savings pressure exerted on suppliers is most pronounced for portfolio firms that face greater financial distress. However, as discussed below, leverage alone does not fully explain our results, underscoring the distinctive role played by PE investors.

In the final part of our paper, we extend our analysis beyond the first-order effects of PE buyouts on suppliers of target firms, and document that buyouts have significant second-order effects on the rivals of PE-backed firms. Specifically, we find that treated suppliers are significantly more likely to terminate relationships with the rivals of their PE-backed customers. In principle, this pattern could reflect either capacity-constrained suppliers prioritizing faster-growing PE-backed customers or anti-competitive behavior by PE-backed customers. Consistent with a supply-side mechanism, we find that suppliers are more likely to sever ties with lower-performing firms particularly when they are capacity-constrained. These relationship terminations have real effects for competitors, as we find that those more exposed to common suppliers experience substantial declines in firm-level performance following a PE buyout, suggesting significant

crowding-out effects through common supplier networks.

Our findings hold for a battery of robustness checks. First, we estimate dynamic difference-in-differences models and show that there are no pre-trends, supporting the parallel trends assumption underlying our empirical framework.

Second, we provide two falsification tests which mitigate that our results are driven by unobservable differences between suppliers of PE-backed firms and suppliers of non-PE-backed firms. In principle, if the two types of suppliers were on different growth trajectories, one would expect to see divergent outcomes even for (1) canceled PE deals and (2) suppliers whose relationship with the PE-backed firm ended right before the buyout.[11] In contrast, we do not find differences in suppliers' outcomes in either of these cases, suggesting that our results are unlikely to be driven by inherent supplier differences alone.

Third, we rule out alternative mechanisms. One could, for instance, think that our results may be driven by knowledge spillovers, as suppliers may learn from the operational and technological improvements of their PE-backed customers (Amiti et al. 2024; Isaksson et al. 2016). Although we do find increased hiring of highly educated employees and innovation activities at PE-backed firms, we do not find that this is the case for their suppliers, and we also do not find larger spillovers for suppliers of technology-intensive PE-backed firms, which is inconsistent with a knowledge spillover channel. Another potential mechanism is that PE buyouts may affect the trade credit terms between PE-backed firms and their suppliers (Billett et al. 2024). Inconsistent with this, we find no evidence that the accounts payable of PE-backed firms change post-buyout and only limited evidence of changes in the accounts receivable of their suppliers. Finally, we study whether suppliers of PE-backed firms benefit from a certification effect. That is, PE investors often have a reputation for excellence and a track record of success, which could help their suppliers to gain new customers (e.g., by facilitating referrals or building credibility, see Dranove and Jin 2010). In line with this view, we find that affected suppliers experience a significant increase in new clients, especially clients from within the network of their PE-backed customer. However, additional analyses indicate that the certification channel is quantitatively minor compared to the direct increase in demand from PE-backed customers.

Fourth, we examine whether our results reflect any change in ownership or leverage, or whether they are specific to PE ownership. To do so, we conduct two tests. First, we compare PE buyouts with high-leverage M&A transactions, which change ownership and increase leverage but lack the governance changes typical of PE deals. We find no significant effects of high-leverage M&As on supplier performance or markups, neither during normal times nor during crisis periods.

[11] The latter falsification test is similar to the one applied by Agrawal and Tambe (2016). They study the impact of PE investments on workers' career paths and argue that, if PE-backed firms produce workers with different levels of ex-post employability than non-PE-backed firms, one would expect to see divergent career paths even for workers who exit PE-backed firms before the PE buyout. In contrast, they do not find differences in the long-run careers of these workers.

Second, we compare PE buyouts to first-time borrowers, which gain substantial leverage without ownership changes, and again observe no significant effects. These results suggest that it is increased leverage *combined with* active PE management that leads to increased supplier input demand in normal times and intensified cost-saving pressures during economic downturns.

Fifth, we show that our results hold using alternative measurement choices and matching models. In our baseline results, the identification assumption is that two suppliers with matching characteristics, before a PE buyout, would have had otherwise similar outcomes had the PE buyout never taken place. In robustness, we apply a stricter matching strategy which is based on matching suppliers on their own characteristics as well as the characteristics of their customers. In this setting, the identification assumption is that two suppliers with matching characteristics who have customers that, on average, have similar characteristics, before a PE buyout, would have had otherwise similar outcomes had the PE buyout never taken place. We show that our results hold even using this stricter matching model. Further, our results hold when excluding buy-and-build PE deals, when using alternative economic downturn definitions, and when restricting the sample to PE deals executed during normal times (i.e., deals for which the subsequent economic downturns that we exploit are arguably more exogenous compared to deals executed during downturns).

Lastly, one could wonder whether, ex-ante, PE investors target firms with inherently different suppliers. For example, PE funds might target firms with more profitable suppliers or firms which face lower switching costs vis-à-vis their suppliers. Inconsistent with this, we do not find evidence that a firm's supply chain structure affects its probability of being acquired by a PE fund, mitigating concerns about endogenous selection.

In sum, while there is growing academic and policy interest in the real effects of PE buyouts, we lack empirical evidence on the network effects of PE buyouts. Our paper addresses this gap by using unique data on buyer-supplier relationships and PE buyouts from Belgium. We uncover that, in normal times, PE-backed firms have positive spillovers on their suppliers, primarily through increased demand for inputs. In contrast, during economic downturns, these positive effects disappear as PE investors exert greater pressure on suppliers to achieve cost savings. Moreover, beyond the direct effect of PE-backed firms on their suppliers, we document that PE buyouts have crowding-out effects on competitor firms through common supplier networks. Overall, our study offers novel evidence on how supply chains contribute to PE investors' ability to create and extract economic value.

Our paper contributes to several strands of research. First, our paper contributes to a large strand of literature that studies the real effects of PE buyouts. This literature has primarily focused on how PE buyouts affect target firms and, in general, has found positive effects on firm growth (Acharya et al. 2013; Boucly et al. 2011; Bansraj et al. 2024; Cohn et al. 2022; Davis

et al. 2014; Fracassi et al. 2022; Kaplan 1989; Lichtenberg and Siegel 1990) managerial practices (Bernstein and Sheen 2016; Edgerton 2012; Bloom et al. 2015), innovation activities (Lerner et al. 2011), and firm resilience during crisis periods (Bernstein et al. 2019; Gompers et al. 2022; Wilson et al. 2012).[12]

In recent years, a growing strand of research has focused on how PE buyouts affect stakeholders, including the employees, consumers, and rivals of PE-backed firms (for an overview, see Sorensen and Yasuda 2023). The empirical evidence on the effect on employees and consumers is rather mixed,[13] while the effect on rivals seems positive (e.g., Aldatmaz and Brown 2020; Bernstein et al. 2017; Chevalier 1995a, 1995b). For instance, Bernstein et al. (2017) find that firms operating in industries with more PE investments grow more rapidly than other firms. Our paper extends the literature by analyzing the effect of PE buyouts on the suppliers of target firms, an important group of stakeholders that has so far been neglected.[14] Our findings show that PE-backed firms boost demand for supplier inputs during normal times—particularly for those that produce critical inputs—but exert greater pressure on suppliers during downturns—particularly on those for which switching costs are lower. These patterns are broadly consistent with seminal theories on transaction costs and property rights, which emphasize the importance of asset specificity and bargaining power in buyer-supplier relationships (Grossman and Hart 1986; Hart and Moore 1988, 1990; Klein et al. 1978; Williamson 1979).

Second, our paper contributes to a growing body of research that studies the effects of shocks to production networks (Acemoglu et al. 2012). Prior work has for instance studied how natural disasters (Barrot and Sauvagnat 2016; Boehm et al. 2019; Carvalho et al. 2021; Ersahin et al. 2024; Giroud and Mueller 2019; Pankratz and Schiller 2024), credit and liquidity shocks (Alfaro et al. 2021; Boissay and Gropp 2013; Costello 2020; Giannetti et al. 2021), bankruptcy (Hertzel et al. 2008; Jacobson and Von Schedvin 2015), ESG incidents (Bisetti

[12]For a more extensive overview on the real effects of PE buyouts, see G. Brown et al. (2020), Bernstein (2022), orLjungqvist (2024). For an overview of the literature on PE fund performance, see Kaplan and Sensoy (2015) or Korteweg (2019).

[13]In the U.S., Herkenhoff et al. (2025) find that workers of PE-acquired firms suffer sizable earnings losses and worse subsequent employment prospects. In Germany, Antoni et al. (2019) report reduced employment and lower wages post-buyout. Agrawal and Tambe (2016), using U.S. individual level data, show that PE buyouts boost IT investments, which in turn enhances employees' human capital and wages. Other studies find positive effects on workplace safety (Cohn et al. 2021), insignificant effects on health (Garcia-Gomez et al. 2024), and negative effects on job satisfaction (Gornall et al. 2024; Lambert et al. 2021). Evidence on the impact of PE buyouts on consumers is mixed and often focused on specific industries, such as retail (Chevalier 1995b, 1995a; Fracassi et al. 2022; Pursiainen and Tykvova 2022), healthcare (Aghamolla et al. 2023; Duggan et al. 2023; Gao et al. 2021; Gupta et al. 2024; Liu 2022), life insurance (Kirti and Sarin 2024), firearms (Hüther 2023), banking (Johnston-Ross et al. 2024), newspapers (Ewens et al. 2022), education (Eaton et al. 2020), airports (Howell et al. 2022), fracking (Bellon 2025), and energy (Andonov and Rauh 2022).

[14]D. T. Brown et al. (2009) analyze how suppliers' stock prices react to customers' leveraged buyouts (LBOs). Four key differences distinguish our analysis from theirs: First, while they mainly rely on stock price reactions to infer the impact of LBOs on suppliers, we leverage granular production network and firm financial statement data covering the entire Belgian economy to provide a much richer analysis of how PE buyouts affect supplier outcomes. Second, while they focus on public firm buyouts, we study private firm buyouts. This distinction is crucial, as private firm buyouts constitute the majority of PE deals globally and often differ substantially from PE deals involving public firms. Third, while they emphasize a bargaining power effect, arguing that LBOs enhance firms' leverage to extract supplier concessions, we show that the effects of PE buyouts on suppliers depend on economic conditions. Specifically, PE-backed firms drive supplier growth in normal times through increased input demand but impose cost-saving pressures during downturns. Fourth, while they only study the effect on suppliers, we also analyze indirect spillovers on rivals of PE-backed firms with common suppliers.

et al. 2024), or cyberattacks (Crosignani et al. 2023) propagate through the supply chain. More related to our work, previous papers have analyzed the supply chain spillovers of horizontal and vertical mergers (Bhattacharyya and Nain 2011; Fee and Thomas 2004; Luco and Marshall 2020; Shahrur 2005), multinational corporations and superstar firms (Alfaro-Urena et al. 2022; Amiti et al. 2024), and common ownership (Fee et al. 2006; Freeman 2023).

Our paper contributes to this literature by documenting the network effects of PE buyouts. This is of first-order importance as critics often argue that PE firms use aggressive short-term value-creation strategies,[15] while the resilience of supply chains rests on long-term investments (Elliott et al. 2022; Grossman et al. 2024; Khanna et al. 2022). We show that PE-backed firms positively influence supplier growth in normal times through increased input demand and impose cost-saving pressures during downturns. These mechanisms contrast with the ones documented for multinational corporations and superstar firms, which have been shown to benefit suppliers through knowledge spillovers and reputation effects (Alfaro-Urena et al. 2022; Amiti et al. 2024). Further, our finding that PE buyouts positively impact suppliers through increased demand contrasts with the negative wealth effects documented for suppliers of merging firms, potentially because strategic mergers primarily enhance the merging firms' bargaining power rather than expand their activities (Frésard and Phillips 2024).

Finally, our study contributes to recent work that examines how product market interactions are influenced by shared upstream or downstream supply chain relationships. For instance, Giannetti et al. (2021) show that suppliers strategically utilize trade credit to ease competition in downstream markets and mitigate the risk of being cannibalized by high-bargaining-power customers. Chod et al. (2019) examine how competition among suppliers influences trade credit decisions, documenting a free-rider problem whereby suppliers serving a common customer reduce trade credit if customers can use it to shift purchases toward competitors. Freeman et al. (2024) document that firms strategically extract trade credit from common suppliers in order to undermine the competitive position of their product market rivals. Our paper contributes to this literature by highlighting the role of common suppliers in understanding the impact of PE buyouts on the competitors of target firms, thereby providing new insights into the product market implications of PE investments.

The remainder of the paper is organized as follows. In Section 2, we describe our data sources and position the PE industry in Belgium compared to the rest of the world. Section 3 explains the empirical methodology used in our analysis. Section 4 presents our main results, the economic mechanisms, and a battery of robustness tests. Finally, Section 5 summarizes our findings and conclusions.

[15] PE firms have distinct incentives to rapidly and substantially increase the value of their portfolio firms as they employ large amounts of leverage, aim to liquidate investments within a short time frame, compensate fund managers through a call option-like share of the profits, and do not have existing relationships with target firm stakeholders (Kaplan and Strömberg 2009).

2. Data

Our primary data source is the business-to-business (B2B) transactions database administered by the National Bank of Belgium. This dataset records the universe of firm-to-firm transactions among all VAT-liable firms in Belgium on an annual basis (for details, see Duprez et al. 2023), which enables us to identify firms' buyers and suppliers (the extensive margin) as well as the sales amount between each buyer-supplier pair (the intensive margin). Unlike commercial datasets, two key advantages of the Belgian B2B database are that it covers all firms—including small, private ones which are most likely to be acquired by PE firms—and that it covers the intensive margin of firm-to-firm trade which, as discussed below, is crucial for analyzing the mechanisms through which PE firms affect suppliers.[16] Our second data source is the annual accounts database from the National Bank of Belgium. This dataset contains detailed information from firms' balance sheets on sales, revenues, costs of inputs (such as capital, labor, and intermediates), as well as firms' 4-digit (NACE) industry code and zip code.[17]

We apply the following filters to our data sample (as in Bernard et al. 2022; Dhyne et al. 2022). First, we select private Belgian firms operating in the non-financial sector that report positive sales and labor cost, and at least one full-time equivalent employee (to avoid potential issues with shell or management companies). Second, we further select firms that report tangible assets of more than 100 euro and positive total assets for at least one year throughout our sample period. Finally, we keep only the set of firms that are active in the production network. This results in a final data sample that yields 231,772 unique firms over the period 2002–2022. Descriptive statistics of the data sample are reported in Panel A of Table 2.

We merge these data with data on PE transactions involving Belgian target firms obtained from Orbis M&A (formerly Zephyr), one of the most comprehensive databases on PE transactions in Europe. Following prior literature, we restrict our focus to transactions for which the deal type is equal to "Private equity" or "Institutional buy-out" as well as all transactions for which the deal type is equal to "Acquisition" and the deal financing is equal to either "Leveraged buyout" or "Private equity." This ensures that we focus on later-stage buyout transactions and exclude venture capital investments, which differ in important ways (Davis et al. 2014; Lambert et al. 2021). Further, we require for all transactions that the acquirer is an institutional investor, the initial stake in the firm is less than 50% and the final stake is larger than 75%. To mitigate

[16] By law, all Belgian firms are required to report client listings containing the firm identifier and annual sales value, if the yearly sales value exceeds 250 euro. The Belgian tax authorities impose pecuniary sanctions for late or erroneous reporting, which ensures a very high quality of the data.

[17] Note that the unit of observation in these datasets are VAT-IDs, and one firm can potentially have multiple VAT-IDs. Following Dhyne et al. (2021), we aggregate VAT-IDs up to the firm level using ownership filings in the annual accounts and foreign ownership filings in the Balance of Payments survey. The Balance of Payments survey reports for each VAT-ID, the name of foreign parent firms that own at least 10% share, along with the associated ownership share. We group all VAT-IDs into firms if they are linked with more than or equal to 50% of ownership or if they share the same foreign parent firm that holds more than or equal to 50% of their shares.

potential concerns that Orbis M&A may not cover all PE deals, we further complement this data with PE deals obtained from S&P Global (Capital IQ). Ultimately, this results in 294 PE buyouts of Belgian firms between 2002 and 2021. The Bureau van Dijk (BvD) identifier in Orbis M&A corresponds to the VAT number for Belgian firms, allowing us to directly link the PE transactions data to the firm B2B and financial statement data explained above. We manage to match nearly 75% of the transactions to the VAT number of a firm in our data sample (after applying the filters mentioned above).[18] For each firm, we record the year of the first PE transaction that we observe as the buyout year.[19]

2.1. PE activity in Belgium

In general, the Belgian PE buyouts in our data sample are relatively comparable to PE buyouts in the rest of the world. First, Figure 1 shows the number of PE buyouts per year in our sample. Overall, the number of buyouts gradually increases from 2002 until 2007 when it peaks, followed by a severe drop in the aftermath of the global financial crisis. The number of deals then slowly recovers, followed by a decrease in the years 2011-2013, after which it strongly increases in the years 2014-2015. In 2018, there is a small dip, after which the number of deals increases again until the end of our sample period. These patterns are similar to the evolution recorded by Aldatmaz and Brown (2020) for their global sample of PE deals. In terms of the total number of deals, our sample obviously includes fewer deals than the sample of U.S. deals from Davis et al. (2014) and French deals from Boucly et al. (2011), but this is primarily due to the fact that these economies are several times larger than the Belgian economy. Accounting for differences in the size of the economy, Belgian PE activity seems comparable to that of the U.S. or France, for instance (with the average ratio of PE buyout capital over GDP being equal to 0.172%, 0.053%, 0.049% in the US, France, and Belgium over the period 1990–2017, respectively, as reported by Aldatmaz and Brown 2020).

Second, the types of sellers involved in our sample of Belgian transactions do not differ much from the typical transactions in the rest of the world. Three points are worth highlighting. First, only 4% of the deals in our sample are public-to-private transactions, a number close to the 7% found in the sample of global PE deals documented by Strömberg (2008). In Belgium, as in the world, about 55% of PE transactions are pure private-to-private transactions. Second, divisional buyouts comprise 23% in our sample, compared to 26% in Strömberg's sample. Finally, secondary buyouts (i.e., transactions involving a financial vendor) comprise 19% in our sample

[18] This match rate is comparable to the one obtained by Davis et al. (2014) with U.S. data and Boucly et al. (2011) with French data, for instance. The small number of unmatched PE deals primarily involves transactions in sectors excluded from the sample, such as health care and real estate companies.

[19] One might wonder whether PE firms consolidate supply chains by acquiring firms that are customers or suppliers of one another. In our sample, this does not appear to be a common strategy. We identify only a single instance in which a PE firm acquired both a company and one of its direct suppliers. Importantly, our results remain robust when excluding these two PE targets from the sample.

compared to 13% in Strömberg's sample.

Third, average deal size is also very similar to international data. Looking at enterprise value, Strömberg (2008) documents that the mean deal size is $389 million in the U.S. and $280 million in the U.K. over the period 2001-2007, while Boucly et al. (2011) report a mean deal size of $395 million in France over the period 1994–2004. These figures are comparable to the median deal size of $280 million in our sample of Belgian deals. The PE firms in our sample are also representative of the universe of PE firms around the world. Among the 147 sponsors backing the deals in our sample, there are both very large sponsors (such as CVC Capital Partners, The Carlyle Group, and Goldman Sachs Capital Partners) as well as small ones (such as Bencis Capital Partners). Table O.A2 in the Appendix reports the distribution of PE deals by investor country. The majority (50%) of PE firms in our sample are Belgian firms which are, on average, small (with $1.1 billion of assets under management). U.S., U.K., and Dutch funds are common (10%, 10% and 16%, respectively, of the deals in our sample) and, on average, larger (with $4.5 billion of assets under management). Overall, domestic funds are prevalent but an important fraction of deals are backed by larger U.S. or U.K. based funds. Finally, Table O.A3 in the Appendix shows the sectoral distribution of PE deals. Around 35% involved firms in manufacturing, primarily in the earlier years of the sample, while more recent deals increasingly target the information and communication services sector, which accounts for just under 15% of all PE deals. These patterns are broadly consistent with those reported by Davis et al. (2021), for instance.

One difference compared to U.S. buyouts is that the target firms in our sample are slightly older than the typical U.S. targets, but this accords with the idea that PE buyouts involve more mature firms in continental Europe than in the U.S. or the U.K. (Boucly et al. 2011). For instance, in the sample of Davis et al. (2014), about 50% of targets are more than 10 years old and 25% are less than 5 years old. In our sample, 78% of targets are more than 10 years old, and only 6% are younger than 5 years old. Nevertheless, it should be stressed that the treated firms in our sample do not systematically differ from their matched control firms on the age dimension (even though age was not a criterion in the matching procedure), which mitigates potential concerns that our results would be driven by the effect of firm age on firm performance, for instance.

In sum, the Belgian economy and PE sector appear broadly comparable to those of other large economies, although our findings may vary depending on a country's industrial structure.

3. Methodology

The main objective of our study is to analyze the spillover effects of PE buyouts on the suppliers of PE targets. In this respect, a common identification challenge is that PE buyouts are non-random, which could lead to endogeneity issues. However, unlike other studies, we do not focus on target firms but on the suppliers of those firms, which addresses many endogeneity concerns. In support of this argument, results presented in Section 4.5.4 indicate that PE investors do not systematically take into account firms' supply chain structure in their investment decisions. Nevertheless, to mitigate any remaining concerns, we use the granularity of our data to construct a control group of comparable firms (as in Davis et al. 2014; Boucly et al. 2011; Cohn et al. 2021), and run stacked difference-in-differences regressions to analyze the supply chain spillovers of PE buyouts.[20]

To do so, for each PE event, we first identify the suppliers of each target firm and match those with a group of control firms. Following previous papers, we apply nearest neighbor propensity score matching (PSM) with replacement, where we require the potential matches to have similar size (total assets), leverage, and profitability (EBITDA) as the supply chain partners of the acquired firms in the year before the event. Further, we require potential matches to be in the same 4-digit NACE industry as the treated supply chain partners and to have data available at least in year $t-1$ and $t+1$. In robustness checks, discussed below, we show that our results are insensitive to the matching procedure or matching variables used. After the matching procedure, we retain the five closest control firms of each treated firm. The resulting control-treatment groups are called cohorts. The implicit assumption is that firms in the same cohort would follow a similar trend in the absence of the treatment, in which case the control firms are an appropriate counterfactual for the treated firms.

We restrict our analysis to cohorts in which the PE-backed customer accounted for at least 5% of the treated supplier's total sales prior to the PE deal, to ensure that the treatment effect is economically meaningful.[21] Then, we track the firms in each cohort for four years prior to the event until five years after the event (as the typical holding period for target firms is three to five years, see Kaplan and Strömberg 2009). Finally, we stack all cohorts together and compare the outcomes of treated firms (relative to their control group) after (versus before) a customer of

[20] Recent studies in econometrics have shown that the use of standard two-way fixed effects models generates biased estimates in settings with staggered timing of treatment assignment or treatment effect heterogeneity. Baker et al. (2022) review the alternative estimators proposed in the literature and find that a stacked difference-in-differences estimator allows to identify the true treatment effects. Gardner et al. (2024) further show that a stacked design is equivalent to estimating an average treatment effect in each cohort and then taking the average of the cohort-specific estimators, weighted by the relative sizes of the cohorts. Therefore, the stacked difference-in-differences estimator is similar to the idea proposed by Sun and Abraham (2021) and Callaway and Sant'Anna (2021) to estimate separate average treatment effects in different groups and then aggregate these estimators to form an overall estimate of the treatment effect.

[21] In Table O.A5 in the Appendix, we present results without imposing a specific threshold, and instead include a series of post-treatment indicators based on suppliers' pre-event sales share to the PE target. The results from this table support the validity of the 5% cutoff used in the main analysis as a reasonable threshold.

the treated firms was acquired by a PE firm. Specifically, we estimate the following regression:

$$y_{i,t,c} = \beta \cdot Post\ PE_{i(j),t,c} + \gamma \cdot X_{i,t-1} + \lambda_{i,c} + \lambda_{t,c} + \epsilon_{i,t,c} \tag{1}$$

where i, j, t, and c correspond to supplier, customer, time, and cohort, respectively. $y_{i,t,c}$ represents various firm-level outcomes, including total sales, profitability, employment, and markups. The latter are computed following De Loecker and Warzynski (2012), by estimating industry-level revenue production functions using the Ackerberg et al. (2015) control function estimator (see Appendix O.B for more details on the estimation procedure).[22]

Our independent variable of interest is $Post\ PE_{i(j),t,c}$ which is an indicator variable equal to one in the years after customer j of supplier i in cohort c was acquired by a PE firm. $X_{i,t-1}$ is a vector of lagged control variables. In principle, the strict matching procedure used to construct cohorts of treated and control firms reduces the need for additional control variables. In robustness checks, we demonstrate that our results remain consistent when we include additional controls. $\lambda_{i,c}$ and $\lambda_{t,c}$ are firm-by-cohort and year-by-cohort fixed effects, respectively. The former ensures that we exploit within-firm variation and that our estimates are not affected by unobservable differences between the treated and control firms (as long as the unobservable differences are time-invariant within a cohort). The latter accounts for any time-specific unobserved heterogeneity. We cluster standard errors at the firm-cohort level.

In essence, our identification strategy compares within-firm dynamics of firms that supply inputs to PE-backed firms and control firms with similar observables in the same industry and year. The key identification assumption is that two suppliers with matching characteristics before a PE buyout would have had similar outcomes had the PE buyout never taken place. To confirm the validity of our matching approach, panels (a) and (b) of Figure 2 present balance diagnostics for suppliers of PE-backed firms and suppliers of non-PE-backed firms before and after applying our matching strategy explained above. We can observe that, after matching, the average size, leverage, and profitability are remarkably similar for treated and control groups. This can be derived from the fact that the standardized mean differences are generally between -25% and 25% after matching, indicating that the variables are well-balanced.[23] We also observe that, after matching, the treated and control firms are similar in terms of employment, tangible assets, age, and markups, among others, even though these variables are not used in our matching procedure. Importantly, as we discuss below, the treated and control suppliers in our matched sample also follow similar trends prior to PE events, which is what ultimately matters for the

[22]We assume materials as variable inputs in the markup estimation procedure. As the data do not record the physical output of Belgian firms, we rely on revenue data in estimating firm level markups. A potential concern is that this may lead to mis-measurement in the output elasticity and, hence, markups. However, as De Ridder et al. (2022) show, even though markups based on revenue data for firms under oligopolistic competition may be biased in levels, they are well estimated in terms of dispersion. As is common in the literature, we restrict our sample for estimating markups to firms in the manufacturing sector as firms in the services sector differ substantially in terms of their input-output conversion processes and their higher ratio of intangible assets, among others.

[23]The standardized difference test is a scale-and-sample-size-free estimator proposed by Imbens and Wooldridge (2009), for which Imbens and Rubin (2015) proposed a heuristic threshold of 25% in absolute value for significant differences.

validity of our empirical methodology.

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4. Results

4.1. The effect of PE buyouts on target firms

Before turning to our main analysis on the supply chain spillovers of PE buyouts, we validate our empirical setting by analyzing the effect of PE buyouts on target firms. Prior research has argued that, in the case of private firm buyouts, PE firms improve targets' access to debt financing, allowing them to take advantage of new growth opportunities (e.g., Boucly et al. 2011; Cohn et al. 2022). To test this hypothesis, we analyze how PE buyouts affect target firms' financial leverage and growth. To do so, we employ the matching strategy explained earlier and compare the outcomes of PE targets with (matched) control firms using stacked difference-in-differences regressions.

The results are reported in Table 3. First, column (1) shows that, relative to control firms, target firms' financial leverage ratio significantly increases in the years after the transaction.[25] Columns (2)–(4) further show that, after a PE transaction, target firms also grow faster than control firms. For instance, columns (2) and (3) imply that, relative to control firms, target firms' total sales and employment increase by around 22% and 16%, respectively, in the five

[24]The standardized difference test is a scale-and-sample-size-free estimator proposed by Imbens and Wooldridge (2009), for which Imbens and Rubin (2015) proposed a heuristic threshold of 25% in absolute value for significant differences.

[25]The debt raised for a PE buyout is typically borne by a holding company and therefore does not appear in the unconsolidated accounts reported to the tax authorities (Boucly et al. 2011). Thus, the positive effect on target firms' leverage indicates that the PE buyout allows firms to raise debt beyond what has been raised by the PE firm to finance the buyout.

years following the PE transaction.[26]

In addition, consistent with prior research, we also find that PE-backed firms outperform their peers even more strongly during economic downturns, when the managerial expertise of PE investors may be particularly valuable (Bernstein et al. 2019; Wilson et al. 2012). This finding is presented in Table 4, which includes an interaction term between the post-treatment indicator ($Post; PE$) and a lagged dummy variable equal to one for years characterized by an economic downturn ($Economic; Downturn$), as defined by the OECD recession indicators for Belgium.[27] Column (2) for instance, shows that total sales of PE-backed firms are 32% higher during economic downturns compared to 15% higher during normal times (relative to their matched controls). These results are broadly consistent with findings by Bernstein et al. (2019), who show that PE firms are more active investors and spend more time working with their portfolio companies during crisis periods.

4.2. The effect of PE buyouts on suppliers of target firms

We now turn to the findings from our main analysis, which studies the spillover effects of PE buyouts on suppliers of PE-backed firms.

Table 5 presents the results from estimating Equation (1), with the natural logarithm of sales, employment, EBITDA, and markups as outcome variables across the different columns. In general, we find that PE buyouts seem to have a positive impact on the suppliers of PE-backed firms. Columns (1)–(3), for instance, indicate that, after a PE transaction, suppliers of PE-backed firms report an increase in sales growth, employment, and EBITDA of 6%, 4%, and 6%, respectively, compared to similar suppliers of non-PE-backed firms. Column (4) further shows that there is no significant change in treated suppliers' markups.

In contrast, while Table 4 discussed earlier indicates that PE-backed firms outperform their peers even more strongly during economic downturns, this pattern does not hold for their suppliers. Specifically, Table 6 shows that suppliers of PE-backed firms do not outperform suppliers of non-PE-backed firms during economic downturns. The coefficient estimates in columns (1)–(3) suggest that the positive effects observed for suppliers of PE-backed firms during normal times disappear during economic downturns. In addition, column (4) indicates that, during periods of economic distress, suppliers of PE-backed firms reduce markups by around 8% compared to their matched controls.

Robustness tests discussed in Section 4.5 show that our findings are very robust. For instance, dynamic difference-in-differences models support the parallel trends assumption underlying

[26] Table O.A4 in the Appendix shows that these effects are more pronounced for target firms with lower ex-ante leverage, supporting the notion that PE firms enhance targets' access to debt financing, thereby enabling them to capitalize on new growth opportunities (consistent with, e.g., Boucly et al. 2011; Davis et al. 2021).

[27] Specifically, economic downturns are identified for the years 2008, 2009, 2012, 2013, and 2020, corresponding to the global financial crisis, the eurozone sovereign debt crisis, and the COVID-19 crisis.

our estimates, and falsification tests confirm that our results are not driven by other, inherent differences between suppliers of PE-backed firms and suppliers of non-PE-backed firms. Before discussing these robustness tests in more detail, we study the mechanism behind our main results in Section 4.3 below. In addition, in Section 4.4, we examine if PE buyouts have spillover effects through common suppliers.

4.3. Mechanism

We first analyze the mechanism behind the results reported in Table 5, which indicate that, on average, suppliers of PE-backed firms outperform their peers. In this section, we focus on two potential mechanisms: (1) increased input demand and (2) certification (other potential mechanisms are discussed in Section 4.5.3). To do so, we exploit heterogeneity in target firm characteristics, supplier characteristics, and customer-supplier relationships.

First, if the positive spillovers stem from increased orders by PE-backed customers, we would expect these effects to be stronger for target firms with greater growth potential. Panel A of Table 7 confirms this conjecture, showing that the effects are more pronounced for suppliers of target firms that had lower leverage prior to the buyout, which were arguably better positioned to pursue growth opportunities and drive higher demand after the buyout.

Second, in line with an increased demand channel, Panels B and C of Table 7 show that the positive spillovers are largest for suppliers on which target firms are highly dependent for inputs. Specifically, in Panel B, we classify suppliers based on whether they represent a below- or above-average share of their customers' inputs, and find that the positive spillovers are largest for suppliers providing a larger fraction of target firms' inputs. In Panel C, we split our sample based on the duration of the supplier's relationship with the PE-backed customer. As long relationships typically indicate greater dependence for inputs, an increased demand channel would predict stronger effects for such cases. Consistent with this, we find that our results are more pronounced for suppliers that have a long relationship with the PE-backed customer.

Third, we exploit the granularity of our dataset and transform the data to the customer-supplier level in order to analyze whether, consistent with an increased demand channel, treated suppliers benefit from a significant increase in purchases from PE-backed customers compared to other (comparable) customers. In particular, for each treated supplier, we identify its PE-backed and non-PE-backed customers. Then, we apply our matching approach in order to match PE-backed customers with comparable non-PE-backed customers from the same supplier (similar to the approach of Benincasa et al. 2024). For each matched pair, we track customer-supplier relationships for four years prior to and five years following the event and estimate the following regression:

$$y_{i,j,t} = \beta \cdot Post\ PE_{j,t} + \lambda_{i,t} + \lambda_j + \lambda_{i,j} + \epsilon_{i,j,t} \tag{2}$$

where $y_{i,j,t}$ corresponds to the purchases from customer j at supplier i in year t. The independent variable is a dummy variable equal to one in the years after customer j was acquired by a PE firm. An important advantage over our baseline regression model is that the regression is at the customer-supplier level (rather than the supplier level), which allows us to include supplier-by-year, customer, and customer-by-supplier fixed effects, represented by $\lambda_{i,t}$, λ_j, and $\lambda_{i,j}$, respectively. The supplier-by-year fixed effects capture unobserved time-varying supplier-specific heterogeneity (such as changes in productivity) and enable us to isolate changes in PE-backed firms' demand from potential supply effects. The customer fixed effects control for time-invariant customer-specific characteristics (such as inherent differences between PE-backed and non-PE-backed firms), and the customer-by-supplier fixed effects control for time-invariant supplier-customer relationship characteristics (such as geographic proximity). The error term is clustered at the customer level.

The results are reported in Table 8. Across the different columns, we gradually saturate the regression with fixed effects to assess the stability of the coefficient estimates. The results consistently show a significantly positive coefficient, which supports the notion that PE suppliers benefit from increased input demand from PE-backed customers, and indicates that the firm level increase in suppliers' sales documented in Table 5 is primarily driven by purchases from PE-backed customers rather than other clients. Taking into account that the average sales share of treated suppliers to their PE-backed customers is around 25% in the sample used for the estimations in Table 8, the economic magnitudes across the two specifications are also highly comparable, confirming that the observed firm level sales growth is attributable to supplying inputs to PE-backed firms post-buyout.[28]

Alternatively, PE-backed firms could indirectly affect their suppliers through a certification channel: A company is often known by the customers it keeps (Simonin and Ruth 1998), and it is common to see firms being referred to by their famous customers.[29] This mechanism is particularly relevant in our context, as PE investors typically have a reputation for excellence and an extensive network, which can benefit the suppliers of PE-backed firms by facilitating referrals, signaling quality, or reducing search costs for potential customers (Cai et al. 2024; Dranove and Jin 2010).

To investigate this channel, we first examine whether suppliers of PE-backed firms experience an increase in their customer base post-buyout. Indeed, column (1) of Table O.A6 in the

[28]The coefficient estimate of 0.06 in column (1) of Table 5 is close to the coefficient estimate of 0.18 in column (3) of Table 8 multiplied by 0.25.

[29]For example, Foxconn, a Taiwanese electronics manufacturer with approximately 2.5 billion USD market capitalization, is often referred to as Apple supplier Foxconn. Similarly, Lamb Weston, one of the world's largest producers and processors of frozen french fries, is often introduced as a key supplier of McDonald's.

Appendix shows that, following a PE buyout, suppliers of PE-backed firms gain on average 3 new customers. Based on the certification channel, we would expect that affected suppliers gain customers that are within the PE-backed firms' network. To test this, we use the production network data to distinguish between customers within and outside of a PE-backed firm's network that the treated and control suppliers of a given cohort sell to (similar to Amiti et al. 2024). The results are reported in columns (2) and (3), which show that, consistent with our prediction, affected suppliers increasingly deal with customers that are in the PE-backed firms' network. Finally, using import–export data, column (4) shows that treated suppliers significantly increase their exports to the country of origin of the target firms' PE investor relative to their matched peers, providing further support for a certification channel.[30]

Consequently, one may wonder about the quantitative importance of the direct demand channel versus the certification channel. We address this question in the Appendix O.C, where our analysis indicates that the direct demand channel is the primary driver of the positive effect observed for suppliers of PE-backed firms during normal periods. Furthermore, as discussed in Section 4.5.3 below, we explore several alternative channels through which PE-backed firms might benefit their suppliers, such as knowledge spillovers, but we find no evidence supporting these mechanisms. This suggests that the positive impact of PE-backed customers on their suppliers during normal times is largely "passive"—through increased demand rather than technology transfer or operational changes.

We then turn to the performance of suppliers of PE-backed firms during economic downturns. As shown in Table 6 earlier, while treated suppliers outperform their peers during normal times, this does not hold during economic downturns. At the same time, Table 6 shows that during such periods, suppliers of PE-backed firms significantly reduce markups compared to their peers. As explained below, we find that these results are driven by cases where the PE-backed firm has lower switching costs vis-à-vis its supplier, particularly when the PE investor has a stronger reputation that strengthens its bargaining power, consistent with the idea that PE investors renegotiate contracts with existing suppliers or shift to alternative suppliers that offer short-term cost advantages to realize cost savings for their portfolio companies.

To provide empirical evidence in line with this conjecture, we start by comparing the spillovers of PE buyouts on suppliers for which the PE-backed firms face low versus high switching costs. First, we differentiate between suppliers offering differentiated versus standardized inputs (following the classification by Giannetti et al. 2011). Suppliers of services and differentiated products are generally more difficult to replace as they provide unique or highly customized inputs (Cunat 2007). Panel A of Table 9 shows that the negative interaction term observed

[30] In the last column, we restrict the sample to suppliers of PE-backed customers with a foreign PE investor, as the relationship between exports and domestic investors is not relevant in this context.

during economic downturns is more pronounced for suppliers that offer standardized inputs. Moreover, these suppliers significantly reduce their markups during such periods. This is consistent with the idea that PE firms exert pressure on suppliers to negotiate lower prices and realize cost savings for their portfolio companies, as reported by some PE firms in the survey by Gompers et al. (2016) and highlighted in media sources (e.g., The New York Times 2012).[31]

Second, we compare the outcomes of suppliers that operate in industries with high versus low competition. Assuming that firms face lower switching costs for suppliers in industries with more competitors (as there are more alternative suppliers from which the firm could obtain inputs), we would expect the negative interaction effect observed during economic downturns to be more pronounced for those suppliers. Consistent with this view, Panel B of Table 9 shows that the negative interaction effect is more pronounced for suppliers in more competitive industries (identified as industries with a below-average HHI), and that suppliers in such industries also reduce their markups during such periods.

Third, we analyze whether cost-saving pressures are more pronounced for more reputable PE firms, which are arguably better positioned to exert pressure on suppliers. Media reports, for instance, highlight how large PE firms—so-called "PE giants" such as BlackRock—leverage their size and bargaining power to extract price concessions from the suppliers of their portfolio companies (The New York Times 2012). To test this, we follow prior literature (e.g., Arcot et al. 2015; Barber and Yasuda 2017) and classify high-reputation PE firms as those above the sample average in age or the number of past funds raised. We find that cost-saving pressures during economic downturns are concentrated among suppliers of PE-backed targets associated with older and larger PE firms. This is consistent with the idea that a strong reputation enhances the capability of PE investors to exert pressure on suppliers in order to support the performance of their portfolio companies during periods of economic distress.

We then return to the customer–supplier level and extend Equation (2) to examine whether PE-backed customers reconfigure their supply chains during economic downturns. Specifically, we study the likelihood that PE-backed customers terminate existing relationships with suppliers, and the role of switching costs as well as PE firms' bargaining power in shaping these decisions. Given our identification strategy, we essentially assess the probability that a PE-backed customer versus a control customer terminates its relationship with the same supplier within the same year. The results, presented in Table 10, indicate that, on average, PE-backed customers are significantly less likely to terminate existing customer–supplier relationships than non-PE-backed firms, as reflected by the post-treatment indicator. However, the interaction term between the post-treatment indicator and the economic downturn dummy reveals that this pattern reverses

[31] For example, an article by The New York Times (2012) highlights how Blackstone used its purchasing power to reduce the price of overnight FedEx shipments for its portfolio companies, illustrating how PE firms pressure suppliers to achieve cost savings.

during periods of economic distress. In downturns, PE-backed customers become significantly more likely to terminate relationships, particularly when switching costs are low or when their strong reputation strengthens their bargaining position with suppliers. Overall, these results suggest that while PE-backed firms tend to maintain more stable supplier relationships in normal times, they are more proactive in reconfiguring their supply chains during periods of economic distress.

Lastly, we shift our attention to the target firms, and provide additional evidence that PE firms more actively adjust their supplier networks during economic downturns, effectively allowing them to realize cost savings. Columns (1) and (2) of Table 11 show that PE-backed firms significantly increase the number of suppliers they rely on, particularly during periods of economic distress, suggesting that they actively diversify their procurement sources. Furthermore, column (3) shows that targets' cost of inputs to total sales decreases on average, while column (4) shows that this reduction is primarily concentrated in periods of economic distress. The coefficient estimate in column (4) implies a reduction of 2 percentage points in the cost of inputs to total sales, which is not only statistically but also economically significant. Together, our findings support the idea that PE firms help their portfolio companies achieve cost savings during periods of economic distress by more actively renegotiating contracts with existing suppliers and reconfiguring their supply chain. This mechanism explains why, during economic downturns, suppliers of PE-backed firms cease to outperform their peers and significantly reduce markups.

That said, an important question that remains is why does this behavior primarily occur during recessions. In general, this pattern is consistent with survey evidence indicating that PE investors tend to be more actively involved in the strategic decision-making of their portfolio companies during crisis periods (Bernstein et al. 2019; Gompers et al. 2022). Moreover, industry evidence suggests that economic downturns both necessitate and facilitate PE firms to exert cost-saving pressures on suppliers. For example, a report titled "How to Manage Portfolio Companies When the Economy Is Down" by Arthur D. Little (2008)—a leading global management consulting firm—states that recessions constrain liquidity and limit firms' capability to invest in long-term improvements, making measures such as renegotiating prices, consolidating vendors, and switching suppliers particularly attractive due to their rapid implementation and immediate cost savings. The report further highlights that the urgency of economic distress enables PE owners to overcome organizational barriers that might otherwise constrain the implementation of cost-saving measures, while distressed suppliers are more inclined to accept less favorable terms to preserve relationships with key customers during economic downturns.

Another explanation lies in the financial structure of PE transactions, which are typically characterized by high leverage and stringent debt servicing requirements (Jensen 1989). These features make downturns especially perilous for PE-owned firms, creating strong incentives

for investors to cut costs and preserve liquidity in order to meet debt obligations (Jensen and Meckling 1976; Kaplan and Strömberg 2009). Consistent with this interpretation, Table 12 shows that PE investors are significantly more likely to exert greater pressure on suppliers when their portfolio companies face greater financial distress, as reflected in higher leverage ratios or lower interest coverage ratios. Importantly, as discussed in greater detail below, this does not imply that our findings are driven solely by leverage. In fact, as discussed in detail below, we show that similar patterns do not arise in highly leveraged M&A deals, suggesting that PE investors possess distinctive skills or incentives that enable them to pressure suppliers more effectively to reduce costs.

4.4. Crowding-out through common suppliers

Our main results show that, on average, suppliers of PE-backed firms outperform their peers as they benefit from increased demand for inputs from their PE-backed customers. This finding suggests that, in general, the affected suppliers can effectively fulfill the increased demand. However, capacity constraints may lead suppliers to prioritize their (faster-growing) PE-backed customers. In such cases, externalities could arise for other customers dependent on these suppliers, particularly competitors of the PE-backed firms (as they tend to rely on the same inputs) (Bolton and Whinston 1993; Grossman et al. 2024).

To formally analyze this, we start by examining whether affected suppliers are significantly more likely to terminate relationships with rivals of their PE-backed customers. To do so, we apply a similar customer-supplier level framework as before, where we first identify the non-PE-backed customers of each affected supplier, and then find comparable non-affected suppliers of those customer using the matching approach described earlier. This allows us to compare whether affected suppliers are significantly more likely to terminate relationships with a certain customer relative to (comparable) non-affected suppliers of that same customer.

The results are presented in Table 13. To investigate potential product market implications, we include an interaction term between our main independent variable of interest and a dummy equal to one if the customer is a direct competitor of the affected suppliers' PE-backed customer (which we proxy based on whether firms operate in the same 4-digit NACE industry). Across the different columns, we find that affected suppliers are 4–6 percentage points more likely to end an existing relationship with a certain customer if that firm is a direct competitor of their PE-backed customer. This result holds after including customer-year fixed effects, and is economically significant, corresponding to around 20% of the average probability of relationship termination in the estimation sample.

In principle, this finding may be driven by two underlying mechanisms. As mentioned earlier, it may result from capacity constraints faced by suppliers, particularly given that

competitors often rely on the same inputs.[32] Alternatively, PE-backed customers might engage in anti-competitive behavior by limiting competitors' access to key suppliers (e.g., through exclusive dealing arrangements). To assess the relative importance of these two mechanisms, we conduct two additional analyses. First, if capacity constraints are driving the effect, it should be more pronounced among suppliers facing such constraints. Since we lack direct data on capacity utilization, we use financial constraints as a proxy, based on the idea that financially constrained firms are less able to expand their operations in response to increased input demand. Specifically, we classify suppliers with a below-average interest coverage ratio as financially—and thus capacity—constrained. Column (1) of Table 14 confirms that capacity-constrained suppliers are significantly more likely to drop other customers, supporting our conjecture. Second, we examine the characteristics of the customers that are more likely be dropped. Columns (2)–(3) of Table 14 show that suppliers tend to sever ties with lower-performing firms, proxied as firms with below-average profitability or a below-average Altman Z-score.[33] These results challenge the notion of anti-competitive behavior by PE-backed firms, which would imply suppliers cutting ties with better-performing rivals who pose stronger competition. Instead, the evidence aligns with a supply-side mechanism where capacity-constrained suppliers prioritize faster-growing PE-backed customers over lower-performing firms.

Lastly, we assess the economic implications of the results above for competitors of PE-backed firms that rely on common suppliers. To this end, we exploit the richness of our production network data to compute the total value of inputs that a competitor sources from suppliers of PE-acquired rivals that underwent a PE buyout. Figure O.A3 in the Appendix plots the distribution of this common supplier exposure measure, illustrating that there is substantial variation in the extent to which the competitors of a PE-acquired firm rely on the same versus different supplier. While the majority of firms have little exposure to common suppliers, others obtain a significant share of their inputs (more than 40% in some cases) from the same suppliers as their PE-backed competitors. Using this common supplier exposure measure, we estimate a difference-in-differences model to examine how a PE buyout in a certain industry affect the competitors of the PE-acquired firm, depending on competitors' reliance on suppliers of the PE-acquired firm. The results, reported in Table 15, indicate that, following a PE buyout, competitors more exposed to common suppliers of PE targets experience a significant decline in sales, employment, profitability, and markups compared to competitors less exposed to common suppliers, suggesting that PE buyouts have crowding-out effects through common supplier

[32] The phenomenon of common suppliers serving same-industry rivals has become increasingly salient in recent years. Freeman et al. (2024) for example document that the average number of rivals sharing at least one supplier rose from 0.53 in 1980 to 1.57 in 2017.

[33] Following prior research, we compute the Altman Z-score as follows:

$$\text{Altman Z-score} = 0.717 \times \frac{\text{Working Capital}_{it}}{\text{Total Assets}_{it}} + 0.847 \times \frac{\text{Retained Income}_{it}}{\text{Total Assets}_{it}} + 3.107 \times \frac{\text{EBIT}_{it}}{\text{Total Assets}_{it}} + 0.42 \times \frac{\text{Equity}_{it}}{\text{Debt}_{it}}.$$

networks.

To summarize, suppliers of PE-backed firms are significantly more likely to terminate relationships with the rivals of their PE-backed customers, particularly when they face capacity constraints. As a result, PE buyouts seem to generate crowding-out effects on competitors that rely on common suppliers with PE-acquired firms. Together, these findings highlight that PE-backed firms can impose indirect competitive pressures on their rivals via common supplier networks.

4.5. Extensions

4.5.1. Parallel trends assumption

Our research design is a generalized difference-in-differences model, using comparable suppliers of non-PE-backed firms as controls. A potential concern could be that PE buyouts are non-random, which could lead to endogeneity issues. For instance, PE firms may target firms that have higher growth potential, which could bias the estimated effect of PE buyouts on target firms' outcomes. As mentioned earlier, a key advantage of our paper is that we do not focus on target firms but on the suppliers of those firms, which addresses many endogeneity concerns. Nevertheless, we estimate dynamic difference-in-differences event studies to see whether suppliers of PE targets appear to be on different growth trajectories than their controls before the buyout. Specifically, we estimate the following regression model:

$$y_{i,t,c} = \sum_{\tau=-4,\tau\neq-1}^{\tau=+5} \beta_\tau \cdot (Post\ PE_{i(j),t,c} \times I_{\tau=t}) + \lambda_{i,c} + \lambda_{t,c} + \epsilon_{i,t,c} \tag{3}$$

where $I_{\tau=t}$ are leads and lags in event time, with $\tau = -1$ being the reference category.

Figures 3a–3d present the results for suppliers of PE-backed firms. The figures generally support the parallel trends assumption underlying our difference-in-differences regressions, as the coefficients are close to zero and statistically insignificant in the periods prior to a PE buyout. This suggests that suppliers of PE targets were not on different growth trajectories compared to their controls before the PE buyout took place, supporting the validity of our empirical methodology.[34] Furthermore, the figure suggests that the positive spillover effects appear to dissipate five years after the buyout—which coincides with PE investors' typical exit period. While these results should not be overstated, they seem to support the importance of PE management.

[34]Figures O.A2a–O.A2d in the Appendix present the estimates for target firms, and also support the parallel trends assumption.

4.5.2. Falsification tests

One alternative explanation for our findings could be that PE-backed firms and non-PE-backed firms have relationships with inherently different types of suppliers. These differences may result from the ex-ante sorting process by which customers and suppliers match before a PE buyout. If the matching variables do not sufficiently capture such differences, this could explain the observed differences in supplier outcomes post-buyout.

To rule out this alternative explanation, we conduct three falsification tests. First, we repeat our baseline analysis, but focus on suppliers whose relationship with a PE-backed firm ended right before the PE buyout took place, and analyze their outcomes relative to matched control suppliers. If PE-backed firms and non-PE-backed firms historically have relationships with suppliers that have different levels of ex-post growth potential—even in the absence of the PE event—then one might expect to see divergent outcomes for suppliers whose relationship with the PE-backed firm ended before the PE buyout.

In contrast, Panels A and B of Table O.A7 in the Appendix illustrate that there are no significant differences in our estimates for suppliers whose relationship with the PE-backed firm ended right before the PE event. In all columns of both panels, the treatment estimates for this sample are economically small and statistically insignificant. The findings suggest that the differences in outcomes of suppliers of PE-backed firms are not explained by systematic differences in the types of suppliers who have relationships with PE versus non-PE targets.

Second, we repeat our baseline analysis using canceled PE deals (e.g., Agrawal and Tambe 2016; Faccio and Hsu 2017). If PE firms target companies with suppliers that have above-average growth opportunities, then one might expect to see divergent outcomes for suppliers of PE targets and non-PE targets, even if the PE deal was not executed in the end (e.g., because the deal was withdrawn).[35] Panels A and B of Table O.A8 in the Appendix shows that this is not the case. Across all columns of both panels, we do not find statistically significant treatment effects for canceled deals, which further supports that our baseline findings are not driven by systematic differences in suppliers who have relationships with PE targets versus non-PE targets.

Finally, although the staggered timing of PE deals makes it unlikely that our results are driven by unrelated events, we conduct a falsification test using random placebo acquisition dates instead of the actual ones. Specifically, we assign random acquisition dates to PE targets, re-run the matching procedure, and re-estimate the effects of these placebo PE deals on supplier outcomes. The results, reported in Table O.A9 in the Appendix, show no significant effects of placebo acquisitions on suppliers—neither during normal times nor during economic downturns. These null results reinforce that our baseline findings are not spurious correlations.

[35] We manually reviewed the stated reasons for deal cancellations and found no instances in which supply chain considerations were cited as the motive for cancellation.

4.5.3. Alternative channels

We examine several alternative channels through which PE-backed firms could influence their suppliers. First, we assess the potential role of knowledge spillovers. Various studies have shown that the technological and operational advancements of one company can spill over to others within the same industry or across the supply chain (Aghion and Jaravel 2015; Grossman and Helpman 1991). This has been identified as a key channel through which multinational corporations and superstar firms generate benefits for their suppliers (Alfaro-Urena et al. 2022; Amiti et al. 2024). Given that previous research has also documented improvements in managerial practices and innovation activities within PE-backed firms (Bloom et al. 2015; Lerner et al. 2011), suppliers of these firms could clearly benefit by learning about innovative technologies or operational practices adopted by their PE-backed customers.

To explore this channel, we study whether the technological and operational investments of PE-backed firms and their suppliers change post-buyout, proxied by their R&D expenses and high-skilled employees.[36] The results for target firms are reported in Table O.A10 in the Appendix. Consistent with previous papers, we find a significant increase in the share of high-skilled employees and R&D expenses of target firms, suggesting that PE investors enhance the technological and operational advancements of their portfolio companies. In Table O.A11 in the Appendix, we focus on the suppliers of PE-backed firms, but we do not find any evidence that treated suppliers increase their share of high-skilled employees or R&D expenses, inconsistent with the idea that our findings are driven by knowledge spillovers from PE-backed firms to their suppliers.

Additionally, to further address the possibility that knowledge spillovers might be confined to a subset of suppliers, we focus on highly innovative sectors, identified as those with above-average patenting activity (using patent data for Belgian firms obtained from PATSTAT).[37] Panels A, B, and C of Table O.A12 in the Appendix present analyses restricted to three distinct subsamples: suppliers of target firms operating in highly innovative sectors, suppliers operating in highly innovative sectors, and buyer-supplier pairs within highly innovative sectors, respectively. Across all three subsamples, we find no evidence that suppliers increase their share of high-skilled employees or R&D expenses, which further rules out that our results can be explained by knowledge spillovers. Overall, these findings imply that the positive impact of PE-backed customers on their suppliers is driven by an increased demand mechanism, rather than active engagement mechanisms such as technological transfer.

Second, we study the potential role of trade credit. Prior studies have highlighted the

[36]The number of observations in both analyses is smaller than in the baseline sample because data on the number of high-skilled employees is available only from 2008 onward.

[37]Unreported results confirm that our findings are consistent if we instead use the OECD's technology intensity classification, which is based on the average R&D intensity of manufacturing industries (Hatzichronoglou 1997; Isaksson et al. 2016).

importance of trade credit in customer-supplier relationships and the transmission of shocks across supply chains (e.g., Billett et al. 2024; Cunat 2007; Costello 2020; Giannetti et al. 2021; Garcia-Appendini and Montoriol-Garriga 2013). For instance, if PE-backed firms have increased bargaining power relative to their suppliers, one might expect that they negotiate more favorable trade credit terms. Alternatively, PE-backed firms' increased access to external debt may reduce their demand for trade credit (Billett et al. 2024; Petersen and Rajan 1997).

To explore this, we analyze how trade credit usage and provision change for both PE-backed firms and their suppliers following a PE buyout. The results are presented in Table O.A13 in the Appendix. Panel A focuses on the accounts payable of PE-backed firms, while Panel B addresses the accounts receivable of the suppliers of PE-backed firms. The outcome variables in Panels A and B, respectively, include the amount of accounts payable and receivable in columns (1)–(2) and the average days payables and receivables are outstanding in columns (3)–(4).[38] We find no significant changes in the accounts payable of PE-backed firms or the accounts receivable of their suppliers, whether during normal or crisis periods. The only notable evidence of a change in trade credit is observed in columns (3)–(4) of Panel B, indicating that treated suppliers report an increase in the number of days receivables remain outstanding. Overall, the lack of significant effects across all panels and columns suggests that changes in trade credit policies likely play a limited role.

Finally, one could wonder whether our results are simply driven by changes in target firms' leverage, rather than by changes in ownership structure. For example, during normal times, increased leverage may allow firms to expand their activities and raise demand for inputs. During crisis periods, leverage may function as a commitment device, enabling firms to limit stakeholders' claims by credibly threatening to forgo investments that would otherwise benefit the stakeholders unless more favorable terms are negotiated (Bronars and Deere 1991; Perotti and Spier 1993). Suppliers, concerned that higher leverage could increase PE-backed customers' bankruptcy risk, may offer price concessions to mitigate the risk of customer default.[39]

To examine this, we compare the impact of PE buyouts with (i) high-leverage M&A transactions and (ii) first-time borrowers. Both events significantly increase firms' leverage, but neither involves the extensive governance changes that characterize PE buyouts. Results for high-leverage M&As, reported in Table O.A14 in the Appendix, show that suppliers of firms involved in high-leverage M&As do not perform significantly different from their peers, neither during normal times nor during crisis periods. We also do not find that high-leverage M&As affect suppliers' markups, suggesting that our baseline results cannot be attributed solely to

[38]The average days payables is proxied as 365 multiplied by the ratio of accounts receivable over cost of goods sold. The average days receivables are outstanding is proxied as 365 multiplied by the ratio of accounts receivable by net credit sales.

[39]Prior research confirms that customer bankruptcies impose significant adverse effects on suppliers (e.g., Hertzel et al. 2008; Carvalho et al. 2021; Jacobson and Von Schedvin 2015).

a change in leverage. Similarly, first-time borrowers, who gain substantial leverage without ownership changes, create only a small increase in sales for suppliers in normal times and do not exert cost-saving pressures in downturns, as shown in Table O.A15 in the Appendix.[40] Together, these findings suggest that high leverage under PE ownership is managed in a distinctive manner, both during normal and crisis periods.[41]

4.5.4. Selection bias

One could wonder whether, ex-ante, PE investors take into account firms' supply chain structure in their investment decisions. For example, PE funds might target firms that, on average, face lower switching costs vis-à-vis their suppliers (i.e., firms with suppliers that are easier to squeeze or replace during economic downturns). While this would not invalidate the empirical strategy used in our baseline analysis, we formally test this hypothesis by building on the approach of Cohn et al. (2022). Specifically, we estimate linear probability regression models to predict which firms are targeted by PE investors:

$$PE\ target_{f,t} = \beta \cdot X_{f,t} + \gamma \cdot Z_{f(i),t} + \lambda_f + \lambda_t + \epsilon_{f,t} \tag{4}$$

where the dependent variable is an indicator variable equal to one if firm f is acquired by a PE fund in year t, and zero otherwise. $X_{f,t}$ is a vector of firm characteristics (such as firm size, profitability, and leverage), while $Z_{f(i),t}$ is a vector of average supplier characteristics (such as the average size, leverage, and profitability of a firm's suppliers, or the share of a firm's suppliers operating in highly competitive industries). λ_f and λ_t represent firm and time fixed effects, respectively, and $\epsilon_{f,t}$ are robust standard errors clustered at the firm level.

The results are presented in Table O.A16 in the Appendix. We report estimates based on two specifications: one with only the vector of firm controls and another with both firm and supplier controls. Additionally, we present separate regression results in which we control for the average markups of the firm and its suppliers, which reduces the sample size.

First, focusing on firm characteristics, the results consistently show that PE investors appear to target firms that are relatively larger, more profitable, and more leveraged. These results accord with findings from Cohn et al. (2022), and could be interpreted as PE acquirers targeting firms with greater growth potential (also see Biesinger et al. 2023).[42] Next, in terms of average supplier characteristics, we do not find any statistically significant coefficient estimates, suggesting that

[40] To identify first-time borrowers, we use the credit register maintained by the National Bank of Belgium. Since the register contains data dating back to 2000, we define first-time borrowers as those with no record in the credit register prior to 2005. Accordingly, we restrict the sample period to 2005–2021 for the analysis.

[41] Several studies have documented distinctive features of PE management, particularly in how PE investors handle leverage (e.g., Hotchkiss et al. 2021).

[42] Using confidential textual data contained in pre-deal investment memos and value-creation plans, Biesinger et al. (2023) recently show that PE funds create value for their investors both by selecting firms that are more likely to outperform their peers over the next years and by helping their portfolio companies improve production processes through capital expenditures and acquisitions (but not by financial engineering).

PE investors do not actively take into account firms' supply chain structure in their investment decisions. While this does not fully rule out endogeneity concerns, the absence of differential pre-trends, combined with this finding, mitigates concerns that our baseline results are driven by selection bias.

4.5.5. Data sample and measurement choices

We conduct a series of robustness checks with respect to our data sample and measurement choices.

First, one could be concerned that PE deals executed during economic downturns may be systematically different from those executed in more stable periods. If that is the case, the differential effect documented in Table 6 could be driven by these crisis deals, rather than by deals that were executed ex-ante and subsequently exposed to a downturn. To address this concern, Appendix Table O.A17 shows that our results remain robust when we restrict the sample to deals executed in normal times, for which subsequent downturns are arguably more exogenous.

Second, to ensure that our findings are not driven by the specific definition of economic downturns used in the main analysis, we apply an alternative approach. Specifically, we construct a sector-specific downturn indicator, which equals one in the year of and the year following a decline of more than 10% in sector-wide sales (based on 4-digit NACE codes). Overall, about 10% of all sector-year combinations are classified as sector-specific downturns, with roughly half occurring during global recessions and half outside such periods. The results using this alternative downturn measure, reported in Table O.A18, remain largely robust.

Third, we show that our results remain robust when excluding buy-and-build private equity (PE) deals from the sample. In recent years, PE investors have increasingly relied on buy-and-build strategies, whereby a portfolio company expands through the acquisition and integration of additional firms (Bansraj and Smit 2025). To verify that our results are not driven by these types of deals, we exclude PE-backed firms that acquired at least one other firm within three years following the PE buyout (using data on mergers and acquisitions from Orbis M&A). Based on this procedure, we identify 28 PE targets that engaged in buy-and-build activity. Consistent with the growing importance of this strategy in recent years, 70% of these deals are concentrated in the second half of our sample period. As reported in Table O.A19 in the Appendix, our findings remain qualitatively unchanged when potential buy-and-build deals are excluded from the analysis.

4.5.6. Matching strategy

In our baseline analysis, we match suppliers of PE-backed firms with suppliers of non-PE-backed firms based on observable firm level characteristics one year before the buyout. The key underlying assumption is that two suppliers with matching characteristics, before a PE buyout, would have had otherwise similar outcomes had the PE buyout never taken place. To strengthen the robustness of our findings, we apply a stricter matching strategy by matching suppliers on their own characteristics as well as the characteristics of their customers. In particular, in line with our baseline matching approach, we match suppliers based on size, leverage, profitability, and industry. However, we now additionally match on the average size, leverage, and profitability of their customer base. In this setting, the identification assumption is that two suppliers with matching characteristics who have customers that, on average, have similar characteristics, before a PE buyout, would have had otherwise similar outcomes had the PE buyout never taken place. The results of this stricter matching strategy are presented in Panels A and B of Table O.A20 in the Appendix. The number of observations slightly decreases, but our findings remain robust. On average, we continue to observe that suppliers of PE-backed firms exhibit faster growth than their matched controls, except during periods of economic distress.

5. Conclusion

Despite the long-time interest of academics and policymakers in the economic implications of PE ownership, there is no evidence on the network effects of PE buyouts. This paper fills this gap in the literature by combining granular data on customer-supplier relationships and PE buyouts from Belgium—a representative country in terms of PE activity.

Using a difference-in-differences methodology, we show that, on average, suppliers of PE-backed firms perform significantly better than comparable suppliers of non-PE-backed firms. This positive effect is driven by increased demand for inputs from target firms that pursue new growth opportunities. Consistent with this view, we find that the positive effects are larger for suppliers of PE-backed firms that have greater growth opportunities and suppliers on which PE-backed firms are more dependent for inputs. Moreover, customer-supplier level regressions (which allow us to separate demand from supply effects) confirm that the increase in sales of affected suppliers is driven by increased purchases of inputs from PE-backed customers rather than other clients.

In contrast, suppliers of PE-backed firms cease to outperform their peers during economic downturns, while reducing their markups. Consistent with the notion that PE firms intensify their engagement with portfolio companies during crisis periods (Bernstein et al. 2019), we find that this pattern is driven by PE investors exerting greater pressure on suppliers and

more actively reconfiguring supply chains to help their portfolio companies weather adverse economic conditions. In line with this, the effect is concentrated among suppliers for which PE-backed firms face lower switching costs and among suppliers of PE-backed firms backed by more reputable PE investors, who are arguably better positioned to enforce price concessions. Moreover, as expected, the effect is stronger among suppliers of PE-backed firms with higher leverage and more stringent debt-servicing obligations, which increase PE firms' cost-cutting incentives during economic downturns.

Finally, we document that PE buyouts create crowding-out effects for competitors that share common suppliers with PE-acquired firms. Specifically, suppliers are significantly more likely to terminate relationships with rivals of their PE-backed customers, particularly when they are capacity-constrained. Consequently, competitors with greater exposure to common suppliers experience a decline in economic activity following a buyout, providing new insights into the product market implications of PE investments. These insights could be valuable for evaluating the antitrust implications of private equity transactions. For instance, in many countries, including the U.S., listed firms are already required to publicly disclose their primary suppliers. Regulators could use this information to examine overlap between the primary suppliers of PE targets and those of their competitors, providing a better view of potential anti-competitive effects.

Overall, our paper provides novel evidence on how PE buyouts affect the suppliers of PE targets—an important but neglected stakeholder group—and, more broadly, improves our understanding of how PE investors create and extract economic value.

References

Acemoglu, Daron, Vasco M Carvalho, Asuman Ozdaglar, and Alireza Tahbaz-Salehi. 2012. "The network origins of aggregate fluctuations." *Econometrica* 80 (5): 1977–2016.

Acharya, Viral V, Oliver F Gottschalg, Moritz Hahn, and Conor Kehoe. 2013. "Corporate governance and value creation: Evidence from private equity." *The Review of Financial Studies* 26 (2): 368–402.

Ackerberg, Daniel A, Kevin Caves, and Garth Frazer. 2015. "Identification properties of recent production function estimators." *Econometrica* 83 (6): 2411–2451.

Aghamolla, Cyrus, Jash Jain, and Richard T Thakor. 2023. "When private equity comes to town: The local economic consequences of rising healthcare costs." *Working Paper.*

Aghion, Philippe, and Xavier Jaravel. 2015. "Knowledge spillovers, innovation and growth." *The Economic Journal* 125 (583): 533–573.

Agrawal, Ashwini, and Prasanna Tambe. 2016. "Private equity and workers' career paths: The role of technological change." *The Review of Financial Studies* 29 (9): 2455–2489.

Alcott Global. 2024. *Private Equity's Role in Supply Chain and Value Chain Optimization.* Alcott Global.

Aldatmaz, Serdar, and Gregory W Brown. 2020. "Private equity in the global economy: Evidence on industry spillovers." *Journal of Corporate Finance* 60:101524.

Alfaro, Laura, Manuel García-Santana, and Enrique Moral-Benito. 2021. "On the direct and indirect real effects of credit supply shocks." *Journal of Financial Economics* 139 (3): 895–921.

Alfaro-Urena, Alonso, Isabela Manelici, and Jose P Vasquez. 2022. "The effects of joining multinational supply chains: New evidence from firm-to-firm linkages." *The Quarterly Journal of Economics* 137 (3): 1495–1552.

Amiti, Mary, Cédric Duprez, Jozef Konings, and John Van Reenen. 2024. "FDI and superstar spillovers: Evidence from firm-to-firm transactions." *Journal of International Economics* 152:103972.

Andonov, Aleksandar, and Joshua D Rauh. 2022. "The shifting finance of electricity generation." *Working Paper.*

Antoni, Manfred, Ernst Maug, and Stefan Obernberger. 2019. "Private equity and human capital risk." *Journal of Financial Economics* 133 (3): 634–657.

Arcot, Sridhar, Zsuzsanna Fluck, José-Miguel Gaspar, and Ulrich Hege. 2015. "Fund managers under pressure: Rationale and determinants of secondary buyouts." *Journal of Financial Economics* 115 (1): 102–135.

Arthur D. Little. 2008. *How to Manage Portfolio Companies When the Economy Is Down.* Https://www.adlittle.com/sites/default/files/viewpoints/ADL_Manage_Portfolio_Companies.pdf.

Baker, Andrew C, David F Larcker, and Charles CY Wang. 2022. "How much should we trust staggered difference-in-differences estimates?" *Journal of Financial Economics* 144 (2): 370–395.

Bansraj, Dyaran, Aneel Keswani, Francisco Urzúa I, and Per Strömberg. 2024. "Undervaluation Induced LBOs." *Working Paper.*

Bansraj, Dyaran S, and Han TJ Smit. 2025. "Buy-and-build strategies in private equity." In *The Palgrave Encyclopedia of Private Equity,* 110–116. Springer.

Barber, Brad M, and Ayako Yasuda. 2017. "Interim fund performance and fundraising in private equity." *Journal of Financial Economics* 124 (1): 172–194.

Barrot, Jean-Noël, and Julien Sauvagnat. 2016. "Input specificity and the propagation of idiosyncratic shocks in production networks." *The Quarterly Journal of Economics* 131 (3): 1543–1592.

Bellon, Aymeric. 2025. "Does private equity ownership make firms cleaner? The role of environmental liability risks." *The Review of Financial Studies.*

Benincasa, Emanuela, Olimpia Carradori, Miguel A Ferreira, and Emilia Garcia-Appendini. 2024. "Rewiring Supply Chains Through Uncoordinated Climate Policy." *Working Paper.*

Bernard, Andrew B, Emmanuel Dhyne, Glenn Magerman, Kalina Manova, and Andreas Moxnes. 2022. "The origins of firm heterogeneity: A production network approach." *Journal of Political Economy* 130 (7): 1765–1804.

Bernstein, Shai. 2022. "The effects of public and private equity markets on firm behavior." *Annual Review of Financial Economics* 14:295–318.

Bernstein, Shai, Josh Lerner, and Filippo Mezzanotti. 2019. "Private equity and financial fragility during the crisis." *The Review of Financial Studies* 32 (4): 1309–1373.

Bernstein, Shai, Josh Lerner, Morten Sorensen, and Per Strömberg. 2017. "Private equity and industry performance." *Management Science* 63 (4): 1198–1213.

Bernstein, Shai, and Albert Sheen. 2016. "The operational consequences of private equity buyouts: Evidence from the restaurant industry." *The Review of Financial Studies* 29 (9): 2387–2418.

Bhattacharyya, Sugato, and Amrita Nain. 2011. "Horizontal acquisitions and buying power: A product market analysis." *Journal of Financial Economics* 99 (1): 97–115.

Biesinger, Markus, Çağatay Bircan, and Alexander Ljungqvist. 2023. "Value creation in private equity." *Working Paper.*

Billett, Matthew T, Kayla Freeman, and Janet Gao. 2024. "Access to debt and the provision of trade credit." *Management Science (forthcoming).*

Bisetti, Emilio, Guoman She, and Alminas Zaldokas. 2024. "ESG shocks in global supply chains." *Working Paper.*

Bloom, Nicholas, Raffaella Sadun, and John Van Reenen. 2015. "Do private equity owned firms have better management practices?" *American Economic Review* 105 (5): 442–446.

Boehm, Christoph E, Aaron Flaaen, and Nitya Pandalai-Nayar. 2019. "Input linkages and the transmission of shocks: Firm-level evidence from the 2011 Tōhoku earthquake." *Review of Economics and Statistics* 101 (1): 60–75.

Boissay, Frederic, and Reint Gropp. 2013. "Payment defaults and interfirm liquidity provision." *Review of Finance* 17 (6): 1853–1894.

Bolton, Patrick, and Michael D Whinston. 1993. "Incomplete contracts, vertical integration, and supply assurance." *The Review of Economic Studies* 60 (1): 121–148.

Boucly, Quentin, David Sraer, and David Thesmar. 2011. "Growth LBOs." *Journal of Financial Economics* 102 (2): 432–453.

Bronars, Stephen G, and Donald R Deere. 1991. "The threat of unionization, the use of debt, and the preservation of shareholder wealth." *The Quarterly Journal of Economics* 106 (1): 231–254.

Brown, David T, C Edward Fee, and Shawn E Thomas. 2009. "Financial leverage and bargaining power with suppliers: Evidence from leveraged buyouts." *Journal of Corporate Finance* 15 (2): 196–211.

Brown, Greg, Bob Harris, Tim Jenkinson, Steve Kaplan, and David Robinson. 2020. "Private equity: Accomplishments and challenges." *Journal of Applied Corporate Finance* 32 (3): 8–20.

Cai, Jing, Wei Lin, and Adam Szeidl. 2024. "Firm-to-Firm Referrals." *Working Paper.*

Callaway, Brantly, and Pedro HC Sant'Anna. 2021. "Difference-in-differences with multiple time periods." *Journal of Econometrics* 225 (2): 200–230.

Cao, Jerry, and Josh Lerner. 2009. "The performance of reverse leveraged buyouts." *Journal of Financial Economics* 91 (2): 139–157.

Carvalho, Vasco M, Makoto Nirei, Yukiko U Saito, and Alireza Tahbaz-Salehi. 2021. "Supply chain disruptions: Evidence from the great east Japan earthquake." *The Quarterly Journal of Economics* 136 (2): 1255–1321.

Chevalier, Judith A. 1995a. "Capital structure and product-market competition: Empirical evidence from the supermarket industry." *American Economic Review,* 415–435.

———. 1995b. "Do LBO supermarkets charge more? An empirical analysis of the effects of LBOs on supermarket pricing." *The Journal of Finance* 50 (4): 1095–1112.

Chod, Jiri, Evgeny Lyandres, and S Alex Yang. 2019. "Trade credit and supplier competition." *Journal of Financial Economics* 131 (2): 484–505.

Cohn, Jonathan, Edith S Hotchkiss, and Erin M Towery. 2022. "Sources of value creation in private equity buyouts of private firms." *Review of Finance* 26 (2): 257–285.

Cohn, Jonathan, Lillian F Mills, and Erin M Towery. 2014. "The evolution of capital structure and operating performance after leveraged buyouts: Evidence from US corporate tax returns." *Journal of Financial Economics* 111 (2): 469–494.

Cohn, Jonathan, Nicole Nestoriak, and Malcolm Wardlaw. 2021. "Private equity buyouts and workplace safety." *The Review of Financial Studies* 34 (10): 4832–4875.

Costello, Anna M. 2020. "Credit market disruptions and liquidity spillover effects in the supply chain." *Journal of Political Economy* 128 (9): 3434–3468.

Crosignani, Matteo, Marco Macchiavelli, and André F Silva. 2023. "Pirates without borders: The propagation of cyberattacks through firms' supply chains." *Journal of Financial Economics* 147 (2): 432–448.

Cunat, Vicente. 2007. "Trade credit: suppliers as debt collectors and insurance providers." *The Review of Financial Studies* 20 (2): 491–527.

Davis, Steven J, John Haltiwanger, Kyle Handley, Ron Jarmin, Josh Lerner, and Javier Miranda. 2014. "Private equity, jobs, and productivity." *American Economic Review* 104 (12): 3956–3990.

Davis, Steven J, John C Haltiwanger, Kyle Handley, Ben Lipsius, Josh Lerner, and Javier Miranda. 2021. "The (heterogenous) economic effects of private equity buyouts." *Management Science (forthcoming).*

De Loecker, Jan, and Frederic Warzynski. 2012. "Markups and firm-level export status." *American Economic Review* 102 (6): 2437–2471.

De Ridder, Maarten, Basile Grassi, Giovanni Morzenti, et al. 2022. "The Hitchhiker's Guide to Markup Estimation." *Working Paper.*

Dhyne, Emmanuel, Ayumu Ken Kikkawa, and Glenn Magerman. 2022. "Imperfect competition in firm-to-firm trade." *Journal of the European Economic Association* 20 (5): 1933–1970.

Dhyne, Emmanuel, Ayumu Ken Kikkawa, Magne Mogstad, and Felix Tintelnot. 2021. "Trade and domestic production networks." *The Review of Economic Studies* 88 (2): 643–668.

Dranove, David, and Ginger Zhe Jin. 2010. "Quality disclosure and certification: Theory and practice." *Journal of Economic Literature* 48 (4): 935–963.

Duggan, Mark, Atul Gupta, Emilie Jackson, and Zachary S Templeton. 2023. "The impact of privatization: Evidence from the hospital sector." *Working Paper.*

Duprez, Cédric, Emmanuel Dhyne, and Toshiaki Komatsu. 2023. *The Belgian business-to-business transactions dataset 2002-2021.* Technical report. National Bank of Belgium.

Eaton, Charlie, Sabrina T Howell, and Constantine Yannelis. 2020. "When investor incentives and consumer interests diverge: Private equity in higher education." *The Review of Financial Studies* 33 (9): 4024–4060.

Edgerton, Jesse. 2012. "Agency problems in public firms: Evidence from corporate jets in leveraged buyouts." *The Journal of Finance* 67 (6): 2187–2213.

Elliott, Matthew, Benjamin Golub, and Matthew V Leduc. 2022. "Supply network formation and fragility." *American Economic Review* 112 (8): 2701–2747.

Ersahin, Nuri, Mariassunta Giannetti, and Ruidi Huang. 2024. "Trade credit and the stability of supply chains." *Journal of Financial Economics* 155:103830.

Ewens, Michael, Arpit Gupta, and Sabrina T Howell. 2022. "Local journalism under private equity ownership." *Working Paper.*

Faccio, Mara, and Hung-Chia Hsu. 2017. "Politically connected private equity and employment." *The Journal of Finance* 72 (2): 539–574.

Fee, C Edward, Charles J Hadlock, and Shawn Thomas. 2006. "Corporate equity ownership and the governance of product market relationships." *The Journal of Finance* 61 (3): 1217–1251.

Fee, C Edward, and Shawn Thomas. 2004. "Sources of gains in horizontal mergers: Evidence from customer, supplier, and rival firms." *Journal of Financial Economics* 74 (3): 423–460.

Fracassi, Cesare, Alessandro Previtero, and Albert Sheen. 2022. "Barbarians at the store? Private equity, products, and consumers." *The Journal of Finance* 77 (3): 1439–1488.

Freeman, Kayla, Jie He, Han Xia, and Liyan Yang. 2024. "(Don't) Feed the Mouth that Bites: Trade Credit Strategies among Rival Customers Sharing Suppliers." *Working Paper.*

Freeman, Kayla M. 2023. "Overlapping ownership along the supply chain." *Journal of Financial and Quantitative Analysis,* 1–30.

Frésard, Laurent, and Gordon M Phillips. 2024. "Product markets, competition and corporate finance: A review and directions for future research." *Handbook of Corporate Finance,* 591–646.

Gao, Janet, Merih Sevilir, and Yong Seok Kim. 2021. "Private equity in the hospital industry." *Working Paper.*

Garcia-Appendini, Emilia, and Judit Montoriol-Garriga. 2013. "Firms as liquidity providers: Evidence from the 2007–2008 financial crisis." *Journal of Financial Economics* 109 (1): 272–291.

Garcia-Gomez, Pilar, Ernst G Maug, and Stefan Obernberger. 2024. "Private equity buyouts and employee health." *Working Paper.*

Gardner, John, Neil Thakral, Linh T Tô, and Luther Yap. 2024. "Two-Stage Differences in Differences." *Working Paper.*

Giannetti, Mariassunta, Mike Burkart, and Tore Ellingsen. 2011. "What you sell is what you lend? Explaining trade credit contracts." *The Review of Financial Studies* 24 (4): 1261–1298.

Giannetti, Mariassunta, Nicolas Serrano-Velarde, and Emanuele Tarantino. 2021. "Cheap trade credit and competition in downstream markets." *Journal of Political Economy* 129 (6): 1744–1796.

Giroud, Xavier, and Holger M Mueller. 2019. "Firms' internal networks and local economic shocks." *American Economic Review* 109 (10): 3617–3649.

Gompers, Paul, Steven Kaplan, and Vladimir Mukharlyamov. 2022. "Private equity and COVID-19." *Journal of Financial Intermediation* 51:100968.

Gompers, Paul, Steven N Kaplan, and Vladimir Mukharlyamov. 2016. "What do private equity firms say they do?" *Journal of Financial Economics* 121 (3): 449–476.

Gornall, Will, Oleg R Gredil, Sabrina T Howell, Xing Liu, and Jason Sockin. 2024. "Do employees cheer for private equity? The heterogeneous effects of buyouts on job quality." *Management Science.*

Grossman, Gene M, and Elhanan Helpman. 1991. "Trade, knowledge spillovers, and growth." *European Economic Review* 35 (2-3): 517–526.

Grossman, Gene M, Elhanan Helpman, and Alejandro Sabal. 2024. "Optimal resilience in multitier supply chains." *The Quarterly Journal of Economics* 139 (4): 2377–2425.

Grossman, Sanford J, and Oliver D Hart. 1986. "The costs and benefits of ownership: A theory of vertical and lateral integration." *Journal of Political Economy* 94 (4): 691–719.

Guo, Shourun, Edith S Hotchkiss, and Weihong Song. 2011. "Do buyouts (still) create value?" *The Journal of Finance* 66 (2): 479–517.

Gupta, Atul, Sabrina T Howell, Constantine Yannelis, and Abhinav Gupta. 2024. "Owner incentives and performance in healthcare: Private equity investment in nursing homes." *The Review of Financial Studies* 37 (4): 1029–1077.

Hart, Oliver, and John Moore. 1988. "Incomplete contracts and renegotiation." *Econometrica,* 755–785.

———. 1990. "Property Rights and the Nature of the Firm." *Journal of Political Economy* 98 (6): 1119–1158.

Hatzichronoglou, Thomas. 1997. *Revision of the high-technology sector and product classification.* Technical report. OECD.

Herkenhoff, Kyle, Josh Lerner, Gordon M Phillips, Francisca Rebelo, and Benjamin Sampson. 2025. "Private Equity and Workers: Modeling and Measuring Monopsony, Reallocation, and Trust." *Working Paper.*

Hertzel, Michael G, Zhi Li, Micah S Officer, and Kimberly J Rodgers. 2008. "Inter-firm linkages and the wealth effects of financial distress along the supply chain." *Journal of Financial Economics* 87 (2): 374–387.

Holmström, Bengt. 1988. "Comment: Breach of trust in hostile takeovers." In *Corporate takeovers: Causes and consequences,* 33–68. University of Chicago Press.

Hotchkiss, Edith S, David C Smith, and Per Strömberg. 2021. "Private equity and the resolution of financial distress." *The Review of Corporate Finance Studies* 10 (4): 694–747.

Howell, Sabrina T, Yeejin Jang, Hyeik Kim, and Michael S Weisbach. 2022. "All clear for takeoff: Evidence from airports on the effects of infrastructure privatization." *Working Paper.*

Hüther, Niklas. 2023. "More Guns Lead to More Crime: Evidence from Private Equity Deals." *Working Paper.*

Imbens, Guido W, and Donald B Rubin. 2015. *Causal inference in statistics, social, and biomedical sciences.* Cambridge university press.

Imbens, Guido W, and Jeffrey M Wooldridge. 2009. "Recent developments in the econometrics of program evaluation." *Journal of Economic Literature* 47 (1): 5–86.

Isaksson, Olov HD, Markus Simeth, and Ralf W Seifert. 2016. "Knowledge spillovers in the supply chain: Evidence from the high tech sectors." *Research Policy* 45 (3): 699–706.

Jabian Consulting. 2022. *Private Equity Ate My Customer: Understanding the Private Equity Mindset to Build Effective Partnerships.* Jabian Consulting.

Jacobson, Tor, and Erik Von Schedvin. 2015. "Trade credit and the propagation of corporate failure: An empirical analysis." *Econometrica* 83 (4): 1315–1371.

Jang, Young Soo, and Simon Mayer. 2025. "Capital Structure in Private Equity." In *The Palgrave Encyclopedia of Private Equity,* 138–141. Springer.

Jensen, Michael C. 1989. *Eclipse of the public corporation.* 61–74. Harvard Business Review.

Jensen, Michael C., and William H. Meckling. 1976. "Theory of the firm: Managerial behavior, agency costs and ownership structure." *Journal of Financial Economics* 3 (4): 305–360.

Johnston-Ross, Emily, Song Ma, and Manju Puri. 2024. "Private equity and financial stability: Evidence from failed bank resolution in the crisis." *The Journal of Finance (forthcoming).*

Kaplan, Steven. 1989. "The effects of management buyouts on operating performance and value." *Journal of Financial Economics* 24 (2): 217–254.

Kaplan, Steven N, and Berk A Sensoy. 2015. "Private equity performance: A survey." *Annual Review of Financial Economics* 7 (1): 597–614.

Kaplan, Steven N, and Per Strömberg. 2009. "Leveraged buyouts and private equity." *Journal of Economic Perspectives* 23 (1): 121–146.

Khanna, Gaurav, Nicolas Morales, and Nitya Pandalai-Nayar. 2022. "Supply chain resilience: Evidence from Indian firms." *Working Paper.*

Kirti, Divya, and Natasha Sarin. 2024. "What private equity does differently: Evidence from life insurance." *The Review of Financial Studies* 37 (1): 201–230.

Klein, Benjamin, Robert G Crawford, and Armen A Alchian. 1978. "Vertical integration, appropriable rents, and the competitive contracting process." *The Journal of Law and Economics* 21 (2): 297–326.

Korteweg, Arthur. 2019. "Risk adjustment in private equity returns." *Annual Review of Financial Economics* 11 (1): 131–152.

Lambert, Marie, Nicolas Moreno, Ludovic Phalippou, and Alexandre Scivoletto. 2021. "Employee views of leveraged buy-out transactions." *Working Paper.*

Lerner, Josh, Morten Sorensen, and Per Strömberg. 2011. "Private equity and long-run investment: The case of innovation." *The Journal of Finance* 66 (2): 445–477.

Lichtenberg, Frank R, and Donald Siegel. 1990. "The effects of leveraged buyouts on productivity and related aspects of firm behavior." *Journal of Financial Economics* 27 (1): 165–194.

Liu, Tong. 2022. "Bargaining with private equity: Implications for hospital prices and patient welfare." *Working Paper.*

Ljungqvist, Alexander. 2024. "The economics of private equity: A critical review." *Working Paper.*

Luco, Fernando, and Guillermo Marshall. 2020. "The competitive impact of vertical integration by multiproduct firms." *American Economic Review* 110 (7): 2041–2064.

Pankratz, Nora MC, and Christoph M Schiller. 2024. "Climate change and adaptation in global supply-chain networks." *The Review of Financial Studies* 37 (6): 1729–1777.

Perotti, Enrico C, and Kathryn E Spier. 1993. "Capital structure as a bargaining tool: The role of leverage in contract renegotiation." *American Economic Review,* 1131–1141.

Petersen, Mitchell A, and Raghuram G Rajan. 1997. "Trade credit: theories and evidence." *The Review of Financial Studies* 10 (3): 661–691.

Pursiainen, Vesa, and Tereza Tykvova. 2022. "Retail customer reactions to private equity acquisitions." *Working Paper.*

Shahrur, Husayn. 2005. "Industry structure and horizontal takeovers: Analysis of wealth effects on rivals, suppliers, and corporate customers." *Journal of Financial Economics* 76 (1): 61–98.

Shleifer, Andrei, and Lawrence H Summers. 1988. "Breach of trust in hostile takeovers." In *Corporate takeovers: Causes and consequences,* 33–68. University of Chicago Press.

Simonin, Bernard L, and Julie A Ruth. 1998. "Is a company known by the company it keeps? Assessing the spillover effects of brand alliances on consumer brand attitudes." *Journal of Marketing Research* 35 (1): 30–42.

Sorensen, Morten, and Ayako Yasuda. 2023. "Stakeholder impact of private equity investments." In *Handbook of the economics of corporate finance,* 1:299–341. 1. Elsevier.

Strömberg, Per. 2008. *The new demography of private equity.* Technical report. The global impact of private equity report. World Economic Forum.

Sun, Liyang, and Sarah Abraham. 2021. "Estimating dynamic treatment effects in event studies with heterogeneous treatment effects." *Journal of Econometrics* 225 (2): 175–199.

The New York Times. 2012. *Private Equity Giants Use Size to Lean on Suppliers.* Https://archive.nytimes.com/dealbook.nytimes.com/2012/07/11/16-million-reams-of-paper-please/.

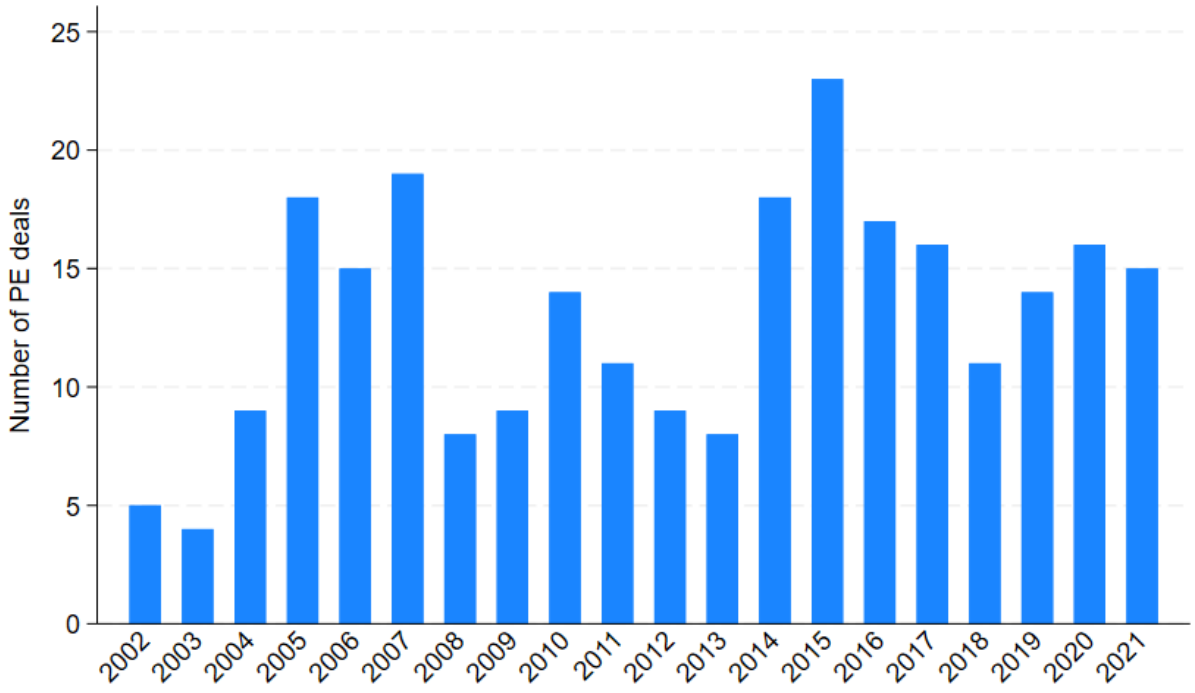
VM. 2024. *What Makes a Good LBO Candidate.* Https://www.verifiedmetrics.com/blog/what-makes-a-good-lbo-candidate.

Williamson, Oliver E. 1979. "Transaction-cost economics: the governance of contractual relations." *The Journal of Law and Economics* 22 (2): 233–261.

Wilson, Nick, Mike Wright, Donald S Siegel, and Louise Scholes. 2012. "Private equity portfolio company performance during the global recession." *Journal of Corporate Finance* 18 (1): 193–205.

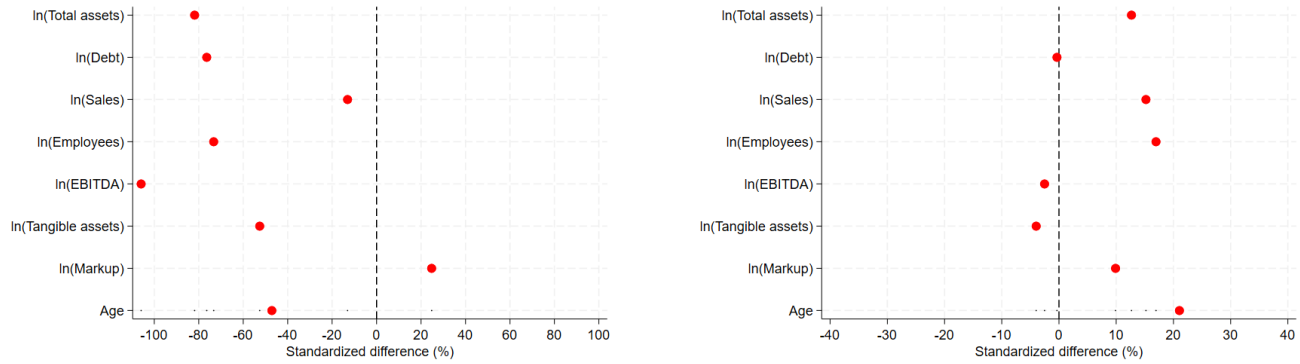
Figures

Figure 1. Number of PE deals per year



This histogram presents the number of PE deals per year in Belgium over the period 2002-2021.

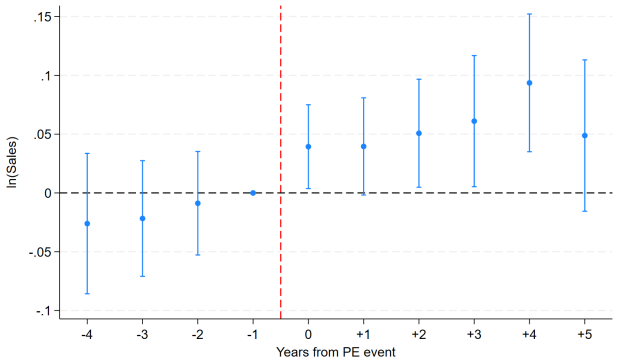
Figure 2. Balance tests: suppliers of target firms



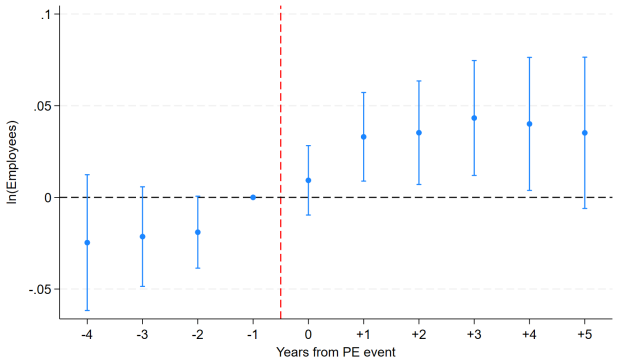
(a) Unmatched (b) Matched

This figure presents the normalized mean differences for the sample of treated suppliers and control suppliers, before and after applying the matching strategy explained in Section 3 . The standardized difference test is a scale-and-sample-size-free estimator proposed by Imbens and Wooldridge (2009), for which Imbens and Rubin (2015) proposed a heuristic threshold of 25% in absolute value for significant differences.

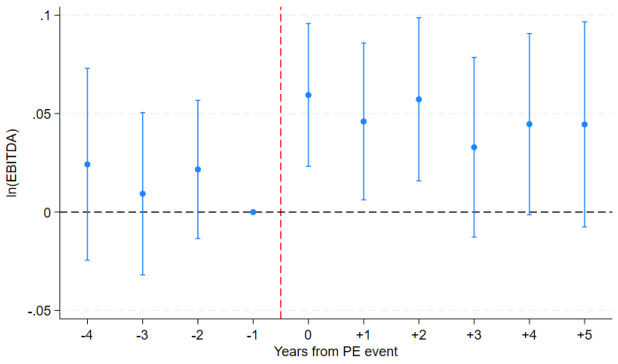
Figure 3. Dynamic difference-in-differences estimates for the effect of PE buyouts on suppliers of target firms



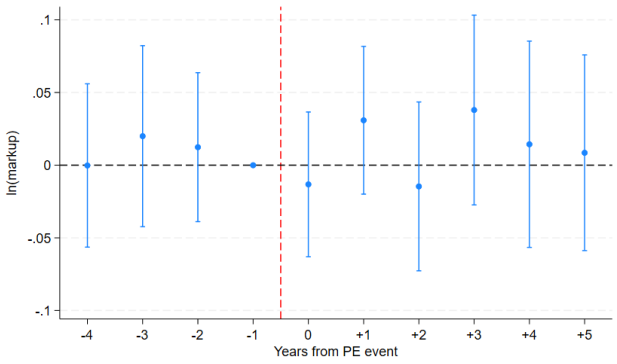
(a) ln(Sales)



(b) ln(Employees)



(c) ln(EBITDA)



(d) ln(Markup)

This figure presents the dynamic difference-in-differences estimates of the effect of PE buyouts on the suppliers of target firms. The y-axis corresponds to the coefficient estimates of β from Equation (1). The x-axis corresponds to years relative to the year in which the target firm was acquired. The dependent variables are the natural logarithm of sales, employees, EBITDA, and markups. Standard errors (in parentheses) are clustered at the firm-cohort level. The vertical bars represent confidence intervals at the 95% level.

Tables

Table 1. Number of treated firms

PE-backed firms	204
Suppliers of PE-backed firms	36,222
Suppliers of PE-backed firms with sales share $> 5\%$	2,457

This table reports the number of PE targets that could be linked to the firms included in the firm financial statement data from the National Bank of Belgium (after applying the data filters explained in Section 2). The table also reports the number of suppliers that had a relationship with a PE-backed customer over the sample period, as well as the number of suppliers that had a relationship with a PE-backed customer that made up at least 5% of the supplier's total sales.

Table 2. Summary statistics

	N	Mean	Median	SD	P10	P90
			Panel A: Full sample			
ln(Total assets)	1,638,918	13.579	13.422	1.501	11.817	15.539
ln(Employees)	1,638,918	1.603	1.386	1.245	0.000	3.277
Age	1,638,918	17.716	15.000	13.092	4.000	35.000
Debt/TA	1,638,918	0.663	0.675	0.335	0.253	0.961
ln(Debt)	1,638,918	13.015	12.909	1.555	11.131	15.024
EBITDA/Sales	1,364,769	0.948	0.905	0.181	0.790	1.166
ln(EBITDA)	1,638,918	11.549	11.453	1.542	9.736	13.515
Tangible assets/TA	1,638,918	0.290	0.225	0.249	0.017	0.675
ln(Tangible assets)	1,638,918	11.511	11.823	2.549	9.117	13.999
ln(R&D expenses)	1,638,918	0.125	0.000	1.199	0.000	7.888
ln(Sales)	1,638,918	12.460	12.675	2.246	9.306	15.209
ln(Markup)	336,959	0.932	0.736	0.806	0.230	1.777
Number of suppliers	1,638,918	63.487	47.000	51.805	16.000	139.000
Number of customers	1,638,918	65.810	21.000	104.835	2.000	191.000
			Panel B: Matched sample			
ln(Total assets)	45,349	14.331	14.049	2.119	11.674	17.369
ln(Employees)	45,349	2.277	1.917	1.692	0.336	4.734
Age	45,349	21.790	19.000	15.018	6.000	41.000
Debt/TA	45,349	0.580	0.550	0.432	0.109	0.957
ln(Debt)	45,349	13.461	13.168	2.268	10.631	16.778
EBITDA/Sales	45,349	0.886	0.907	0.274	0.743	1.107
ln(EBITDA)	45,349	12.335	12.198	2.072	9.715	15.256
Tangible assets/TA	45,349	0.234	0.162	0.225	0.010	0.583
ln(Tangible assets)	45,349	11.941	12.081	2.966	8.987	15.469
ln(R&D expenses)	45,349	0.393	0.000	2.155	0.000	12.906
ln(Sales)	45,349	13.274	13.392	2.373	10.065	16.536
ln(Markup)	15,821	0.746	0.571	0.697	0.132	1.524
Number of suppliers	45,349	84.834	55.000	72.350	15.000	216.000
Number of customers	45,349	81.389	26.000	124.707	2.000	266.000

This table reports the number of observations, mean, median, standard deviation, 10^{th} percentile, and 90^{th} percentile for the main variables of interest. Panel A contains statistics for the entire sample of firm-year observations. Panel B contains statistics for the sample of treated and control suppliers used in our baseline analysis. The sample period is from 2002 to 2022. Table O.A1 in the Appendix provides more information about the variable definitions.

Table 3. The effect of PE buyouts on target firms

	(1) ln(Debt)	(2) ln(Sales)	(3) ln(Employees)	(4) ln(EBITDA)
Post PE	0.50***	0.22***	0.16***	0.22***
	(0.06)	(0.06)	(0.03)	(0.06)
Observations	6,662	6,662	6,662	6,662
Adjusted R-squared	0.92	0.86	0.98	0.80
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on target firms. Across the different columns, the outcome variables are the natural logarithm of total debt, sales, employees, and EBITDA. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 4. The effect of PE buyouts on the economic resilience of target firms

	(1) ln(Debt)	(2) ln(Sales)	(3) ln(Employees)	(4) ln(EBITDA)
Post PE	0.47***	0.15**	0.12***	0.20***
	(0.06)	(0.07)	(0.04)	(0.07)
Post PE × Economic downturn	0.09	0.17*	0.12***	0.06**
	(0.08)	(0.10)	(0.04)	(0.03)
Observations	6,662	6,662	6,662	6,662
Adjusted R-squared	0.92	0.86	0.98	0.80
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the economic resilience of target firms. Across the different columns, the outcome variables are the natural logarithm of total debt, sales, employees, and EBITDA. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 5. The spillover effect of PE buyouts on suppliers of target firms

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Post PE	0.06***	0.04***	0.06**	-0.00
	(0.02)	(0.01)	(0.02)	(0.02)
Observations	45349	45349	45349	15821
Adjusted R-squared	0.93	0.97	0.90	0.73
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the suppliers of target firms. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 6. The spillover effect of PE buyouts on the economic resilience of suppliers of target firms

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Post PE	0.08***	0.05***	0.07**	0.01
	(0.03)	(0.01)	(0.03)	(0.02)
Post PE × Economic downturn	-0.06*	-0.04**	-0.04*	-0.08*
	(0.03)	(0.02)	(0.02)	(0.05)
Observations	45349	45349	45349	15821
Adjusted R-squared	0.93	0.97	0.90	0.73
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the economic resilience of suppliers of target firms. Across the different columns, the outcome variables are the natural logarithm of total debt, sales, employees, and EBITDA. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 7. The spillover effect of PE buyouts on suppliers of target firms: Heterogeneity

	ln(Sales)		ln(Employees)	
	(1)	(2)	(3)	(4)
Panel A:	Low leverage	High leverage	Low leverage	High leverage
Post PE	0.07***	0.06	0.04**	0.03
	(0.03)	(0.04)	(0.02)	(0.02)
Observations	28432	16099	28432	16099
Adjusted R-squared	0.94	0.93	0.97	0.97
Panel B:	High input dependence	Low input dependence	High input dependence	Low input dependence
Post PE	0.07**	0.06	0.05***	0.02
	(0.03)	(0.04)	(0.02)	(0.02)
Observations	27309	18040	27309	18040
Adjusted R-squared	0.92	0.93	0.97	0.97
Panel C:	Long relationships	Short relationships	Long relationships	Short relationships
Post PE	0.10***	0.04	0.07***	0.01
	(0.04)	(0.03)	(0.02)	(0.02)
Observations	17845	22827	17845	22827
Adjusted R-squared	0.93	0.93	0.97	0.97
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

(Table continues below)

Table 7 (continued)

	ln(EBITDA)		ln(Markup)	
	(5)	(6)	(7)	(8)
Panel A:	Low leverage	High leverage	Low leverage	High leverage
Post PE	0.07**	0.05	0.00	-0.01
	(0.03)	(0.04)	(0.03)	(0.03)
Observations	28432	16099	9940	5632
Adjusted R-squared	0.90	0.89	0.73	0.74
Panel B:	High input dependence	Low input dependence	High input dependence	Low input dependence
Post PE	0.08**	0.02	0.00	-0.01
	(0.03)	(0.03)	(0.02)	(0.04)
Observations	27309	18040	11785	4036
Adjusted R-squared	0.89	0.88	0.75	0.67
Panel C:	Long relationships	Short relationships	Long relationships	Short relationships
Post PE	0.08**	0.04	0.02	-0.01
	(0.04)	(0.03)	(0.03)	(0.03)
Observations	17845	22827	5253	8975
Adjusted R-squared	0.89	0.90	0.70	0.77
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the suppliers of target firms across different subsamples. The outcome variables are the natural logarithm of total sales in columns (1) and (2), employees in columns (3) and (4), EBITDA in columns (5) and (6), and markups in columns (7) and (8). All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 8. PE buyouts and PE-backed customers' demand for inputs from suppliers

	(1) ln(Purchases)	(2) ln(Purchases)	(3) ln(Purchases)
Post PE	0.15**	0.16**	0.18**
	(0.06)	(0.07)	(0.07)
Observations	9951	9238	9197
Adjusted R-squared	0.78	0.78	0.82
Supplier FE	Yes	No	No
Customer FE	Yes	Yes	No
Year FE	Yes	No	No
Supplier × Year FE	No	Yes	Yes
Supplier × Customer FE	No	No	Yes

This table reports the estimated impact of PE buyouts on target firms' demand for inputs from suppliers. Across the different columns, the outcome variable is the natural logarithm of total purchases from customer j at supplier i in year t. Across the different columns, the regressions are saturated with supplier fixed effects, customer fixed effects, year fixed effects, supplier-by-year fixed effects, and supplier-by-customer fixed effects, as indicated at the bottom of the table. For each treated supplier, the sample contains PE-backed customers and non-PE-backed customers, which are selected using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 4.3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the customer level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 9. The spillover effect of PE buyouts on the economic resilience of suppliers of target firms: Heterogeneity

	ln(Sales)		ln(Employees)	
	(1)	(2)	(3)	(4)
Panel A:	Differentiated inputs	Standardized inputs	Differentiated inputs	Standardized inputs
Post PE	0.11***	0.06*	0.04**	0.04**
	(0.04)	(0.03)	(0.02)	(0.02)
Post PE × Economic downturn	-0.04	-0.09**	-0.03	-0.04*
	(0.05)	(0.04)	(0.03)	(0.02)
Observations	18845	26194	18845	26194
Adjusted R-squared	0.94	0.92	0.97	0.97
Panel B:	Low competition	High competition	Low competition	High competition
Post PE	0.08*	0.08***	0.04*	0.05***
	(0.04)	(0.03)	(0.02)	(0.02)
Post PE × Economic downturn	-0.05	-0.07*	-0.02	-0.04*
	(0.06)	(0.04)	(0.03)	(0.02)
Observations	15929	29420	15929	29420
Panel C:	Young PE firm	Old PE firm	Young PE firm	Old PE firm
Post PE	0.08**	0.09***	0.05**	0.06***
	(0.04)	(0.03)	(0.03)	(0.02)
Post PE × Economic downturn	-0.03	-0.09*	0.01	-0.04*
	(0.05)	(0.04)	(0.03)	(0.03)
Observations	18586	24662	18586	24662
Adjusted R-squared	0.92	0.93	0.96	0.96
Panel D :	Small PE firm	Large PE firm	Small PE firm	Large PE firm
Post PE	0.06**	0.13***	0.03*	0.10***
	(0.04)	(0.03)	(0.02)	(0.02)
Post PE × Economic downturn	-0.05	-0.10*	-0.01	-0.05*
	(0.03)	(0.05)	(0.02)	(0.03)
Observations	18263	25571	18263	25571
Adjusted R-squared	0.92	0.94	0.96	0.96
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

(Table continues below)

Table 9 (continued)

	ln(EBITDA)		ln(Markup)	
	(5)	(6)	(7)	(8)
Panel A:	Differentiated inputs	Standardized inputs	Differentiated inputs	Standardized inputs
Post PE	0.04	0.09**	0.07	-0.02
	(0.04)	(0.04)	(0.05)	(0.02)
Post PE × Economic downturn	0.07	-0.09*	-0.09	-0.09*
	(0.06)	(0.05)	(0.08)	(0.05)
Observations	18845	26194	5832	9922
Adjusted R-squared	0.89	0.90	0.73	0.74
Panel B:	Low competition	High competition	Low competition	High competition
Post PE	0.04	0.08**	-0.04	0.02
	(0.04)	(0.03)	(0.07)	(0.02)
Post PE × Economic downturn	0.03	-0.05	-0.02	-0.08*
	(0.06)	(0.05)	(0.14)	(0.05)
Observations	15929	29420	2685	13136
Adjusted R-squared	0.88	0.90	0.62	0.75
Panel C:	Young PE firm	Old PE firm	Young PE firm	Old PE firm
Post PE	0.07	0.07**	0.04	0.01
	(0.04)	(0.03)	(0.04)	(0.02)
Post PE × Economic downturn	0.06	-0.07	-0.04	-0.09*
	(0.07)	(0.05)	(0.08)	(0.05)
Observations	18586	24662	4588	11233
Adjusted R-squared	0.90	0.90	0.75	0.70
Panel D :	Small PE firm	Large PE firm	Small PE firm	Large PE firm
Post PE	0.05*	0.13***	0.03	0.01
	(0.03)	(0.04)	(0.02)	(0.02)
Post PE × Economic downturn	0.01	-0.10*	-0.04	-0.03
	(0.04)	(0.06)	(0.04)	(0.04)
Observations	18263	25571	6167	9574
Adjusted R-squared	0.90	0.91	0.76	0.78
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the economic resilience of suppliers of target firms across different subsamples. Across the different columns, the outcome variables are the natural logarithm of total sales in columns (1) and (2) employees in columns (3) and (4), EBITDA in columns (5) and (6), and markups in columns (7) and (8). All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 10. PE buyouts and customer-supplier relationship termination during economic downturns: Heterogeneity

	(1) Relationship terminated	(2) Relationship terminated	(3) Relationship terminated	(4) Relationship terminated	(5) Relationship terminated	(6) Relationship terminated
Panel A:	Standardized inputs	Differentiated inputs	Standardized inputs	Differentiated inputs	Standardized inputs	Differentiated inputs
Post PE	-0.11***	-0.08***	-0.12***	-0.08***	-0.12***	-0.08***
	(0.04)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)
Post PE × Economic Downturn	0.02	-0.01	0.08**	-0.03	0.08**	-0.03
	(0.07)	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)
Observations	2060	6966	1935	6511	1934	6490
Adjusted R-squared	0.26	0.28	0.66	0.59	0.66	0.57
Panel B:	High competition	Low competition	High competition	Low competition	High competition	Low competition
Post PE	-0.08**	-0.09***	-0.09***	-0.09***	-0.10***	-0.09***
	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)
Post PE × Economic Downturn	0.02	-0.03	0.07*	-0.04	0.07*	-0.03
	(0.07)	(0.05)	(0.04)	(0.03)	(0.04)	(0.03)
Observations	2766	6262	2604	5844	2603	5827
Adjusted R-squared	0.24	0.29	0.62	0.59	0.63	0.58
Supplier FE	Yes	Yes	No	No	No	No
Customer FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	No	No	No	No
Supplier × Year FE	No	No	Yes	Yes	Yes	Yes
Supplier × Customer FE	No	No	No	No	Yes	Yes

(Table continues below)

Table 10 (continued)

	(1) Relationship terminated	(2) Relationship terminated	(3) Relationship terminated	(4) Relationship terminated	(5) Relationship terminated	(6) Relationship terminated
Panel C:	Old PE firm	Young PE firm	Old PE firm	Young PE firm	Old PE firm	Young PE firm
Post PE	-0.16***	-0.10***	-0.12***	-0.09***	-0.12***	-0.09***
	(0.04)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)
Post PE × Economic Downturn	0.04*	-0.02	0.07*	-0.03	0.07*	-0.02
	(0.02)	(0.05)	(0.05)	(0.03)	(0.05)	(0.03)
Observations	2270	7678	2096	7139	2090	7107
Adjusted R-squared	0.33	0.27	0.60	0.60	0.58	0.59
Panel D:	Large PE firm	Small PE firm	Large PE firm	Small PE PE firm	Large PE firm	Small PE firm
Post PE	-0.20***	-0.09***	-0.18***	-0.09***	-0.18***	-0.09***
	(0.05)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)
Post PE × Economic Downturn	0.04	-0.00	0.10**	-0.02	0.11**	-0.02
	(0.08)	(0.05)	(0.05)	(0.03)	(0.05)	(0.03)
Observations	1796	8081	1615	7561	1597	7522
Adjusted R-squared	0.35	0.26	0.59	0.59	0.56	0.58
Supplier FE	Yes	Yes	No	No	No	No
Customer FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	No	No	No	No
Supplier × Year FE	No	No	Yes	Yes	Yes	Yes
Supplier × Customer FE	No	No	No	No	Yes	Yes

This table reports the estimated impact of PE buyouts on the probability that customer-supplier relationships are terminated across different subsamples. Across the different columns, the outcome variable is a dummy variable equal to one if the relationship between supplier i and customer j is terminated in year $t+1$. Across the different columns, the regressions are saturated with supplier fixed effects, customer fixed effects, year fixed effects, supplier-by-year fixed effects, and supplier-by-customer fixed effects, as indicated at the bottom of the table. For each treated supplier, the sample contains PE-backed customers and non-PE-backed customers, which are selected using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 4.3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the customer level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 11. The effect of PE buyouts on target firms:
The number of suppliers and cost of inputs

	ln(Number of suppliers)		Cost of inputs/Sales	
	(1)	(2)	(3)	(4)
Post PE	0.04*	0.02	-0.02**	-0.01
	(0.02)	(0.02)	(0.01)	(0.01)
Post PE × Economic downturn		0.04*		-0.02**
		(0.02)		(0.01)
Observations	6106	6106	6584	6584
Adjusted R-squared	0.95	0.95	0.70	0.70
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on target firms. The outcome variables are the natural logarithm of the firm's total number of suppliers in columns (1) and (2), and the ratio of the cost of inputs over total sales in columns (3) and (4). All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 12. The spillover effect of PE buyouts on the economic resilience of suppliers of target firms: The role of target firms' indebtedness

Indebtedness measure	PE-backed firms with high leverage		PE-backed firms with low ICR	
	ln(Markup)	ln(Markup)	ln(Markup)	ln(Markup)
	(1)	(2)	(3)	(4)
Post PE	-0.00	0.01	0.00	0.01
	(0.02)	(0.02)	(0.02)	(0.02)
Post PE × Indebtedness	-0.00	0.04	-0.01	0.06
	(0.04)	(0.04)	(0.05)	(0.05)
Post PE × Economic downturn		-0.04		-0.04
		(0.05)		(0.05)
Post PE × Economic downturn × Indebtedness		-0.15*		-0.22**
		(0.08)		(0.11)
Observations	15821	15821	15821	15821
Adjusted R-squared	0.73	0.73	0.73	0.73
Firm×Cohort FE	Yes	Yes	Yes	Yes
Year×Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on suppliers of target firms, depending on the targets' indebtedness. Across the different columns, the outcome variables is the natural logarithm of the supplier's markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 13. PE buyouts and customer-supplier relationship terminations with rivals of PE-backed customers

	(1) Relationship terminated	(2) Relationship terminated	(3) Relationship terminated
Post PE	-0.03	0.00	-0.01
	(0.02)	(0.02)	(0.02)
Post PE × Competitor	0.01	0.04**	0.06**
	(0.02)	(0.02)	(0.03)
Observations	97101	95308	84144
Adjusted R-squared	0.18	0.34	0.46
Supplier FE	Yes	No	No
Customer FE	Yes	Yes	No
Year FE	Yes	No	No
Customer × Year FE	No	Yes	Yes
Supplier × Customer FE	No	No	Yes

This table reports the estimated impact of PE buyouts on the probability that treated suppliers terminate customer-supplier relationships with competitors of their PE-backed customers. Across the different columns, the outcome variable is a dummy variable equal to one if the relationship between supplier i and customer j is terminated in year $t+1$. Across the different columns, the regressions are saturated with supplier fixed effects, customer fixed effects, year fixed effects, customer-by-year fixed effects, and supplier-by-customer fixed effects, as indicated at the bottom of the table. For each treated supplier, the sample contains suppliers of PE-backed customers and suppliers of non-PE-backed customers, which are selected using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 4.3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the supplier level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 14. PE buyouts and customer-supplier relationship terminations with rivals of PE-backed customers: Heterogeneity

	(1) Relationship terminated	(2) Relationship terminated	(3) Relationship terminated
Post PE	-0.02	0.01	0.00
	(0.02)	(0.02)	(0.02)
Post PE × Competitor	0.02	0.03	0.04**
	(0.03)	(0.02)	(0.02)
Post PE × Competitor × Low ICR supplier	0.06*		
	(0.03)		
Post PE × Competitor × Low EBITDA customer		0.06**	
		(0.03)	
Post PE × Competitor × Low Altman Z-score customer			0.06*
			(0.03)
Observations	68990	68990	68990
Adjusted R-squared	0.46	0.46	0.46
Customer × Year FE	Yes	Yes	Yes
Supplier × Customer FE	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the probability that treated suppliers terminate customer-supplier relationships with competitors of their PE-backed customers. Across the different columns, the outcome variable is a dummy variable equal to one if the relationship between supplier i and customer j is terminated in year $t+1$. All specifications include customer-by-year and supplier-by-customer fixed effects. For each treated supplier, the sample contains suppliers of PE-backed customers and suppliers of non-PE-backed customers, which are selected using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 4.3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the supplier level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 15. PE buyouts and crowding-out effects on rivals of PE-backed firms through common suppliers

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Post PE	-0.01*	-0.00	-0.02***	0.00
	(0.01)	(0.00)	(0.00)	(0.01)
Post PE× Common supplier exposure	-0.07*	-0.07**	-0.23***	-0.11***
	(0.04)	(0.03)	(0.05)	(0.03)
Observations	273961	273961	273961	83942
Adjusted R-squared	0.92	0.92	0.82	0.67
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on competitors of PE-backed firms through common suppliers. The sample is restricted to firms operating in (4-digit NACE) industries with at least one PE buyout over the sample period, for four years before versus five years after the buyout event. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm and year fixed effects. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the industry level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

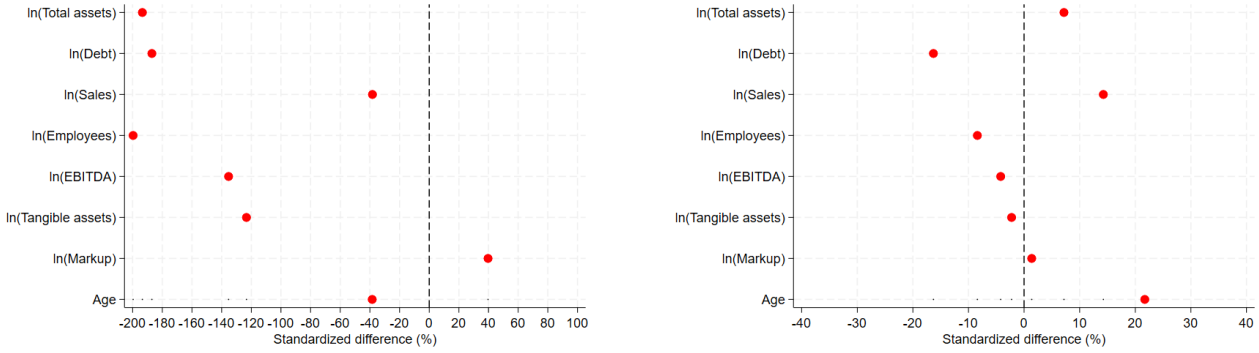
INTERNET APPENDIX:

The Supply Chain Spillovers of Private Equity Buyouts

Cédric Huylebroek and Olivier De Jonghe

Appendix O.A

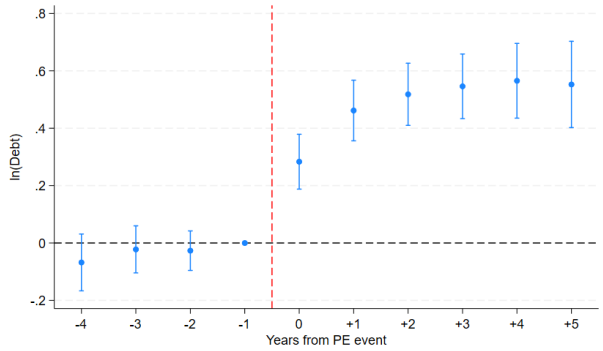
Figure O.A1. Balance tests: target firms



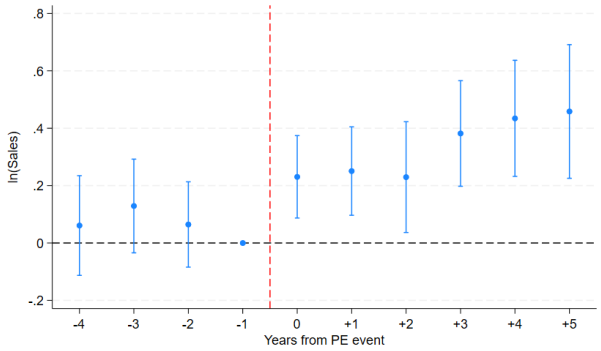
(a) Unmatched (b) Matched

Note: This figure presents the balance test statistics for the sample of target firms and control firms, before and after applying the matching strategy explained in Section 3.

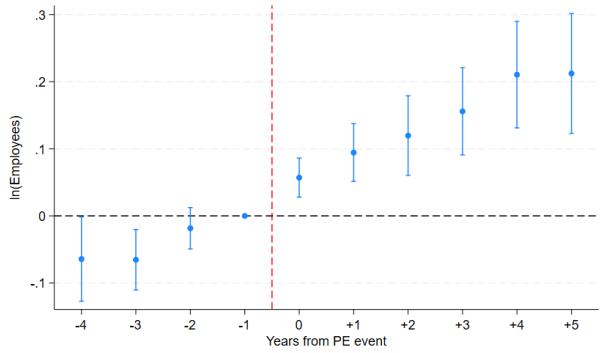
Figure O.A2. Dynamic difference-in-differences estimates for the effect of PE buyouts on target firms



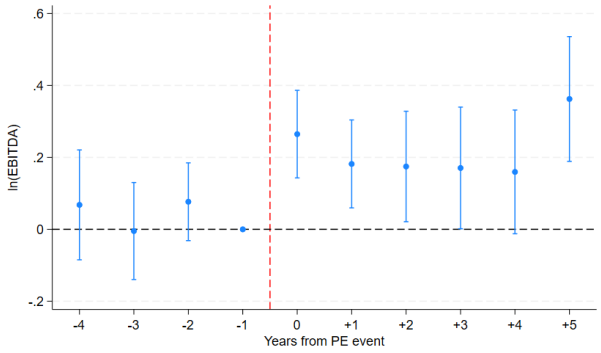
(a) ln(Debt)



(b) ln(Sales)



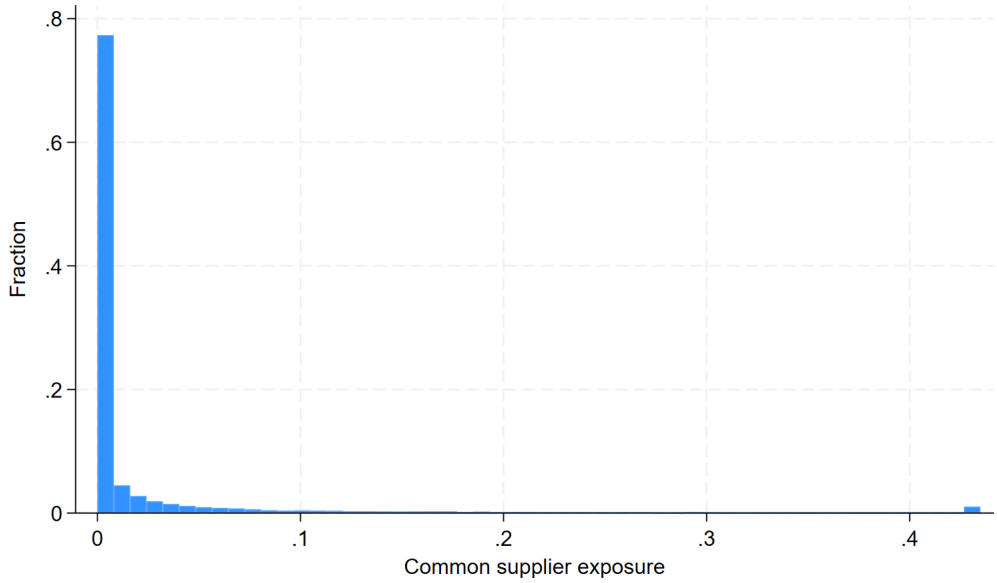
(c) ln(Employees)



(d) ln(EBITDA)

This figure presents the dynamic difference-in-differences estimates of the effect of PE buyouts on target firms. The y-axis corresponds to the coefficient estimates of β from Equation (3). The x-axis corresponds to years relative to the the year in which the target firm was acquired. Across the different panels, the outcomes variables are the natural logarithm of debt, sales, employees, EBITDA. A constant is included in all regressions but not reported. Standard errors are clustered at the firm-cohort level. The vertical bars represent confidence intervals at the 95% level.

Figure O.A3. Distribution of competitors' exposure to common suppliers of PE-backed firms



This figure shows the distribution of competitors' exposure to common suppliers of PE-backed firms. The sample is restricted to firms operating in 4-digit NACE industries that experienced at least one PE buyout during the sample period.

Table O.A1. Variable definitions

Variable	Description
ln(Total assets)	The natural logarithm of total assets.
ln(Employees)	The natural logarithm of the number of employees.
Age	The number of years since the firm was founded.
Debt/TA	The ratio of debt to total assets.
ln(Debt)	The natural logarithm of the total debt.
EBITDA/Sales	The ratio of earnings before interest, taxes, depreciation, and amortization to sales.
ln(EBITDA)	The natural logarithm of earnings before interest, taxes, depreciation, and amortization (EBITDA).
Tangible assets/TA	The ratio of tangible assets to total assets.
ln(Tangible assets)	The natural logarithm of tangible assets.
ln(R&D expenses)	The natural logarithm of research and development expenses.
ln(Sales)	The natural logarithm of total sales.
ln(Markup)	The natural logarithm of firm-level markups, estimated following the procedure from De Loecker and Warzynski (2012).
ln(Skilled labor)	The natural logarithm of employees with a higher education degree.
Accounts payable	The ratio of accounts payable over total purchases.
Accounts receivable	The ratio of accounts receivable over total sales.
Number of suppliers	The total number of suppliers that the firm has a relationship with.
Number of customers	The total number of customers that the firm has a relationship with.

This table provides the variable definitions of our main variables of interest.

Table O.A2. Distribution of PE deals by investor country

Acquirer country	Number of PE deals	Percentage of total deals (%)
Belgium	96	47.06
Netherlands	33	16.18
United States	20	9.80
United Kingdom	14	6.86
Luxembourg	7	3.43
Germany	6	2.94
France	6	2.94
Other	22	10.79
Total	204	100.00

This table reports the distribution of PE deals by investor country.

Table O.A3. Distribution of PE deals by sector

Sector	Number of PE deals	Percentage of total deals (%)
Accommodation and food services	3	1.5
Administrative and support services	12	5.9
Agriculture, forestry, and fishing	1	0.5
Construction	7	3.4
Electricity, gas, steam	1	0.5
Information and communication services	27	13.2
Manufacturing	73	35.8
Mining and Quarrying	1	0.5
Professional, scientific and technical services	25	12.3
Transportation and storage	3	1.5
Water supply	3	1.5
Wholesale and retail trade	48	23.5
Total	204	100.0

This table reports the distribution of PE deals by sector.

Table O.A4. The effect of PE buyouts on target firms: Heterogeneity

	(1) ln(Debt)	(2) ln(Sales)	(3) ln(Employees)	(4) ln(EBITDA)
Post PE	0.42***	0.17**	0.11***	0.17**
	(0.07)	(0.07)	(0.04)	(0.07)
Post PE × Low leverage$_{pre}$	0.38**	0.21*	0.28***	0.23*
	(0.15)	(0.12)	(0.08)	(0.13)
Observations	6,662	6,662	6,662	6,662
Adjusted R-squared	0.92	0.86	0.98	0.80
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on target firms, depending on the targets' pre-buyout leverage. Across the different columns, the outcome variables are the natural logarithm of total debt, sales, employees, and EBITDA. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A5. The effect of PE buyouts on suppliers of target firms: Treatment intensity heterogeneity

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Post PE × Sales share ∈ (0%, 5%]	0.04	0.01	0.05*	0.02
	(0.03)	(0.02)	(0.03)	(0.03)
Post PE × Sales share ∈ (5%, 10%]	0.10***	0.06***	0.09***	-0.02
	(0.03)	(0.02)	(0.03)	(0.03)
Post PE× Sales share ∈ (10%, 100%]	0.13***	0.08***	0.09***	-0.01
	(0.01)	(0.00)	(0.01)	(0.01)
Observations	399829	399829	399829	119329
Adjusted R-squared	0.94	0.97	0.91	0.75
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports placebo results for the estimated impact of PE buyouts on the suppliers of target firms. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A6. PE buyouts and the certification effect of PE-backed customers

	ln(Number of customers) (1)	ln(Number of within-network customers) (2)	ln(Number of outside-network customers) (3)	ln(Exports to PE investor country) (4)
Post PE	0.04**	0.05***	-0.01	0.06*
	(0.02)	(0.01)	(0.02)	(0.03)
Observations	45349	45349	45349	30883
Adjusted R-squared	0.95	0.87	0.95	0.87
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on target firms. Across the different columns, the outcome variables are the natural logarithm of the total number of customers, the number of customers within the PE-backed firms' network, the number of customers outside of the PE-backed firms' network, and the value of exports to the country of origin of the target firms' PE investor. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A7. The effect of PE buyouts on suppliers of target firms: Falsification test based on supplier-customer relationships that ended pre-buyout

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Panel A:				
Post $PE_{placebo}$	-0.01	-0.01	0.21	-0.07
	(0.05)	(0.02)	(0.18)	(0.05)
Observations	19399	19399	19399	3529
Adjusted R-squared	0.90	0.94	0.50	0.64
Panel B:				
Post $PE_{placebo}$	0.02	-0.01	0.09	-0.08
	(0.06)	(0.02)	(0.24)	(0.07)
Post $PE_{placebo}$ × Economic Downturn	-0.07	-0.01	0.31	0.01
	(0.10)	(0.04)	(0.39)	(0.12)
Observations	19399	19399	19399	3529
Adjusted R-squared	0.90	0.94	0.49	0.64
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports placebo results for the estimated impact of PE buyouts on the suppliers of target firms, based on suppliers whose relationships with the target firm ended pre-buyout. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A8. The effect of PE buyouts on suppliers of target firms: Falsification test based on canceled deals

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Panel A:				
Post $PE_{canceled}$	0.04	0.00	0.02	-0.02
	(0.04)	(0.03)	(0.04)	(0.05)
Observations	14959	14959	14959	5458
Adjusted R-squared	0.95	0.97	0.91	0.69
Panel B:				
Post $PE_{canceled}$	0.03	0.00	-0.02	-0.01
	(0.05)	(0.03)	(0.05)	(0.06)
Post $PE_{canceled}$ × Economic Downturn	0.03	-0.00	0.09	-0.03
	(0.05)	(0.03)	(0.06)	(0.07)
Observations	14959	14959	14959	5458
Adjusted R-squared	0.95	0.97	0.91	0.69
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports placebo results for the estimated impact of PE buyouts on the suppliers of target firms, based on canceled PE deals. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A9. The effect of PE buyouts on suppliers of target firms: Placebo test

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Panel A:				
Post $PE_{placebo}$	-0.01	0.04	0.01	-0.00
	(0.05)	(0.03)	(0.05)	(0.03)
Observations	12328	12328	12328	4610
Adjusted R-squared	0.92	0.97	0.90	0.78
Panel B:				
Post $PE_{placebo}$	0.00	0.04	0.02	-0.00
	(0.05)	(0.03)	(0.05)	(0.03)
Post $PE_{placebo}$ × Economic Downturn	-0.02	0.03	-0.03	-0.03
	(0.09)	(0.05)	(0.11)	(0.11)
Observations	12328	12328	12328	4610
Adjusted R-squared	0.92	0.97	0.90	0.78
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports placebo results for the estimated impact of PE buyouts on the suppliers of target firms, based on PE deals with randomized instead of actual deal years. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A10. The effect of PE buyouts on target firms:
Alternative channel: Knowledge spillovers

	ln(Skilled labor)		ln(R&D expenses)	
	(1)	(2)	(3)	(4)
Post PE	0.25***	0.23**	0.72**	0.48*
	(0.09)	(0.11)	(0.30)	(0.27)
Post PE × Economic downturn		0.04		0.72
		(0.14)		(0.45)
Observations	5163	5163	6662	6662
Adjusted R-squared	0.83	0.83	0.73	0.73
Firm×Cohort FE	Yes	Yes	Yes	Yes
Year×Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on target firms. The outcome variables are the natural logarithm of highly skilled employees in columns (1) and (2), and the natural logarithm of R&D expenses in columns (3) and (4). All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A11. The effect of PE buyouts on suppliers of target firms: Alternative channel: Knowledge spillovers

	ln(Skilled labor)		ln(R&D expenses)	
	(1)	(2)	(3)	(4)
Post PE	-0.01	-0.01	0.04	0.04
	(0.03)	(0.03)	(0.05)	(0.05)
Post PE × Economic downturn		-0.00		0.02
		(0.03)		(0.06)
Observations	30622	30622	45349	45349
Adjusted R-squared	0.87	0.87	0.70	0.70
Firm×Cohort FE	Yes	Yes	Yes	Yes
Year×Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the suppliers of target firms. The outcome variables are the natural logarithm of highly skilled employees in columns (1) and (2), and the natural logarithm of R&D expenses in columns (3) and (4). All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A12. The effect of PE buyouts on suppliers of target firms: Alternative channel: Knowledge spillovers

	ln(Skilled labor)		ln(R&D expenses)	
	(1)	(2)	(3)	(4)
Panel A:	Innovative sectors (targets)			
Post PE	-0.04	-0.03	0.02	0.02
	(0.03)	(0.04)	(0.05)	(0.05)
Post PE × Economic downturn		-0.01		0.01
		(0.04)		(0.09)
Observations	19067	19067	30922	30922
Adjusted R-squared	0.87	0.87	0.72	0.72
Panel B:	Innovative sectors (suppliers)			
Post PE	0.02	-0.00	0.03	0.01
	(0.05)	(0.06)	(0.08)	(0.07)
Post PE × Economic downturn		0.05		0.07
		(0.05)		(0.12)
Observations	12552	12552	19145	19145
Adjusted R-squared	0.86	0.86	0.74	0.74
Panel C:	Innovative sectors (targets & suppliers)			
Post PE	-0.03	-0.04	0.04	0.03
	(0.05)	(0.06)	(0.09)	(0.08)
Post PE × Economic downturn		0.02		0.06
		(0.06)		(0.16)
Observations	8600	8600	14207	14207
Adjusted R-squared	0.86	0.86	0.74	0.74
Firm×Cohort FE	Yes	Yes	Yes	Yes
Year×Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the suppliers of target firms across different subsamples. The outcome variables are the natural logarithm of highly skilled employees in columns (1) and (2), and the natural logarithm of R&D expenses in columns (3) and (4). All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A13. The effect of PE buyouts on target firms:
Alternative channel: Trade credit

	(1)	(2)	(3)	(4)
Panel A: PE-backed firms	Accounts payable		Days payable outstanding	
Post PE	0.00	-0.00	3.42	2.39
	(0.00)	(0.00)	(3.15)	(3.23)
Post PE × Economic downturn		0.01		1.58
		(0.01)		(4.40)
Observations	6296	6296	5247	5247
Adjusted R-squared	0.77	0.77	0.70	0.70
Panel B: Suppliers of PE-backed firms	Accounts receivable		Days sales outstanding	
Post PE	0.00	0.00	3.79*	4.43**
	(0.00)	(0.00)	(2.11)	(2.23)
Post PE × Economic downturn		-0.00		-3.08
		(0.00)		(3.44)
Observations	41454	41454	16967	16967
Adjusted R-squared	0.67	0.67	0.71	0.71
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on target firms and their suppliers. The outcome variables in columns (1) and (2) are the ratio of accounts payable to total purchases in Panel A, and the ratio of accounts receivable to total sales for the sample in Panel B. The outcome variables in columns (13) and (4) are the average days payables are outstanding in Panel A, and the the average days receivables are outstanding in Panel B. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A14. The effect of high-leverage M&As on suppliers

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Panel A:				
Post High-leverage M&A	0.02	0.02	0.04	0.03
	(0.03)	(0.02)	(0.04)	(0.03)
Observations	18909	18909	18909	6100
Adjusted R-squared	0.93	0.97	0.90	0.77
Panel B:				
Post High-leverage M&A	0.01	0.01	0.02	0.02
	(0.03)	(0.02)	(0.04)	(0.03)
Post High-leverage M&A × Economic Downturn	0.05	0.04	0.06	0.02
	(0.06)	(0.03)	(0.06)	(0.07)
Observations	18909	18909	18909	6100
Adjusted R-squared	0.93	0.97	0.90	0.77
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of high-leverage M&As on suppliers. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A15. The effect of first-time bank borrowers on suppliers

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Panel A:				
Post first-time borrower	0.02***	0.01	-0.00	-0.03
	(0.00)	(0.01)	(0.00)	(0.02)
Observations	118358	118358	118358	27097
Adjusted R-squared	0.82	0.79	0.69	0.67
Panel B:				
Post first-time borrower	0.02***	0.00	-0.00	-0.04
	(0.00)	(0.01)	(0.00)	(0.02)
Post first-time borrower × Economic Downturn	-0.00	0.00	-0.00	0.03
	(0.01)	(0.00)	(0.00)	(0.03)
Observations	118358	118358	118358	27097
Adjusted R-squared	0.82	0.79	0.69	0.67
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of first-time bank borrowers on suppliers. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A16. The determinants of PE buyouts

	(1) PE target	(2) PE target	(3) PE target	(4) PE target
ln(Total assets)	0.0006***	0.0007***	0.0010***	0.0011***
	(0.0001)	(0.0001)	(0.0004)	(0.0004)
ln(Employees)	-0.0000	0.0000	-0.0003*	-0.0002
	(0.0001)	(0.0001)	(0.0002)	(0.0002)
Debt/TA	0.0008***	0.0008***	0.0018***	0.0018***
	(0.0002)	(0.0002)	(0.0006)	(0.0007)
Accounts receivable	0.0002	0.0004	-0.0009	-0.0007
	(0.0007)	(0.0007)	(0.0022)	(0.0022)
EBITDA/TA	0.0023***	0.0023***	0.0057***	0.0058***
	(0.0005)	(0.0005)	(0.0016)	(0.0016)
ln(Markup)			-0.0006*	-0.0006**
			(0.0003)	(0.0003)
$\text{Age}_{\text{average supplier}}$		-0.0000		-0.0000
		(0.0000)		(0.0000)
$\ln(\text{Total assets})_{\text{average supplier}}$		0.0003		0.0004
		(0.0003)		(0.0007)
$\ln(\text{Employees})_{\text{average supplier}}$		-0.0001		0.0001
		(0.0002)		(0.0006)
$\text{Debt/TA}_{\text{average supplier}}$		0.0002		0.0008
		(0.0005)		(0.0018)
$\text{Accounts payable}_{\text{average supplier}}$		0.0022		-0.0104
		(0.0029)		(0.0078)
$\text{EBITDA/TA}_{\text{average supplier}}$		0.0002		0.0039
		(0.0011)		(0.0037)
Number of suppliers		-0.0002		-0.0004
		(0.0001)		(0.0004)
Share of suppliers offering standardized inputs		0.0004		0.0003
		(0.0007)		(0.0015)
Share of suppliers in low competition sectors		-0.0004		0.0000
		(0.0005)		(0.0012)
$\ln(\text{Markup})_{\text{average supplier}}$				0.0002
				(0.0003)
Observations	400106	400106	117946	117404
Adjusted R-squared	0.09	0.09	0.12	0.12
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

This table reports the determinants of PE buyouts. Across the different columns, the outcome variable is a dummy variable equal to one if firm f is a PE target in year t, and zero otherwise. All specifications include firm and year fixed effects. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A17. The effect of PE buyouts on suppliers of target firms: Excluding PE deals completed during economic downturns

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Panel A:				
Post PE	0.07***	0.04***	0.07***	0.02
	(0.02)	(0.01)	(0.03)	(0.02)
Observations	34495	34495	34495	12236
Adjusted R-squared	0.94	0.97	0.91	0.78
Panel B:				
Post PE	0.09***	0.04***	0.09***	0.02
	(0.03)	(0.01)	(0.03)	(0.02)
Post PE × Economic downturn	-0.08**	-0.02*	-0.08*	-0.00
	(0.04)	(0.01)	(0.05)	(0.04)
Observations	34495	34495	34495	12236
Adjusted R-squared	0.94	0.97	0.91	0.78
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the suppliers of target firms, excluding PE deals completed during economic downturns. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, industry, and average customer base characteristics as explained in Section 4.5.6. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A18. The effect of PE buyouts on suppliers of target firms: Alternative economic downturn indicator

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Post PE	0.07***	0.04***	0.07***	-0.01
	(0.02)	(0.01)	(0.02)	(0.02)
Post PE × Economic downturn	-0.20*	-0.10*	-0.16*	0.04
	(0.10)	(0.06)	(0.09)	(0.06)
Observations	45349	45349	45349	15821
Adjusted R-squared	0.93	0.97	0.90	0.73
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the suppliers of target firms, using a sector-specific economic downturn indicator. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, industry, and average customer base characteristics as explained in Section 4.5.6. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A19. The effect of PE buyouts on suppliers of target firms: Excluding buy-and-build PE deals

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Panel A:				
Post PE	0.06***	0.03**	0.06**	-0.02
	(0.02)	(0.01)	(0.02)	(0.02)
Observations	40150	40150	40150	13816
Adjusted R-squared	0.94	0.97	0.91	0.73
Panel B:				
Post PE	0.08***	0.04***	0.06**	0.01
	(0.02)	(0.01)	(0.03)	(0.02)
Post PE × Economic downturn	-0.06**	-0.05**	-0.04	-0.11**
	(0.03)	(0.02)	(0.04)	(0.05)
Observations	40150	40150	40150	13816
Adjusted R-squared	0.94	0.97	0.91	0.73
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the suppliers of target firms using a stricter matching strategy, excluding buy-and-build PE deals. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, industry, and average customer base characteristics as explained in Section 4.5.6. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table O.A20. The effect of PE buyouts on suppliers of target firms: Stricter matching procedure

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Panel A:				
Post PE	0.06**	0.03**	0.05*	-0.00
	(0.02)	(0.01)	(0.02)	(0.02)
Observations	43773	43773	43773	14229
Adjusted R-squared	0.93	0.97	0.89	0.72
Panel B:				
Post PE	0.08***	0.04***	0.05*	0.00
	(0.03)	(0.01)	(0.03)	(0.02)
Post PE × Economic downturn	-0.07**	-0.03*	0.01	-0.04*
	(0.03)	(0.02)	(0.04)	(0.02)
Observations	43773	43773	43773	14229
Adjusted R-squared	0.93	0.97	0.89	0.72
Firm × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the suppliers of target firms using a stricter matching strategy. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, industry, and average customer base characteristics as explained in Section 4.5.6. Table O.A1 in Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Appendix O.B

Estimating markups requires the input share of revenue and the output elasticity of that input. The former can simply be computed as costs for input X divided by total firm revenue. However, the latter need to be recovered from estimating production functions. Below, we describe how De Loecker and Warzynski (2012), and other papers using the production approach, address this estimation challenge using a control function approach that assumes productivity is Hicks neutral.

O.B1. Production functions

For the translog production function with capital (k_{it}), labour (l_{it}), and materials (m_{it}), the (logged) production function excluding the Hicks neutral productivity term is:[a]

$$f_{it} = \beta_k k_{it} + \beta_l l_{it} + \beta_m m_{it} + \beta_{kk} k_{it}^2 + \beta_{ll} l_{it}^2 + \beta_{mm} m_{it}^2 + \beta_{kl} k_{it} l_{it} + \beta_{km} k_{it} m_{it} + \beta_{lm} l_{it} m_{it}, \quad (5)$$

and the output elasticity for each input will depend on the level of all inputs. The production function coefficients are not time-varying, but the output elasticities can vary over time due to changes in factors.

O.B2. Control function estimation

We follow prior literature and use the Ackerberg et al. (2015) (ACF) estimator. The two key assumptions of the ACF estimator are that productivity is (1) Hicks neutral and (2) evolves following a Markov process.

The control function approach assumes that observed revenue includes additive measurement error ϵ_{it}. Thus, given log productivity ω_{it}, measured log revenue y_{it} is:

$$y_{it} = f(k_{it}, l_{it}, m_{it}) + \omega_{it} + \epsilon_{it}. \quad \text{(B1)}$$

Let materials be the flexible input decided at the time the firm learns its productivity shock. If so, materials is a function of the observed inputs and productivity $m_{it} = g(k_{it}, l_{it}, \omega_{it})$, and can be inverted for productivity so that $\omega_{it} = g^{-1}(k_{it}, l_{it}, m_{it})$.

The first stage of the ACF estimator controls for a flexible form of the inputs to recover the additive measurement error ϵ_{it}. Formally, y_{it} is:

$$y_{it} = f(k_{it}, l_{it}, m_{it}) + g^{-1}(k_{it}, l_{it}, m_{it}) + \epsilon_{it} = h(k_{it}, l_{it}, m_{it}) + \epsilon_{it}, \quad \text{(B2)}$$

Since both the production function and productivity are functions of the inputs, they cannot

[a] For notation purposes, all lower case variables are in logged form.

be separated in the first stage. Instead, the nonparametric function h includes both productivity ω_{it} and measurement error ϵ_{it} and the production function f. The measurement error in sales ϵ_{it} is a residual in the first stage equation after controlling for h.

The second major assumption of the ACF approach is that productivity follows a first-order Markov process:

$$\omega_{it} = k(\omega_{it-1}) + \nu_{it} \tag{6}$$

where where k is a non-parametric function[b] and ν_{it} captures productivity innovation. In that case, based on the production function coefficients β, one can recover the innovation in productivity ν_{it} as:

$$\nu_{it}(\beta) = \omega_{it} - \rho\omega_{it-1} \tag{7}$$

The innovation in productivity is a function of production coefficients β because $\omega_{it} = y_{it} - \epsilon_{it} - f_{it}(\beta)$, and ϵ_{it} was recovered in the first stage.

Because the innovation in productivity is, by construction, independent of inputs chosen before time t, moments of the innovations multiplied by inputs chosen before the productivity innovation, such as $E(\nu_{it}h_{it-1})$, identify the production function coefficients.

For the translog, we use capital, materials, and labor, as well as their interactions, as instruments.

Finally, we follow De Loecker and Warzynski (2012) and correct the value of sales in the input share of revenue for the measurement error estimated in the first stage. Hence, for inputs M, the estimate of the markup is:

$$\hat{\mu}_{it} = \frac{\hat{\beta}^M}{s_{it}^M \exp(\epsilon_{it})} \tag{8}$$

[b] As is common, we use a a third-order polynomial.

Appendix O.C

Our main results show that, on average, PE-backed firms have a positive impact on the performance of their suppliers. This effect operates through two main channels. On the one hand, suppliers benefit from increased demand for inputs as PE-backed firms pursue new growth opportunities and expand their activities following the buyout. On the other hand, PE-backed firms appear to have a certification effect, helping their suppliers to gain new customers from within the PE-backed firms' network.

To assess the relative economic importance of these two mechanisms, we perform two additional analyses. First, we augment our baseline regression model by including a variable (*Post-buyout within-network customers*) that measures the number of new customers a treated supplier gains within the PE-backed firms' network post-buyout. This variable isolates the effect of new customer acquisition on suppliers' post-buyout performance, while the post-treatment indicator would capture the impact of increased demand from PE-backed firms.

Table O.C1 presents the results. Across the different columns, the post-treatment indicator remains statistically significant and positive, with coefficient estimates of a magnitude comparable to those in our baseline results. In contrast, the estimated effect of new within-PE-network customers is statistically insignificant across all columns. These findings suggest that the observed improvement in affected suppliers' performance, as documented in our baseline results, cannot be attributed to the certification effect; instead, this is more likely driven by increased demand from the PE-backed firm.

Moreover, as mentioned earlier, our results from Table 8 provide further support that the direct increase in demand from PE-backed customers is the primary driver of the positive impact on suppliers' performance. This table reports the changes in sales of treated suppliers to PE-backed customers versus (comparable) non-PE-backed customers, before versus after the buyout event. The results confirm that treated suppliers experience a significant increase in purchases from PE-backed customers relative to other (comparable) customers. Furthermore, the coefficient estimates suggest that the firm-level increase in suppliers' sales is predominantly driven by purchases from PE-backed customers rather than other clients. Specifically, multiplying the estimated coefficient of 0.18 in column (3) of Table 8 by the average sales share of treated suppliers to their PE-backed customers in the sample (approximately 25%) yields a value close to the estimated firm-level sales increase (with coefficient estimate of 0.06) in column (1) of Table 5.

Table O.C1. The effect of PE buyouts on suppliers of target firms: Disentangling the direct demand and certification channel

	(1) ln(Sales)	(2) ln(Employees)	(3) ln(EBITDA)	(4) ln(Markup)
Post PE	0.07***	0.04***	0.06**	-0.00
	(0.02)	(0.01)	(0.02)	(0.02)
Post-buyout within-network customers	0.01	0.01	0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Observations	45349	45349	45349	15821
Adjusted R-squared	0.93	0.97	0.90	0.73
Controls	No	No	No	No
Firm×Cohort FE	Yes	Yes	Yes	Yes
Year×Cohort FE	Yes	Yes	Yes	Yes

This table reports the estimated impact of PE buyouts on the suppliers of target firms. Across the different columns, the outcome variables are the natural logarithm of total sales, employees, EBITDA, and markups. All specifications include firm-by-cohort and year-by-cohort fixed effects. The sample of treated and control firms is constructed using a granular matching approach based on firm size, leverage, profitability, and industry, as explained in Section 3. Table O.A1 in the Appendix provides more information about the variable definitions. Standard errors are clustered at the firm-cohort level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

References

Ackerberg, Daniel A, Kevin Caves, and Garth Frazer. 2015. "Identification properties of recent production function estimators." *Econometrica* 83 (6): 2411–2451.

De Loecker, Jan, and Frederic Warzynski. 2012. "Markups and firm-level export status." *American Economic Review* 102 (6): 2437–2471.