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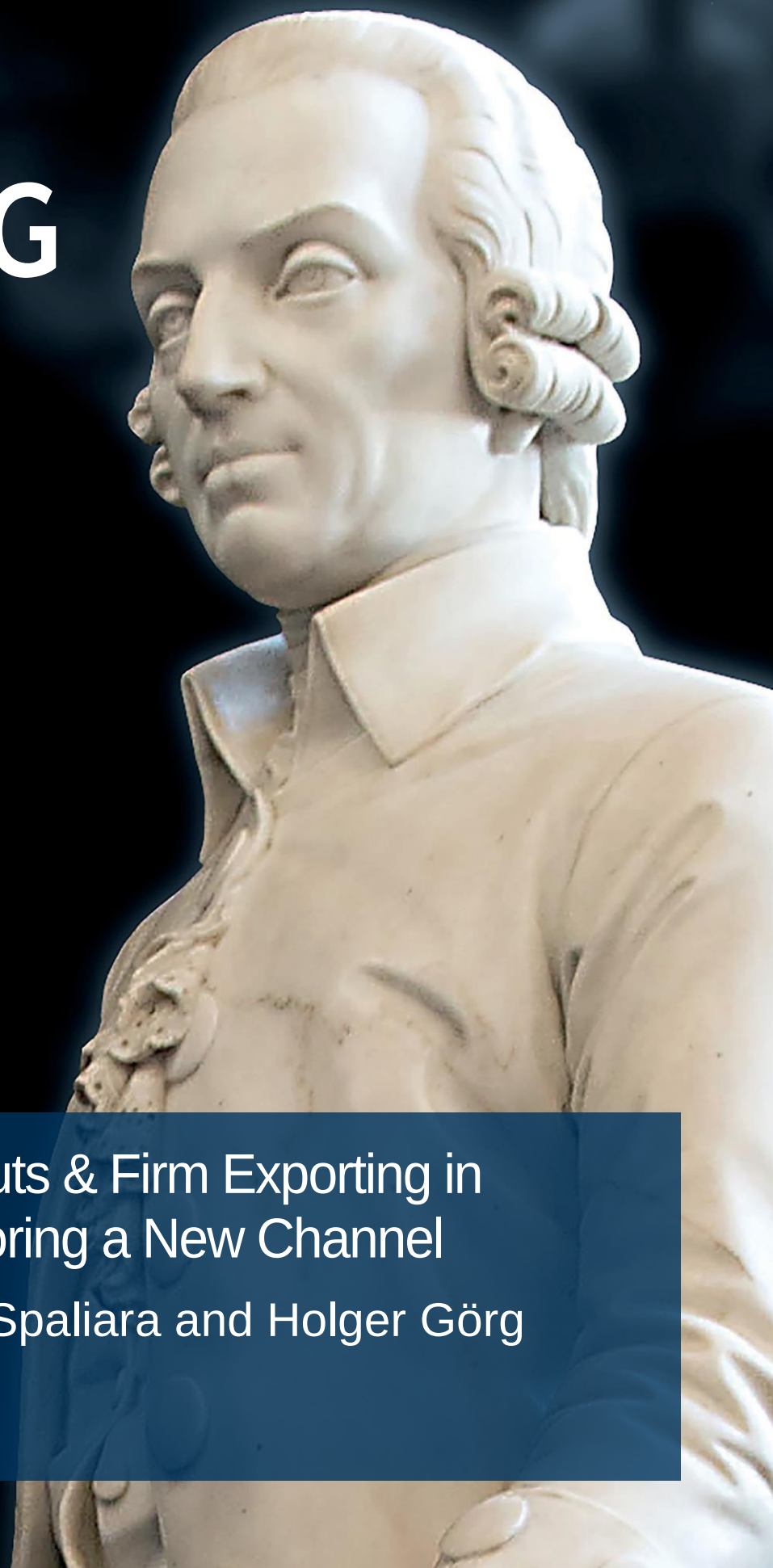

Private Equity Buyouts & Firm Exporting in Crisis Periods: Exploring a New Channel

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Private equity buyouts & firm exporting in crisis periods: Exploring a new channel *

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Abstract

This paper examines whether private equity (PE)-backed companies are better able to remain active on export markets compared to similar non-PE firms, when hit by a negative shock. We look at two such recent shocks, namely the global financial crisis (GFC) and COVID-19 pandemic. We construct two matched samples, one for each crisis period, to assess the resilience of exporting under PE ownership in recessionary periods. We then explore how improvements in working capital management allow PE-backed firms to engage in international activities and maintain their export relationships relative to similar, non-PE-backed firms. Our results show that the export activities of PE-backed firms are significantly more resilient to the effects of the GFC but less pronounced following COVID-19. PE investment enhances working capital management, which in turn improves the persistence in export markets at the onset of the crises.

Keywords: Private equity buyouts; exporting; working capital; recessions

JEL Classification: F14, G01, G32, G34

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1 Introduction

Private equity (PE) investors can enhance the value of their portfolio companies in various ways, including boosting operating performance, increasing productivity, investing in innovation, and improving employment (see, for example, Harris et al., 2005; Lerner et al., 2011; Acharya et al., 2012; Cohn et al., 2014; Lerner et al., 2019). In the face of economic downturns, PE investors have been found to actively engage in activities to help their portfolio companies stave off the effects of economic crises and periods of uncertainty through improvements in governance, operations, and access to financing (Wilson et al., 2012; Bernstein et al., 2019; Gompers et al., 2022; Lavery et al., 2024). In this paper, we use data for the United Kingdom to add a new aspect to this literature and investigate whether PE investment also helps firms to remain active in export markets during crisis periods. Furthermore, we explore how improvements in working capital management may allow PE-backed firms to maintain their export relationships relative to similar, non-PE-backed firms.

In line with other European economies (and indeed many other countries worldwide), firms in the UK were severely affected by various crises in the last two decades, primarily the global financial crisis in 2008 and the COVID-19 pandemic in 2020. UK firms have traditionally been heavily involved in exporting activity: the UK was the fourth largest exporter nation in 2019 according to World Bank data,[1] whereas a large proportion of British unlisted firms are active in export markets.[2] Yet, compared to other European countries, UK firms arguably have more options for accessing finance, with an active private capital market being one channel which is considerably more developed in the UK than elsewhere in continental Europe (Lavery et al., 2021).[3] Hence, investigating whether PE may play a role in the crises-resistance of exporters - and understanding how this may work through

[1] https://wits.worldbank.org/CountryProfile/en/Country/WLD/Year/2019/TradeFlow/Export

[2] According to Görg and Spaliara (2014b), over the period 2000 - 2009 more than 50 percent of their sample of non-quoted firms in manufacturing export.

[3] In line with this, Pitchbook's 2023 Annual European Private Equity Breakdown reports that the UK and Ireland accounted for around 30% of European private equity deal value over the past decade, surpassing any other region in Europe. Similarly, it accounts for almost 50% of funds raised in Europe over the same period.

adjustments of working capital - is an important issue, as it provides further evidence on the relevance and possible advantages of such forms of capital.

The literature thus far highlights that PE-backed companies are more recession-resistant than other firms, yet, the role of PE investment in firms' exporting behavior during crisis periods has scarcely been looked at.[4] The opportunity to export is important to firms, as it allows access to larger markets and the ability to leverage economies of scale, as well as exposure to new technology and management practices in foreign markets. Empirical evidence shows that although larger and more profitable firms self-select into exporting, firms also – on average – gain from operating in export markets in terms of improving their productivity and technology performance, thus also contributing to overall growth of the economy (for recent contributions see, e.g., Wagner, 2016; Girma and Görg, 2022). Also, exporting has implications for labor markets, with exporting firms generally paying higher wages and having higher demand for skilled labor than nonexporters (see Schank et al., 2007; Davidson et al., 2023). Given these potential positive effects, it is important to understand how exporting behavior may change during crises periods. Do export relationships shrink or break during a crisis, or do they stay in place or even strengthen?

To look at these issues, we explore the intensive and the extensive margins of PE-owned firms' exporting activities following the global financial crisis (GFC) and the COVID-19 pandemic.[5] The choice of the GFC and COVID-19 pandemic stems from the differential impact of both crises on the economic environment. The trade collapse in early 2020 was of a similar depth to the GFC; however, the impact in certain sectors was more pronounced and the recovery pace was faster (OECD, 2022). Although the negative demand shock during both crises meant a recession for the UK, a distinct difference is that the GFC caused a negative supply shock to financial markets, which had a far-reaching impact on activity

[4] Lavery et al. (2024) examine exporting activity among PE-backed firms following the Leave vote in the UK. The authors find export gains for PE portfolio firms relative to their non-PE-backed counterparts through changes in governance.

[5] Throughout the paper, we use the terms PE-backed and PE-owned interchangeably.

ascribed to the diminished volume of credit.[6] By contrast, there is no indication that the pandemic significantly reduced access to financing. If anything, access to financing increased when governments launched large-scale guarantee programs to support bank lending to firms (Chodorow-Reich et al., 2022).

Given these differences, we argue that PE investment is likely to boost the resilience of exports in the aftermath of the GFC, but we expect this impact to be less potent following COVID-19. PE targets often receive strategic advice, and financial support; however, the latter is far more relevant during the 2008 crisis when funding was scarce and expensive, and when credit tightening negatively affected exporting (Amiti and Weinstein, 2011; Bricongne et al., 2012; Chor and Manova, 2012; Görg and Spaliara, 2018). Also, because PE investors place emphasis on adding value to their portfolio firms through financial, operational, and governance engineering (Gompers et al., 2016), we expect PE-backed exporting firms to remain more resilient during the credit crunch. We expect the beneficial role of PE investment in exporting to be less significant during COVID-19, where the financial environment remained largely unchanged and access to financing was not restricted.

Our main contribution is to explore how PE investors boost export resilience. We focus on one particular channel that may be relevant: working capital. We begin our investigation by looking at differences in export resilience between PE-backed and non-PE-backed firms during the two crises. To establish a mechanism, we then investigate how PE ownership affects targets' working capital management following the GFC and COVID-19. PE firms engage in actions to control costs, and they release cash in order to reach an optimal level of working capital. We suggest that working capital improvements during recessions are greater for PE-backed portfolio firms. Establishing a link between PE ownership and effective working capital allows us then to examine how improvements in working capital are related to resilience in export markets in the wake of the two crises. If PE improves working capital

[6]Due to the turmoil in financial markets, at the end of the third quarter of 2008, 1.4 million small firms in the UK reported a severe shortage of credit, and some 30% of firms considered shutting down their operations altogether unless credit became cheaper and readily available (Guariglia et al., 2016).

management, then exporters, which by nature have higher working capital needs and rely on external financing, should benefit from PE ownership in terms of their export resilience.

Our empirical analysis uses two samples of UK-based PE-backed companies matched with an appropriate control group during the GFC and COVID-19. In order to determine whether exporting among PE-backed companies is more persistent to crises than is exporting activity among non-PE-backed peers, we use a difference-in-differences approach. We match PE-backed companies to control firms that have similar firm-level observable characteristics in the pre-crisis periods, such as industry, size, profitability, and leverage. We also employ four alternative matching techniques to confirm that matching methods or other pre-crises trends do not drive our results.

Three key considerations drive the choice of the UK as a setting for the study. First, UK law requires all limited companies in the UK to provide certain accounting information to the public UK register. Given that our analysis typically involves midmarket companies, we have excellent coverage of balance sheet and income statement information in our sample. Second, the UK is the largest and most active private equity market in Europe, with the highest average annual deal value and the highest aggregate annual deal value relative to GDP in Europe (Bernstein et al., 2019). Finally, prior to both crises, the UK played an important role in international export markets. In 2007, it was the second-largest exporter of commercial services and the eighth-largest exporter of merchandise trade (WTO, 2008). UK exports were more than 31% of GDP in 2019, making the UK the 11th largest global exporter (DIT, 2020). A recent report estimates that UK export production supports around 6.5 million jobs, or 23% of all UK full-time equivalent jobs (Black et al., 2021).

Our main findings, which remain unchanged after several robustness tests, are threefold. First, we find that exporting activity among PE-backed companies is significantly more resilient to the effects of the global financial crisis than is the exporting activity of similar, matched peers. Second, we document positive differentials in export value and intensity post-GFC relative to the control group firms. We also find that firm ownership structure

matters for export entry and exit by providing evidence that PE-backed companies are more (less) likely to start (stop) exporting after the GFC. Third, for the COVID-induced recession, we find that the role of PE ownership in the intensive and extensive marginS of exports is less potent. This result is in accord with the idea that COVID-19 did not have a detrimental effect on access to credit, which timely government interventions may also explain.[7]

Finally, to shed light on the role of the working capital channel, we employ the cash conversion cycle (CCC) as a proxy for the effectiveness of working capital management (Tong and Wei, 2011; Wang, 2019). To appreciate the timing of the effects, we test yearly changes in CCC and its component and examine the pre-crises and post-crises exporting performance of PE-backed and non-PE-backed firms. First, we show that PE-backed firms are more likely to manage their working capital more efficiently relative to their peers when uncertainty hits. PE-owned firms achieve a shorter CCC, lower days inventory outstanding (DIO), and higher days payable outstanding (DPO). Next, we find that PE-backed firms with a high-CCC are more resilient in export markets after the crises compared to their non-PE-backed counterparts. We show that improvements in working capital management of high-CCC PE-backed firms improve the resilience of exporting. Results are robust to controlling for various firm-level attributes and a range of fixed effects, as well as to adjustments to our sample selection and to our matching technique.

Our paper contributes to several strands of literature. First, we build on the literature studying the resilience of PE-backed firms during economic shocks. Besides our paper, Bernstein et al. (2019) and Lavery et al. (2024) show that UK firms were able to resist the effects of the GFC and the uncertain environment created by the UK referendum in 2016, respectively. We differ from the above studies in two main ways. First, we cover both the GFC and the COVID-19 pandemic, acknowledging their differential impact on the economy. Second, we focus for the first time on the working capital channel to reveal improvements in exporting behavior of PE-backed firms.

[7]To support this argument, we identify firms that participated in the loan guarantee program and exclude them from the data. We present the results in the robustness section.

We also add to the trade literature that emphasizes the significant role of firms' financial soundness in the resilience of exporters (e.g., Paravisini et al., 2015; Friedrich and Zator, 2023). Our main differentiation to the above studies is that we investigate how PE ownership may be used as a tool to mitigate the impact of the crises on export propensity and intensity.

Finally, we extend the working capital literature, which identifies that the optimal level of working capital enhances firms' real and financial decisions (e.g., Aktas et al., 2015; Ben-Nasr, 2016). Unlike these studies, we document the role of PE investment in optimizing firms' working capital and improving the resilience of exporting firms.

The remainder of the paper is structured as follows. Section 2 outlines our hypotheses. In section 3 we describe the data and present statistics. Section 4 presents our econometric specifications, and sections 5 and 6 discuss the findings and robustness tests. Section 7 concludes.

2 Hypothesis development

2.1 GFC, COVID-19, and PE

We study two large but materially different crises. The trade collapse during the COVID pandemic was of similar depth to the GFC, yet, the impact in certain sectors was more pronounced and the recovery pace was faster (OECD, 2022). Global trade's recovery from the COVID-19 crisis hit a record high in the first quarter of 2021. The impressive rebound took four quarters after the start of the pandemic-induced economic crisis, whereas, according to UNCTAD's Global Trade Update Report (UNCTAD, 2021), it took nine quarters to bounce back from the 2008 recession caused by the GFC. Public intervention, among other factors, largely explains this. Even though the pandemic caused a liquidity squeeze and dash for cash among firms (Eichenbaum et al., 2021), there is no indication that the COVID-19 recession led to a severe cut in access to financing. Developed countries reacted promptly to the emerging economic crisis and announced stimulus packages to stabilize their economies.

Governments offered loan guarantee programs to keep affected companies afloat (Chodorow-Reich et al., 2022), and certain EU countries targeted the exporting sector.

The GFC and COVID-19 both caused negative demand shocks and recessions in the UK, but disruptions in the banking sector also caused a severe supply shock during the GFC.[8] The effects of the supply-side shock on trade during the Great Trade Collapse of 2009 have been detrimental. Chor and Manova (2012), Bricongne et al. (2012), and Paravisini et al. (2015) highlight that credit conditions are one of the main culprits for reducing trade, given that exporters are more dependent on access to financing than are firms with only domestic operations (Amiti and Weinstein, 2011). In addition, using the fall in demand for Danish exports after the "cartoon crisis" in 2006, Friedrich and Zator (2023) also show the importance of financial flexibility for the resilience of exporters. This is relevant for the UK, where exports fell by 25.5% (Baldwin, 2009). In this respect, Görg and Spaliara (2014a, 2018) find that firms' financial soundness predicts export market entry and exit, especially in the midst of the GFC. Even though UK exports plunged in 2020 by 14.6% due to supply chain disruptions and reduced demand, trade was not affected as strongly as in 2009 and the recovery started quickly (Du and Shepotylo, 2022). UK exports to the EU recovered robustly during the course of 2021 (Freeman et al., 2022).

Empirical evidence thus far paints a positive picture of PE's role in productivity, profitability, growth, and exporting among portfolio firms during recessions and economic downturns (Wilson et al., 2012; Bernstein et al., 2019; Johnston-Ross et al., 2021; Lavery et al., 2024). Such resilience is attributable to a number of considerations. First, PE investors often have strong relationships with banks and other lenders (Ivashina and Kovner, 2011), which may help acquired firms better weather periods of crisis (Bernstein et al., 2019). Second, PE groups raise funds that are drawn down and invested over multiple years. Hence, they are able to provide funding even during times of uncertainty (Gompers et al., 2022). Finally, PE groups can redeploy their human capital by pivoting away from new transactions and toward

[8] According to the British Chambers of Commerce (BCC), one-third of small and medium-size businesses in the UK faced difficulties in accessing finance during the global financial crisis.

helping existing firms operationally improve (Bernstein and Sheen, 2016). In a similar vein, PE investors can introduce board changes that bring international experience, which can ultimately improve the exporting status of acquired firms (Lavery et al., 2024).

If the reduction in the supply of credit during the GFC affects exporting activities, we might expect PE investment to be a more important predictor of export market participation during that period. PE investors can inject additional debt and equity into firms, help ensure efficient firm governance, and provide active, strategic support when their portfolio firms need it most (Bernstein et al., 2019). This, however, might be less expected during the COVID-19 crisis, as the financial environment for firms did not change, affected firms received prompt government financial support, and trade recovered sharply from the slump in 2020. Taking these considerations into account, we expect that PE investors provide a "spare tire" that dampens the effects of the GFC on exporting portfolio firms. We expect the beneficial role of PE investment in exporting to be less prominent in COVID years.

Hypothesis 1a: *The export value and export intensity of PE-backed companies is more resilient after the GFC relative to their non-PE-backed peers, but the impact of PE ownership on the intensive margin is less pronounced following COVID-19.*

Hypothesis 1b: *Export market entry and exit of PE-backed companies is more resilient following the GFC compared to their counterparts, but the impact of PE ownership on the extensive margin is less potent following COVID-19.*

2.2 Working capital management

Working capital efficiency is a channel through which PE-backed firms could outperform their peers during downturns. Given that PE buyouts often involve a substantial injection of debt into target firms, efficient cash control and working capital management are vital for target firms to release cash, amortize debt, and improve financial ratios. Managing working capital effectively may allow firms to repay debt, expand through investment, or conduct

acquisitions without the need for external debt markets (Duchin et al., 2010; Denis and Sibilkov, 2010). Thus, finding the optimal level of working capital can improve profitability, investment, and performance (Aktas et al., 2015; Ben-Nasr, 2016).[9]

To achieve efficient working capital, managing trade credit is key. The time firms need to sell inventories, collect receivables, and pay suppliers reflects their dependence on short-term debt (Zeidan and Shapir, 2017). As such, a firm's control of its working capital can reflect liquidity needs and vulnerability to funding shocks (Raddatz, 2006; Wang, 2019). The reliance on external financing for working capital becomes pertinent when liquidity dries up. Tong and Wei (2011) find that firms in greater need of external financing for working capital experience a decline in their stock prices during the GFC. Therefore, firms adopting efficient working capital management policies cushion themselves against credit crunches and reduced access to external financing (Ding et al., 2013).

Working capital optimization is very relevant for PE-backed firms, as it is a key enabler for value creation and cost control (Wright et al., 1992). In univariate analyses, Wright et al. (1992), Wilson et al. (2012), and Weir et al. (2015) show that post-buyout targets enhance the efficiency of working capital management and improve financial control by reducing debtor days. In the same vein, PE-backed firms experience faster payments from customers (Boucly et al., 2011), and firms that raise PE financing through private placements (PIPEs) improve their noncash working capital (Brown and Floros, 2012).

PE firms are likely to engage in actions following acquisitions to bring about working capital improvements by reducing inventories, limiting trade debt, and extending trade credit. We therefore expect that PE-backed firms with efficient working capital management are better prepared for recessions and credit shocks.

Hypothesis 2: *PE investors improve target firms' working capital management during*

[9]There is also the argument that cash freed up through working capital improvements may be paid out to investors as dividends. However, existing evidence largely supports the notion that PE firms engage in actions to reduce costs, provide operational and strategic guidance, and inject capital for their portfolio firms to better weather economic downturns (Gompers et al., 2016; Bernstein et al., 2019).

crisis periods.

Efficient working capital management is relevant to firms' trade activities. Ahn et al. (2011) and Alessandria et al. (2010) show that inventory dynamics play a prominent role in explaining the trade volatility in the 2009 trade collapse. Exporters are likely more exposed to financial shocks than are domestic companies because international transactions normally involve higher working capital requirements and default risks (Auboin, 2009). This is not surprising, because exporters rely heavily on trade financing relative to domestic firms due to the length and the risk of international transactions (Ahn et al., 2011).[10] An increase in exports leads to higher working capital needs, as firms may need to cover the costs of goods produced but not yet delivered. This is attributed to longer shipping times (Foley and Manova, 2015), days in transit, and customs procedures (Amiti and Weinstein, 2011).

The liquidity squeeze in 2008 reduced trade credit supply, which is one of the main contributors to the decline in global exports (Baldwin, 2009).[11] Levchenko et al. (2010) provide evidence of a contraction in trade credit during the GFC as proxied by accounts receivable.[12] In the same manner, longer periods for selling inventory and collecting accounts receivables were associated with a decline in exports during the GFC (Alessandria et al., 2010; Ahn et al., 2011).

On the impact of COVID-19, Colak and Gustafsson (2023) finds that Swedish firms and their European counterparts receive more credit from suppliers, which the firms then extend to their customers. Suppliers value preexisting relationships and have incentives to ensure sufficient liquidity. The significant role of suppliers in extending trade credit financing to their customers is also highlighted in Adelino et al. (2023). Although the evidence so far

[10]To finance their operations, exporters obtain working capital loans, credit lines, discounted prepayments, or credit default insurance based on foreign purchase orders or credit guarantees provided by the importers' banks.

[11]Spreads on short-term trade credit facilities soared to 300 to 600 basis points above LIBOR, compared to 10 to 20 basis points in normal times (Auboin, 2009).

[12]For most firms, a large fraction of working capital is accounts receivable, which represents the money customers owe the firm.

suggests that the 2008 financial meltdown had a severe impact on trade credit, there is no indication of a trade credit squeeze during COVID-19.

Higher working capital needs and trade credit restrictions translate into stronger funding requirements. The ability of firms to finance short-term debt internally may thus play an important role in their capacity to export. This becomes critical for exporting firms, which are more susceptible to downturns. We expect PE-backed firms to receive the necessary support from their PE sponsors to overcome financial burdens and manage their working capital effectively. Accordingly, improvements in working capital management in turn improve the resilience of exporting.

Hypothesis 3: *Improvements in working capital management of PE-backed firms with poor cash flow management increase export resilience during the crises.*

3 Data & descriptive statistics

3.1 Data sample

In order to construct the data set, we rely on two primary data sources. First, we use S&P Capital IQ to identify all private equity transactions where the target firm is in the UK. In recent academic studies, Capital IQ is the primary source of data about private equity transactions.[13] We consider deals shown as completed, and we omit deals that are announced but not yet completed. We take all relevant transaction information, such as the completion date, the name of the private equity investor, and the size of the transaction.

Our selection strategy of buyout transactions follows Bernstein et al. (2019), who study firm performance during the global financial crisis. That is, we select all deals involving a UK-based target firm that take place before the start of the GFC and COVID-19 crisis years (2007 and 2019, respectively) and where the private equity investor has not exited before

[13]It is a source of private equity buyout transactions in, among others, Bernstein and Sheen (2016), Bernstein et al. (2019), Fracassi et al. (2022), and Lavery et al. (2024).

the end of 2008 and 2020. In order to identify how and when the private equity investor has exited a deal in each case, we use a variety of resources. We use Capital IQ's mergers and acquisitions database to search for sales to trade buyers or other private equity investors (secondary buyouts). We also use Nexis and manual searches of financial news to search for acquisitions, initial public offerings, and bankruptcies/liquidations involving target firms.

The second part of the sample construction involves matching private equity buyout targets from Capital IQ to the Fame database, which we use to source companies' financial accounts. Fame is a Bureau van Dijk database that contains historical financial data about companies in the UK from Companies House, the national UK registrar. It provides balance sheets, income statements, and other information such as firm locations, industry codes, and dates of incorporation. In order to maximize the matching between Capital IQ and Fame, we match buyout targets manually to the Fame database, ensuring that we match to the correct consolidated PE entity in the post-buyout period.

3.2 Constructing a matched control group

Crucial to implementing a successful difference-in-differences approach is building a suitable sample of control firms; that is, a sample of firms similar to the sample of PE-backed firms in the pre-crisis periods but that did not receive private equity investment. Our matching technique is similar to Boucly et al. (2011), Bernstein et al. (2019), and Lavery et al. (2024), and it involves matching PE-backed firms to control firms based on similar characteristics in the pre-crisis years (2007; 2019). Accordingly, and consistent with recent literature, we match control firms to PE-backed firms based on their industry, size, profitability, and leverage in 2007 and 2019 (the years before the onset of the crises). As such, we select up to five companies for each portfolio company that: 1) has the same two-digit SIC code; 2) has total assets within 50% of the PE-backed firm in 2007; 3) has a return on assets within 50% of the target company, and 4) has leverage (total debt/assets) within 50% of the target in 2007 and 2019. Using this method, we construct two samples of PE-backed and control firms

around each crisis. The samples contain 417 PE-backed firms and 1,840 control firms for the GFC, as well as 1,022 PE-backed and 4,054 control firms for the COVID-19 pandemic.

In order to ensure our matching technique is adequate for a difference-in-differences model, we show some summary statistics of key variables in 2007 and 2019 for both the treated and control samples in tables 1 and 2. This provides initial evidence that, by construction, our two groups of matched firms share similar characteristics in the pre-GFC/COVID periods. In panel A, the distribution of firm-specific characteristics is very similar across both groups as indicated by the statistically insignificant differences. Some exceptions apply to the export intensity, cash conversion cycle (CCC), and days payable outstanding (DPO) variables in panels B and C, respectively. However, when we look at the one-year export growth in panel B, and working capital growth in panel D, the differences fade away, suggesting that the two groups of firms follow similar trends in the run-up to the GFC and COVID recessions across all observable variables. Overall, our matching indicates that differences across the PE-backed and non-PE-backed groups disappear when we compare firms in the same industry with similar sizes, profitability, and leverage ratios.

To further explore the pre-crises parallel-trend assumption, we graphically show the evolution of firms' exporting and working capital around the 2008 financial crisis and COVID-19 pandemic in figures 1, 2, and 3. We plot year fixed effects around the time of the GFC and COVID pandemic. Specifically, the graphs show the α_t of the following equation:

$$y_{i_t} = \alpha_t + \alpha_i + \varepsilon_{it} \tag{3.1}$$

where α_t captures year fixed effects and α_i stands for company fixed effects. We estimate the above equation separately for both the PE-backed and control samples, with standard errors clustered at the firm level. We use the years before the crises (2007, 2019) as the base period, and we normalize its corresponding coefficient to zero. We observe that both our treated and control samples follow similar paths before the GFC and COVID in terms of exporting and working capital. This alleviates concerns that either group is outperforming

the other in the run-up to both crises. As illustrated in figures 1a and 2, following the 2008 shock, we observe a divergence in exporting behavior and working capital that widens in 2009. As a response to the GFC, the CCC of PE-owned firms declined significantly more relative to the control, implying that PE investors took actions to improve the management of working capital. Further, figure 2 suggests that PE-owned firms reduce inventories outstanding and extend payables outstanding. Graph 1b shows that PE-backed and matched controls follow similar paths before and after the pandemic. Next, figure 3 depicts that the difference in *CCC* between PE-backed and matched controls widens in 2020 and 2021. The post-COVID divergence for both groups in figures 3b, c, and d is less prominent. Together, the graphs support the parallel-trends assumption.

4 Econometric models in crises years

4.1 Intensive margin of exports

We begin our empirical investigation by testing whether, following the GFC and COVID-19 crises, PE ownership affects the value of firms' exports and their export intensity. To this end we adopt a difference-in-differences model where we estimate the following baseline equation:

$$y_{it} = \alpha_t + \alpha_i + \beta_1(PE_i * Post_t) + \beta_2 X_i * Post_t + \varepsilon_{it} \tag{4.1}$$

Where the dependent variable is the natural logarithm of export value and the export intensity, which is the ratio of a firm's export sales to total sales. *PE* equals 1 for all PE-backed companies and zero for controls. *Post* equals 1 for the crisis years 2008-2010 and 2020 to 2021, respectively, and zero for the pre-GFC and pre-pandemic period (2005-2007; 2017-2019). We include firm and year fixed effects, denoted by α_i and α_t.[14] X represents

[14] As we show in the robustness section, the results remain unchanged if we control for time-varying industry shocks around the crisis.

a vector of firm-level controls and includes size (logarithm of total assets), firm age, cash holdings scaled by total assets, leverage (debt divided by total assets), profitability (return on assets), and the one-year growth in sales. These control variables are taken in the pre-crisis years (2007; 2019) and are interacted with $Post_t$. Standard errors are clustered at the firm level.

We are particularly interested in the sign and significance of β_1, which captures the change in PE targets' exporting from before the crises to after the crises, relative to controls. A positive coefficient implies that, following GFC/COVID, PE buyouts boost the resilience of targets' exporting at the intensive margin relative to the control group. This rests on the identification assumption that treated and control firms experience similar pre-crises growth in exporting. We can therefore interpret that any differences after the recessions relate to the changes brought about as a result of the buyout. Support for H1a is reflected in a positive coefficient for the $PE_i * Post_t$ interaction.

The coefficient β_1 captures the average impact of PE ownership from before to after the shock, compared to control firms. However, we can more closely examine the timing of the effects by estimating the following equation:

$$y_{it} = \alpha_t + \alpha_i + \Sigma\beta_k(PE_i) + \varepsilon_{it} \tag{4.2}$$

where we estimate a different β_k for each year between 2005 and 2010 (2017 and 2021), using the pre-GFC year 2007 (pre-pandemic year 2019) as the reference point. We anticipate that PE ownership has an economically significant effect on the intensive and extensive margins of exporting and working capital management in the years following the crises.

4.2 Extensive margin of exports

We continue our empirical analysis by testing whether, following GFC/COVID-19, PE-backed companies are more likely to become exporters and remain in the export market

relative to the control group. We do so by estimating the following Probit model:

$$Prob(EXP_{it}/EXIT_{it} > 0) = \alpha_t + \alpha_i + \beta_1(PE_i * Post_t) + \beta_2 X_i * Post_t + \varepsilon_{it} \tag{4.3}$$

The dependent variable EXP_{it} is a dummy variable that equals 1 if firm i has a positive amount of exports in year t, and zero otherwise. We define a firm as exiting ($EXIT_{it}$) the export market in year t if it exported in years *t-1* and *t-2* but not in year t. Following Görg and Spaliara (2018), to ensure that we correctly identify firms that definitely exit the market and do not start exporting again during our sample period, we do not count export market reentrants as exiters. The rest of the control variables are the same as those in equation 4.1

We focus on β_1, which measures the difference in the probability of starting (stopping) exporting between PE-backed and non-PE-backed firms in the post-GFC/COVID-19 periods. A positive (negative) coefficient supports H1b, indicating that PE firms help their portfolio companies become (remain) exporters in the aftermath of the crisis periods. We also estimate a model with time-varying coefficients as in equation 4.2.

4.3 Working capital management channel

To identify the channel through which PE ownership affects firms' exporting, we first assess how PE-backed firms respond to the crises with regard to their working capital management. To test hypothesis 2, we estimate the following specification:

$$y_{it} = \alpha_t + \alpha_i + \beta_1(PE_i * Post_t) + \beta_2 X_i * Post_t + \varepsilon_{it} \tag{4.4}$$

where y_{it} is the cash flow conversion cycle (CCC), a widely used metric for the effectiveness of a firm's working capital management and the liquidity needed for external financing (Tong and Wei, 2011; Wang, 2019). To construct CCC we add the number of inventory days to the number of days of accounts receivable and subtract the number of days of accounts

payable. All remaining control variables and fixed effects remain unchanged.[15]

To support H2, we expect to identify a significant role for PE investors in improving working capital management, compared to their peers. A longer CCC implies that a firm's cash is tied up in its operations for a more extended period. It indicates that more time needed to sell inventories, and collect receivables, while the firm pays its suppliers more quickly than it collects from its customers. In a nutshell, it captures the firm's dependence on short-term debt and external funding. We anticipate a negative β_1, which would indicate that PE firms engage in activities that help their portfolio firms achieve a shorter CCC and optimize working capital in the aftermath of the crises relative to their non-PE-backed peers.

Next, in H3, we assess the role of PE investment in alleviating the impact of economic downturns on export activities for firms facing longer CCC. To do so, we split the sample of firms based on their pre-crises cash conversion cycle into low-CCC (bottom 50% of the distribution of CCC) and high-CCC (top 50% of the distribution of CCC) groups and estimate equations 4.1 and 4.3. These specifications capture how different levels of working capital affect the way exporting responds to private equity investment. High-CCC firms have a greater need to finance their working capital with short-term debt and therefore are more likely to perform worse in crisis years. We expect PE-owned firms to exhibit more resilient exporting behavior when they face a high-CCC. This is more relevant to the GFC than COVID-19, where exporters are exposed to financial shock and increased trade costs.

5 Empirical results

5.1 Intensive margin

To examine if PE investment affects the exporting of portfolio firms following the GFC and COVID-19 shocks relative to non-PE-backed firms, we estimate difference-in-differences

[15] In unreported robustness tests, we also use firms' ratio of sales to net working capital as an alternative measure of working capital efficiency. The results, which are available on request, are similar.

models and present the results in table 3. In columns 1, 2, 5, and 6 the dependent variable is the logarithm of the value of export sales, and in columns 3, 4, 7, and 8 it is the ratio of export sales to total sales. We find that, around the financial crisis, exporting of PE-backed companies is more resilient relative to that of non-PE-backed companies. For the GFC, the effect of PE ownership on exporting is both statistically significant and large in economic magnitude. Target firms' export value increases by 24.6% relative to control firms during the crisis. The inclusion of firm-level control variables in column 2 has no impact on the coefficients. In columns 3 and 4, our results indicate that PE-backed firms' export intensity likewise is more resilient relative to that of similar, non-sponsored firms during the financial crisis. Specifically, they show that PE-backed firms increase their export intensity by 2% relative to control firms. Taken together, our findings clearly show that PE-backed firms improve persistence during the financial crisis across both measures of exporting activity.

Turning to the pandemic results, the interaction term ($PE_i * Post_t$) shows no significant difference in how PE investment affects the intensive margin of sponsored and unsponsored firms following the COVID-19 crisis. As we argue in the hypotheses section, in the face of the pandemic-induced recession governments reacted promptly, whereas COVID-19 did not lead to severe cuts in access to financing or increases in trade costs.[16]

To further verify our findings presented above, we estimate equation 4.2 to examine the time-varying behavior of the treatment effects of export value and export intensity. The estimated coefficients in panel B of table 3 appear insignificant before the crises, meaning that there are no divergent trends before 2008 and 2020. The differences between the treated and control firms become significant after the GFC. Exporting by PE-owned firms diverges from their non-PE-owned counterparts in 2009 and 2010, in line with figure 1a. The results hold after controlling for firm characteristics, showing that the difference persists for a couple of years. When we turn our attention to the COVID period, treated and control firms follow

[16]To account for the potential impact of the Covid loan programs on our results, in the robustness section we identify all that which participated in the Loan Guarantee Scheme (LGS) and reestimate our baseline models.

very similar paths pre- and post-COVID-19. This corroborates the preliminary evidence in figure 1b and the econometric results in panel A. To this end, our results provide empirical support for H1a.

5.2 Extensive margin

The results of estimating equation 4.3 for the GFC and COVID-19 crises are presented in table 4. Columns 1, 2, 5, and 6 show estimates of the likelihood of export market entry, and columns 3, 4, 7, and 8 present the probability of export exit. We begin our analysis by looking at the probability of becoming an exporter following the global financial crisis. The coefficients on the interacted term are positive and significant, signalling the role of PE investment in helping portfolio firms overcome entry barriers in international markets. Further, findings on export exit (columns 3 and 4) reveal that PE-backed firms are more likely to survive in export markets and therefore are less likely to exit following the GFC-induced shock, relative to their non-PE-backed counterparts. This suggests that PE investment provided a "spare tyre" to portfolio firms when credit markets dried up in 2008 and access to financing was restricted. This is in line with previous evidence suggesting that PE-backed firms are more robust and resilient to economic downturns (Wilson et al., 2012; Bernstein et al., 2019).

Following the COVID-19 pandemic, PE-owned firms are more likely to enter global markets relative to their peers (columns 5 and 6). Where export market exit is concerned, the coefficients on the interaction term in columns 7 and 8 attract the expected sign but they are statistically insignificant, implying that the effect of the pandemic on the hazard of exit is similar for PE-backed and non-PE-backed firms. This finding is in line with the idea that the COVID pandemic did not have any detrimental effects on access to finance, which may have led to excessive exits among exporting firms. As before, when we study the timing of the effect, we see no statistically significant differences between the two sets of firms in the pre-crisis periods. Overall, our findings support H1b.

5.3 Working capital management

Next we explore the mechanism behind the intensive and extensive margins findings. We hypothesize that PE firms help their portfolio companies maintain their exporting status by improving working capital management, particularly during economic downturns. First, we examine the direct role of PE ownership in improving firms' working capital management during the two crisis periods, and we estimate equation 4.4, where our dependent variable is the logarithm of the cash conversion cycle. Results in column 1 of table 5 show that PE-backed companies' CCC decreases relative to non-PE-backed firms around the GFC. The effect is statistically significant and meaningful in terms of its economic magnitude. Relative to non-PE-backed firms, PE-backed firms experience a fall in CCC of around 9.6%. Next, we decompose the CCC into each component and focus on how PE ownership affects firms' DIO, DSO, and DPO in columns 2, 3, and 4. We observe that days inventory outstanding falls by around 4.4% for PE-backed firms compared to their non-PE-backed counterparts, implying that PE investors may use the necessary inventory management tools and methods to convert stock into sales more efficiently. In column 4, the result on the third component of CCC indicates that PE-backed firms are more likely to extend debt payments to suppliers by approximately 3.8%, which can result in a greater availability of cash and working capital in the short term.

Similar conclusions arise from columns 5 to 8, where we turn our focus to the COVID-19 crisis years. Here, PE-backed firms achieve a CCC that is 5.7% shorter relative to their counterparts, reduce inventories by 3.3%, and delay debt payments by 2.8%. Even though the magnitude and significance of the coefficients on the double-interacted term ($PE_i * Post_t$) is smaller relative to the GFC, our findings imply that PE investors engage in necessary actions to improve portfolio firms' working capital management in crisis years. These findings are consistent with the idea that PE investors help portfolio firms tighten control systems, especially with respect to improving cash flow through better stock and working capital control (Wilson et al., 2012), as well as reduce costs (Gompers et al., 2022).

The year-by-year effects presented in panel B show that pre-GFC and pre-COVID differences are insignificant, whereas the divergence in working capital management appears in 2009 and 2010 (2020 and 2021). This corroborates the graphical evidence in figures 2 and 3. All in all, our results support H2.

Although our findings show that PE-backed firms have better working capital management during crisis periods relative to similar control firms, they do not explicitly state whether PE investors improve portfolio companies' exporting resilience by enhancing their working capital. Given that firms with a higher CCC rely more on short-term debt to finance their working capital, those firms are more likely to underperform during financial crisis periods (Duchin et al., 2010). What is the role of PE investment in dampening the effects of crises and efficiently managing the working capital to support targets' exporting operations? To assess the working capital channel, we split the sample into groups of firms with high-CCC and low-CCC prior to the crises to unveil the effect of PE ownership on exporting activities.

Specifically, we split the sample of firms based on their pre-crises CCC. We classify firms in the top 50% of the CCC distribution as high-CCC companies; those in the bottom 50% are low-CCC companies. The results for the intensive and extensive margins of exporting are in tables 6 and 7, respectively. For both time periods, the coefficients on the interacted terms are statistically significant for firms with high-CCC, although the magnitude and significance is much lower in the case of COVID-19 (columns 3 and 4) compared to the GFC (columns 1 and 2). PE investment improves the resilience of the export value and export intensity of portfolio firms by 34% (7%) and 2.6% (1%), respectively, following the GFC (COVID-19).

Further, PE-owned firms are more likely to start exporting after GFC and the pandemic, and they are less likely to exit the export market post-GFC (though not after COVID-19). This suggests that the effect of PE ownership on firms' exporting is considerably stronger for firms with poor working capital management prior to the onset of the crises. Improvements in cash flow control for high-CCC firms can contribute to resilience in export markets in

terms of export value, intensity, and export entry. Through more efficient working capital management, PE-backed firms can overcome the financial barriers and associated trade costs to begin and continue their operations in foreign markets. This is of particular importance to exporters, which are more likely to experience financial shocks than are domestic companies because international transactions normally involve higher working capital requirements (Amiti and Weinstein, 2011). In summary, our results support H3 and are in line with the idea that working capital influences how PE ownership affects export performance.

6 Robustness tests

We put our findings through a battery of checks to investigate their robustness. To save space, we present our econometric estimations in the online appendix.

6.1 COVID support loans

The evidence presented so far indicates that PE ownership dampens firms' exporting sensitivity to the 2008-2009 financial crisis, yet, results are less clear for the COVID-induced recession. A possible explanation might be the timely introduction of economic stimulus packages to stabilize the economy amid the COVID-19 outbreak. To inspect more closely how public intervention affects the internationalization behavior of PE-backed companies in 2020-2021, we consider the UK government's Loan Guarantee Scheme (LGS) to support small and large affected firms. In the case of COVID business loans, the UK government extended the existing LGS, encouraging banks to lend to businesses, with the government (British Business Bank) acting as a guarantor in the event of default.[17] In total the government guaranteed more than £80bn of loans and over one million UK limited companies received some form of bank loan, guaranteed by the government, during the pandemic period.

[17]The UK government's three large-scale loan guarantee programs focused on smaller firms where major market failures were thought to exist. Two of these are Bounce Back Loans (BBLS) and Coronavirus Business Interruption Loans (CBILS). The third program, Coronavirus Large Business Interruption Loans (CLBIL), focused on larger firms where there are fewer market failures.

As we have access to the LGS loans, we can identify firms that received a loan and exclude them from the sample.[18] To assess whether the liquidity the UK government provided during COVID-19 affects our results, we reestimate our intensive and the extensive margins models. Results based on the reduced sample of firms (table A2) reveal a positive and significant effect of PE ownership on the intensive margin of exporting. This finding supports our earlier argument that public support that non-PE-backed firms received during the pandemic allowed them to continue their operations abroad uninterrupted (table 3). In the absence of the loan guarantee scheme, non-PE-backed firms are more likely to suffer the exporting consequences of the pandemic . The significant role of PE ownership is further evident in the extensive margin results. Between the treated and control groups that did not receive financial support from the UK government, PE-backed companies are more likely to enter the export market. The statistical significance of the interacted term further improves relative to table 4.

6.2 Alternative matching

Our results may be sensitive to the construction of the matched control group. In the following robustness test, we make adjustments to our matching technique. First, we tighten our matching bandwidths from 50% to 30%. Second, we construct alternative control groups by matching firms at different points in time. In particular, we match companies based on characteristics in 2006 or in 2018 for the COVID sample. Third, we use firms' export sales in the pre-crises years in the matching process to isolate any potential PE impact on export activity. We should note, however, that when matching on export sales, we cannot carry out the first exercise (hypothesis 1b), which concerns the extensive margin. Finally, we use domestic sales (as opposed to total assets) to capture firm size. Results presented in tables A3, A4, A5, and A6 remain intact.

[18] Approximately 12% of firms in our sample received government support. More precisely, 148 of 1,022 PE-backed firms got a loan and 435 of 4,054 control firms received a loan.

6.3 Controlling for pre-crises growth patterns

To account for pre-GFC and pre-COVID growth, we include an interaction term between the three-year pre-crises growth rate in sales and the $Post_t$ variable. Thus, we estimate the following specification:

$$y_{it} = \alpha_t + \alpha_i + \beta_1(PE_i * Post_t) + \beta_2(SalesGr_i * Post_t) + \theta X_i * Post_t + \varepsilon_{it} \tag{6.1}$$

where *SalesGr* is the three-year growth in sales prior to 2008 and 2020. We report the results in table A7 in the online appendix. Even though we find that growth in sales has a positive effect on exports, its inclusion does not have a material impact on our estimates of how private equity buyouts affect firms' exporting activity during the GFC and COVID-19 periods.

6.4 Placebo test

Our various matching methodologies, as well as fixed effects and control variables, help to account for any potential differences between our treated and control groups of firms. We conduct one further test to provide comfort that PE ownership of the treated group drives our results, where we run our baseline models but exclude the real treated firms from the test. Specifically, the control group in our main samples become our placebo "treated," which we then match with the remaining non-PE-backed "control" firms based on a number of characteristics (see section 3.2). This allows us to build a sample of matched non-PE-backed "treated" firms and non-PE-backed "control" firms. We rerun our baseline models and present the results in table A8 in the appendix. The placebo test shows that the impact of PE ownership disappears, as there are no differential effects between the non-PE-backed treated and control groups of firms.

6.5 Potential impact of Brexit

By construction, our COVID-19 variable captures the first year of Brexit. The EU-UK Trade and Cooperation Agreement (TCA) was signed on December 30, 2020, and on January 1, 2021, the UK left the European Union. This increased barriers to trade between the UK and EU.[19] Even though it will take several years to realize the full effects of Brexit and therefore it is highly unlikely to affect our findings, we need to make sure that Brexit-related effects are not driving our results. In order to do so, we reestimate our specifications excluding industries that are heavily exposed to trading with the EU.[20] This exercise allows us to isolate the effect of the COVID-19 shock on export activities while limiting a potential bias through the impact of Brexit.

The results in table A9 show that the magnitude and significance of the interaction terms are not dissimilar from those in our baseline models. That is, industries and firms most affected by Brexit do not appear to drive our results.

6.6 Time-varying industry fixed effects

Next, we include a set of time-varying industry fixed effects. This enables us to control for changes in industry demand and other industry factors around both crisis periods. This is relevant given that certain industries are more affected than others during both crises. To do so, we follow Bernstein et al. (2019) and interact two-digit industry fixed effects with the *Post* dummy. The main results in table A10 remain unchanged.

[19] Unlike COVID-19, Brexit is generally seen as a permanent shock with long-run economic costs to the UK economy (Lambert and Van Reenen, 2021).

[20] Following the literature (De Lyon and Dhingra, 2021; ONS, 2021, 2022), we exclude firms in industries most affected by Brexit: printing, pulp, paper; recreation, community, personal services; basic metals; hotels and restaurants; transportation services; food, beverage, and tobacco; fuels and crude materials; and wholesale durable and nondurable except transport equipment.

6.7 Remove secondary buyouts

First we drop all secondary buyouts from our sample and rerun our baseline model. There is recent evidence that the rationale and motives for secondary buyouts may differ from that of primary buyouts (Degeorge et al., 2016). To control for the potential that the inclusion of secondary buyouts may affect our results, we remove them from the sample. The main results presented in table A11 hold for both crisis periods.

6.8 Remove management buyouts

Second, we drop management buyouts (MBOs) from the sample. An MBO involves the existing management team taking a stake in the company, therefore increasing managerial incentives to improve operating performance. As such, Bernstein et al. (2019) suggest that MBOs may have lower engagement from PE investors. To explore whether the inclusion of MBOs is driving our findings, we drop them from the sample and repeat the main analysis. As before, our main findings in table A12 remain intact.

6.9 Remove deals executed in 2007 and 2019

To further validate our findings, we next drop all buyouts that took place in 2007 and 2019, which reduces our sample by around one-third. This alleviates any concern that some of our buyout transactions occur too close to the beginning of the crises years and that the ownership change may not have taken full effect by the time of the crises. Despite the drop in sample size, the findings in table A13 are upheld.

6.10 Controlling for add-on acquisitions

A concern in our results could be that private equity buy-and-build strategies dominate our results. This strategy involves a PE investor acquiring a platform company to which it then adds on several bolt-on acquisitions to create a larger organization with an increased

market share (Hammer et al., 2022). To test whether the more resilient export activity in PE portfolio firms during the crises periods is organic or acquisitive, we remove all buy-and-build deals (where the portfolio company makes add-on acquisitions during the period) from our sample and rerun our baseline models. Table A14 shows that although the economic magnitude of our results diminishes slightly, the significance of our main findings remains.

7 Conclusion

In this paper, we build on recent work showing that PE ownership mitigates the negative effects that crises and uncertainty have on firm performance (Bernstein et al., 2019; Gompers et al., 2022; Lavery et al., 2024). The analysis is motivated by the observation that, if PE-backed firms are more recession-resistant, then the exporting decisions of firms with respect to the extensive and intensive margins will be more sensitive to changes in ownership. We contribute to the literature by uncovering a new channel, working capital, to explain how PE-backed firms improve export resilience during the GFC and the COVID-19 pandemic. These downturns share some similarities given their impact on international trade, but they also display differences, the most notable of which is that access to credit did not decline during the COVID-19 pandemic.

We find that PE ownership has a marked impact on exporting post-GFC, emphasizing the importance of firm ownership for export market decisions and highlighting the resilience of exporting among PE-backed firms relative to non-PE-backed firms. By contrast, our results show that the impact of PE ownership on export intensity and propensity is less profound following COVID-19, where the financial environment remained relatively unchanged mainly due to economic stimulus packages offered to affected firms. Further, we provide evidence that PE-backed firms are more likely to engage in actions to achieve effective working capital management during both crises. Finally, we show that resilience in export markets is greater when working capital management improves among target firms with poorer cash

flow management prior to crises.

Our results highlight the potential advantage of PE ownership in increasing resilience in trade activities during crisis periods, an important finding for managers and policy makers. Our results also provide fertile ground for future research in the area. One aspect is related to recent turmoil in global supply chains due to factors including extreme weather events, and geopolitical tensions, which are expected to lead companies to reassess their trade and investment relationships (Alfaro and Chor, 2023). Would PE-backed firms also be in a position to make a smoother transition in this respect? Another issue is to try and understand more fully the exact mechanisms at play. While our findings suggest that PE backed companies have more efficient working capital management, we do not observe any other management practices that may play a role. (Bloom et al., 2015), e.g., shows that PE backed companies have better management practices than other companies. It would be very useful to pinpoint what exactly the kind of management practices are - apart from working capital management - that are important for the resilience of trading relationships.

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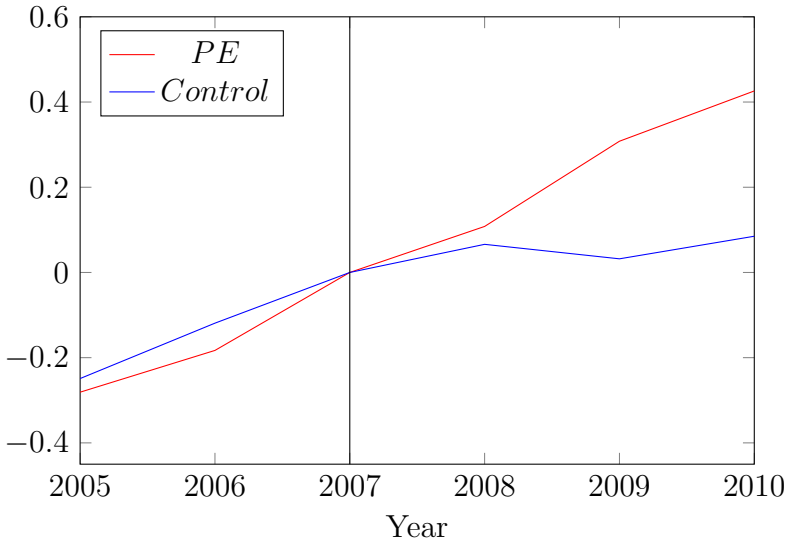
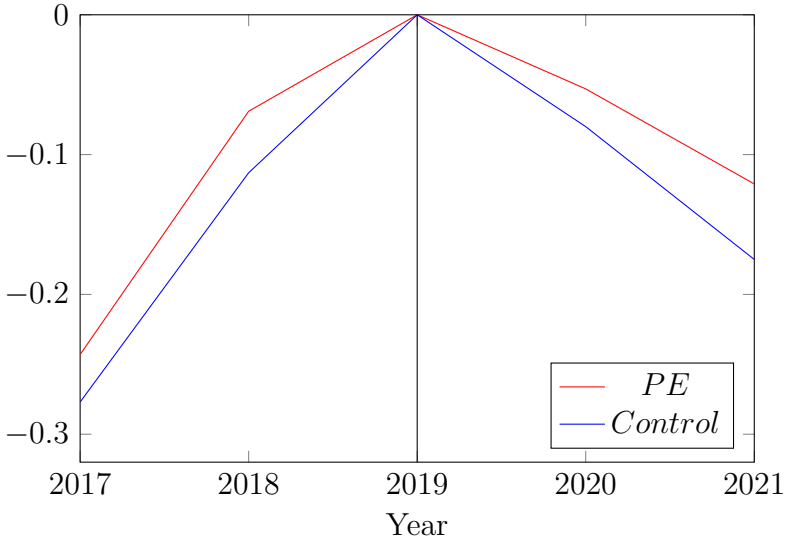
Figures

Figure 1: The effect of PE on exporting during the GFC and the pandemic

This figure shows the evolution of firm exporting during the global financial crisis (GFC) and the COVID pandemic. Specifically, the graphs shows the α_t of the following equation: $y_{it} = \alpha_t + \alpha_i + \varepsilon_{it}$. α_t captures year fixed effects, and α_i captures firm fixed effects. y_{it} is the logarithm of firms' export sales. The year prior to each crisis, 2007 and 2019, is the reference period and its corresponding coefficient is normalized to zero. Standard errors are clustered at the firm level.



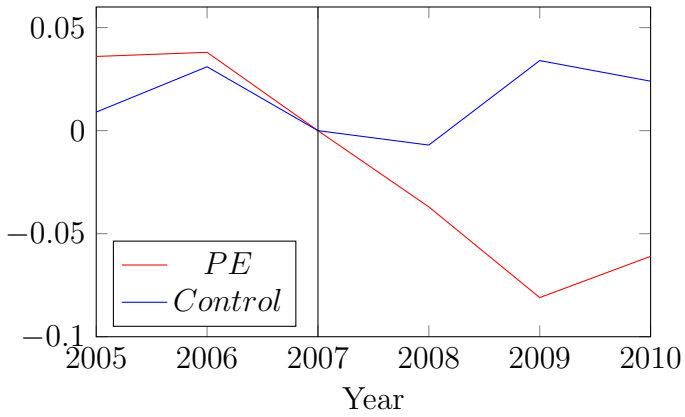
(a) Global financial crisis



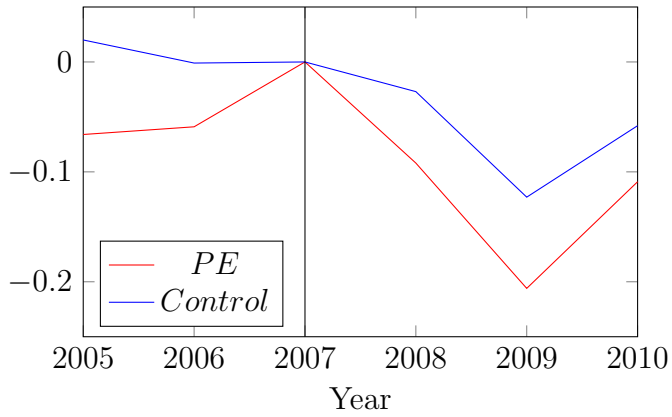
(b) COVID-19 pandemic

Figure 2: The effect of PE on working capital management during the GFC

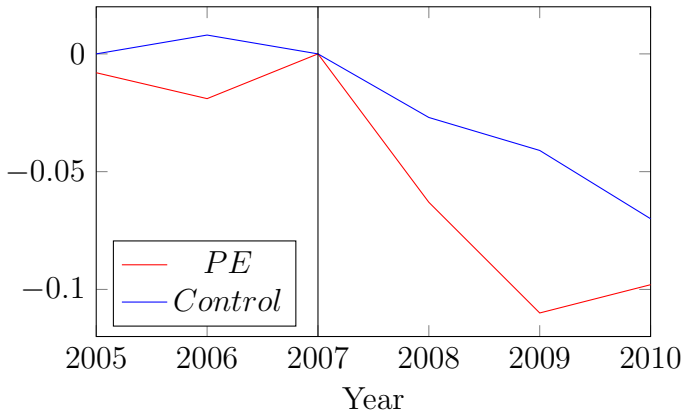
This figure shows the evolution of working capital management during the global financial crisis (GFC). Specifically, the graphs shows the α_t of the following equation: $y_{it} = \alpha_t + \alpha_i + \varepsilon_{it}$. α_t captures year fixed effects, and α_i captures firm fixed effects. y_{it} is firms' cash flow conversion cycle, days inventory outstanding, days sales outstanding, and days payable outstanding. Days inventory outstanding is inventory divided by the cost of sales, multiplied by 365. Days sales outstanding (or days receivables outstanding) is accounts receivable divided by sales, multiplied by 365. Days payable outstanding is accounts payable divided by the cost of sales, multiplied by 365. The cash flow conversion cycle (CCC) is days inventory outstanding plus days sales outstanding, minus days payable outstanding. The year prior to the crisis, 2007, is the reference period, and its corresponding coefficient is normalized to zero. Standard errors are clustered at the firm level.



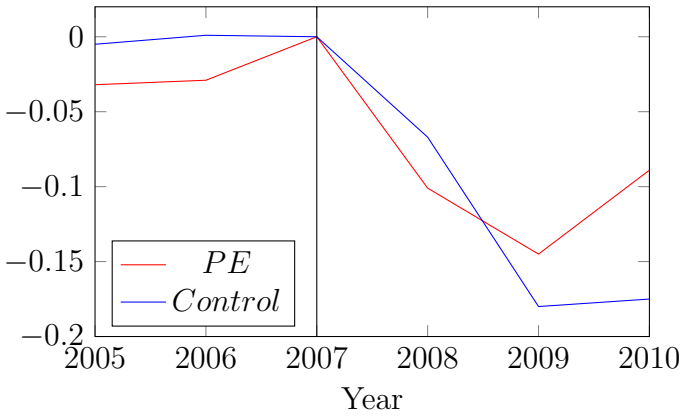
(a) Cash flow conversion cycle



(b) Days sales outstanding



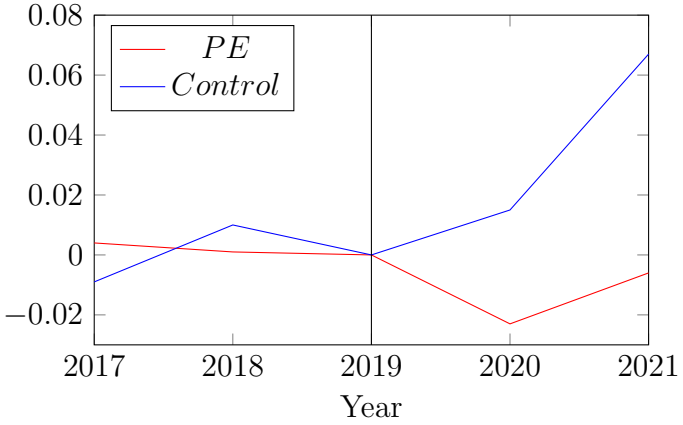
(c) Days inventory outstanding



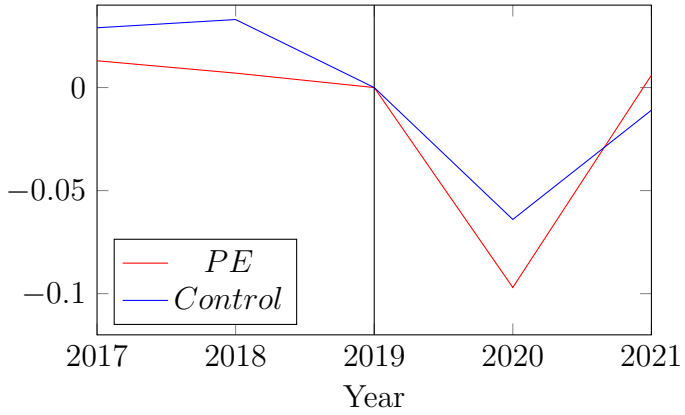
(d) Days payable outstanding

Figure 3: The effect of PE on working capital management during the COVID pandemic

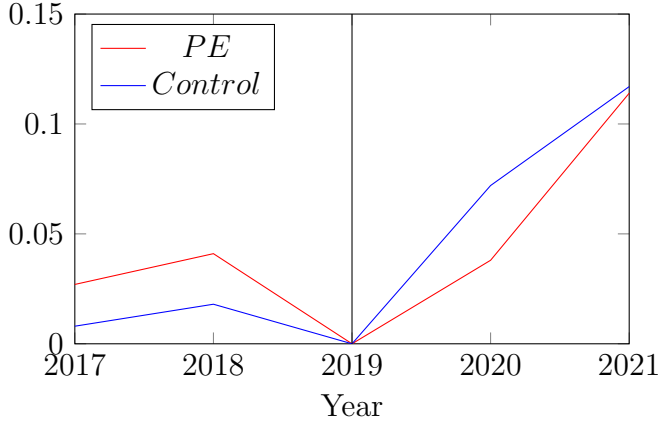
This figure shows the evolution of working capital management during the COVID pandemic. Specifically, the graphs show the α_t of the following equation: $y_{it} = \alpha_t + \alpha_i + \varepsilon_{it}$. α_t captures year fixed effects, and α_i captures firm fixed effects. y_{it} is firms' cash flow conversion cycle, days inventory outstanding, days sales outstanding, and days payable outstanding. Days inventory outstanding is inventory divided by the cost of sales, multiplied by 365. Days sales outstanding (or days receivables outstanding) is accounts receivable divided by sales, multiplied by 365. Days payable outstanding is accounts payable divided by the cost of sales, multiplied by 365. The cash flow conversion cycle (CCC) is days inventory outstanding plus days sales outstanding, minus days payable outstanding. The year prior to the pandemic, 2019, is the reference period, and its corresponding coefficient is normalized to zero. Standard errors are clustered at the firm level.



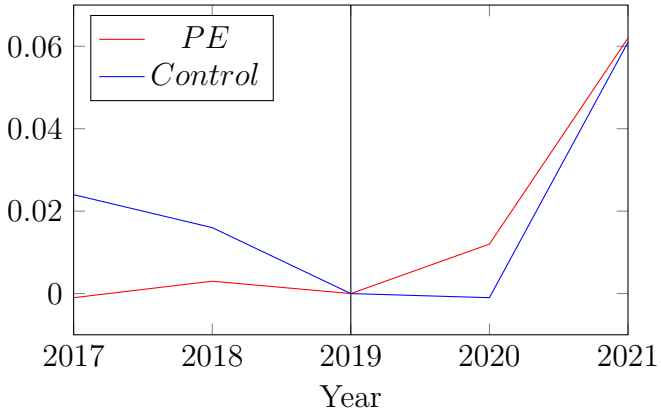
(a) Cash flow conversion cycle



(b) Days sales outstanding



(c) Days inventory outstanding



(d) Days payable outstanding

Tables

Table 1: Pre-GFC descriptive statistics

The table below details summary statistics of sample firms in 2007 across treated (PE-backed companies) and control firms (non-PE-backed companies). *PE-backed* refers to all PE-backed companies; *Control* refers to a sample of control firms, matched on their two-digit SIC code, profitability, total assets, and leverage in the pre-crisis year, 2007. *Cash flow* is a firm's earnings plus depreciation and is scaled by total assets, while *ROA* is net income divided by total assets. *Leverage* is a firm's ratio of debt to total assets. *Export intensity* is export sales divided by total sales. *Days inventory outstanding* (*DIO*) is inventory divided by the cost of sales, multiplied by 365. *Days sales outstanding* (*DSO*) is accounts receivable divided by sales, multiplied by 365. *Days payable outstanding* (*DPO*) is accounts payable divided by the cost of sales, multiplied by 365. *Cash conversion cycle (CCC)* is days inventory outstanding plus days sales outstanding, minus days payable outstanding. Other variables are self-explanatory. *** denotes statistical significance at the 1% level; ** denotes the 5% level; * denotes the 10% level.

	PE-backed				Control					
	N	Mean	Median	SD	N	Mean	Median	SD	Mean diff	Median diff
Panel A: Firm variables										
Total assets (£m)	417	112,349	20,515	317099.4	1,840	84,383	18,283	236159.4	27,965	2,232
Sales (£m)	402	84,996	30,212	172682.1	1,489	69,474	24,084	156748.5	15,521	6,128*
ROA	417	0.14	0.10	0.16	1,840	0.13	0.10	0.14	0.01	0.00
Leverage	417	0.65	0.57	0.24	1,840	0.64	0.55	0.27	0.01	0.02
Cash flow	402	0.17	0.14	0.16	1,539	0.16	0.13	0.13	0.01	0.01
Panel B: Exporting										
Export sales	142	11,965	4,227	31317.1	462	15,880	4,824	44425.9	-3,915	-597
Export intensity	142	0.30	0.15	0.30	462	0.34	0.23	0.33	-0.04*	-0.08**
1-year export growth	120	0.15	0.11	0.46	360	0.12	0.10	0.52	0.03	0.01
2-year export growth	109	0.27	0.18	0.59	342	0.26	0.22	0.71	0.01	-0.04*
Panel C: Working capital										
Sales/NWC	402	6.73	3.86	24.02	1,488	6.63	3.36	22.92	0.10	0.50
Cash/assets	394	0.12	0.07	0.15	1,637	0.14	0.07	0.18	-0.02*	0.00
CCC	270	42	34	117.44	840	68	52	117.40	-26***	-18***
DIO	281	66	41	120.64	916	79	43	146.52	-13	-2
DSO	380	55	50	49.92	1,283	54	50	46.47	1	0
DPO	343	78	53	109.12	1,107	56	39	80.38	22***	14***
Panel D: Working capital growth rates										
Sales/NWC	375	-0.05	-0.14	1.56	1,372	-0.01	-0.11	1.41	-0.04	-0.03*
Cash/assets	375	2.35	0.02	10.24	1,522	2.44	-0.02	10.35	-0.09	0.04*

CCC	244	0.02	-0.01	1.09	754	0.07	-0.01	1.13	-0.05	0.00
DIO	259	0.08	0.01	0.53	834	0.09	0.00	0.55	-0.01	0.01
DSO	346	0.06	0.00	0.51	1,156	0.09	-0.01	0.60	-0.03	0.01
DPO	314	0.10	0.00	0.62	1,001	0.09	-0.02	0.67	0.01	0.02

Table 2: Pre-COVID descriptive statistics

The table below details summary statistics of sample firms in 2019 across treated (PE-backed companies) and control firms (non-PE-backed companies). *PE-backed* refers to all PE-backed companies; *Control* refers to a sample of control firms, matched on their two-digit SIC code, profitability, total assets, and leverage in the pre-COVID year, 2019. *Cash flow* is earnings plus depreciation and is scaled by total assets, while *ROA* is net income divided by total assets. *Leverage* is the ratio of debt to total assets. *Export intensity* is export sales divided by total sales. *Days inventory outstanding (DIO)* is inventory divided by the cost of sales, multiplied by 365. *Days sales outstanding (DSO)* is accounts receivable divided by sales, multiplied by 365. *Days payable outstanding (DPO)* is accounts payable divided by the cost of sales, multiplied by 365. *Cash conversion cycle (CCC)* is days inventory outstanding plus days sales outstanding, minus days payable outstanding. Other variables are self-explanatory. *** denotes statistical significance at the 1% level; ** denotes the 5% level; * denotes the 10% level.

	PE-backed				Control					
	N	Mean	Median	SD	N	Mean	Median	SD	Mean diff	Median diff
Panel A: Firm variables										
Total assets	1,022	117,853	22,518	606765.2	4,054	85,234	19,543	341468.5	32,601	2,975
Sales	1,014	72,355	24,965	186044.0	3,955	61,332	20,264	227392.9	11,023	4,341
ROA	1,022	0.04	0.05	0.15	4,054	0.04	0.05	0.13	0.00	0.00
Leverage	1,022	0.53	0.51	0.34	4,054	0.54	0.54	0.30	-0.01	-0.03
Cash flow	1,013	0.15	0.10	0.14	3,988	0.14	0.12	0.15	0.01	-0.02
Panel B: Exporting										
Export sales	404	21,745	6,337	62116.8	1,261	17,833	5,183	54324.7	3,912	1,154
Export intensity	404	0.34	0.22	0.32	1,266	0.37	0.26	0.34	-0.03	-0.04*
1-year growth in exports	368	0.29	0.10	1.30	1,114	0.22	0.06	1.22	0.07	0.04
2-years growth in exports	324	0.44	0.15	1.61	1,028	0.38	0.10	1.88	0.06	0.05*
Panel C: Working capital										
Sales/NWC	1,014	3.20	2.62	22.12	3,952	4.17	2.70	22.17	-0.97	-0.08
Cash/assets	1,003	0.12	0.07	0.13	3,809	0.13	0.07	0.17	-0.01	0.00
CCC	609	48	36	86.29	2,178	59	46	89.83	-11***	-10***
DIO	627	62	34	80.50	2,293	64	35	86.25	-0.02	-1
DSO	974	53	50	41.97	3,508	53	46	46.32	0	4
DPO	918	75	52	89.75	3,103	60	40	80.12	15***	12***
Panel D: Working capital growth rates										
Sales/NWC	965	0.00	-0.12	1.64	3,695	-0.07	-0.10	1.47	0.07	-0.02
Cash/assets	980	1.32	-0.05	7.29	3,648	1.44	-0.02	7.60	-0.12	-0.03*
CCC	567	-0.03	-0.04	1.18	1,963	0.02	-0.02	1.17	0.05	-0.02

DIO	586	0.06	0.00	0.47	2,097	0.08	0.00	0.53	-0.02	0.00
DSO	917	0.13	-0.01	0.72	3,184	0.13	-0.03	0.79	0.00	0.02
DPO	864	0.17	-0.02	0.85	2,836	0.18	-0.03	0.89	0.01	0.01

Table 3: Intensive margin of export after the GFC and COVID

We estimate all specifications using a difference-in-differences estimator. The dependent variables are the logarithm of export value and exporting intensity, which is the ratio of export sales to total sales. In panel A, we present the results from our baseline difference-in-differences model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that takes the value 1 for years 2008 to 2010 and 2020 to 2021. In panel B, we show the estimates from regression equation 4.2, where we estimate a different β_k for each year between 2005 and 2010, and 2017 and 2021, using the pre-crisis or pre-pandemic year, 2007 or 2019, as the reference year. Standard errors, reported in the parentheses, are clustered at the firm level. Even-numbered columns include firm controls, which are taken in the pre-pandemic year 2019, and interacted with the *Post* dummy. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC					COVID			
	Log exports		Export sales/total sales			Log exports		Export sales/total sales	
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
Panel A: Baseline difference-in-differences									
PE*Post	0.246***	0.243***	0.020***	0.021***		0.028	0.030	0.001	0.001
	(0.071)	(0.071)	(0.008)	(0.009)		(0.052)	(0.056)	(0.007)	(0.008)
Panel B: Year-by-year effects									
PE*2005	-0.032	-0.041	-0.002	-0.004	PE*2017	-0.139*	-0.122*	-0.010	-0.009
	(0.090)	(0.095)	(0.009)	(0.010)		(0.089)	(0.086)	(0.008)	(0.008)
PE*2006	-0.064	-0.068	-0.009	-0.011	PE*2018	-0.074	-0.069	-0.001	-0.001
	(0.072)	(0.078)	(0.008)	(0.009)		(0.045)	(0.051)	(0.007)	(0.008)
PE*2008	0.041	0.044	0.008	0.010	PE*2020	-0.022	-0.024	-0.008	-0.006
	(0.057)	(0.058)	(0.007)	(0.009)		(0.051)	(0.053)	(0.007)	(0.007)
PE*2009	0.268***	0.272***	0.017**	0.016**	PE*2021	-0.074	-0.077	-0.007	-0.011
	(0.070)	(0.072)	(0.008)	(0.009)		(0.070)	(0.072)	(0.009)	(0.010)
PE*2010	0.330***	0.328***	0.026***	0.026***					
	(0.088)	(0.090)	(0.010)	(0.011)					
Firm FE	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes		No	Yes	No	Yes
Observations	3,569	3,569	3,569	3,569		7,397	7,397	7,397	7,397

Table 4: Extensive margin of export after the GFC and COVID

We estimate all specifications using a probit model. In panel A, we present the results from our baseline difference-in-differences model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that takes the value 1 for years 2008 to 2010 and 2020 to 2021. In panel B, we show the estimates from regression equation 4.2, where we estimate a different β_k for each year between 2005 and 2010, and 2017 and 2021, using the pre-crisis or pre-pandemic year, 2007 or 2019, as the reference year. Standard errors, reported in the parentheses, are clustered at the firm level. Even-numbered columns include firms controls which are taken in the pre-pandemic year 2019, and are interacted with the *Post* dummy. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC					COVID			
	Entry		Exit			Entry		Exit	
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
Panel A: Baseline difference-in-differences									
PE*Post	0.265**	0.249**	-0.237**	-0.228**		0.418***	0.379**	-0.047	-0.045
	(0.125)	(0.128)	(0.111)	(0.104)		(0.118)	(0.123)	(0.0.049)	(0.053)
Panel B: Year-by-year effects									
PE*2005	-0.084	-0.090	0.009	0.010	PE*2017	-0.198	-0.241	0.024	0.020
	(0.191)	(0.196)	(0.014)	(0.016)		(0.151)	(0.169)	(0.092)	(0.102)
PE*2006	0.185	0.171	0.089	0.093	PE*2018	0.019	0.089	0.018	0.033
	(0.171)	(0.0.174)	(0.349)	(0.353)		(0.121)	(0.124)	(0.088)	(0.097)
PE*2008	0.042	0.040	-0.039	-0.045	PE*2020	0.097*	0.113*	-0.071	-0.088
	(0.156)	(0.163)	(0.044)	(0.047)		(0.071)	(0.077)	(0.072)	(0.119)
PE*2009	0.155**	0.139**	-0.027*	-0.029*	PE*2021	0.570***	0.398***	0.019	0.023
	(0.069)	(0.070)	(0.019)	(0.020)		(0.159)	(0.167)	(0.021)	(0.031)
PE*2010	0.368**	0.351**	-0.268**	0.261**					
	(0.183)	(0.187)	(0.113)	(0.1.119)					
Firm FE	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes		No	Yes	No	Yes
Observations	13,542	13,542	13,542	13,542		22,866	22,866	22,866	22,866

Table 5: Working capital management

We estimate all specifications using a difference-in-differences estimator. The dependent variables are the logarithms of firms' cash flow conversion cycle, days inventory outstanding, days sales outstanding, and days payable outstanding. Days inventory outstanding is inventory divided by the cost of sales, multiplied by 365. Days sales outstanding (or days receivables outstanding) is accounts receivable divided by sales, multiplied by 365. Days payable outstanding is accounts payable divided by the cost of sales, multiplied by 365. The cash flow conversion cycle (CCC) is days inventory outstanding plus days sales outstanding, minus days payable outstanding. In panel A, we present the results from our baseline difference-in-differences model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that takes the value 1 for years 2008 to 2010 and 2020 to 2021. In panel B, we show the estimates from regression equation 4.2, where we estimate a different β_k for each year between 2005 and 2010, and 2017 and 2021, using the pre-crisis or pre-pandemic year, 2007 or 2019, as the reference year. Standard errors, reported in the parentheses, are clustered at the firm level. Even-numbered columns include firms controls, which are taken in the pre-crisis or pre-pandemic year, 2007 or 2019, and are interacted with the *Post* dummy. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC					COVID			
	CCC	DIO	DSO	DPO		CCC	DIO	DSO	DPO
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
Panel A: Baseline difference-in-differences									
PE*Post	-0.096**	-0.044**	-0.014	0.038**		-0.057*	-0.033*	0.006	0.028*
	(0.039)	(0.028)	(0.034)	(0.021)		(0.026)	(0.026)	(0.022)	(0.020)
Panel B: Year-by-year effects									
PE*2005	0.099	-0.016	-0.032	-0.084*	PE*2017	-0.010	0.019	-0.016	-0.060*
	(0.072)	(0.054)	(0.052)	(0.048)		(0.020)	(0.031)	(0.027)	(0.041)
PE*2006	0.078	0.015	0.052	-0.048	PE*2018	0.009	0.022	-0.026	-0.014
	(0.062)	(0.050)	(0.042)	(0.046)		(0.019)	(0.025)	(0.023)	(0.026)
PE*2008	-0.019	-0.007	-0.007	-0.044	PE*2020	-0.015*	-0.033*	-0.032*	0.017*
	(0.063)	(0.046)	(0.036)	(0.049)		(0.010)	(0.022)	(0.022)	(0.010)
PE*2009	-0.022**	-0.039**	-0.023	0.026*	PE*2021	-0.067***	-0.003	0.018	-0.009
	(0.010)	(0.018)	(0.045)	(0.019)		(0.021)	(0.034)	(0.031)	(0.030)
PE*2010	-0.072**	-0.101**	0.010	0.035**					
	(0.038)	(0.030)	(0.046)	(0.017)					
Firm FE	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Observations	5,357	6,958	9,616	8,375		9,964	13,362	20,553	18,465

Table 6: Working capital channel: Export intensity post-GFC/COVID

We estimate specifications using a difference-in-difference estimator. The dependent variables are the logarithm of export value, and exporting intensity, which is the ratio of export sales to total sales. Panel A contains firms in the bottom 50% of the CCC distribution (low-CCC firms with strong cash flow management in 2007 and 2019), and panel B contains firms in the top 50% of the CCC distribution (high-CCC firms with weaker cash flow management in 2007 and 2019). *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that takes the value 1 for 2008 to 2011 and 2020 to 2021. Standard errors, reported in the parentheses, are clustered at the firm level. Even-numbered columns include firms controls, which are taken pre-crisis or pre-pandemic year 2007 or 2019 and are interacted with the *Post* dummy. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC		COVID	
	Log exports	Export sales/total sales	Log exports	Export sales/total sales
	(1)	(2)	(3)	(4)
Panel A: Low-CCC firms				
PE*Post	0.081*	0.003	0.014	0.004
	(0.043)	(0.003)	(0.022)	(0.013)
Observations	976	976	1,736	1,736
Panel B: High-CCC firms				
PE*Post	0.340***	0.026**	0.071*	0.009*
	(0.150)	(0.013)	(0.043)	(0.006)
Observations	1,591	1,591	3,390	3,390
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Test of equality (P-value) for PE*Post	0.048	0.046	0.000	0.000

Table 7: Working capital channel: Export propensity post-GFC/COVID

We estimate specifications using a probit model. Panel A contains firms in the bottom 50% of the CCC distribution (low-CC firms with strong cash flow management in 2007 and 2019), and panel B contains firms in the top 50% of the CCC distribution (high-CCC firms with weaker cash flow management in 2007 and 2019). *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that takes the value 1 for 2008 to 2011 and 2020 to 2021. Standard errors, reported in the parentheses, are clustered at the firm level. Even-numbered columns include firms controls taken pre-crisis or pre-pandemic year 2007 or 2019 and are interacted with the *Post* dummy. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC		COVID	
	Export entry	Export exit	Export entry	Export exit
	(1)	(2)	(3)	(4)
Panel A: Low-CCC firms				
PE*Post	0.095	-0.044	0.328	-0.032
	(0.079)	(0.056)	(0.214)	(0.049)
Observations	3,129	3,129	6,412	6,412
Panel B: High-CCC firms				
PE*Post	0.281***	-0.251**	0.583**	-0.042
	(0.077)	(0.104)	(0.228)	(0.057)
Observations	3,116	3,116	6,414	6,414
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Test of equality (P-value) for PE*Post	0.046	0.000	0.000	0.447

Online appendix for "Private equity buyouts and firm exporting in crisis periods: Exploring a new channel"

October 7, 2024

Definition of the variables and data sources

Table A1 contains definitions of all the variables used in the empirical models.

Table A1: Variable definitions and sources

A. Dependent variables		
Entry	Dummy variable equal to 1 for firm-year observations where export sales exceed zero, and 0 otherwise.	Fame
Exit	Dummy variable equal to 1 for firm-year observations where export sales exceed zero in *t-1, t-1* but not in year *t*, and 0 otherwise.	Fame
Log(export)	The natural logarithm of the value of export sales.	Fame
Export intensity	Export sales as a percentage of total sales.	Fame
Cash conversion cycle	The number of inventory days plus the number of days of accounts receivable minus the number of days of accounts payable.	Fame
Days inventory outstanding	Inventories divided by the cost of sales, multiplied by 365.	Fame
Days sales outstanding	Accounts receivable divided by sales, multiplied by 365.	Fame
Days payable outstanding	Accounts payable divided by the cost of sales, multiplied by 365.	Fame
B. Main explanatory variables		
PE	Dummy variable equal to 1 for PE-backed firms, and 0 for control firms.	Capital IQ
Post	Dummy variable equal to 1 for the postshock period, and 0 otherwise.	Capital IQ & Authors' calculations
PE*Post	Interaction term between *PE* and *Post*.	Capital IQ & Authors' calculations
C. Control variables		
Size	The logarithm of total assets.	Fame
Age	The difference between the present year and the firm's date of incorporation.	Fame
Profitability (ROA)	Net income divided by total assets.	Fame

Leverage	Total debt divided by total assets.	Fame
Cash holdings	Cash divided by total assets.	Fame

Table A2: Controlling for government intervention during the COVID-19 pandemic

In this specification, we drop all firms that obtained a government COVID loan during the pandemic period. We estimate specifications in columns 1 to 4 using a difference-in-differences estimator and in columns 5 to 8 using a probit model. *PE* is a dummy taking the value 1 for PE-backed firms and zero otherwise. *Post* is a dummy variable that equals 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in parentheses, are clustered at the firm level. Even-numbered columns include firm controls taken in the prepandemic year, 2019, and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Intensive margin				Extensive margin			
	Log Exports		Export intensity		Export entry		Export exit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.066**	0.062**	0.010*	0.008*	0.431***	0.409***	-0.053	-0.050
	(0.030)	(0.031)	(0.006)	(0.006)	(0.130)	(0.133)	(0.050)	(0.052)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	6,540	6,540	6,540	6,540	20,220	20,220	20,220	20,220

Table A3: Robustness: Alternative matching: Tighter matching bandwidths

In this specification, we tighten our matching bandwidths from 50% to 30%. We estimate specifications in columns 1, 2, 5, and 6 using a difference-in-differences estimator, and we estimate specifications in columns 3, 4, 7, and 8 using a probit model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that equals 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in parentheses, are clustered at the firm level. All columns include firm controls taken in the prepandemic (GFC) year, 2019 (2007), and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC				COVID			
	Intensive margin		Extensive margin		Intensive margin		Extensive margin	
	Log export	Export intensity	Export entry	Export exit	Log export	Export intensity	Export entry	Export exit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.203***	0.015**	0.124**	-0.219**	0.067	0.002	0.271**	-0.036
	(0.075)	(0.005)	(0.044)	(0.095)	(0.061)	(0.008)	(0.128)	(0.077)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,202	3,202	9,772	9,772	5,506	5,506	16,524	16,524

Table A4: Robustness: Alternative matching: Matching companies in 2006 and 2018

In this specification, we match companies based on characteristics in 2006 (or in 2018 for the COVID sample). We estimate specifications in columns 1, 2, 5, and 6 using a difference-in-differences estimator, and we estimate specifications in columns 3, 4, 7, and 8 using a probit model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that equals 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in parentheses, are clustered at the firm level. All columns include firms controls taken in the prepandemic (GFC) year, 2019 (2007), and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC				COVID			
	Intensive margin		Extensive margin		Intensive margin		Extensive margin	
	Log export	Export intensity	Export entry	Export exit	Log export	Export intensity	Export entry	Export exit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.210***	0.017**	0.346**	-0.197**	0.027	-0.003	0.232**	-0.021
	(0.070)	(0.008)	(0.158)	(0.098)	(0.034)	(0.008)	(0.084)	(0.086)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,668	3,668	10,990	10,990	7,224	7,224	21,391	21,391

Table A5: Robustness: Alternative matching: Including export sales in matching criteria

In this specification, we match firms based on their two-digit SIC code, export sales within a 50% bracket in the preshock year, leverage within a 50% bracket, and ROA within a 50% bracket in the preshock year. We estimate specifications in columns 1, 2, 5, and 6 using a difference-in-differences estimator, and we estimate specifications in columns 3, 4, 7, and 8 using a probit model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that equals 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in the parentheses, are clustered at the firm level. All columns include firm controls taken in the prepandemic (GFC) year, 2019 (2007), and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC		COVID	
	Log export	Export intensity	Log export	Export intensity
	(1)	(2)	(3)	(4)
PE*Post	0.096**	0.011**	0.086*	0.003
	(0.055)	(0.004)	(0.058)	(0.006)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Observations	4,348	4,348	9,405	9,405

Table A6: Robustness: Matching on domestic sales

In this specification, we match firms based on their two-digit SIC code, domestic sales within a 50% bracket in the preshock year, leverage within a 50% bracket, and ROA within a 50% bracket in the preshock year. We estimate specifications in columns 1, 2, 5, and 6 using a difference-in-differences estimator, and we estimate specifications in columns 3, 4, 7, and 8 using a probit model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that equals 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in parentheses, are clustered at the firm level. All columns include firm controls taken in the prepandemic (GFC) year, 2019 (2007), and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC				COVID			
	Intensive margin		Extensive margin		Intensive margin		Extensive margin	
	Log export	Export intensity	Export entry	Export exit	Log export	Export intensity	Export entry	Export exit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.136**	0.013*	0.272***	-0.211**	0.079	0.010	0.232**	-0.022
	(0.071)	(0.008)	(0.088)	(0.098)	(0.097)	(0.012)	(0.079)	(0.031)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,849	1,849	5,210	5,210	2,770	2,770	7,871	7,871

Table A7: Robustness: Controlling for preshock sales growth

In this specification, we control for firms' preshock three-year sales growth. We estimate specifications in columns 1, 2, 5, and 6 using a difference-in-differences estimator, and we estimate specifications in columns 3, 4, 7, and 8 using a probit model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* equals 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in parentheses, are clustered at the firm level. All columns include firm controls taken in the prepandemic (GFC) year, 2019 (2007), andinteracted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC				COVID			
	Intensive margin		Extensive margin		Intensive margin		Extensive margin	
	Log export	Export intensity	Export entry	Export exit	Log export	Export intensity	Export entry	Export exit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.197***	0.014**	0.198**	-0.188**	0.026	-0.001	0.309**	-0.024
	(0.067)	(0.007)	(0.112)	(0.101)	(0.064)	(0.008)	(0.145)	(0.033)
SalesGr*Post	0.003*	-0.001	0.003*	0.002	0.006**	0.002***	0.004**	-0.002
	(0.002)	(0.002)	(0.001)	(0.002)	(0.003)	(0.000)	(0.001)	(0.007)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,366	2,366	7,224	7,224	5,086	5,086	14,823	14,823

Table A8: Robustness: Placebo test

In this specification, we run a placebo test, whereby we match control firms to similar non-PE-backed firms. We match firms based on their two-digit SIC code, total assets within a 30% bracket in the preshock year, leverage within a 30% bracket, and ROA within a 30% bracket in the preshock year. We estimate specifications in columns 1, 2, 5, and 6 using a difference-in-differences estimator, and we estimate specifications in columns 3, 4, 7, and 8 using a probit model. *PE* is a dummy taking the value 1 for treated non-PE-backed target firms and zero for control non-PE-backed target firms. *Post* is a dummy variable that takes the value 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in parentheses, are clustered at the firm level. All columns include firm controls taken in the prepandemic (GFC) year, 2019 (2007), and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC				COVID			
	Intensive margin		Extensive margin		Intensive margin		Extensive margin	
	Log export	Export intensity	Export entry	Export exit	Log export	Export intensity	Export entry	Export exit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	-0.092	-0.012	0.122	0.069	0.044	0.003	-0.118	0.129
	(0.063)	(0.009)	(0.116)	(0.068)	(0.042)	(0.005)	(0.118)	(0.147)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,774	4,774	16,185	16,185	11,559	11,559	37,748	37,748

Table A9: Robustness: Controlling for the impact of Brexit

In this specification, we control for the potential impact of Brexit by reestimating our baseline specifications excluding industries heavily exposed to trading with the EU: printing, pulp, paper; recreation, community, personal services; basic metals; hotels and restaurants; transportation services; food, beverage and tobacco; fuels and crude materials; and wholesale durable and nondurable except transport equipment. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that equals 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in the parentheses, are clustered at the firm level. All columns include firm controls taken in the prepandemic (GFC) year, 2019 (2007), and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Intensive margin		Extensive margin	
	Log export	Export intensity	Export entry	Export exit
	(1)	(2)	(3)	(4)
PE*Post	0.078	0.002	0.465***	-0.059
	(0.063)	(0.008)	(0.138)	(0.051)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Observations	5,129	5,129	16,590	16,590

Table A10: Robustness: Time-varying industry fixed effects

In this specification, we add time-varying industry fixed effects, which can capture changes in industry demand and other industry factors around each shock. To do so, we interact two-digit SIC fixed effects with *Post*. We estimate specifications in columns 1, 2, 5, and 6 using a difference-in-differences estimator, and we estimate specifications in columns 3, 4, 7, and 8 using a probit model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that equals 1 for 2020 to 2021. Standard errors, reported in the parentheses, are clustered at the firm level. All columns include firm controls taken in the prepandemic (GFC) year, 2019 (2007), and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC				COVID			
	Intensive margin		Extensive margin		Intensive margin		Extensive margin	
	Log export	Export intensity	Export entry	Export exit	Log export	Export intensity	Export entry	Export exit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.215***	0.020**	0.231**	-0.181**	0.037	0.005	0.473***	-0.037
	(0.070)	(0.008)	(0.101)	(0.103)	(0.053)	(0.007)	(0.124)	(0.045)
Industry*Post FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,549	3,549	10,666	10,666	7,374	7,374	22,544	22,544

Table A11: Robustness: Removing secondary buyouts

In this specification, we remove secondary buyouts from the sample. We estimate specifications in columns 1, 2, 5, and 6 using a difference-in-differences estimator, and we estimate specifications in columns 3, 4, 7, and 8 using a probit model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* equals 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in parentheses, are clustered at the firm level. All columns include firm controls taken in the prepandemic (GFC) year, 2019 (2007), and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC				COVID			
	Intensive margin		Extensive margin		Intensive margin		Extensive margin	
	Log export	Export intensity	Export entry	Export exit	Log export	Export intensity	Export entry	Export exit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.248***	0.026***	0.287**	-0.210**	0.016	0.002	0.442***	-0.022
	(0.082)	(0.010)	(0.122)	(0.102)	(0.062)	(0.008)	(0.129)	(0.037)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,856	2,856	8,455	8,455	6,030	6,030	18,894	18,894

Table A12: Robustness: Removing management buyouts

In this specification, we remove management buyouts from the sample. We estimate specifications in columns 1, 2, 5, and 6 using a difference-in-differences estimator, and we estimate specifications in columns 3, 4, 7, and 8 using a probit model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* equals 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in parentheses, are clustered at the firm level. All columns include firm controls taken in the prepandemic (GFC) year, 2019 (2007), and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC				COVID			
	Intensive margin		Extensive margin		Intensive margin		Extensive margin	
	Log export	Export intensity	Export entry	Export exit	Log export	Export intensity	Export entry	Export exit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.260***	0.028**	0.588**	-0.238**	0.043	0.002	0.452***	-0.031
	(0.102)	(0.013)	(0.255)	(0.108)	(0.067)	(0.008)	(0.139)	(0.088)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,608	1,608	4,775	4,775	5,364	5,364	16,972	16,972

Table A13: Robustness: Removing deals completed in 2007 and 2019

In this specification, we remove buyouts completed in 2007 and 2019, respectively. We estimate specifications in columns 1, 2, 5, and 6 using a difference-in-differences estimator, and we estimate specifications in columns 3, 4, 7, and 8 using a probit model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* is a dummy variable that equals 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in parentheses, are clustered at the firm level. All columns include firm controls taken in the prepandemic (GFC) year, 2019 (2007), and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC				COVID			
	Intensive margin		Extensive margin		Intensive margin		Extensive margin	
	Log export	Export intensity	Export entry	Export exit	Log export	Export intensity	Export entry	Export exit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.262***	0.017**	0.189**	-0.208**	0.012	0.002	0.414***	-0.077
	(0.083)	(0.006)	(0.101)	(0.101)	(0.057)	(0.007)	(0.218)	(0.109)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,490	2,490	7,441	7,441	6,351	6,351	19,975	19,975

Table A14: Robustness: Controlling for add-on acquisitions

In this specification, we drop all deals where the target firm makes any add-on acquisitions during the PE holding period. We estimate specifications in columns 1, 2, 5, and 6 using a difference-in-differences estimator, and we estimate specifications in columns 3, 4, 7, and 8 using a probit model. *PE* is a dummy taking the value 1 for buyout target firms and zero otherwise. *Post* equals 1 for 2008 to 2010 and 2020 to 2021. Standard errors, reported in parentheses, are clustered at the firm level. All columns include firm controls taken in the prepandemic (GFC) year, 2019 (2007), and interacted with *Post*. These include firm age, size, leverage (debt divided by assets), return on assets, cash holdings scaled by assets, and sales growth. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	GFC				COVID			
	Intensive margin		Extensive margin		Intensive margin		Extensive margin	
	Log export	Export intensity	Export entry	Export exit	Log export	Export intensity	Export entry	Export exit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.183***	0.017*	0.149**	-0.187**	0.008	0.002	0.517***	-0.029
	(0.070)	(0.010)	(0.086)	(0.091)	(0.017)	(0.008)	(0.146)	(0.052)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,174	3,174	9,690	9,690	5,027	5,027	15,835	15,835