

# Private Equity Buyouts and Exports: The Impact of Brexit on UK Firms

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**This paper examines how private equity (PE) buyouts affect export activity among target firms around the Brexit period. Using data on UK firms for 2012–2019 and difference-in-differences estimations for matched target versus non-target firms, we assess how the unprecedented Leave vote affects portfolio firms' internationalization. We find that following the referendum, PE buyout targets are more likely to engage in exporting and are in turn more likely to increase the value of their exports and their export intensity relative to their non-PE-backed peers. We further find evidence of an active governance channel, whereby the benefits of PE investment after Brexit are more potent when greater governance changes occur on boards of directors, and for firms whose senior directors have more international experience.**

## Introduction

Understanding the development of private equity (PE) funds and their role when it comes to the performance of their portfolio firms has been important to both academics and practitioners over the past two decades (Cumming and Johan, 2007; Dai, 2022; Wood and Wright, 2009; Wilson *et al.*, 2022). In particular, a substantial body of literature documents enhanced operating performance among the portfolio companies of PE firms in the United States (Acharya *et al.*, 2013; Cohn *et al.*, 2022; Fracassi *et al.*, 2022; Guo *et al.*, 2011; Kaplan, 1989) and in Europe (Biesinger *et al.*, 2020;

Boucly *et al.*, 2011; Chung, 2011). Moreover, there is evidence among these target firms of improvements in productivity (Harris *et al.*, 2005), investment in innovation (Lerner *et al.*, 2011) and increases in employment (Davis *et al.*, 2014; Lerner *et al.*, 2019).

The literature that examines how PE investment affects target firms' exporting behavior is less well developed, however, which is somewhat surprising given that PE-backed firms are increasingly involved in cross-border investments and have the potential to engage in international trade (Cumming *et al.*, 2016; Wright *et al.*, 2019). A point of reference is Wilson *et al.* (2022), which explores the exporting activities of PE-backed firms. The authors find export gains for PE-backed firms, both in propensity and intensity (the extensive and intensive margins of exporting). However, although there is evidence that PE-backed companies are more recession-resistant relative to other firms (Bernstein *et al.*, 2019; Wilson *et al.*, 2012), extant studies do not evaluate the role of PE investment in improving exporting after the United Kingdom's decision to leave the European Union in the 23 June 2016 referendum (Brexit). In this paper, we fill this research gap by studying the exporting decisions of PE-backed and non-PE-backed companies in the wake of Brexit. The motivation to examine Brexit stems from the fact that it was a largely unexpected event that brought about a considerable rise in uncertainty for UK business (Bloom *et al.*, 2018, 2019; Cumming and Zahra, 2016). If anything, the popular press gives a succinct account of the United Kingdom's

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decision to leave the European Union. Giles (2022) notes that there is a consensus that 'Brexit has significantly worsened the country's economic performance'. Moreover, Brexit-related uncertainty had a negative impact on PE activity in the United Kingdom (Kellard *et al.*, 2022) and was associated with deep disintegration affecting trade flows (Douch and Edwards, 2021).

In this paper, we argue that PE investment is likely to affect export performance in the aftermath of Brexit. We follow the line of enquiry in Wilson *et al.* (2022), which shows that PE investment is related to improved exporting. This occurs because PE targets receive strategic advice, financial support and industry specialization. PE investors with an international presence or network and operational knowledge of overseas markets may offer a comparative advantage to their portfolio companies relative to non-PE-backed firms. Therefore, target firms are more likely to expand their operations abroad, improve their exporting status, increase their brand awareness in foreign markets and overcome the sunk cost of entering a foreign market. The underlying assumption is that a higher volume of export sales is associated with greater value creation, and thus exporting can provide varied and diverse benefits to PE-backed firms. Therefore, our hypothetical argument is that PE investment improves firms' export performance in the aftermath of the Brexit referendum.

Our main contribution is to explore how PE investors unlock firms' exporting potential, paying attention to the governance channel. Specifically, we investigate board-level changes in target firms, which reflect the governance engineering that PE investors often bring to their portfolio companies. We postulate that exporting improvements after Brexit are greater when the PE investor introduces more significant changes to the target company's board. In addition, we delve deeper into the governance channel by examining whether firms, whose chair/CEO have greater international experience, are able to improve exporting performance after Brexit. If PE provides some relief during periods of heightened economic uncertainty, companies with foreign CEOs and national CEOs with foreign working experience should benefit more from PE ownership.

In our empirical implementation, we use a difference-in-differences (DiD) analysis to estimate how PE investment affects firms' exporting activity. On this basis, we define two groups of firms: treated firms with PE-backed investment and a matched sample of non-PE-backed control firms. We match the latter group to our sample of buyout targets across three key areas: two-digit SIC industry, profitability (return on assets, ROA) and domestic sales in the pre-Brexit year.<sup>1</sup> In doing so,

we construct a comprehensive panel dataset of sponsored and non-sponsored firms that are similar in nature prior to Brexit. In the empirical analysis that follows, a probit model examines the probability of exporting among firms with and without PE backing following Brexit. We then use a DiD model to investigate how PE buyouts affect the value and intensity of firms' exports in the wake of Brexit.

To conduct the analysis, we merge data from Standard and Poor's (S&P's) Capital IQ and Bureau van Dijk's FAME database. In this way we are able to link PE transaction data with firm-level accounting data for 1229 target firms under PE ownership at the onset of the Brexit referendum. The United Kingdom is an ideal setting for the empirical analysis for three main reasons. First, it is the largest and most active PE market in Europe; in recent years, it had the highest average annual deal value and aggregate annual deal value relative to GDP (Bernstein *et al.*, 2019).<sup>2</sup> Second, the law requires all limited companies in the United Kingdom to provide certain accounting information to the public UK register. The depth and detail of this information varies according to firm size; however, as most firms in our sample are mid-market companies, there is an excellent coverage of balance sheet and income statement information in our sample. Accordingly, we have access to accounting statements for a rich dataset of firms, over 98% of which are private. Private companies in our sample are generally small and medium-sized, relatively young and bank-dependent firms. This is vitally important because these firms are more likely to suffer from information asymmetry problems, and hence their exporting is likely to respond more strongly to PE investment. Finally, the United Kingdom is the sixth-largest trader in the world and the third-largest exporter of services, while the European Union is the biggest trading partner. Despite the British government's focus on export-promotion strategies to increase engagement in international markets, the Brexit vote initiated economic and trade policy uncertainty, with adverse effects for financial markets and trade.

Our main results, which remain intact after several robustness tests, are summarized as follows. First, we find that following Brexit, PE-backed firms are more likely to export relative to control firms. That is, PE ownership appears to improve firms' exporting at the extensive margin. Second, PE-backed firms have higher export sales and higher exporting intensity, as measured by share of export sales to total sales in the aftermath of Brexit. Both findings are robust to controlling for various firm-level attributes and a range of fixed effects, implying that differences in exporting behaviour are due

<sup>1</sup>We outline various robustness tests to our matching criteria in the on-line appendix.

<sup>2</sup>Bernstein *et al.* (2019) also note that international comparisons of country-level private equity activity are difficult due to the lack of harmonized data and definitions.

to changes in ownership structure as opposed to other firm-level or macroeconomic factors. In addition, we present evidence that the probability of exporting, exporting value and exporting intensity are considerably higher in companies experiencing changes to their board structures and in those whose chair/CEO have greater international experience. This is consistent with the view that the skills and expertise PE investors accumulate over time, as well as their vast networks of board chairs and directors, can help explain the improvements in governance and performance among PE-backed firms.

This paper brings together three streams of literature. First, we add to the literature which shows that PE buyouts have a positive impact on the exporting performance of portfolio companies (Wilson *et al.*, 2022). We complement and extend these findings in two main ways. First, we examine whether the beneficial effect of PE investment survives after the Brexit shock. Second, we offer a more detailed analysis on the link between PE buyouts and exporting using a DiD framework in a matched sample. We agree with Wilson *et al.* (2022) that ‘there could be endogeneity issues that would be better handled by using more sophisticated econometric techniques such as the DiD method’. Hence, our econometric modelling strategy is able to better handle endogeneity concerns in our model.

Our study broadens the literature on PE and Brexit, which finds that Brexit-related uncertainty negatively affects the overall number and the value of PE deals (Kellard *et al.*, 2022; Wright *et al.*, 2016). Our evidence departs from the evolution of deals around Brexit and is centred around PE-backed firms. We show that these firms were more resilient in the wake of Brexit compared to their counterparts. Finally, our study speaks to the literature that combines PE and board composition. Existing work notes the importance of PE directors’ financial experience (Jelic *et al.*, 2019), specialization (Acharya *et al.*, 2013) or diversity (Hammer *et al.*, 2022). Our evidence provides a key contribution by documenting the beneficial role of changes in the board and managers’ international experience in the aftermath of Brexit on firms’ exporting, both at the extensive and the intensive margin.

The rest of the paper is set out as follows. In the next section, we provide a short discussion of the related literature and derive our testable hypotheses. The third section describes our data and presents some summary statistics. In the fourth section, we lay out our econometric methodology. The fifth section illustrates our main empirical results, and the sixth section concludes.

## Hypothesis development

### *Brexit and private equity*

Recent empirical literature analyses the negative impact of extreme economic events on trade at extensive

and intensive margins (see Bricongne *et al.*, 2012; Chor and Manova, 2012; Görg and Spaliara, 2018; Paravisini *et al.*, 2014). For example, the United Kingdom’s decision to leave the European Union was an unanticipated political and economic shock; it prompted a major change in expectations about future policy, creating heightened economic and policy uncertainty (Bloom *et al.*, 2019; Cumming and Zahra, 2016; Dhingra and Sampson, 2022; Graziano *et al.*, 2020; Kellard *et al.*, 2022; Van Reenen, 2016).<sup>3</sup> The Leave vote affected trade through two main channels. First, it shifted expectations about future trade policy and the introduction of trade barriers (Graziano *et al.*, 2020). Second, the sterling depreciated following the referendum, which reduced aggregate UK import and export growth relative to other countries due to the inability to generate a persistent gain in price competitiveness for UK exporters (Dhingra and Sampson, 2022; Springford, 2021).

The impact of uncertainty from the Brexit shock is also relevant for financial markets and the PE segment more specifically. Wright *et al.* (2016) point out that uncertainty surrounding Brexit, combined with limited funding opportunities around this period, led to a significant decline in the overall number and value of PE deals. Kellard *et al.* (2022) arrive at a similar conclusion studying measures of Brexit-related uncertainty and show a drop in UK PE activity when Brexit uncertainty remained at elevated levels. These findings support the notion that PE is intensely cyclical (Bernstein *et al.*, 2019). Yet, in the aftermath of Brexit, there may be opportunities for PE firms. Specifically, activities in the United Kingdom following Brexit are likely subject to less regulation, which might create a deregulation premium, making it easier for portfolio firms to cut costs (Kellard *et al.*, 2022; Wright *et al.*, 2016). In addition, the new landscape is likely to provide access to new export market opportunities, aided by favourable movements in relative export prices.

Recent literature paints a picture where, during recessions and downturns, PE portfolio firms are found to be resilient in terms of productivity, profitability and growth (Bernstein *et al.*, 2019; Wilson *et al.*, 2012). The rationale for such resilience can be attributed to a number of considerations. First, PE investors often have strong relationships with the banking industry (Ivashina and Kovner, 2011) and may help target 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

<sup>3</sup>Using the news-based policy uncertainty index drawn from Baker *et al.* (2016), we find that a period of quiescence at the beginning of the sample period is followed by a sharp increase of the index during 2016. In other words, we observe higher levels of aggregate uncertainty at the time of the Brexit referendum. This statistic is available upon request.

to provide funding even during bad times. Finally, PE groups can redeploy their human capital by pivoting away from new transactions and pivoting toward helping existing firms generate operational improvements (Bernstein and Sheen, 2016).

The argument that PE-backed firms are recession-resistant is relevant for Brexit as well. Wright *et al.* (2016) note that the performance of PE-backed firms may make them attractive investments in turbulent periods. Hence, PE investors may wish to exploit new opportunities post-Brexit. In addition, Brexit can give rise to new trade agreements which could reshape global trading relationships. PE-backed firms could tap on their investors' resources, networking with global suppliers, buyers and finance providers. Therefore, PE investors could provide access to new export market opportunities aided by favourable movements in relative export prices. Motivated by these considerations, we posit that the export performance of PE-backed and non-PE-backed firms will differ post Brexit. Specifically, we argue that PE investment could help boost exports in the aftermath of the Brexit referendum. In this sense, PE can be portrayed as UK firms' saviour in the wake of Brexit, leading to firm expansion in international markets. Based on this discussion, we stipulate testable hypotheses as follows:

- H1a:** Following Brexit, PE-backed firms are more likely to become exporters (extensive margin).  
**H1b:** Following Brexit, PE-backed firms are more likely to increase their export intensity (intensive margin).

### Governance

Corporate boards influence firms' internationalization strategies by providing two main functions. First, monitoring and overseeing the process of hiring, promotion and dismissal of executives (Aguilera *et al.*, 2019). Second, offering advice and counsel in setting the strategy of the firm (Adams *et al.*, 2010). Moreover, heterogeneity in a board's human capital is important in both pre- and post-internationalization stages (Puthusserry *et al.*, 2021).

One of the primary ways PE firms add value to portfolio companies is through governance engineering and improving a target firm's governance structure. Cumming and Johan (2007) highlight the need to understand the human-capital expertise that successful PE firms require. Indeed, Kaplan *et al.* (2012) look at the link between portfolio company managers and the success of buyouts. They find evidence that execution skills play a more significant role in the likelihood of success than interpersonal skills. Acharya *et al.* (2013) find that the skills and expertise PE partners gain over time explain the superior performance of buyouts.

Similarly, Jelic *et al.* (2019) show that PE directors' own human capital significantly affects firm performance in secondary management buyouts. PE firms often restructure the boards of their portfolio companies to include PE firm representatives and new outsiders, and PE investors almost always take at least one board seat on their portfolio firms' boards (Gompers *et al.*, 2016).

Closely related to our own study, Wilson *et al.* (2022) show that PE target firms' export propensity and export intensity increase in the post-buyout period and the authors find that characteristics of board composition are important in explaining this positive impact. In particular, export intensity and propensity are found to be positively associated with smaller board sizes, as well as more experienced directors, and more foreign national directors on board. The evidence in Wilson *et al.* (2022) suggests that governance changes brought about by PE acquisition are important determinants in portfolio firms' export performance.

A formal board structure with experienced and knowledgeable directors can help firms with exporting, as a lack of resources can impede firm internationalization (Wright *et al.*, 2007). Corporate governance can likewise play a key role in firm performance during times of crisis and uncertainty (Erkens *et al.*, 2012; Mitton, 2002). Given that governance structures need to anticipate and adapt to new geopolitical balances, such as Brexit, as well as growing extreme socioeconomic risks and other unprecedented long-term trends (Cumming *et al.*, 2021), and given the active role that PE investors play in the governance of their portfolio firms (Gompers *et al.*, 2016), we build the following hypothesis:

- H2:** Exporting is likely to increase during the Brexit period in portfolio firms when PE firms add new senior directors to the board.

### International experience

There is broad consensus in the management literature that internationalization offers firms the opportunity to expand into new markets, to grow and to improve performance (Paul *et al.*, 2017; Wang and Ma, 2018). The resource-based view of the firm links firms' internal characteristics to their performance (Barney, 1991); hence, a combination of firm resources and capabilities affects firms' export performance. Exporting firms face more challenges and uncertainty when they enter foreign markets, however, the notion that foreignness is a liability for firms engaging in international business is well recognized in the literature as a 'liability of foreignness' (Zaheer, 1995). To meet these challenges, firms need adequate resources to secure an international

presence and engage in strategies to overcome this liability of foreignness (Bell *et al.*, 2012).<sup>4</sup>

However, not all firms may possess all the required resources and capabilities to exploit international growth opportunities. Therefore, they may seek to acquire them from external partners (Meuleman *et al.*, 2009). One potential source for these resources and capabilities is the PE firms, who can adjust their governance structures by including a large number of foreigners or nationals with international experience on their boards (Oxelheim *et al.*, 2013). Specifically, PE investors who make changes to the board composition after the buyout are in a better position to provide these necessary resources because they have the capacity to learn from their networks, relationships and experience. As such, having PE investors as board members, or appointing directors with international presence and experience, can help firms engage in exporting activities.

Board diversity in terms of directors' nationality is important for various aspects of firm performance. For example, introducing Anglo-American board members improves firms' value as measured by Tobin's Q (Oxelheim and Randøy, 2003). Estélyi and Nishar (2016) arrive at a similar conclusion, finding that boards containing diverse nationalities positively affect international market operations and profitability. Masulis *et al.* (2012) find that foreign directors benefit firms' cross-border acquisitions, implying that the benefit survives during the link between a director's geographic location and the corporate's headquarters. Nielsen and Nielsen (2013) report similar findings when they concentrate on the link between directors' nationality diversity and firms' performance in Switzerland. Finally, having boards of directors with prior experience in foreign markets can provide the specific human capital needed to benefit from exporting. If PE investors are able to add directors with such experience and capabilities, this form of governance engineering could have a positive impact on firms' ability to grow internationally. Wilson *et al.* (2022) show that increasing the percentage of foreign nationals in the board, or the share of experienced directors, raises PE-backed firms' export performance.

Managers' international experience is likely to be key not only in affecting exporting, but also in overcoming export barriers. Moini (1995) and Leonidou *et al.* (1998) propose that demographic and behavioural attributes of management are important determinants of exporting and play an important role in alleviating export barriers. Kahiya and Dean (2015) find that managerial evaluation of the prevailing business atmosphere, as captured

by exporters' confidence, can influence perception of export barriers. For example, changes in exporters' expectations can affect logistics and distribution factors as well as internal resource constraints. In the context of Brexit, which can be conceptualized as a major export barrier, PE backing can bring a competitive edge when it comes to international growth because this is 'smart money'. Put differently, firms benefit from international networks and the nurturing of an experienced director. We expect the effect to be stronger after Brexit because there are greater impediments to export activity.

**H3:** Following Brexit, firms with directors who have international experience are more likely to increase export entry, value and intensity.

## Data and descriptive statistics

### Sample characterization

We construct our dataset using different sources. First, to build our sample of PE-backed companies, we use S&P's Capital IQ to identify all PE buyouts with targets in the United Kingdom.<sup>5</sup> Capital IQ is the primary source of PE transactions in recent academic studies.<sup>6</sup> Following prior work, we identify PE transactions by searching for 'leveraged buyout', 'going private', 'management buyout' and 'platform' transactions in Capital IQ. We take all relevant information, such as the transaction date, name(s) and location(s) of buyer/investor(s), transaction value and type of transaction. We exclude venture capital and growth equity deals, as well as any follow-on financings of the same target company by the same PE investor. In order to identify how and when the PE investor exits a deal in each case, we use a variety of resources. We use Capital IQ's merger and acquisition database to search for sales to trade buyers and sales to other PE investors (secondary buyouts). We also use Factiva and manual searches of financial news for acquisitions, initial public offerings and bankruptcies/liquidations involving the target firms. In some cases, we conduct extensive web searches on a deal-by-deal basis to deduce the ultimate outcome of the transaction.

To source companies' financial accounts, we use the FAME database, published by Bureau Van Dijk Electronic Publishing (BvDEP). This database sources historical accounts of companies in the United Kingdom from Companies House, the national UK register. We first download company accounts (balance sheets

<sup>5</sup>We also rely on Thomson Reuters Eikon and Pitchbook to supplement our deal search.

<sup>6</sup>Other authors use this database as a source of PE buyouts (e.g. Bernstein and Sheen, 2016; Bernstein *et al.*, 2019; Faccio and Hsu, 2017; Fang *et al.*, 2013; Fracassi *et al.*, 2022; Jenkinson and Sousa, 2015; Strömberg, 2008).

<sup>4</sup>Haddoud *et al.* (2021) provide a detailed review of the factors that influence export initiation, focusing on managers' characteristics, firms' resources and environmental factors.

and income statements) and static firm information (e.g. industry codes, location and date of incorporation) for all companies in the FAME database for 2000 through to 2020. The next step is to match target firms from our list of transactions from Capital IQ to the FAME database. In order to maximize our matches, we do so manually. An advantage of FAME in this case is that it tracks firms' prior names. If company names differ between our list of transactions from Capital IQ and FAME, we verify that we are tracking the correct company by cross-checking that information such as reported sales, total assets and company address or website are consistent between the two sources. We also use Companies House in this respect. In total, we match 4799 PE buyout target companies from Capital IQ to FAME over a 20-year period.

We also gather data on boardroom changes introduced after target firm acquisition by a PE investor. In particular, we track whether a new board chair or CEO is introduced to the firm by using S&P Capital IQ, Companies House filings, press releases and news articles. We likewise gather information on the background of any new board chair or CEO who is introduced, paying attention to their international background and work experience. We note the nationality of the introduced chair/CEO, whether they have previously worked for a foreign company or have served on the board of a foreign company. To this end, we make use of resources including Capital IQ, BoardEx, LinkedIn and news articles.

Following Bernstein *et al.* (2019), who study PE portfolio company performance during the global financial crisis, we refine our sample based on the timing of the buyout and its exit status at the time of the Brexit vote in 2016. We keep all deals in which the target firm received PE investment before the end of 2015, the pre-Brexit year. We likewise only keep firms that do not experience an exit by the PE firm by the end of 2016. This results in a sample of 1299 PE-backed firms. Our sample period spans from 2012 to 2019 in order to allow us to build a suitable window around the Brexit referendum for our DiD estimation.<sup>7</sup>

#### Creating a matched control sample

To estimate the DiD models, we define a matched control group of non-PE-backed firms, which should be similar to sponsored firms in the pre-Brexit vote year (2015). To construct a control group, we use a matching procedure inspired by Boucly *et al.* (2011) and Bernstein *et al.* (2019). Each matched control company meets the

<sup>7</sup>We end our sample in 2019 because 2020 was characterized by the COVID-19 pandemic, which would bring considerable noise to our results, and which is not the objective of our investigation.

Table 1. Industry distribution of target firms

	Number	Percentage
Agriculture, forestry, fishing	5	0.4%
Mining	8	0.6%
Construction	42	3.0%
Manufacturing	306	23.5%
Transportation and communication	114	8.6%
Wholesale trade	70	5.4%
Retail trade	129	10.0%
Finance, insurance, real estate	156	12.0%
Services	478	36.7%
Public administration	2	0.2%

The table displays the industry distribution of the target companies involved in the buyouts.

following three criteria: (1) it has the same two-digit SIC code as the target firm; (2) it has domestic sales in the pre-Brexit year within a 50% bracket of the target; (3) it has ROA in the pre-Brexit year within a 50% bracket of the target firm.<sup>8</sup>

Using this technique, we match up to five control firms for as many target firms as possible. Where a target generates more than five matches, we retain the five closest matches as measured by the sum of the squares of the difference between the target and the control firm's sales and ROA. Naturally, the choice of percentage bracket involves a trade-off between matching accuracy and finding control firms for as many targets as possible. Using a 50% bracket, we find control firms for 958 of our 1299 PE-backed firms, equating to 72% success in matching.<sup>9</sup> We finish with a sample of 958 PE-backed firms and 4312 control firms.

#### Descriptive analysis

Table 1 shows the industry distribution of the target firms, which tend to be concentrated in the services and manufacturing sectors, similar to other recent work in deal-level PE research (Bernstein *et al.*, 2019; Chung, 2011; Jenkinson and Sousa, 2015). Other important sectors include retail trade and financial services. The industry affiliation of PE-backed portfolio companies is relevant to our work, as the main UK exporting industries are concentrated in the manufacturing and services sectors.

Table 2 presents pre-Brexit descriptive statistics and provides initial evidence that, by construction, our two

<sup>8</sup>In the on-line appendix, we present four alternative matching procedures. First, we match on export sales to isolate any potential PE impact on export activity. Second, we reduce our matching bandwidths from 50 to 30%. Third, we add pre-Brexit leverage along with industry, sales and ROA to our matching criteria. Last, we employ a propensity score-matching technique.

<sup>9</sup>This is similar to the matching success in Bernstein *et al.* (2019), who report a 60% match using a similar matching technique.

Table 2. Descriptive statistics

Variable	PE				Control				Mean-diff
	N	Mean	Median	SD	N	Mean	Median	SD	
Export sales	365	17,394	4,256	69,195	1,238	17,055	4,384	74,333	334
Export intensity	365	0.34	0.21	0.31	1,238	0.36	0.24	0.33	-0.02
Size	958	136,789	20,216	1,006,245	4,312	97,498	15,912	576,633	39,291
Sales	943	77,747	22,717	220,898	3,894	64,938	15,042	196,979	12,809*
ROA	958	0.04	0.05	0.17	4,312	0.05	0.05	0.17	-0.01
Earnings	954	0.11	0.10	0.18	4,217	0.10	0.09	0.18	0.01
Leverage	764	0.69	0.65	0.37	3,040	0.67	0.63	0.38	0.02
Cash flow	926	0.08	0.08	0.15	3,858	0.08	0.07	0.18	0.00
Productivity	790	55.61	42.15	48.61	2,618	60.26	43.85	63.23	-4.65

The table reports summary statistics for the pre-Brexit year across PE-backed companies and control firms. *PE-backed* refers to all PE-backed companies. *Control* refers to a sample of non-PE-backed firms, matched on their two-digit SIC code, domestic sales and ROA (net income/total assets) within a 50% bracket in the pre-Brexit year (2015). *Export sales* is the value of export sales. *Export intensity* is exports as a percentage of total sales. *Size* is total assets, measured in thousands of pounds. *Sales* is total firm sales. *Earnings* is earnings before interest, taxes, depreciation and amortization (EBITDA), normalized by total assets. *ROA* is the ratio of net income to total assets. *Leverage* is the ratio of total debt to total assets. *Cash flow* is net income plus depreciation and is scaled by total assets. *Productivity* is value added per employee. All ratios are winsorized at the 1% level.

Table 3. Growth rates

Variable	PE				Control				Mean-diff
	N	Mean	Median	SD	N	Mean	Median	SD	
Export sales	284	0.46	0.13	1.57	950	0.40	0.09	1.31	0.06
Export intensity	284	0.26	0.01	1.07	950	0.21	0.00	0.91	0.05
Size	913	0.46	0.17	1.18	3998	0.44	0.13	1.21	0.02
Sales	819	0.26	0.14	0.64	3339	0.23	0.09	0.66	0.03
ROA	839	-0.20	-0.27	3.64	3712	-0.12	-0.22	4.01	-0.08
Earnings	833	-0.22	-0.17	2.28	3609	-0.16	-0.11	2.53	-0.06
Leverage	648	0.01	-0.01	0.34	2506	0.00	-0.02	0.31	0.01
Cash flow	853	2.69	-0.02	12.97	3442	3.21	0.00	14.69	-0.52
Productivity	665	0.06	0.01	0.54	2172	0.06	0.03	0.60	0.00

The table displays 2-year pre-Brexit growth rates for firm level variables across treated PE-backed and control firms. *PE-backed* refers to all PE-backed companies. *Control* refers to a sample of non-PE-backed firms, matched on their two-digit SIC code, total sales and ROA (net income/total assets) within a 50% bracket in the pre-Brexit year (2015). *Export sales* is the value of export sales. *Export intensity* is exports as a percentage of total sales. *Export intensity* is foreign sales as a percentage of total sales. *Size* is total assets, measured in thousands of pounds. *Sales* is total firm sales. *Earnings* is earnings before interest, taxes, depreciation and amortization (EBITDA), normalized by total assets. *ROA* is the ratio of net income to total assets. *Leverage* is the ratio of total debt to total assets. *Cash flow* is net income plus depreciation and is scaled by total assets. *Productivity* is value added per employee. All growth rates are winsorized at the 1% level.

groups of matched firms share similar characteristics in the pre-Brexit period. The distribution of profitability (ROA) and leverage is very similar across both groups, as is size (measured by total assets), cash flow and earnings. The mean value of sales is also close, with very little difference between each group. Similarly, there are no statistically significant differences between export levels and firm productivity in the pre-Brexit period.

The DiD estimation dictates examining the assumption of pre-Brexit parallel trends. Therefore, we explore whether this assumption holds in a set of observables in Table 3. To this end, we compare 2-year growth rates ending in 2015 for the main firm-specific characteristics and find that the differences in the growth rates between matched and control groups are not significantly different from zero.

## Empirical model

### Extensive margin of export

We begin our empirical investigation by testing whether, following Brexit, PE buyout targets are more likely to become exporters relative to the control group by estimating:

$$\text{Prob}(\text{EXP}_{ft} > 0) = \alpha_t + \alpha_f + \beta_1 \text{PE}_f * \text{Post}_t + \beta_2 \mathbf{X}_f * \text{Post}_t + \varepsilon_{ft} \quad (1)$$

where  $f$  is a firm index and  $t$  is a year index. The dependent variable  $\text{EXP}_{ft}$  is a dummy variable that equals one if firm  $f$  has a positive amount of exports in year  $t$ , and zero otherwise.  $\text{PE}_f$  is a dummy variable that

equals one for PE-backed companies, and zero for the control group.  $Post_t$  is a dummy variable that equals one for observations in the post-Brexit period of 2016–2019, and zero in the pre-Brexit years of 2012–2015. In line with the literature, we estimate both linear probability and probit models based on the above specifications (see Greenaway *et al.*, 2007; Minetti and Zhu, 2011; Muûls, 2015). The model also includes year fixed effects,  $\alpha_t$ , and firm fixed effects,  $\alpha_f$ , which absorb the  $PE_f$  and  $Post_t$  dummies. To deal with serial correlation, we cluster standard errors at the firm level.

We also construct several firm-level control variables to control for pre-Brexit heterogeneity in firm-level characteristics (captured by vector  $X_f$  in Equation (1)). In particular, following Bernstein *et al.* (2019), we control for firm size (total assets), cash flow scaled by total assets, leverage, profitability (ROA) and earnings (earnings before interest, taxes, depreciation and amortization, EBITDA), normalized by assets. Including such controls helps to alleviate any concerns regarding any differences between the treated and control samples in the pre-buyout period.<sup>10</sup>

The coefficient of interest in Equation (1) is  $\beta_1$ , which measures the difference in the probability to starting to export between the target and control firms in the post-Brexit period. Because the matching ensures that treated and control firms are alike before Brexit, we attribute any post-Brexit differences to the effect that PE investors exert on their portfolio companies. A positive coefficient on  $\beta_1$  supports H1a, indicating that PE firms help their portfolio companies to become exporters in the aftermath of Brexit.

### Intensive margin of export

In this subsection, we explore whether, following Brexit, the value of firms' exports and their exporting intensity are affected by being backed by a PE sponsor. To do so, we use a standard DiD approach to estimate the changes in firm-level exporting after Brexit for buyout transactions, relative to changes at control firms. Our baseline specification is

$$y_{ft} = \alpha_t + \alpha_f + \beta_1 PE_f * Post_t + \beta_2 X_f * Post_t + \varepsilon_{ft} \quad (2)$$

where the dependent variable is the log of export value or export sales as a percentage of total sales. The rest of the control variables are the same as those in Equation (1). The main coefficient of interest is again  $\beta_1$ , which captures the estimated change in PE targets' exporting from before Brexit to after Brexit, relative to

control firms. A positive coefficient reveals that, following Brexit, PE buyouts boost 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-Brexit growth in exporting. This assumption is validated by the summary statistics for pre-Brexit growth rates shown in Table 3 – and discussed in detail in the previous section 'Data and descriptive statistics'. We can, therefore, interpret that any differences after Brexit relate to the changes brought about as a result of the buyout. Support for H1b is reflected in a positive coefficient for the  $PE_f * Post_t$  interaction.

### The governance channel

To test our remaining hypotheses and assess the governance channel, we specify the following regression models:

$$\begin{aligned} \text{Prob}(\text{EXP}_{ft} > 0) = & \alpha_t + \alpha_f \\ & + \beta_1 PE_f * Post_t * \text{MgtTurnover}_f \\ & + \beta_2 PE_f * Post_t + \beta_3 Post_t * \text{MgtTurnover}_f \\ & + \beta_4 X_f * Post_t + \varepsilon_{ft} \quad (3) \end{aligned}$$

$$\begin{aligned} y_{ft} = & \alpha_t + \alpha_f + \beta_1 PE_f * Post_t * \text{MgtTurnover}_f \\ & + \beta_2 PE_f * Post_t + \beta_3 Post_t * \text{MgtTurnover}_f \\ & + \beta_4 X_f * Post_t + \varepsilon_{ft} \quad (4) \end{aligned}$$

The  $\text{MgtTurnover}_f$  variable equals one if the firm experiences a change in board chair or CEO after being acquired by PE, and it equals zero otherwise. Our attention is focused on the triple interacted term which measures whether portfolio firms falling in the  $\text{MgtTurnover}_f = 1$  category improve exporting both at the intensive and the extensive margins following Brexit compared to non-sponsored firms in the pre-Brexit period. Positive coefficients on both  $PE_f * Post_t$  and  $PE_f * Post_t * \text{MgtTurnover}_f$  support H1 and H2. This would imply that PE and exporting are positively related, but more so for firms which experience more significant changes in their board-level governance. The remaining control variables and fixed effects remain unchanged.

In further analysis, we focus on the subsample of firms where the PE investor instigates boardroom changes and introduces a new CEO or board chair to the target firm. Specifically, we explore whether the international experience of the chair/CEO introduced to the target firm after its PE acquisition impacts on its

<sup>10</sup>In untabulated regressions, we control for contemporaneous values of our financial health controls. Our results remain unchanged.



export behaviour in the face of Brexit:

$$\begin{aligned} \text{Prob}(\text{EXP}_{ft} > 0) = & \alpha_t + \alpha_f \\ & + \beta_1 \text{PE}_f * \text{Post}_t * \text{IntExp}_f + \beta_2 \text{PE}_f * \text{Post}_t \\ & + \beta_3 \text{Post}_t * \text{IntExp}_f + \beta_4 X_f * \text{Post}_t + \varepsilon_{ft} \end{aligned} \quad (5)$$

$$\begin{aligned} y_{ft} = & \alpha_t + \alpha_f + \beta_1 \text{PE}_f * \text{Post}_t * \text{IntExp}_f \\ & + \beta_2 \text{PE}_f * \text{Post}_t \\ & + \beta_3 \text{Post}_t * \text{IntExp}_f + \beta_4 X_f * \text{Post}_t + \varepsilon_{ft} \end{aligned} \quad (6)$$

The  $\text{IntExp}_f$  variable equals one if the chair or CEO introduced to the target firm by the PE investor is foreign, or has prior experience of working for a foreign company or has served on the board of a foreign company, and zero otherwise. In doing so, we attempt to capture the prior international experience of the boardroom personnel brought into the target firm (Conyon et al., 2019; Oxelheim et al., 2013; Wilson et al., 2022). A positive coefficient on the  $\text{PE}_f * \text{Post}_t * \text{IntExp}_f$  interaction would support H3 as it would suggest that the positive impact of PE ownership on firm exporting after Brexit is stronger where the CEO or chair introduced to the firm has more prior international experience.

## Results

### Extensive margin of export

We start our empirical investigation by examining whether companies backed by PE investors were better able to weather Brexit compared to non-sponsored firms.<sup>11</sup> Specifically, we test whether the difference in the probability of exporting in the post-Brexit period is greater for PE-backed firms relative to control firms. In Table 4, we report coefficient estimates and standard errors clustered at the firm level. In each specification, we include firm fixed effects to remove time-invariant characteristics of the control and treatment firms, as well as year fixed effects to control for business cycle changes.

In column 1, we show the results of a linear probability model, supporting the idea that PE ownership positively and significantly affects firms' probability of exporting around Brexit. This is reflected in the positive sign of the key variable of interest, namely the interaction between the firm level dummy  $\text{PE}_f$  and the time-period dummy  $\text{Post}_t$  ( $\text{PE}_f * \text{Post}_t$ ). The effect is economically significant. The probability of entering the export market increases by 2.2 percentage points in the post-Brexit period. Our main finding is robust when we add firm level controls, as we show in column 2. Moreover,

<sup>11</sup>We put our findings through a battery of checks in order to investigate their robustness. We do not report them due to space constraints, but they are available in the on-line appendix.

Table 4. Extensive margin of export

	Linear probability		Probit	
	(1)	(2)	(3)	(4)
PE*Post	0.022** (0.010)	0.018** (0.011)	0.221*** (0.090)	0.188** (0.098)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	42,160	42,160	42,160	42,160

We estimate specifications in columns 1 and 2 using a linear probability model, and in columns 3 and 4 using a probit model. The dependent variable is a dummy variable equal to one for firm-year observations where export sales exceed zero, and zero otherwise. PE is a dummy variable equal to one for PE-backed firms, and zero for control firms. Post is a dummy variable equal to one for post-Brexit years, and zero otherwise. Columns 2 and 4 include firm level controls taken in the pre-Brexit year and are interacted with the Post variable. Firm controls include sales, cash flow, earnings, leverage and profitability (ROA). Standard errors, reported in parentheses, are clustered at the firm level. \*\*\* denotes statistical significance at the 1% level, \*\* denotes the 5% level and \* denotes the 10% level.

the results hold when we estimate the equations with a probit model in columns 3 and 4.

We conclude that PE buyouts positively affect the extensive margin of exporting in the face of Brexit. These findings provide strong support for H1a and the idea that PE investors can add value to portfolio companies, helping them to grow and expand by providing resources to overcome the liability of foreignness – and become more resilient to economic uncertainty, relative to non-sponsored peers (see Bernstein et al., 2019; Wilson et al., 2012).

### Intensive margin of export

We now turn our attention to the impact of PE ownership on the intensive margin of exporting. Specifically, we examine how PE buyouts affect foreign sales and exporting intensity (i.e. foreign sales as a share of total firm sales) after Brexit. To explore the role of PE investors in alleviating the unexpected shock in portfolio firms, we estimate DiD models and present the results in Table 5. In columns 1 and 2, the dependent variable is the logarithm of the value of export sales; in columns 3 and 4, it is the ratio of export sales to total sales.<sup>12</sup>

We focus on the sign and significance of the double-interaction term ( $\text{PE}_f * \text{Post}_t$ ), which reveals whether PE-backed firms are more likely to have a higher export value and exporting intensity compared to our sample of control firms during the post-Brexit period. We find that, following Brexit, the intensive margin of exporting is more sensitive for sponsored firms. Specifically, we

<sup>12</sup>In this exercise, we examine only companies that export, hence the lower number of observations relative to Table 4.

Table 5. Intensive margin of exporting

	LogExport		Export intensity	
	(1)	(2)	(3)	(4)
PE*Post	0.101** (0.042)	0.095** (0.043)	0.010** (0.003)	0.009** (0.003)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	11,979	11,979	11,979	11,979

We estimate all specifications using a difference-in-differences estimator. The dependent variables are the log value of exports (columns 1 and 2), and the ratio of export sales to total sales (columns 3 and 4). PE is a dummy variable equal to one for PE-backed firms, and zero for control firms. Post is a dummy variable equal to one for post-Brexit years, and zero otherwise. Columns 2 and 4 include firm level controls taken in pre-Brexit year and are interacted with the Post dummy. Firm controls include sales, cash flow, earnings, leverage and profitability (ROA). Standard errors, reported in the parentheses, are clustered at the firm level. \*\*\* denotes statistical significance at the 1% level, \*\* denotes the 5% level and \* denotes the 10% level.

find a positive and highly significant coefficient on the double-interaction term  $PE_f * Post_t$ , which implies that PE-backed firms increase the value of their export sales by approximately 10 percentage points, relative to similar non-PE-backed firms after Brexit. When we control for firm level covariates in the pre-Brexit period, the statistical significance and economic magnitude of our baseline coefficient are barely affected (column 2). Considering exporting intensity, in columns 3 and 4, we likewise detect a significant effect of PE ownership on the share of export sales to total sales. In particular, we find that exports as a share of total firm sales among buyout targets increase by around 1% more than in matched control firms post-Brexit. Once again, this is robust to the inclusion of firm controls.

In summary, our results provide strong empirical support for H1b, as we observe that PE-backed firms sell more abroad and have a higher exporting intensity relative to similar non-PE-backed firms after Brexit. As know-how is a key resource for business, our findings suggest that PE investors may provide financial and active strategic support to help companies accelerate their growth (Lerner *et al.*, 2012) and overcome the risks associated with Brexit uncertainty.

As a result, investors can bring expertise and experience in overseas markets, as well as act as a source of knowledge transfer for their portfolio companies, allowing them to reap the benefits of PE sponsorship via international expansion.

### Board changes

To test H2, we assess how a change in board governance affects portfolio firms' exporting during Brexit. The results are given in Table 6. In column 1, we present a

specification that includes a dummy for the introduction of a new board chair or CEO. We find that PE-backed firms experiencing a change in their governance structure are more likely to engage in exporting relative to those without a change. The effect is strong in statistical significance and economic magnitude, as is evident in the triple-interaction term ( $PE_f * Post_t * MgtTurnover_f$ ). Specifically, when the PE investor introduces a new board chair or CEO to the target firm, the probability of exporting increases by approximately two percentage points after Brexit relative to their counterparts. This result remains unchanged once we introduce firm controls in column 2. Finally, the value of exports and export intensity, examined in columns 3–6, displays similar results.

Overall, these analyses suggest that having boards composed of PE-led directors with skills and expertise improves governance by giving target management teams new capabilities to grow internationally. We document that the positive impact of PE ownership on firm exporting during Brexit uncertainty is stronger in portfolio companies where the acquiring PE investor introduces new senior board personnel. Most important, we show that well-structured boards can better weather periods of uncertainty, including Brexit.

### Managers' international experience

We now consider whether chairs and CEOs with foreign experience, as measured by their nationality and whether or not they have previously worked for a foreign company or served on the board of a foreign company, can improve firms' exporting after Brexit. We estimate Equations (5) and (6) and present the estimates in Table 7. In columns 1 and 2, we find that firms which replace their chairs/CEO after the buyout with managers with international experience, are more likely to initiate exporting compared to their counterparts during the post-Brexit period. This is evident from the coefficient of the triple-interaction term ( $PE_f * Post_t * IntExp_f$ ), which is positive and statistically significant. The effect is not only statistically significant, but also it is economically important. Specifically, when the PE investor introduces a board chair or CEO who has prior international experience, the probability of exporting increases by over three percentage points after Brexit relative to their counterparts. In the remaining columns, we find weaker evidence that the positive effect of being backed by PE is stronger for firms with chair or CEO having international experience at the intensive margin of exports.

To sum up, the presence of senior board directors with international experience and capabilities has a positive impact on a firm's ability to grow internationally

Table 6. Governance channel

	Exporting dummy		LogExport		Export intensity	
	(1)	(2)	(3)	(4)	(5)	(6)
PE*Post*MgtTurnover	0.020** (0.008)	0.019** (0.008)	0.072*** (0.014)	0.069*** (0.015)	0.013** (0.004)	0.012** (0.004)
PE*Post	0.036** (0.017)	0.033** (0.018)	0.059* (0.039)	0.060 (0.044)	0.016* (0.009)	0.015* (0.009)
Post*MgtTurnover	-0.010 (0.011)	-0.012 (0.013)	-0.015 (0.023)	-0.017 (0.025)	-0.003 (0.008)	-0.004 (0.009)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	28,872	28,872	8,582	8,582	8,582	8,582

We estimate specifications in columns 1 to 2 using a linear probability model, and columns 3–6 using a difference-in-differences estimator. The dependent variables are a dummy variable equal to one for firm-year observations where export sales exceed zero, and zero otherwise (columns 1 to 2), the log value of exports (columns 3 and 4) and the ratio of export sales to total sales (columns 5–6). *PE* is a dummy variable equal to 1 for PE-backed firms, and zero for control firms. *Post* is a dummy variable equal to one for post-Brexit years, and zero otherwise. *MgtTurnover* is a dummy variable that takes the value one if the PE investor introduces a new chair of the board or CEO to the target firm, and zero otherwise. Columns 2, 4 and 6 include firm level controls taken in the pre-Brexit year and are interacted with the *Post* dummy. Firm controls include sales, cash flow, earnings, leverage and profitability (ROA). Standard errors, reported in parentheses, are clustered at the firm level. \*\*\* denotes statistical significance at the 1% level, \*\* denotes the 5% level and \* denotes the 10% level.

Table 7. Foreign experience of new senior management

	Exporting dummy		LogExport		Export intensity	
	(1)	(2)	(3)	(4)	(5)	(6)
PE*Post*IntExp	0.031** (0.012)	0.033** (0.013)	0.041* (0.027)	0.036 (0.030)	0.018** (0.008)	0.016* (0.009)
PE*Post	0.019** (0.009)	0.018* (0.009)	0.040 (0.037)	0.036 (0.038)	0.015 (0.011)	0.014 (0.011)
Post*IntExp	-0.027 (0.029)	-0.025 (0.030)	-0.033 (0.041)	-0.035 (0.044)	-0.002 (0.002)	-0.002 (0.003)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	21,320	21,320	6,412	6,412	6,412	6,412

We estimate specifications in columns 1 to 2 using a linear probability model, and columns 3–6 using a difference-in-differences estimator. The dependent variables are a dummy variable equal to one for firm-year observations where export sales exceed zero, and zero otherwise (columns 1 to 2), the log value of exports (columns 3 and 4) and the ratio of export sales to total sales (columns 5 and 6). *PE* is a dummy variable equal to one for PE-backed firms, and zero for control firms. *Post* is a dummy variable equal to one for post-Brexit years, and zero otherwise. *IntExp* is a dummy variable that takes the value one if the new chair of the board or CEO introduced to the target firm is foreign or has previously worked for a foreign company or served on the board of a foreign company. Columns 2, 4 and 6 include firm level controls taken in pre-Brexit year and are interacted with the *Post* dummy. Firm controls include sales, cash flow, earnings, leverage and profitability (ROA). Standard errors, reported in the parentheses, are clustered at the firm level. \*\*\* denotes statistical significance at the 1% level, \*\* denotes the 5% level and \* denotes the 10% level.

during the post-Brexit period, in particular at the extensive margin of export (i.e. to help firms initiate exporting). We find evidence that targets with internationally experienced board chair/CEO exhibit a greater sensitivity of post-Brexit growth in exporting to PE ownership.

## Conclusion

### Discussion

A large and growing set of studies measure how PE investment affects firm performance. Our study builds on these foundations, focusing on PE buyouts and their effect on target firms' export performance. We examine the exporting decisions of these firms in the wake of Brexit, aiming to understand whether PE dampens the economy's sensitivity to major economic shocks.

Our results from a panel of 958 PE-backed firms and 4312 control firms from 2012 to 2019 show that PE investment leads to improvements in exporting, relative to matched control firms, in the aftermath of the Brexit vote. This effect holds for both the intensive and the extensive margin of export. We further uncover significant heterogeneity at the firm level. We show that improvements in portfolio firm exporting are stronger when greater governance changes occur on the target firm board, and in particular when the PE investors introduce senior directors with greater prior international experience to the firm.

### Managerial implications

The resulting implications are important for managers and finance practitioners. Specifically, exporting provides many benefits to firms, including a higher likelihood of survival amid downturns. By helping their portfolio companies to increase their exports, PE firms thus insulate them from the adverse effects of the Brexit referendum shock. This is more relevant than ever under the new Trade and Cooperation Agreement (TCA), which

came into force at the start of 2021 and caused a rise in trade barriers.

### Limitations and avenues for future research

Our data pool together exporters and non-exporters. However, it is possible that certain segments of the exporting markets have responded more favorably than others to the referendum shock. Further research on the role of PE investment in firms' export activities is warranted, exploiting the introduction of the TCA as a quasi-natural experiment and using transaction-level export data for the universe of exporters in the United Kingdom. Such analysis is likely to provide more insights on heterogeneous responses to the shock across exporters.

Moreover, in this study, we focused our attention on the governance channel by exploiting managers' international experience as an important trait to explain how PE adds value to international growth. Future research should consider the relationship between the educational background of management teams and their firms' exporting performance. For example, institutional quality, individual performance and academic variety of directors are three potential channels that can influence firms' exporting status.

Finally, we used two indicators of managers' international experience, but it would be interesting in future studies to incorporate alternative measures of directors' international experience (e.g. the length of directors' international assignments). This distinction could provide insights about the intensity of the governance channel documented in the present study.

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