Essays on Private Equity Buyouts

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1 Abstract

This thesis consists of three independent essays on the consequences of and market for private equity buyouts. The introduction provides a brief outline of the growth of buyout markets in recent decades and the conclusion summarises the main findings.

The first essay examines the exporting behaviour of buyout target firms relative to control firms. We build a data set of over 1,400 buyouts in the UK from 2004 to 2017 and using a difference-in-differences approach, estimate the effect of private equity ownership on target firms' exporting activities at the extensive and intensive margin, relative to a sample of carefully matched control firms. The results show that: (a) private equity ownership increases the probability of firms exporting (the extensive margin of trade); (b) private equity ownership increases the value of firms exports (the intensive margin of trade); (c) private equity ownership increases the exporting intensity of firms (the ratio of export sales-to-total sales). Our consequent findings indicate private equity investors' ability to alleviate financing constraints of companies, as our results are amplified where the target company is more likely to be in a constrained position. Along similar lines, target firms' exporting is found to have been more resilient during the global financial crisis. To explain our findings, we postulate that improvements to target firms' working capital management allows them to overcome the associated costs of exporting. Our results support this hypothesis: the working capital of buyout targets improves significantly relative to control firms.

In an attempt to better understand how banking sector shocks can be transmitted onto the real economy, the second essay examines bank-affiliated private equity buyouts and studies how portfolio companies respond to external shocks affecting their parent banks. In particular, we assess how the 2011 European Banking Authority (hereafter EBA) Capital Exercise impacted the portfolio companies of the private equity arms of affected and unaffected banks. Our results imply that the shock came with associated real effects: the portfolio companies associated with the private equity arms of affected banks experienced weaker investment and financing at the onset of the shock. These companies were consequently found to under-perform the portfolio companies of unaffected banks. The effects are heterogeneous in two ways: first, the negative effect on portfolio company performance is stronger for companies which were more likely to be constrained at the onset of the shock. Second, the effect is found to be stronger on portfolio companies whose private equity owner is less experienced.

The last essay investigates the importance of capital market development for international buyout activity. Given the evidence of the diverse range of industry- and firm-level benefits of buyout investment, studying the stimulants of an active buyout market merits attention. Robust to a battery of checks, our findings strongly suggest that well-developed stock and credit markets are an important driver of buyout activity. We show that that capital market development is more important to buyout investment relative to other types of international investment flows. Lastly, we underline the importance of countries' institutional environments for their buyout market activity. The positive effect of capital market development on buyout capital is significantly stronger in country-years with lower legal and political risk.

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2 Acknowledgements

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3 Author's Declaration

"I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution."

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4 Introduction

In 1989, Michael Jensen famously predicted that by the end of the twentieth century, publicly-listed equity would be "eclipsed" by private equity, arguing that private equity involved a superior form of ownership for companies (Jensen (1989)). Whether this is true or not remains the subject of much academic debate, but irrespective of one's belief, Jensen's prediction appears to be materialising. Private equity investment as a form of financing has increased spectacularly over the last three decades. Global private equity investment has increased from under $10 billion per year in the early 1990s to over $100 billion in 2017 (Aldatmaz et al. (2020)). The US and the UK dominate the scene, accounting for around 70% of the market in 2017. However, this figure has fallen from being close to 100% in the early 1990s underlining the growth of the asset class and its market on a global scale, as private equity investment has become a more mainstream form of financing across countries.

Similarly consistent with Jensen's prediction, there has been a concurrent marked decline in the number of publicly quoted companies in both the UK and the US (Gao et al. (2013), Doidge et al. (2018)). Aldatmaz et al. (2020) report that the number of listed companies in the UK and the US fell from around 10,000 in 1997 to around 6,5000 in 2017. Reasons for this decline in public listings may be linked to the proliferation of forms of private financing available to SMEs and 'growth' companies, resulting in companies staying private for longer, or, forever (Doidge et al. (2018), Ewens and Farre-Mensa (2019)). Another reason may reflect a change in private equity buyout strategy. When Jensen initially made his prediction, the typical private equity buyout involved taking a large listed company private, and in doing so, addressing an 'overinvestment' problem. The infamous leveraged buyout of RJR Nabisco characterized the early boom in private equity dealmaking (Burrough and Helyar (1989). However, more recently, private equity investors have evolved to target smaller, private companies, where they may be able to help companies address an 'underinvestment' problem [1]. In this part of the market, private equity is arguably offering an alternative to quoted equity markets for companies that have never been listed before (Morris and Phalippou (2020)).

Focusing on the UK alone, the growth of the buyout market is illustrated in Figure 1, where we graph the number of buyouts per year from 1990 to 2018[2]. Buyout activity

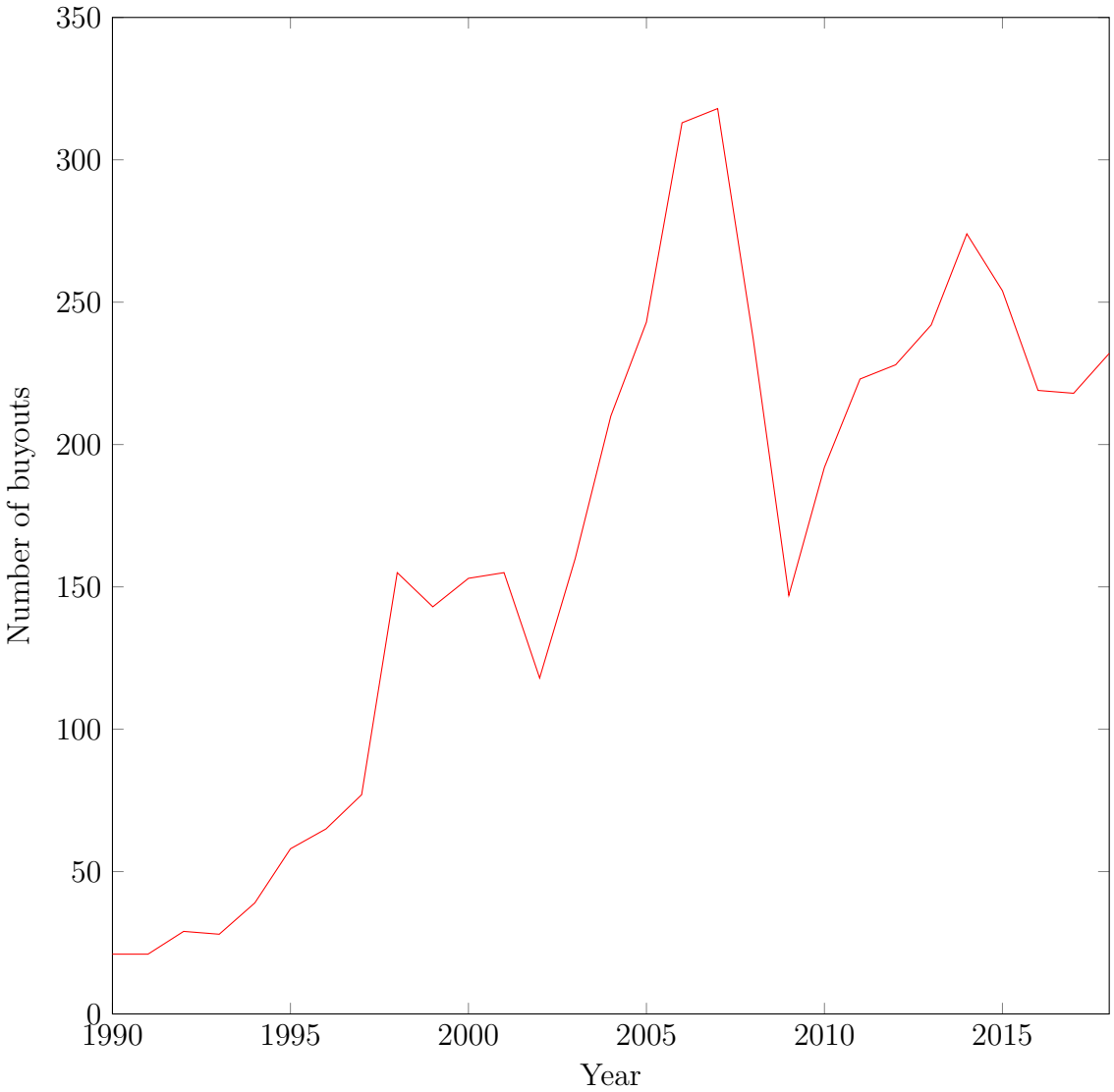
[1] Consistent with this, recent empirical evidence has suggested that private equity firms may be able to mitigate financing constraints facing their portfolio companies (Boucly et al. (2011), Bernstein et al. (2019)).

[2] It should be noted that Capital IQ's coverage of buyout transactions is weaker in the early 1990s. Capital IQ began tracking global private equity transactions in 1999 and through extensive

is cyclical, with declines during the dot com boom of the early 2000s and the global financial crisis notable. To shed light on the importance of private equity-backed companies to the UK economy, the leading UK industry body for private capital, the BVCA, estimates that 2,980 companies in the UK are currently backed by buyout and venture capital investors. With regards to employees, this amounts to around 840,000 people working for companies which are under private equity ownership[3].

Figure 1: UK buyouts 1990 - 2018

This graphs the number of private equity buyouts of UK companies annually from 1990 to 2018. Data comes from S&P's Capital IQ database.



research, has attempted to 'backfill' transaction data prior to 1999.

[3] https://www.ft.com/content/809cb691-f4f9-48e8-80f8-2cfd08c14106

The aim of this thesis is to help increase our understanding of the consequences of private equity buyouts at the firm-level, and the drivers of buyout activity at the aggregate-level. Specifically, at the target firm-level, in Chapter 1 we examine the behaviour of target firms and how they respond to being bought-out by private equity investors, and how their behaviour differs to that of firms which do not receive private equity backing. In particular, we study the exporting behaviour of firms, which to date, has been neglected by prior research. We build a data set of over 1,400 buyouts in the UK from 2004 to 2017 and using a difference-in-differences approach, estimate the effect of private equity ownership on target firms' exporting activities at the extensive and intensive margin, relative to control firms. Our sample of control firms is constructed by matching each buyout target to similar non-backed firms in the pre-buyout year. In order to ensure a sample of control firms which are similar in nature in the pre-buyout period, we match firms across their industry, size, profitability and leverage. Our results are striking: private equity ownership increases firms' exporting at the extensive margin (ie. the probability of exporting) and the intensive margin (ie. the value of exports). Moreover, the exporting intensity of firms (the ratio of export sales-to-total sales) similarly increases relative to control firms. We then extend the analysis to provide evidence of private equity investors alleviating financing constraints facing their portfolio companies: the growth in exporting is found to be stronger for firms which were ex-ante more likely to be constrained in the pre-buyout period. In particular, smaller firms, firms with higher leverage ratios and targets of private-to-private deals all exhibit greater post-buyout growth. In subsequent analysis, we show that private-equity backed firms' exporting was more resilient in the face of the global financial crisis relative to non-sponsored firms' exporting. Finally, we ask why private equity-backed firms may be able to increase their exporting relative to similar unsponsored firms. We postulate that improvements to their working capital management allow them to overcome the various fixed and variable costs associated with exporting. Our results support this hypothesis: the working capital of buyout targets improves significantly relative to control firms.

In Chapter 2, we turn our attention to buyout transactions where banks act as private equity investors themselves. In the case of these bank-affiliated private equity buyouts, where the investor is owned by a parent bank, we investigate how target firms respond to an external shock to the parent bank of their private equity owner. In order to do so, we exploit the Capital Exercise conducted by the European Banking Authority (EBA) in 2011, where selected banks had to increase their core tier 1 capital (CT1) ratios to 9% of their risk-weighted assets by June 2012. The exercise

was unexpected in both its magnitude and its timing. Our empirical analysis focuses on a sample of over three hundred companies backed by the private equity arms of different European banks. In a difference-in-differences setting, we examine how the financing and performance of these companies was affected at the onset of the EBA Capital Exercise. We first show that companies affiliated to affected banks reduced their investment by between 5% to 8% relative to companies receiving investment from private equity arms of unaffected banks; a result that is strongly significant when controlling for various fixed effects and firm-level covariates. Moreover, when we look at the timing of the effects, the two sub-samples of companies' investment levels did not significantly differ in the pre-shock period, but diverged from 2011, the year of the shock. We then consider the financing of the portfolio companies and show that equity and debt issuance was lower for companies linked to affected banks. The results suggest that there is a knock-on effect of the shock to the parent bank to the portfolio companies of its private equity arm. We then exploit firm-level heterogeneity and find that the negative impact of the shock on affected banks' portfolio companies' performance is stronger for companies who were ex-ante more likely to be financially constrained at the onset of the shock. This is consistent for various measures of financial constraints, such as dependence on bank finance, size, leverage and companies located in the countries most severely affected by the concurrent sovereign debt crisis in Europe. Lastly, we show that the negative effect on the performance of portfolio companies was stronger for companies of less experienced private equity investors.

Lastly, we examine the role of capital markets and political stability and their importance for international buyout markets at the macro-level in Chapter 3. Using a sample of 34 European countries from 2007 to 2019, we assess the role of stock and credit market activity in stimulating buyout markets and find robust evidence that active international buyout markets depend on well-developed capital markets. This finding is robust to several model and sample re-specifications. Furthermore, to account for the fact that active capital markets may be similarly important for other forms of investment flows into countries and that buyout investment may be no different to these other investment flows, we scale buyout investment relative to other important international capital flows and our findings remain intact. Finally, we explore the importance of political and legal risks for international buyout capital. We find that the positive association between well-developed capital markets and buyout activity is prevalent in country-years exhibiting lower levels of political and legal risk, implying that countries' institutional setting is important in determining the size of its buyout market.

5 Chapter - Private equity buyouts & firm exporting

5.1 Background

Understanding the role of private equity (PE) investment when it comes to the performance of firms has been an important aspect of corporate finance literature in the past three decades. To date, there is a substantial body of literature which documents enhanced operating performance of portfolio companies of private equity firms in the US (Kaplan (1989), Guo et al. (2011), Acharya et al. (2012), Fracassi et al. (2018), Cohn et al. (2020)) and in Europe (Boucly et al. (2011), Chung (2011), Biesinger et al. (2020)). Moreover, there is evidence of improvements to target firms' productivity (Harris et al. (2005)), investment in innovation (Lerner et al. (2011)) and increases in employment (Davis et al. (2014), Lerner et al. (2019)). Private equity-backed companies are also been found to be more recession-resistant relative to other firms (Bernstein et al. (2019)). More recently, studies suggest that private equity investors can help run cleaner, safer businesses with fewer health violations (Bernstein and Sheen (2016)), that buyouts can lead to reduced workplace injury rates and fewer safety violations (Cohn et al. (2019)) and lastly, that target firms can be more environmentally-friendly (Bellon (2020)).

These studies, however, remain largely silent about the role of private equity investment in firms' exporting activities. This paper provides novel evidence on the channels through which private equity investment impacts portfolio companies' exporting both at the intensive and the extensive margin. We examine whether being backed by a private equity investor encourages companies to expand into international markets and we study their ensuing behaviour in export markets. Firms' exporting merits special attention as there exists an abundance of literature attributing varied and diverse benefits to firms which export, relative to non-exporting firms. Evidence suggests that exporting improves firms' financial health (Greenaway et al. (2007)) and that exporters have a higher probability of survival relative to non-exporters (Bernard and Jensen (1999a)); something which is particularly pertinent today, as firms continue to struggle for survival amid the economic crisis brought about by the global COVID-19 pandemic. Exporting is also associated with a more efficient reallocation of resources which can contribute to industry productivity growth (Bernard and Jensen (1999b)). Finally, there exists benefits at the employee-level, as considerable evidence suggests that exporting firms pay higher wages than non-exporting firms (Bernard et al. (1995), Schank et al. (2007)).

Nevertheless, there is limited empirical evidence explaining how important changes in the organizational structure of firms can be for their international expansion and exporting activities. We argue that providing such evidence is important as it adds a new dimension to help improve our understanding of the channels through which private equity investors are able to help firms grow. Specifically, it sheds light on portfolio company growth at the previously unexplored international level. A deeper understanding of the firm-level effects of private equity investment is of paramount importance today, as the industry currently sits on an unprecedented amount of uninvested capital (estimated to be around $1.5tn in January 2020 according to data from Preqin) and is in the midst of a fundraising boom, both of which imply investors are likely to increase levels of investment in the near future. Moreover, there has been an ongoing debate in the US related to the 'Stop Wall Street Looting' act which was unveiled by Elizabeth Warren, a US senator, in response to a number of high-profile buyouts which ended in businesses failing and left employees and pensioners in a perilous state [4]. The reform aims to hold private equity investors accountable for the debt burdens of their portfolio companies, and would ultimately force investors to reconsider how they structure buyout transactions. In light of this ongoing debate and the unprecedented level of uninvested capital held by private equity investors, it is therefore fundamentally important to have a clear understanding as to the firm-level changes and consequences for firm behaviour brought about by the organizational change experienced in private equity buyouts.

Our empirical work is based on an assessment of the probability that a firm will initiate exporting and investigating the impact of private equity buyouts on the value and intensity of firm-level exports. We merge data from Standard and Poor's (S&P) Capital IQ and Bureau van Dijk's FAME database in order to link private equity transaction data with firm-level accounting data for over 1,400 buyout targets in the UK from 2004 to 2017. We carry out a difference-in-differences analysis to estimate how private equity investment affects firms' exporting status. On this basis, we define two groups of firms: treated firms with PE-backed investment and a matched sample of non-private equity-backed control firms. The latter group of firms is matched to our sample of buyout targets across four key areas: they operate within the same two-digit SIC industry, and they are of a similar size, profitability and leverage in the pre-buyout year. In doing so, we are able to construct a comprehensive panel data set of sponsored and non-sponsored firms, which are similar in nature prior to our treated sample of private equity-backed firms being acquired. In the empirical analysis which follows, a probit model examines the probability

[4] https://www.congress.gov/116/bills/s2155/BILLS-116s2155is.pdf

of exporting for firms with and without private equity backing. We then use a difference-in-differences model to investigate the effects of private equity buyouts on the value and intensity of firms' exports. In extensions of this, we exploit firm-level and deal-level heterogeneity to investigate whether particular segments of firms and deals can further improve their performance following the PE investment. Moreover, we show that private equity-backed firms' exporting was more resilient during the financial crisis relative to matched non-sponsored firms. Lastly, in a bid to help to explain our primary results concerning firms' exporting, we examine movements in firms' working capital management before and after the buyouts.

The UK is an ideal setting for the empirical analysis for two main reasons. First, it is the largest and most active private equity market in Europe. As outlined by Bernstein et al. (2019), international comparisons of country-level private equity activity are difficult due to the fact that different international industry bodies compile their own data and the methodologies and definitions used can vary across different data sets. Nevertheless, Bernstein et al. (2019) note that the UK has had the highest average annual deal value and highest aggregate annual deal value relative to GDP in recent years. Consistent with this, commercial data provider Pitchbook report in their 2019 Annual European Private Equity Breakdown that the UK & Ireland have accounted for 29% of European private equity deal value over the last ten years, more than any other region in Europe. Similarly, it has accounted for over 50% of funds raised in Europe over the same period. Second, all limited companies in the UK are required by law to provide certain accounting information to the public UK register. The depth and detail of this information varies according to the size of firms, however as most firms in our sample are mid-market companies, there is excellent coverage of balance sheet and profit & loss statement information in our sample. Accordingly, through the FAME database of Bureau van Dijk, we have access to a rich data set of firms and their annual accounting statements, over 98% of which are private firms. This characteristic is vitally important since these firms are more likely to suffer from information asymmetry problems and hence their exporting is likely to respond more strongly to private equity investment.

Our results are striking: private equity ownership appears to improve firms' exporting at both the extensive and intensive margin. That is, in a difference-in-differences setting, we find that private equity-backed firms have a higher probability of exporting and that they export more, relative to control firms. Moreover, they have a higher exporting intensity, as measured by share of export sales-to-total sales. These findings are robust to controlling for various firm-level attributes and a range of fixed effects, implying that differences in exporting behaviour are brought about

by the change in organizational structure of firms, as opposed to any other firm-level or macroeconomic factors. In particular, we find that the value of exports of private equity-backed companies rises by around 30% post-buyout relative to non-sponsored firms. The share of export sales to total sales is also found to increase by between 2-3%. These effects are found to be strongly statistically significant. When we examine the timing of the effects, sponsored and non-sponsored firms share similar trends in the pre-buyout period, and the divergence in exporting appears only at the onset of the transaction.

In addition, we present evidence that the positive effect on exporting value and intensity is considerably stronger on companies which were more likely to be constrained in the pre-buyout period; that is, companies with higher pre-deal leverage and companies which were smaller in size in the pre-buyout year experience significantly greater growth in exporting. At the deal-level, we find that our main results are driven by private-to-private buyouts, as opposed to public-to-private transactions. We interpret this as evidence of private equity investors mitigating constraints facing their portfolio companies. Along similar lines, private equity investors appear to have been able to alleviate constraints facing their portfolio companies during the financial crisis: private-equity backed firms' exporting was significantly more resilient relative tot he exporting of non-sponsored firms during the global financial crisis. Finally, we show that the net working capital to assets ratio of private equity backed firms increase after the buyout, relative to the control group. This indicates that private equity investors may help targets to finance the working capital needs associated with exporting (Amiti and Weinstein (2011)). Overall, our evidence provides a key contribution to the literature on exporting, private equity investment, and credit constraints.

We contribute to the literature in three main ways. First, we add to the growing body of work assessing the firm-level effects of private equity ownership (Kaplan (1989), Boucly et al. (2011), Davis et al. (2014), Bernstein and Sheen (2016), Fracassi et al. (2018), Cohn et al. (2019), Lerner et al. (2019), Bellon (2020)). We also relate to the extant literature investigating the role of private equity investors in easing the financing constraints of portfolio companies (Amess et al. (2016), Fracassi et al. (2018), Bernstein et al. (2019)). Finally, we add a new dimension to the understanding of firm-level participation and behaviour in international export markets (Greenaway and Kneller (2004), Minetti and Zhu (2011), Manova (2013), Muûls (2015), Chaney (2016)). As far as we are concerned, ours is the first study to document a significant relationship between the private equity ownership of firms and their exporting habits.

The rest of the chapter is set out as follows. In Section 2, we provide a short discussion of the related literature and derive our testable hypotheses. Section 3 describes our data and presents some summary statistics. In Section 4 we lay out our econometric modelling strategy. Sections 5 and 6 illustrate our main empirical results and robustness tests. Section 7 concludes.

5.2 Related Literature

5.2.1 Private Equity Firms & Value-added

To date a rich body of literature has examined the effect of private equity investment on a diverse range of portfolio company outcomes. In early work, Kaplan (1989) finds private equity-backed companies in the US in the 1980s to experience increases in their post-buyout operating margin of between 10% and 20%, and likewise increases in their cash flow margins. The target companies also exhibit reductions in their capex investment, implying the increased profitability is achieved by means of cutting costs. Similarly, Smith (1990) notes a post-transaction increase in the operating cash flow per employee and per dollar of operating assets. The increase is not a bi-product of layoffs or reduced spending on advertising, R&D or fixed assets. Moving from firm-level to plant-level analysis, Lichtenberg and Siegel (1990) investigate the post-buyout productivity of US plants and find that buyout targets are more productive relative to non-buyout plants in the three years following the buyout transaction. Reinforcing the idea that improvements in performance are a result of firm's reducing their costs, Muscarella and Vetsuypens (1990) study a sample of reverse LBOs[5] and report that while increases in sales were roughly in line with a random sample of other firms, PE-backed firms experienced significantly greater increases in profitability, as measured by their gross margin, implying a material reduction in production costs. They also report increases in the dollar amount of gross profit and operating profit relative to their control sample. Likewise, Holthausen and Larcker (1996) show that on average, the accounting performance (operating income and operating cash flow) of RLBO target firms is significantly better than their industries at the time of going public and for at least the following four years. Also analysing reverse LBOs, Degeorge and Zeckhauser (1993) find contradictory results in post-LBO firm performance, which they reason is explained by Muscarella and Vetsuypens (1990) only examining firm performance from the LBO to the last fiscal year prior to the firm going public, while they themselves also consider the period following the IPO. Consistent with Muscarella and Vetsuypens (1990), they report

[5] A reverse LBO (RLBO) is the IPO of a company that was previously taken private via an LBO.

improved post-LBO (and pre-IPO) firm operating performance, however when they extend the analysis to include the post-IPO period, they find that firm performance disappoints relative to a control group[6]. Other early literature such as Smart et al. (1994) finds evidence consistent with value creation through improvements in post-transaction operating performance.

While the early literature considered samples of large US deals, later work has offered insights into other markets, including that of the UK. Amess (2003) finds that UK management buyout (MBO) targets have between 4% and 7% higher technical efficiency, defined as producing the maximum output for a given range of inputs, in the four years post-buyout transaction. Similar to Lichtenberg and Siegel (1990), Harris et al. (2005) conduct a plant-level analysis. They find that MBO plants are less productive than comparable plants before the transaction but thereafter experience a significant increase in total factor productivity, which they attribute to outsourcing of production costs. Moving away from profitability and productivity, Amess and Wright (2007) study UK transactions and examine the wage and employment consequences for target firms. Their results indicate heterogeneity across different types of transactions as while wage growth is lower for both MBO and MBIs, employment growth is higher for MBOs but lower for MBIs[7]. Finally, and also analysing UK deals, Cressy et al. (2007) find private equity-backed companies to outperform comparable non-private equity-backed companies. In particular, sponsored companies experience 4.5% higher operating profitability over the first three post-buyout years. Moreover, they go on to show that industry specialization by private equity firms raises this differential by an additional 8.5%.

More recently, and analysing a wide range of samples and transactions, research has considered various different avenues of value creation in private equity. Boucly et al. (2011) provide evidence that private equity firms create value by relaxing credit constraints. They analyse a sample of buyouts of French companies and find that private equity investment relaxes constraints, allowing firms to grow and expand. Specifically, they note that target companies enjoy increases in profitability (ROA), earnings and sales in the three post-transaction years relative to comparable non-LBO-backed companies[8]. Aside from being more profitable, they also find that

[6]More recently, a comprehensive study by Cao and Lerner (2009) found a large sample of reverse LBOs to perform as well as or better than other IPOs.

[7]An MBO is a management buyout, where existing management take control of the company, while an MBI refers to a management buy-in, where an outside management team take a controlling stake in the target.

[8]The control sample is constructed to be similar in terms of industry, size and profitability to the LBO-backed companies

sponsored companies issue more debt and increase capital expenditures, in contrast to earlier work which found that improved performance was a result of reductions in capital expenditures. Their results are more profound where the transaction is a private-to-private buyout (as opposed to a public-to-private buyout, divisional buyout or secondary buyout) and where the company operates in an industry which is more dependent on external finance, suggesting that private equity firms create value by easing credit constraints[9]. In the UK, Chung (2011) finds spectacular post-transaction growth in buyout targets across sales, earnings, employment, capex and property, plant & equipment. He notes that the growth is concentrated in private-to-private buyouts, while public-to-private deals show evidence of downsizing. Guo et al. (2011) consider large US public-to-private transactions and finds gains in operating performance to be comparable or to slightly exceed those observed for benchmark control firms. Acharya et al. (2012) find that improvements in operating measures such as stronger sales growth and EBITDA margins during the private phase relative to listed peers are important in explaining the abnormal performance of US public-to-private deals.

Using tax returns to analyse target firms post-transaction performance, Cohn et al. (2014) find marginal evidence that LBOs lead to improvements in targets operating performance. When they narrow their sample to only targets with publicly available accounting data, they do witness operating improvements post-buyout[10]. In a subsequent study of private-to-private buyouts in the US, Cohn et al. (2020) document evidence of significant increases in operating performance and post-buyout growth in target companies. Moreover, they find buyout investors to target two types of firms: those with poor operating performance, and those with growth potential but who are highly levered and depend upon external financing. In a large-scale study of over three thousand private equity deals from 1980 to 2005, Davis et al. (2014) compare pre- and post-buyout target characteristics relative to a control group of similar non-sponsored firms. They conclude that while buyouts result in modest job losses (roughly 3% fall in employment relative to control firms), they lead to substantial increases in job creation. Their analysis shows that target firms create new jobs in new establishments at a faster pace relative to their controls and furthermore, the job reallocation rate at targets exceeds that of non-buyout-companies by

[9]Other work which has analysed European private equity deals includes Desbrières and Schatt (2002), Bergström et al. (2007) and Goossens et al. (2008) who likewise report increases in private equity-backed companies' operating performance relative to a control group of non-sponsored firms.

[10]Leslie and Oyer (2008) find no evidence of improvements after U.S. LBOs during a similar period, however their sample consists primarily of LBOs of already private firms and they do not compare performance to a matched sample of firms that did not go private

14% in the post-buyout period. They then consider the total factor productivity of firms and their subsequent findings suggest that target companies outperform their control firms with respect to TFP growth in the two-year post-transaction period.

Consistent with a positive impact of private equity firms on their targets' operating performance, Fracassi et al. (2018) show that in post-transaction years, US target firms in the retail sector increase sales by 50% more than a matched sample of control firms. Relatively similar to our own hypothesis, they go on to illustrate that this rise is by virtue of launching new products and by expanding into new geographic areas in the US, as opposed to increasing prices. This echoes the conclusions of a survey of 79 US private equity firms by Gompers et al. (2016) whose findings suggest that investors rely primarily on revenue growth and less so on cost cutting when it comes to value creation in their portfolio companies.

Considering the heterogeneity across target firms, Faccio and Hsu (2017) find evidence of higher job creation at targets of private equity firms with strong political connections. In an extensive recent study of thousands of private equity transactions, Lerner et al. (2019) document systematic differences in the real effects of buyouts depending on the nature of transactions, credit conditions and the state of the economy[11]. They find buyouts of public companies to experience substantial post-transaction employment losses, but overall productivity gains. Private-to-private transactions exhibit gains in both productivity and employment. Furthermore, employment rises in secondary buyouts, but falls in divisional buyouts. Concerning the wider macro-economy, they note that productivity gains are amplified when deals are transacted in a tight credit market. Where credit spreads widen post-buyout, or where the economy slows in terms of GDP growth, targets' employment growth is curtailed and productivity gains in public-to-private deals and in divisional buyouts are weakened. Finally, they find the average earnings per worker falls in target companies post-transaction. Biesinger et al. (2020) exploit value creation and execution plans of private equity investments to analyse changes in the performance of target firms. Their findings show that increases in firm-level operating performance and profitability as a result of private equity investment are sustained even once the investor exits the transaction.

Private equity investment has also been shown to impact portfolio firms' innovation. Lerner et al. (2011) find that while portfolio companies' level of patenting does not change post-LBO, patents are more frequently cited, therefore implying that these companies are producing research that has a greater economic impact; however, they

[11]The study is an extension of Davis et al. (2014) using a larger data set

are unable to determine whether this is a selection or a causal effect. Analysing UK deals, Amess et al. (2016) provide evidence that private equity firms alleviate financial constraints in their portfolio. They identify a positive causal effect of private equity investment on patent stock and quality-adjusted patent stock and then show that this increase is concentrated in private-to-private deals. Along similar lines, Cumming et al. (2018) study a sample of *public*-to-private buyouts over a twenty year period and conclude that public-to-private buyouts are associated with a significant reduction in patents and patent citations. On a similar note, Ayash and Egan (2019) find that LBO target firm's flow of patents is reduced by 33% for the duration of a leveraged buyout, which leads to a decrease of 28% in an acquired firm's patent stock relative to non-LBO firms.

Aside from buyout targets' operating performance, profitability, employment and innovation, another strand of literature has considered the impact of private equity deals on target companies' distress risk. Thomas (2010) analyses over three thousand private equity-backed companies during the financial crisis and documents that sponsored companies defaulted at less than one half the rate of comparable companies (2.84% against 6.17%), rebuffing claims that 'overleveraged' portfolio companies will default at higher rates than other companies. Tykvová and Borell (2012) examine European buyout-backed companies over 2000 to 2008 and find buyout-backed companies to exhibit similar bankruptcy rates to comparable firms. However, their results suggest that where the private equity firm is more experienced, the bankruptcy rate is actually lower relative to control firms. Similarly, Wilson and Wright (2013) conclude that private-equity backed buyouts are no more suspect to insolvency risk than non-buyout firms. While the aforementioned studies examine the likelihood of falling into distress, Cressy and Farag (2012) examine companies which have already fallen into distress and analyse the recovery rates of buyout targets relative to public companies, and find that private equity-backed companies actually exhibit longer recovery rates, approximately twice that of public companies. Hotchkiss et al. (2014) considers a sample of firms which borrow in the leveraged loan market and, consistent with the above studies, find that private equity-backed companies are no more likely to default than other leveraged loan borrowers. When they do default, buyout-backed firms restructure faster and their results imply that private equity firms can help to efficiently resolve distress in portfolio companies. Examining a sample of UK buyouts, Wright et al. (2014) explore the restructuring of buyouts around the financial crisis. They document that despite buyout targets having greater associated risk, they often already contained provisions to boost recovery rates under insolvency, increasing their recovery rates significantly relative to

control firms. Moreover, they quickly adjusted the capital structures of new transactions in response to the changes in the economy from 2007 onwards resulting in lower failure rates relative to publicly-listed firms and non-PE-backed buyouts. Finally, Weir et al. (2015) reveal that companies involved in take-private buyouts exhibit significantly better financial health post-buyout years relative to the pre-buyout years, and that they improve significantly more than companies which remain public.

Wilson et al. (2012) investigate the impact of the global financial crisis on UK private equity-backed companies. Their results suggest that private equity firms attenuated the effects of the crisis on their portfolio companies, as they document positive differentials in both productivity and profitability between private equity-backed companies and comparable non-sponsored companies. Also focusing on the recent financial crisis, Bernstein et al. (2019) likewise examine UK transactions and provide evidence that private equity firms eased credit constraints facing firms during the crisis. They find that sponsored companies decreased their capital investments and debt and equity issuance less than non-sponsored firms, suggesting that private equity firms alleviated financing constraints of portfolio companies when credit markets dried up. They then go on to show that these companies consequently outperformed other comparable companies and increased their relative market share[12].

In more recent years, literature has begun to examine more refined areas of the value-added by private equity firms. Bloom et al. (2015) find private equity-backed companies to have better management practices in terms of performance monitoring, effective targets and performance incentives, relative to other firm structures, such as family firms, founder-owned and government-owned companies. Analysing the CEO turnover in LBO-backed firms, Cornelli and Karakaş (2015) find that LBO firms take around 33% of seats on the board of portfolio companies and that a higher involvement of LBO sponsors reduces CEO turnover but improves operating performance.

At the industry-level, Bernstein et al. (2017) find that industries where private equity funds have invested grow faster in terms of total production and employment and they provide evidence rebuffing claims that economic activity in industries with private equity backing is more exposed to aggregate shocks. Aldatmaz and Brown (2020) examine industry spillovers arising from private equity activity and find evidence of employment, productivity, and profitability increases for public peers following private equity activity in the sector.

[12]The control group of comparable non-private equity-backed companies is constructed on the basis of similar industry, size, profitability and leverage

While earlier work focused on the corporate performance of targets, Bernstein and Sheen (2016) extended this line of work to examine the operational consequences for restaurants being bought-out in an LBO. They note that restaurants become cleaner, safer and better-maintained post-buyout, committing fewer health violations. Operations improve more in stores where the private equity firms have direct ownership, and hence more control. Similarly, Cohn et al. (2019) investigate workplace safety in US public-to-private targets and document a decline in workplace injury rates and safety inspection violations. Considering the ESG impact of private equity, Bellon (2020) investigates private equity sponsorship in the US oil & gas sector and finds that target companies produce significantly less carbon dioxide and toxic chemical pollution.

Nevertheless, studying the impact of private equity on the education sector, Eaton et al. (2018) document that, despite enrollment and profits increasing in buyout-backed for-profit education institutions, private equity ownership leads to institutions exhibiting lower graduation rates, lower loan repayment rates, lower earnings in graduates and increased levels of per-student debt. Along similar lines, Gupta et al. (2020) analyse the impact of private equity activity in a similarly delicate sector: care homes. Using facility-level data, they provide evidence that private equity involvement leads to significant declines in per-patient nursing staff availability, patient health and in facility's compliance with healthcare standards. The quality of care is likewise found to decrease: staff-per-patient counts fall, as do readmission rates and federal government ratings of facilities. These declines are not experienced after takeovers by chains and non-PE corporates, suggesting private equity investor's incentives are accountable.

As for the employees of private equity targets, Agrawal and Tambe (2016) show that many employees gain transferable IT-complementary skills, boosting both long-run employability and wages relative to what they would have otherwise been, implying positive effects at the employee-level. However, Antoni et al. (2019) find somewhat contrasting evidence. They conclude that LBOs are followed by an increase in employee turnover and that employees experience significant earnings declines, and show that managers and older employees are typically the worst affected. Finally, Garcia-Gomez et al. (2020) use employee-level data on 55,000 buyout target employees and examine the differential impact of buyout transactions on employees based on their pre-buyout health, in a difference-in-differences setting. They find that buyouts have a stronger negative impact on the careers and human capital of employees with pre-buyout health issues.

5.2.2 Financial Frictions and International Trade

5.2.2.1 Theoretical Background Firms rely on external capital when they face large upfront costs associated with entering into the export market, that cannot be funded through retained earnings or their internal cash flows. These costs may be fixed (R&D, advertising, fixed capital equipment) or variable (rental fees, intermediate input purchases, advance payments to salaried workers). Exporters may be even more dependent on external financing than domestic producers for different reasons. Entering into a new foreign market involves incurring several new costs. Fixed costs will reflect areas such as the analysis of the potential profitability of foraying into new geographies, acquiring local information, product customization to fit local markets, regulatory compliance and installing and maintaining new local distribution networks. Moreover, the cross-border transporting and delivery of goods can take significantly longer than domestic delivery. As such, an exporting firm's working capital is strained relative to that of a domestic producer. Finally, the greater risk associated with international operations requires exporters to obtain trade insurance. As such, an active market exists for the financing and insurance of international transactions. Specifically, Manova et al. (2015) report that up to 90% of world trade has been estimated to employ some form of trade finance.

Existing models have introduced credit constraints into theoretical models of international trade with heterogeneous firms, in light of Melitz (2003). Manova (2013) builds a model where firms need to borrow to cover both the fixed and the variable costs of exporting. This is due to the imperfect enforceability of international transaction contracts[13] together with imperfect information on the potential returns from entering into foreign markets. In equilibrium, total exports will increase with lower credit constraints. Less constrained firms and more productive firms will be more likely to export. Credit constraints will decrease both the firm extensive margin and the overall intensive margin. In Chaney (2016), firms must pay up-front a fixed cost of entry into foreign markets and hence need sufficient liquidity to do so. They finance these costs with cash flows from their domestic operations. Firms which face a liquidity constraint and are prevented from entering foreign markets may be able to do so profitably, but are unable to do so as they lack the internal funds and access to external capital to cover the associated fixed costs of export market entry. Once a firm has entered foreign markets, financial constraints do not impact the marginal cost of exporting: the firm will finance an increase in the scale of its exports through

[13] ie it may be more difficult for investors to collect the proceeds of international sales in the event of a disagreement. Put differently, a potential exporter cannot pledge much of its foreign activities as collateral, and this translates into ex-ante under-investment.

its internal cash-flow and foreign trade credit. In equilibrium, financial constraints impact the extensive but not the intensive margin of exports. In summary, these models show that in equilibrium, credit constraints affect the intensive (extensive) margins of exports if financial constraints are assumed to affect the variable (fixed) costs of exporting.

5.2.2.2 Empirical Evidence The existing theoretical evidence therefore suggests that more productive and less constrained firms are more likely to enter the export market (Manova (2013), Chaney (2016)). Early empirical literature largely supports this, finding that larger, more productive, more efficient and less constrained firms are more likely to export (Clerides et al. (1998), Bernard and Jensen (1999a), Bernard and Jensen (2004), Girma et al. (2004), Greenaway and Kneller (2004), Van Biesebroeck (2005)). More recent work has found similar conclusions.

Greenaway et al. (2007) find evidence that exporters are more liquid and less levered than non-exporters, controlling for firm size and productivity. Nevertheless, they find ex-ante financial health to be uncorrelated with export entry, and export starters display worse financial ratios, perhaps reflecting the entry costs they have just incurred. Berman and Héricourt (2010) use two measures of financial health and study 5,000 firms in 9 developing economies: liquidity and leverage, calculated respectively as the ratios of cash flow-to-total assets and total debt-to-total assets. Firms are considered less constrained if they have more liquid assets that can be quickly deployed and fewer outstanding debt obligations, relative to pledgeable collateral, which complicates raising more funds. Lagged financial health is strongly positively correlated with export entry and more weakly with export revenues, controlling for firm size and productivity. This pattern is more pronounced in sectors with high external finance dependence. Yet conditional on export status, lagged financial health is not significantly associated with export survival or the share of exports in total sales.

Bellone et al. (2010) find that firms enjoying better financial health are more likely to become exporters and that financial constraints act as a barrier to export participation. They show that better access to external finance increases the probability to start exporting and also shortens the time before firms decide to serve foreign customers. Similarly, Buch et al. (2010) show that financial frictions matter for firms' export and FDI engagement at the intensive and extensive margins. In particular, more productive and less constrained firms are more likely to engage in export and FDI activity. At the plant-level, Ilmakunnas and Nurmi (2010) find that larger, more productive plants are more likely to enter the export market and to survive in

the market for longer.

Minetti and Zhu (2011) examine over four thousand Italian firms in 2000 where they define a company to be weakly credit rationed if they would have liked to borrow more at the market interest rate but did not try to. Similarly, a company is said to be strongly credit rationed if they demanded more credit than they obtained. Controlling for industry fixed effects and various company attributes including productivity, credit-rationed firms are 39% less likely to export and exporters sell 38% less abroad. These effects are stronger in sectors with exogenously high levels of external finance dependence. While credit rationing also impedes domestic sales, its impact on international trade is somewhat greater.

Feenstra et al. (2014) provide complementary evidence using data on the interest payments of 160,000 Chinese companies in 2000-2008. Their findings indicate that credit constraints become more stringent as firms' export share grows, especially when shipping times are longer and working capital needs therefore more acute. Examining the role of exporting in the link between financial health and firm survival, Görg and Spaliara (2014b) assess whether firms at different stages of export activity (starters, exiters, continuers, switchers) react differently to changes in different financial variables such as their leverage, coverage ratio and cash flow. In general, export starters and exiters experience much stronger adverse effects of financial constraints for their survival prospects. By contrast, they find that the exit probability of continuous exporters and export switchers is less negatively affected by financial characteristics.

Muûls (2015) examines a large sample of Belgian manufacturing firms over the period of 1999 to 2007 and defines a more constrained firm as one with a weaker credit rating. Her results show that firms are more likely to be exporting or importing if they are less constrained, and that they export or import more. Moreover, the growth in the number of products exported and destinations served is positively correlated with the credit rating measure which supports the hypothesis that entering a new market or exporting a new product implies fixed costs for the exporting firm. Overall, the results underline the link between credit constraints and export and import margins.

Along similar lines, Manova et al. (2015) also provide Chinese firm-level evidence that credit market imperfections restrict firms ability to engage in international trade. Specifically, they show that credit constraints restrict companies' total exports, prevent them from foraying into more markets, and limit their export product range. They also shed light on how firm structure and consequent credit constraints

can play a role: foreign subsidiaries and joint ventures have superior export performance in financially more vulnerable sectors relative to private domestic firms. This comparative advantage is consistent with multinational corporation affiliates being less constrained due to their easier access to foreign capital markets and funding from their parent company.

Besedeš et al. (2014) find that more constrained exporters to the US and EU members grow faster. The effect of constraints on export growth is found to decrease over time. Amongst a sample of Belgian firms, Araujo et al. (2016) conclude that firm export growth decreases with the quality of the foreign country's institutions.

Finding that tighter, more stringent credit constraints induce firms to significantly lower export prices and produce lower quality products, Fan et al. (2015) detect a positive relationship between firm productivity and export prices. On a similar note, Bernini et al. (2015) examine a large sample of French manufacturing firms and document a negative relationship between firm leverage and export product quality, implying that more levered and hence more constrained firms produce lower quality exports.

Examining ordinary trade versus processing trade under financial frictions, Manova and Yu (2016) provide evidence that credit constraints induce firms to carry out more processing trade. They find ordinary trade to have a higher value-added and profitability and therefore conclude that credit market imperfections prohibit firms' involvement in more profitable opportunities in trade.

More recently, Chan (2019) investigates the role of financial intermediaries and posits that since exporting through an intermediary involves lower fixed costs but higher variable costs, more constrained firms are more likely to export indirectly via an intermediary. A large-scale empirical study supports this hypothesis and the evidence on over 9,000 global firms shows that more constrained firms are more likely to rely on trade intermediation to export relative to unconstrained firms. The results are paralleled at the country-level: countries which are less financially-developed are more likely to trade internationally through an intermediary. The results in both cases are stronger in more vulnerable sectors and are robust to the inclusion of other firm- and country-level determinants of exporting.

Using the FEMA policy reform in 2000 as an external economic shock to firms, Bose et al. (2020) examine its impact on a panel of Indian firms over a 26 year period in a difference-in-differences setting. This export-oriented intervention is found to have a material effect on firm performance: affected firms increased their productivity and

exporting intensity significantly more than unaffected firms as a result of the policy initiative. Interestingly, their results contrast with traditional findings regarding the differing effects on more and less financially constrained firms. More indebted and more liquidity-constrained firms were found to gain more from the reform than their less constrained counterparts.

5.2.2.3 Banks and Crises/Shocks Another related body of literature examines the role of banks in firms' exporting. Minetti et al. (2018) show that banks matter in the export market. Their findings imply that bank-oriented financial systems boost the size of the export sector more than market-oriented financial systems. However, particularly in middle- and low-income countries, they find that this effect mostly stems from banks slowing down exporters' exit rather than boosting firms' entry into the export market. Paravisini et al. (2014) use a sample of Peruvian firm-bank data and show that a contraction in bank funding has a negative impact on exporting at the intensive margin. However, they find no evidence that the credit shock impedes entry into new products or destinations. Similarly, Iacovone et al. (2019) show that banking crises have a material, negative impact on exports, with sectors more reliant on external finance suffering more in export markets. Likewise, Buono and Formai (2018) find that shocks to banks' credit supply causes exporters to export less, despite having no impact on their domestic sales. Niepmann and Schmidt-Eisenlohr (2017) exploit the market for letters of credit, a trade-specific, risk-reducing instrument. They show that shocks to the supply of letters of credit statistically and economically affect US firms' exports. The results are stronger where the export destination is a smaller-export country and in times of financial distress.

Meanwhile, Caballero et al. (2018) document evidence that links formed between international banks increase exports. They show that new connections between banks in a given country-pair result in an increase in trade flows between these countries in the following year. On a similar note, also highlighting banks' activity in promoting firm-level exports, Ferri et al. (2019) discover a link between banks' access to information and firm exports. Their results suggest that the probability of firms suffering an export drop in 2009 was lower when their banks had access to soft information about export prospects.

Another interconnected and relevant strand of work investigates the role of external shocks in the export market. Levchenko et al. (2010) document that the reduction in trade in 2008/09 crisis relative to overall economic activity was greater than in previous economic downturns. Bems et al. (2013) find evidence suggesting that shocks

to credit supply are detrimental to export supply, further exacerbating the decline in trade during the crisis. Considering 179 episodes from 1970 to 2009, Abiad et al. (2014) find that financial crises are associated with declines in both imports and exports of affected countries. Chor and Manova (2012) reveal a negative association between financing constraints and exports during the recent crisis. Specifically, they show that countries with higher interbank rates and thus tighter credit markets exported less to the US during the peak of the crisis. Their findings are more pronounced in more vulnerable sectors implying that exports of financially vulnerable industries were thus more sensitive to the cost of external capital than exports of less vulnerable industries, and this sensitivity rose during the financial crisis. Eaton et al. (2016) develop a dynamic multi-country general equilibrium model and find a shift in final spending away from tradable sectors, largely caused by declines in durables investment efficiency, accounts for most of the collapse in trade relative to GDP during the recent global financial crisis.

At the industry-level, Borensztein and Panizza (2010) find that sovereign defaults hurt export-orientated industries, however the effect is found to be short-lived. Ariu (2016) provides evidence that unlike trade in goods, trade in the services sector did not fall during the recent global crisis, and instead continued to grow.

Moving to the firm-level, Dell'Ariccia et al. (2008) find no evidence that more export-orientated industries perform better during banking crises. They do, however, find evidence consistent with the hypothesis that export sectors should perform better during currency crises on account of the real exchange rate depreciation. Similarly, Bougheas et al. (2018) find that exporters are among the best performers during currency crises given that their foreign sales are more competitively priced under a devalued currency. Also using banking shocks, Amiti and Weinstein (2011) find that exporters whose main bank experiences a fall in its market-to-book value reduces its exports whilst leaving domestic sales unchanged. In contrast, non-exporters reduce their domestic sales. Behrens et al. (2013) use microdata from Belgium and conclude that exports and imports mostly fell during the recent crisis because of smaller quantities sold and unit prices charged as opposed to fewer firms, trading partners, and products being involved in trade.

Constructing firm-specific measures of global demand to disentangle the effect of falling demand from that of financial constraints on sales, Coulibaly et al. (2011) provide evidence indicating that the presence of credit frictions is among the factors that contributed to the disproportionately large decline in international trade during the crisis. Bricongne et al. (2012) study French firms around the crisis and find

that financial constraints are a significant microeconomic determinant of exports. The crisis affected large firms at the intensive margin and resulted in a smaller portfolio of products being offered to export destinations. Smaller exporters were found to reduce the range of destinations they exported to or left the export market altogether. Görg and Spaliara (2014a) show that financial variables, such as liquidity and leverage, are important in predicting export market entry, particularly in the midst of the recent global financial crisis.

With regards to a change in currency, Pappalardo and Vicarelli (2017) examine the effect of the introduction of the euro on the export behaviour of Italian firms along the intensive and extensive margins of trade. They find an increase of flows to 'peripheral' eurozone countries is channelled through the intensive margin. When heterogeneity in terms of firm-level labour-productivity is controlled for, they document a reduction of the intensive margin for less productive firms and an increase for the more productive ones. Finally, more financially-constrained firms decreased the extensive margin in core markets, regardless of their productivity level. Lastly, Görg and Spaliara (2018) assess the relationship between a firm's financial position and its export market situation paying particular attention to the ERM currency crisis and the global financial crisis. They find that the deterioration in firm's financial health increased the hazard of export market exit during the 2007–09 crisis but had no significant effect on the ERM crisis. They then investigate whether firms in financially vulnerable industries face a greater sensitivity of export market exit to financial conditions and conclude that they experienced higher hazards of exiting the export market during the recent financial crisis.

5.3 Hypothesis Development

5.3.1 Private equity and exporting

There is an extensive line of theoretical work which shows that in light of the associated fixed costs (R&D, advertising, capital equipment) and variable costs (rental fees, intermediate input purchases) of entering into foreign markets, credit constraints maintain an important role in determining a firm's participation in export markets. Manova (2013) proposes a model whereby firms must borrow to cover the fixed and variable costs of entering the export market. In equilibrium, credit constraints negatively impact both the extensive and intensive margins of exporting. Likewise, in the model of Chaney (2016) where firms are required to pay a fixed entry cost to enter into foreign markets, similar conclusions are met.

Empirical evidence of firm-level international trade flows has been largely supportive of the above predictions (see Clerides et al. (1998), Bernard and Jensen (1999a), Bernard and Jensen (2004), Greenaway and Kneller (2004), Minetti and Zhu (2011), Muûls (2015)). Studying French firms around the recent financial crisis, Bricongne et al. (2012) document financial constraints to be a significant determinant of firm exports. The crisis had a material impact on firms' total exports and resulted in a more narrow range of products being offered. Related to extreme economic events, Görg and Spaliara (2018) assess the relationship between a firm's financial position and it's exporting status around two recent crises. More constrained firms and those operating in more financially vulnerable industries were found to be more likely to exit the export market during the global financial crisis.

The insights offered from the above discussion lead to a natural question: if better financial health is linked with higher levels of exporting both at the intensive and the extensive margin, how do firms respond when they are being bought out by private equity firms? In the value-added literature surrounding private equity, there is ample evidence that private equity targets experience a growth in productivity as a result of being bought out. Amess (2003) finds that UK management buyout (MBO) targets have between 4% and 7% higher technical efficiency, defined as producing the maximum output for a given range of inputs, in the four years post-buyout transaction. In a plant-level analysis, Harris et al. (2005) find that MBO plants are less productive than comparable plants before the transaction but thereafter experience a significant increase in total factor productivity, which they attribute to outsourcing of production costs. In a large-scale study of over three thousand private equity deals from 1980 to 2005, Davis et al. (2014) conclude that aside from creating new jobs at a faster pace relative to control firms, private eq-

uity targets experience greater productivity growth in the two year post-transaction period. Moreover, in an extensive recent analysis using an improved data set of Davis et al. (2014), Lerner et al. (2019) provide further evidence that the overall productivity of target firms increases. The study documents systematic differences across different deal types and macroeconomic conditions: private-to-private transaction targets experience a significant rise in labour productivity, but the effect on other deal types is insignificant. Furthermore, productivity gains are found to be amplified when deals are executed in a tight credit market. Enhanced productivity of target firms aligns with evidence documented in Bloom et al. (2015), who survey a sample of buyouts of middle-market firms and find that private equity investment brings about better management practices.

Fracassi et al. (2018) study the effects of buyouts on consumer product markets in the US and find that target firms' sales increase by 50% more than matched control firms. They go on to show that this rise in sales is driven by new product integration and geographic expansion; price increases do not play a role. More recently, Bernstein et al. (2019) study the effect of the financial crisis on UK buyout target companies. They find that the impact of the crisis on the investment levels of private equity-backed target companies was weaker relative to a matched control sample of similar unsponsored firms. They attribute this to private equity targets being less constrained during the crisis, as their issuance of debt and equity was significantly higher over the period[14]. Taken together, the existing literature posits that more productive and less constrained firms are more likely to export and are more likely to export more, and that private equity investors relax credit constraints and help their portfolio companies to grow. Based on the above discussion, we stipulate the testable hypotheses as follows:

Hypothesis 1a: Private-equity backed companies are more likely to export than non-private equity-backed companies (extensive margin).

Hypothesis 1b: Private-equity backed companies are more likely to improve their export intensity than non-private equity-backed companies (intensive margin).

5.3.2 The role of credit constraints

Prior portfolio company-level research has attributed value creation of private equity investors to their ability to ease financial constraints facing the companies in which

[14]Consistent with this idea, Demiroglu and James (2010) find that more reputable private equity investors obtain narrower bank spreads to finance their acquisitions, suggesting that some of these groups may be able to decrease the financing costs of their portfolio companies.

they invest. This effect is shown to be dependent on the different types of buyout transactions. Public and private firms differ in many ways. The former are more likely to be larger and more mature and suffer from potential agency problems (Jensen (1986)), while the latter are more likely to be smaller and more constrained (Farre-Mensa and Ljungqvist (2016)). Boucly et al. (2011) suggest that target firms involved in take-private transactions involving listed firms and divisional buyouts of subsidiaries of larger groups are less likely to be constrained pre-buyout, as they are more likely to have better access to capital markets, and as such, Boucly et al. (2011) speculate that these firms are less likely to grow after the buyout relative to firms involved in private-to-private buyouts. Their results support their hypothesis, as private-to-private target firms experience spectacular post-deal growth, while firms in other types of transactions do not. Chung (2011) finds supporting evidence that investors alleviate constraints facing private firms, facilitating their growth, while take-private target firms are found to downsize. Similarly, Fracassi et al. (2018) shows that the sales growth in targets is predominantly in private, and not public targets, while Lerner et al. (2019) observe that gains in productivity and employment occur in private target firms, as opposed to public-to-private and divisional deals.

On a similar note, Amess et al. (2016) find the positive impact of private equity ownership on firms' patenting to be concentrated in private-to-private deals and in industries and firms which are ex-ante more likely to be constrained.[15]. The findings are consistent with the hypothesis that private equity firms ease financial constraints of their portfolio firms, facilitating their investment in innovative activity. In a study of UK leveraged buyouts, Chung (2011) documents spectacular post-transaction growth of private-to-private target firms, while public-to-private targets are found to downsize and scale back on investment in the post-transaction period. As such, he interprets the results as private equity investors alleviating credit constraints faced by private-to-private target firms, and facilitating their growth. Finally, Bernstein et al. (2019) note that target firms which were smaller, more leveraged or operating in more financially dependent industries outperformed buyout target firms which were less likely to be ex-ante constrained during the global financial crisis. Likewise considering constraints at the firm-level, the post-buyout growth reported by Boucly et al. (2011) is found to be greater in firms which operate in industries which are more dependent on external finance. In light of the above discussion, we formulate our next hypothesis.

Hypothesis 2: Following the deal, private-to-private transactions and financially

[15]Similarly, Cumming et al. (2018) find that public-to-private buyouts are followed by a reduction in patents and patent citations

constrained companies are likely to witness greater increases in export activity.

5.3.3 Exporting during the financial crisis

Along similar lines, we then explore the exporting behaviour of firms during the recent global financial crisis. There is ample evidence that more constrained firms tend to be significantly more affected by economic shocks relative to less constrained firms (Cingano et al. (2016), Bottero et al. (2020)). Within the literature on international trade, the evidence likewise suggests that more constrained firms suffered more during the global financial crisis: Görg and Spaliara (2018) show that more constrained firms and those operating in more vulnerable industries were more likely to exit the export market during the crisis. Furthermore, Bricongne et al. (2012) find that smaller exporting firms reduced the range of destinations served or stopped exporting altogether. As the previous section outlined, there is a breadth of evidence implying that private equity investors are able to help to relax the constraints facing their portfolio companies (Boucly et al. (2011), Amess et al. (2016), Fracassi et al. (2018), Bernstein et al. (2019)). Piecing these together, we hypothesize that private equity firms are able to help attenuate the effects of the crisis and the associated constraints facing firms, allowing private equity-backed firms' exporting to be more resilient to the crisis relative to non-sponsored firms.

Hypothesis 3: Private-equity backed companies exporting' is more resilient during the financial crisis relative to the exporting of non-sponsored firms

5.3.4 Working capital

Finally we explore *how* private equity backed-firms are able to outperform similar, unsponsored firms in export markets. It is well known that an increase in exports leads to higher working capital needs. This reflects that completing an export transaction involves a long time lag, due to the high number of days involved in the transit and custom procedures (Amiti and Weinstein (2011)). The consequent strain on working capital and the higher working capital needs implied by exports translate into stronger funding requirements. These are often provided by banks through letters of credit. Due to the working of export markets, we posit that in parallel to the growth in exports we should empirically observe an increase in the volume of trade receivables of private-equity backed firms. This would reveal a benefit of the weaker credit constraints of portfolio companies, namely that they are able to finance higher trade receivables.

Specifically, we expect private-equity backed firms to experience an increase in their

claims against customers, referred to in accounting as trade receivables, and their net working capital. A formal empirical examination of the relationship between private equity ownership and portfolio companies' working capital management is hitherto unexplored. Wright et al. (1992) provide evidence from a survey of 182 European buyout deals and the results from respondents stress the importance of improving financial control through reducing debtor days (43% of respondents allude to this) and extending creditor days (31%) in their portfolio companies[16]. Examining firm performance during the recent global financial crisis, Wilson et al. (2012) show summary statistics implying that private equity-backed companies had better working capital control during the crisis. Finally, Weir et al. (2015) find evidence that target companies' working capital improves following a buyout, using a sample of public-to-private transactions. All of this suggests that private equity sponsorship may help to improve firms' working capital management and financial control, however no study is yet to provide a rigorous empirical analysis of this. Our final testable hypothesis is therefore:

Hypothesis 4: Private-equity backed companies increase their holdings of working capital, relative to non-private equity-backed companies.

[16]Debtor days refers to the number of days taken to obtain cash from credit sales, and creditor days is the number of days taken to settle debts

5.4 Data & Descriptive Statistics

In the following section, we describe the data used in the empirical analysis and outline the methodology behind the construction of our sample.

5.4.1 Sample construction

A variety of databases are used to construct our data set. Firstly, to build our sample of private equity-backed companies, we use S&P Capital IQ to identify all private equity transactions where the target firm is located within the UK[17]. Capital IQ is the primary source of private equity transactions used in recent academic studies[18]. We consider deals which are shown as being 'completed' and took place between the years 2004 and 2017[19]. We omit deals which are announced but not yet completed. Following prior work, we identify private equity transactions by searching for "leveraged buyout", "going private", "management buyout" and "platform" transactions in Capital IQ. This yields an initial 7,505 private equity transactions. We then drop all deals where there is no defined buyer/ private equity investor, leaving us with 3,310 transactions.

We take all relevant information such as the transaction date, the name(s) and location(s) of buyer/investor(s), the transaction value and the type of transaction. Using Capital IQ, we also check the size of the fund of the private equity investor through which the transaction is made. Where the target company is not explicitly linked to a fund of the private equity investor in Capital IQ, we take the size of the most recent fund raised which is in its investment period prior to the transaction (Arcot et al. (2015)). In order to identify how and when the private equity investor has exited a deal in each case, we make use of a variety of resources. We use Capital IQ's merger & acquisition database to search for sales to trade buyers and sales to other private equity investors (secondary buyouts). We also use Factiva and manual searches through financial news and journalism to search for acquisitions, initial public offerings and bankruptcies/liquidations involving the target firms. In some cases, we have to 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 FAME, a Bureau van Dijk database

[17]Thomson Reuters Eikon is also used to supplement our deal search.

[18]It is used as a source of private equity buyouts in, among others, Strömberg (2008), Fang et al. (2013), Jenkinson and Sousa (2015), Bernstein and Sheen (2016), Faccio and Hsu (2017), Fracassi et al. (2018), Bernstein et al. (2019)

[19]The choice of sample years is driven by the desire to have relatively sufficient pre- and post-deal accounting information for target companies and, as we explain later, we have companies' accounts from 2000 through to 2019.

which sources historical accounts of companies located in the UK from Companies House, the national UK registrar. We first download company accounts (balance sheets and profit/loss statements) and static firm information (such as industry codes, location of firms, date of incorporation) for all companies in the FAME database for each year from 2000 through 2019 (this is every year available in the current FAME database as of April 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 match, we do so manually. An advantage of FAME in this case is that it tracks firms' prior names where firms have changed their names at given points in time. Where the name of a company differs between our list of transactions from Capital IQ and FAME, we verify that the correct company is being tracked by cross-checking that various company information such as reported firm sales, total assets and the company address and website are consistent between the two sources. Companies House is also used in this respect. In total, we are able to match 1,434 private equity-backed companies from Capital IQ to FAME over a 14 year period. This equates to 44% of the deals initially identified in Capital IQ with a defined private equity investor. Using similar data sources, Jenkinson and Sousa (2015) report a 40% match from an initial sample of 2,567 exited deals involving European targets[20].

Tables 1 and 2 offer an initial insight into our sample of transactions. Table 1 describes the annual distribution of deals in our sample. Deal activity increased in the run up to 2007, before dropping dramatically at the onset of the global financial crisis, and recovering thereafter (Shivdasani and Wang (2011)). As shown in Table 1, we have a relatively equal spread of deals across each year, outwith years during crises periods.

Table 2 provides some further analysis of our sample of transactions. Panel A 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 private equity research (Chung (2011), Jenkinson and Sousa (2015), Bernstein et al. (2019)). Other important sectors include retail trade and transportation & communication. Panel B of Table 2 gives a breakdown of the types of deals in our sample. Similar to other papers such as Strömberg (2008), Kaplan and Stromberg (2009), Boucly et al. (2011) and Bernstein et al. (2019), the majority of the deals in our sample are private-to-private buyouts. Around 5% are public-to-private transactions, a

[20]The only difference is that Jenkinson and Sousa (2015) match from Capital IQ to all of FAME, Amadeus and Orbis, all of which are managed by Bureau van Dijk. Amadeus and Orbis provide coverage of European firms, whereas FAME only follows UK and Irish firms.

figure very similar to the samples in the above papers. Likewise, our proportion of secondary buyouts is also representative of the literature which largely reports similar deal type distributions. Our sample contains a slightly lower proportion of divisional sales (10.1%) compared to the above studies. This can likely be explained by the fact that accounting information can be more difficult to find when divisions are carved out of companies. Finally, in Panel C, we can see how the transactions are exited. Consistent with other samples of deals, selling to a strategic buyer (trade sale) or to another private equity investor (secondary buyout) are the primary forms of exit, whereas going public via an an IPO is less common (Strömberg (2008), Kaplan and Stromberg (2009), Jenkinson and Sousa (2015))[21]. Around 65% of the transactions have experienced some form of exit[22].

Aside from the details reported in Table 2, other aspects of our sample of transactions also relate to recent studies involving samples of buyouts and private equity investors. The median (mean) deal size in our sample is £46m (£182m) which is not dissimilar to other studies. Strömberg (2008) reports a median deal size of $64m in the US and $36m in the UK over the period of 2001 to 2007 and according to Boucly et al. (2011) the median-sized French deal is $63m. The median holding period in our sample of deals is 5 years, similar to other studies which examine European private equity transactions (Strömberg (2008), Jenkinson and Sousa (2015)).

With regards to our sample of private equity investors, domestic (UK-based) investors are prevalent, with 77% of transactions involving a UK-based private equity acquirer. Nevertheless, an important fraction of targets are acquired by international investors. Specifically, around 16% of deals involve a US-based investor and 5% involve European investors. Table 3 details the top 15 most active investors in our sample of transactions. LDC, the mid-market buyout arm of Lloyds Banking Group is involved in the most transactions (94). The majority of the other most frequent investors operate somewhere in the lower to upper mid-market space. Larger, global private equity investors such as KKR, Apollo and Blackstone also feature frequently in our sample.

Lastly, we consider the size of our investors. Our range of transactions covers small-cap buyouts to mid-market transactions to deals made by the larger, global 'mega-funds'. With regards to the size of the corresponding fund through which the investor executes the transaction, our sample has a median (mean) fund size of $600m

[21] Similarly, figures from the BVCA, the leading UK industry body for private equity investors, report that of 5,533 deal divestments from 2007 to 2019, selling to trade acquirers was by far the most common exit route, with almost 25% of target companies being sold to trade.

[22] As of April 2020

($1.82bn)[23]. This is also consistent with other studies. Barber and Yasuda (2017) cite a median (mean) US buyout fund size of $650m ($1.53bn), and in a global sample of buyout funds, Metrick and Yasuda (2010) report a median fund size of $600m[24].

[23]Where Capital IQ does not specify the exact fund through which a deal is executed, we take the size of the most recent fund raised relative to the transaction date which is still investing.

[24]Harris et al. (2014a) and Harris et al. (2014b) also report similar summary statistics on buyout fund size

Table 1: Deal time series distribution

The below table shows the time series distribution of the buyout transactions in our study

Year	Number	Percentage
2004	70	4.9%
2005	87	6.1%
2006	116	8.1%
2007	128	8.9%
2008	112	7.8%
2009	41	2.9%
2010	90	6.3%
2011	90	6.3%
2012	109	7.6%
2013	117	8.2%
2014	123	8.6%
2015	133	9.3%
2016	116	8.1%
2017	102	7.1%
Total	1,434	100.0%

Table 2: Sample statistics

This table provides sample statistics on the transactions used in our study. Panel A displays the industry distribution of the target company involved in the transactions. Panel B describes the type of deals, while Panel C details the exit status of the deals.

	Number	Percentage
Panel A: Industry Distribution		
Agriculture, Forestry, Fishing	5	0.4%
Mining	14	1.0%
Construction	39	2.7%
Manufacturing	344	24.2%
Transportation & Communication	130	9.2%
Wholesale Trade	76	5.4%
Retail Trade	147	10.4%
Finance, Insurance, Real Estate	131	9.2%
Services	530	37.3%
Public Administration	4	0.3%
Panel B: Deal Type		
Private-to-private	1,003	70.1%
Public-to-private	67	4.7%
Secondary buyout	215	15.0%
Divisional buyout	145	10.1%
Panel C: Exits		
Sale	485	34.1%
Secondary buyout	266	18.7%
IPO	54	3.8%
Write-off	85	6.0%
Other/Unknown	16	1.1%
Not yet exited	517	36.3%

Table 3: Sample statistics: transactions by PE investor

The below table shows the top 15 most active PE investors in our sample of transactions

PE Firm	Number of deals	Percentage of total sample
LDC	94	5.8%
Inflexion	40	2.4%
Livingbridge	29	1.8%
ECI Partners	28	1.8%
Equistone	27	1.7%
Phoenix Equity	26	1.6%
3i	24	1.5%
Bowmark Capital	23	1.5%
The Carlyle Group	22	1.4%
Bridgepoint	21	1.3%
HgCapital	21	1.3%
Sovereign Capital	21	1.3%
Close Brothers Private Equity	20	1.2%
Exponent Private Equity	20	1.2%
Lyceum Capital Partners	20	1.2%

5.4.2 Creating a matched control sample

The next step, and an important empirical application in a difference-in-differences approach, is to construct a matched control group of non-private equity-backed firms which are similar in nature in the pre-buyout period to our sample of sponsored firms. In order to do so, we use a matching procedure inspired by the recent work of Boucly et al. (2011) and Bernstein et al. (2019). Each matched control company meets the following four criteria: 1) it belongs to the same two-digit SIC code as the target firm; 2) it has total assets in the pre-deal year within a 50% bracket of the target; 3) it has a ROA in the pre-deal year within a 50% bracket of the target firm, and 4) it has leverage, defined as the ratio of total debt-to-assets in the pre-deal year within a 50% bracket of the target firm .

Using this procedure, we match up to 5 control firms for as many target firms as possible. Where a target generates more than 5 matches, we retain the 5 closest matches as measured by the sum of the squares of the difference between the target and the control firm's total assets, ROA and leverage. Naturally, the choice of percentage bracket involves a trade-off between the matching accuracy and finding control firms for as many targets as possible. Using a 50% bracket, we are able to find control firms for 733 of our 1,434 private equity-backed firms, equating to a 51% success in matching [25]. This is not too dissimilar to the matching success obtained in Bernstein et al. (2019) who report a 60% match using a similar matching technique. We finish with a sample of 733 private equity-backed firms and 3,104 control firms.

Table 4 presents pre-buyout descriptive statistics and provides initial evidence that, by construction, our two groups of firms are fairly similar in nature in the pre-buyout period. The two groups of firms share similar characteristics, with the only significant exception being that private equity-backed firms have slightly higher pre-buyout sales; a difference which is statistically significant only at the 10% level. Prior studies like Boucly et al. (2011) and Bernstein et al. (2019) have likewise found private equity-backed firms to be slightly larger relative to control firms in terms of turnover, prior to being acquired. In any case, in all empirical specifications we augment our model with a vector of control variables (which includes firm sales) taken in the pre-buyout year. The distribution of pre-transaction profitability (ROA) and leverage is very similar across both groups, as is the size (as measured by total

[25] In a robustness check, following Bernstein et al. (2019) we tighten the matching bandwidths to 30% and while the sample size is reduced, the main results are upheld. Specifically, this reduces our sample to involve 651 private equity-backed firms and 2,184 control firms. Likewise, if we follow Boucly et al. (2011) and remove leverage as a matching factor and use 50% bandwidths, our treated sample increases to 935 private equity-backed firms. Again, all of our main results are intact.

assets) and the industry in which they operate. This is unsurprising given that these formed part of the matching process. Other variables such as cash flow, earnings and firm productivity are very similar across both samples of firms. Moreover, the magnitude of pre-transaction variables such as firm sales, profitability and leverage are very similar to those presented in Bernstein et al. (2019). Finally, the export sales of the two groups is similar, with very little difference between the pre-buyout dollar value of their export sales. However, the non-private equity-backed firms tend to have a higher pre-transaction exporting intensity, as measured by the ratio of export sales to total sales.

Moving a step further, Table 5 explores the parallel trends assumption behind the difference-in-differences model where we consider the pre-buyout one- and two-year growth rates of various firm-level variables. Again, the target firms and controls exhibit similar trends across most variables. The only difference of note across both the one- and two-year growth trends is that target firms have a higher pre-buyout growth rate in sales[26]. We later show that our results are upheld when controlling for the pre-transaction growth in sales, as well as other variables measured in the pre-buyout year. The mean growth rates of profitability (ROA) and earnings show significant differences, however when we consider the rates over one- and two-year periods, and take into account the median rates, there are no systematic differences which provides some form of comfort. Taking the static pre-buyout period figures and the pre-buyout growth rates together, we can appreciate that both groups of firms are generally similar in nature in the pre-transaction period.

Finally, Figure 2 offers a graphical interpretation of the evolution of firms' exporting around the transaction. Specifically, the graphs shows the α_t of the following equation:

$$(y_{it}) = \alpha_t + \alpha_i + \varepsilon_{it} \tag{1}$$

Where α_t captures year fixed effects and α_i captures company fixed effects. The x axis of the graph depicts the years relative to the buyout transaction occurring; four years prior to the deal and four years after the deal occurs. The year precedent to the buyout is used as the base period and its corresponding coefficient is normalized to zero. The equation is estimated separately for both the private equity-backed and control samples, with standard errors being clustered at the firm level. The graphs

[26] Boucly et al. (2011) likewise find that private equity-backed targets exhibit greater growth in sales in the pre-transaction period relative to a sample of matched control firms

suggest that both our treated and control samples follow similar paths in the run up to the transaction, after which there is a divergence in exporting behaviour, giving us an initial insight into the effect that private equity ownership may have on the exporting behaviour of target firms. Taken together, we can plausibly assume that the parallel trends assumption is satisfied. As we discuss in the next section, our estimates are robust to the inclusion of a host of firm-level control variables taken in the pre-buyout period, as well as the inclusion of a wide range of fixed effects and robustness checks.

Table 4: Descriptive Statistics

The below table details summary statistics of sample firms in the pre-transaction year 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 2 digit SIC code, ROA (net income/total assets) (within a 50% bracket) and total assets (size) (within a 50% bracket) in the pre-transaction year. Export dummy is a binary variable taking the value of 1 for firm-year observations where export sales exceed zero, and 0 otherwise. Log(export) is the log of the value of export sales. Cash flow is defined as a firm's net income plus depreciation and is scaled by total assets, earnings is EBITDA normalized by total assets, while ROA is net income divided by total assets. Leverage is calculated as a firm's ratio of debt to total assets and productivity is the earnings generated per-employee.

	PE				Control				
Variable	N	Mean	Median	SD	N	Mean	Median	SD	t-test
Exporting									
Export dummy	733	0.36	0.00	0.48	3,104	0.29	0.00	0.45	0.07***
Log(export)	271	8.15	8.29	1.80	912	8.31	8.49	1.82	-0.16
Export/total sales	271	0.29	0.18	0.30	912	0.34	0.22	0.32	-0.05**
Firm Variables									
Total assets	733	98,961	18,625	394.238	3,104	76,693	15,181	332,988	22,267
Sales	717	71,997	25,115	172,078	2,867	59,307	20,742	158.727	12,690*
Cash flow	719	0.16	0.13	0.11	2,815	0.15	0.13	0.10	0.01
Earnings	730	0.26	0.17	1.85	3,075	0.17	0.15	0.19	0.09
ROA	733	0.12	0.10	0.10	3,104	0.12	0.09	0.10	0.00
Leverage	733	0.63	0.63	0.26	3,104	0.63	0.63	0.22	0.00
Productivity	701	24.26	17.01	20.65	2,692	25.50	17.14	22.15	-1.24

Table 5: Growth rates

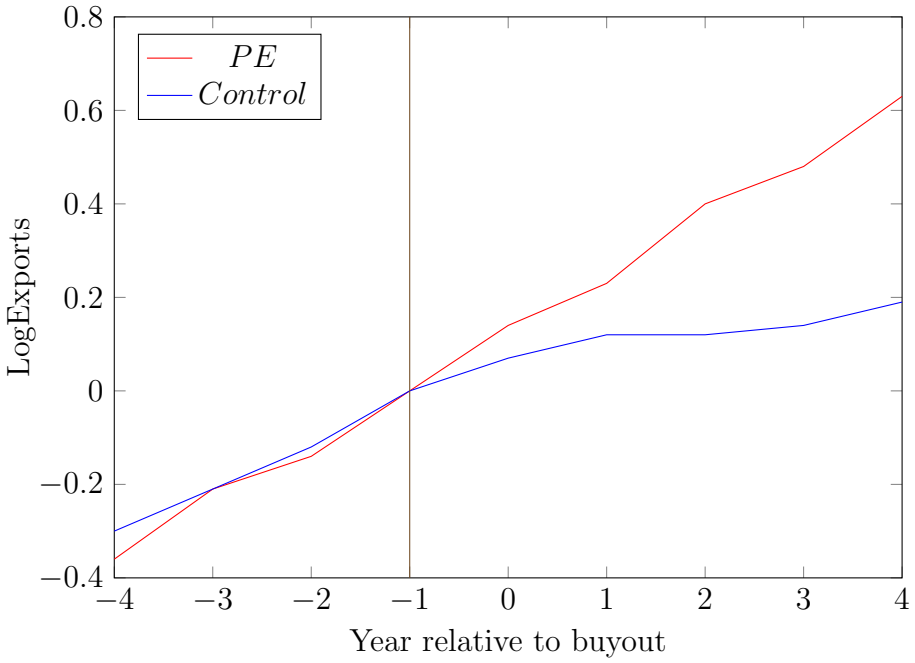
The below table displays 1- and 2-year pre-transaction growth rates of firm-level variables across treated (PE-backed companies) and non-treated firms (non-PE companies). PE-backed refers to all PE-backed companies; Control refers to a sample of control firms, matched on their 2 digit SIC code, ROA (50% bracket) and total assets (50% bracket) in the pre-transaction year. Cash flow is defined as a firm's net income plus depreciation and is scaled by total assets, earnings is EBITDA normalized by total assets, while ROA is net income divided by total assets. Leverage is calculated as a firm's ratio of debt to total assets and productivity is the earnings generated per-employee.

	PE				Control				
Variable	N	Mean	Median	SD	N	Mean	Median	SD	t-test
Exporting - 1 year rate									
Log(export)	225	0.18	0.11	0.71	785	0.13	0.09	0.67	0.05
Export/total sales	225	0.28	0.02	1.36	785	0.26	0.01	1.39	0.02
Firm variables - 1 year rate									
Total assets	724	0.26	0.15	0.54	2,999	0.24	0.10	0.71	0.02
Sales	658	0.19	0.13	0.31	2,631	0.16	0.08	0.37	0.03***
Cash flow	675	0.08	0.03	1.86	2,579	0.22	0.05	2.27	-0.14*
Earnings	683	0.16	0.04	1.49	2,841	0.21	0.03	1.93	-0.05
ROA	632	0.27	0.07	0.50	2,606	0.37	0.11	0.79	-0.10**
Leverage	722	-0.01	-0.14	0.89	2,693	-0.02	-0.12	0.85	0.01
Productivity	652	0.29	0.10	1.76	2,481	0.34	0.09	2.16	-0.05
Exporting - 2 year rate									
Log(export)	200	0.25	0.22	0.92	694	0.23	0.16	0.89	0.02
Export/total sales	200	0.33	0.03	1.72	694	0.41	0.02	2.02	-0.08
Firm variables - 2 year rate									
Total assets	707	0.72	0.32	2.41	2,923	0.87	0.21	3.61	-0.15
Sales	607	0.49	0.26	1.03	2,413	0.37	0.17	1.02	0.12**
Cash flow	626	0.49	0.09	2.56	2,414	0.34	0.08	3.14	0.15
Earnings	637	0.35	0.07	3.01	2,673	0.06	0.03	3.33	-0.29*
ROA	559	0.57	0.19	1.13	2,350	0.59	0.16	1.14	-0.02
Leverage	634	-0.05	-0.07	0.24	2,602	-0.04	-0.06	0.26	-0.01
Productivity	599	0.68	0.17	3.38	2,295	0.36	0.14	3.50	0.32*

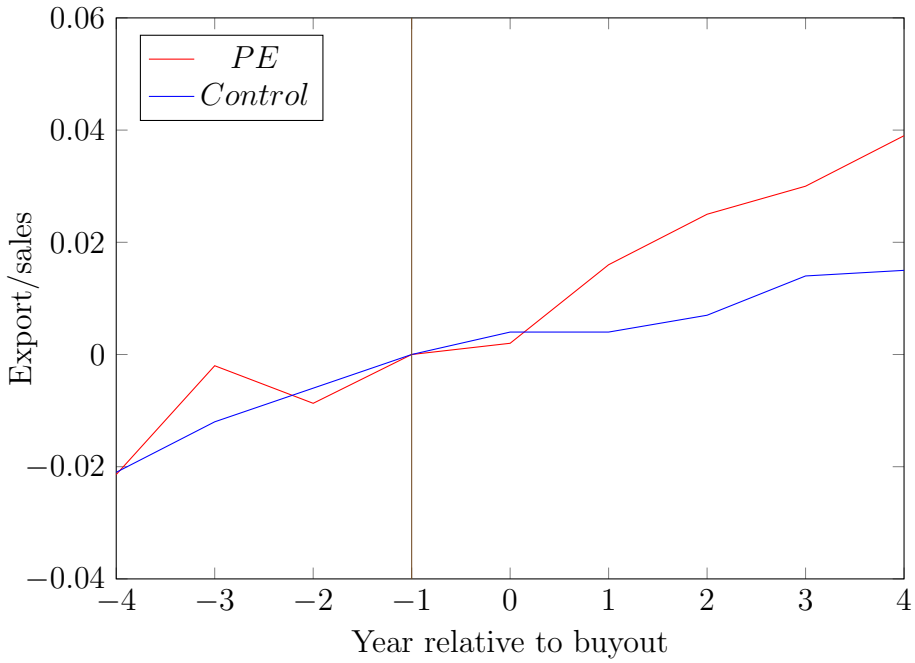
Figure 2: Effect of being PE-backed on export activity

These figures illustrates the change in exports and the ratio of export sales to total sales separately for both PE-backed companies and control companies in our sample around the transaction, where year 0 is equal to the year of the transaction. Specifically, the figure reports the α_t of the following equation: $(y_{it}) = \alpha_t + \alpha_i + \varepsilon_{it}$. Where α_t captures year fixed effects and α_i captures company fixed effects. The year precedent to the transaction is used as the base period and its corresponding coefficient is normalized to zero. The equation is estimated separately for both the PE-backed and control samples, with standard errors being clustered at the company level.

LogExports



Exports/sales



5.5 Empirical model

5.5.1 Extensive margin of export

We begin our empirical investigation by asking whether being backed by a private equity sponsor affects the probability of a portfolio company exporting (ie. the extensive margin of export). We model the probability of exporting using the following equations:

$$Prob(X_{i_t} > 0) = \alpha_t + \alpha_i + \alpha_c + \beta_1(PE_i) + \theta X_{i_t} + \varepsilon_{it} \tag{2}$$

The above model sheds light on whether or not being private equity-backed increases the likelihood of a firm being an exporter. However, in order to better understand whether the probability of exporting actually increases from the onset of the buyout transaction we estimate the following model:

$$Prob(X_{i_t} > 0) = \alpha_t + \alpha_i + \alpha_c + \beta_1(PE_i * Post_{i_t}) + \theta X_{i_t} + \varepsilon_{it} \tag{3}$$

In line with exporting literature to date, we estimate both linear probability and probit models based on the above specifications[27]. In each case, the dependent variable is a firm-year dummy variable taking the value one if firm i reports a positive amount of exports in year t, and zero otherwise. PE is a dummy variable that takes the value one for all private equity-backed companies and zero for controls. $Post$ is a dummy that equals one after the transaction and zero before. For control firms, $Post$ equals one when the target corresponding to the control has undergone the transaction, and zero beforehand. A positive coefficient for PE*$Post$ supports H1a.

The models include additional controls as follows: α represents sets of firm, industry and year fixed effects. Moreover, we also include specifications with (industry*year) fixed effects to mitigate concerns about any contemporaneous changes in demand or any other time-varying industry characteristics. We also construct several firm-level control variables to capture the pre-buyout heterogeneity in firm-level characteristics. Following Bernstein et al. (2019), we control for firm size (the log of sales), cash flow scaled by total assets, leverage, profitability (ROA) and earnings (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

[27] See for example Greenaway et al. (2007), Minetti and Zhu (2011), Minetti et al. (2015), Muûls (2015)

period. These control variables are taken in the pre-transaction year and are interacted with the *Post* variable in order to avoid any endogeneity concerns. Finally, we cluster standard errors at the firm-level.

5.5.2 Intensive margin of export and firm performance

In this sub-section we explore whether the value of firms' exports and their exporting intensity are affected by being backed by a private equity sponsor. To do so, we use a standard difference-in-differences (DiD) approach to estimate the changes in firm-level exporting after buyout transactions, relative to changes at control firms. A similar model for different firm activities has been used by Boucly et al. (2011), Bernstein et al. (2019) and Cohn et al. (2019). Our baseline specification in this respect is as follows:

$$(y_{i_t}) = \alpha_t + \alpha_i + \alpha_c + \beta_1(Post_{i_t}) + \beta_2(PE_i * Post_{i_t}) + \theta X_{i_t} + \varepsilon_{it} \tag{4}$$

The dependent variable is the log of export sales and export sales as a percentage of total sales. The main coefficient of interest is β_2 which captures the estimated change in private equity targets' exporting from before to after a buyout for target firms relative to control firms. Support for H1b would be reflected in positive coefficient for the *PE*Post* interaction. The remaining control variables and fixed effects remain unchanged.

While the estimates from Equation 4 capture the average change in exports of the target firms relative to the controls, they do not indicate the timing of these changes. As such, we investigate how firms' exporting evolve over time after buyout transactions in more detail by estimating the following regression:

$$(y_{i_t}) = \alpha_t + \alpha_i + \alpha_c + \Sigma\beta_k(PE_i) + \theta X_{i_t} + \varepsilon_{it} \tag{5}$$

where the dependent variable is the log of export value and export sales as a percentage of total sales. We estimate a different β_k for every year between t-4 and t+4 relative to the buyout, using the last year before the transaction, t-1, as a reference year[28]. This allows us to formally examine the time-varying behaviour of the treatment effects for firms' exporting behaviour. The vector of firm controls are the same as those in Equations 2, 3 and 4. The coefficient β_k captures the difference

[28]In an unreported robustness check, we rerun Equation 5 using a narrower two year window either side of the buyout, as opposed to a four year window, and we find similar results.

between firm-level exporting in year K relative to the transaction year and firm-level exporting in the pre-transaction year.

5.5.3 Accounting for credit constraints

Next, we take into account how credit constraints affect the relationship between export participation and intensity and private equity financing. Specifically, our main interest lies in examining whether firms facing different levels of financial constraints within the treated group exhibit different sensitivities to their exporting after the buyout compared to firms in the control group. In order to ensure robustness, we focus on two dimensions of financial constraints: size and leverage. Size is the key proxy for capital market access by manufacturing firms in Gertler and Gilchrist (1994) because small firms are more vulnerable to capital market imperfections and thus more likely to be financially constrained. In addition, firms that are highly indebted are more likely to face higher liquidation risks and hence are more likely to be financially constrained (Mizen and Tsoukas (2012)). Therefore, we estimate Equation 4 for two sub-samples (constrained and unconstrained firms). These specifications capture how deal- and firm-level heterogeneity, measured by deal types, firms' size and leverage, affect the way exporting responds to private equity investment in firms which were more and less likely to suffer from financial constraints at acquisition. To support H2 we would expect the impact of the private equity investment to be stronger for firms classified as financially constrained compared to their unconstrained counterparts.

5.5.4 The working capital mechanism

Finally we test how private equity ownership affects the net working capital holdings of targets. Again, we use a DiD approach to estimate the changes in firm-level trade receivables after buyout transactions, relative to changes at control firms. In our baseline models, we use as a dependent variable the stock of net working capital (NWC) to firms' total assets and to sales [29]. Net working capital is receivables (credit to customers) minus payables (debt against suppliers), from both exports and domestic sales. High values reveal strong working capital needs, as signal that companies provide more trade credit to its customers than get from its suppliers. To better understand the mechanism, we also analyze (the logarithm of) gross trade receivables and payables.

[29] We scale NWC by total assets and sales as we find private equity-backed firms to experience a growth in assets and sales post-buyout

5.6 Results

5.6.1 Extensive Margin of Export

We start by examining whether private equity-backed firms are more likely to be exporting than comparable unsponsored firms. Table 6 shows the results from the estimation of Equation 2. In columns 1-3 we report estimates from linear probability models, and in columns 4-6 we show estimates from probit models. Columns 2 and 5 contain a vector of firm-level covariates which are taken in the pre-transaction year and interacted with the Post variable. These include firm size, cash flow, leverage, profitability and earnings. Moreover, all specifications include firm, industry and year fixed effects. Lastly, in columns 3 and 6 we include (industry*year) fixed effects. We report coefficient estimates and standard errors clustered by firm. The main finding is that private equity ownership positively and significantly, both statistically and economically, affect firms' probably of exporting.

The inclusion of firm-level controls does not have a material impact on the significance or magnitude of the coefficients, a shown in columns 2 and 5. However, given that we are interested in the evolution of firms' behaviour *as a result* of being private equity-backed, we extend the model to ask whether the difference in the probability of exporting from the pre-deal period to the post-deal period is greater for private equity-backed firms relative to control firms. Accordingly, we estimate Equation 3 and report the output in Table 7. Our key variable of interest is the interaction between the firm-level dummy PE and the time period dummy $Post$ (PE*$Post$). This shows the impact of the private equity buyout on the extensive margin of exporting. Controlling for firm characteristics and macroeconomic shocks and industry differences, the impact of the buyout is substantial for the sponsored firms, as demonstrated by the positive coefficient on the interaction term across all specifications. As private equity investors provide financial support to their portfolio companies by alleviating credit constraints, we find that portfolio firms can relax their credit constraints and positively influence their participation in export markets. The results show qualitatively and quantitatively significant effects. Based on the estimates in column 1, being PE-backed increases the probability to enter the export market by 4.6 percentage points after the transaction. In the following columns of Table 6, we rerun the same regressions and find that the main results persist even after controlling for other firm-level characteristics, industry and time-varying shocks that could affect PE and non-PE-backed firms differently.

Our results thus far are valuable in light of previous studies, as we document that private equity investors are able to relax credit constraints, allowing their portfolio

companies to be subject to fewer distortions and hence improve their exporting infrastructure. In this sense, PE-backed firms can attract foreign consumers and initiate global sales. Therefore, our findings provide strong support for H1a and the idea that private equity firms play in helping companies grow and improve their operating performance relative to unsponsored peers by easing financial constraints they may face.

Table 6: Extensive margin of exporting

This table investigates the effect of private equity buyouts on the intensive margin of exporting. The dependent variable is a dummy variable taking the value one where a firm exports in a given year, and zero otherwise. PE is a dummy taking the value one for buyout target firms and zero otherwise. Firm controls include firm sales, earnings, leverage, profitability (ROA) and cash flow. These controls are taken in the pre-deal year and are interacted with the Post variable. Standard errors are clustered at the firm-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Linear Prob			Probit		
	(1)	(2)	(3)	(4)	(5)	(6)
PE	0.064***	0.062***	0.058***	0.545***	0.539***	0.533***
	(0.011)	(0.012)	(0.014)	(0.079)	(0.080)	(0.094)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	Yes	Yes	No
Year FE	Yes	Yes	No	Yes	Yes	No
(Industry x Year) FE	No	No	Yes	No	No	Yes
Firm controls	No	Yes	Yes	No	Yes	Yes
Observations	72,219	72,219	72,219	70,699	70,699	70,699

Table 7: Extensive margin of exporting

This table investigates the effect of private equity buyouts on the intensive margin of exporting. The dependent variable is a dummy variable taking the value one where a firm exports in a given year, and zero otherwise. PE is a dummy taking the value one for buyout target firms and zero otherwise, while Post takes the value zero before a transaction and one after. Firm controls include firm sales, earnings, leverage, profitability (ROA) and cash flow. These controls are taken in the pre-deal year and are interacted with the Post variable. Standard errors are clustered at the firm-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Linear Prob			Probit		
	(1)	(2)	(3)	(4)	(5)	(6)
PE*Post	0.046***	0.042***	0.040***	0.224***	0.217***	0.202**
	(0.012)	(0.013)	(0.013)	(0.083)	(0.084)	(0.085)
Post	-0.005	0.009	0.011	-0.028	0.226	0.255
	(0.006)	(0.022)	(0.022)	(0.044)	(0.202)	(0.209)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	Yes	Yes	No
Year FE	Yes	Yes	No	Yes	Yes	No
(Industry x Year) FE	No	No	Yes	No	No	Yes
Firm controls	No	Yes	Yes	No	Yes	Yes
Observations	72,219	72,219	72,219	70,699	70,699	70,699

5.6.2 Intensive margin of Export

In this sub-section, we investigate the impact of private equity backing on the intensive margin of exporting by looking at the effect of private equity buyouts on the value of foreign sales and on exporting intensity (ie the share of foreign sales in total firm sales). We estimate our baseline DiD specification, Equation 4, and present the results in Table 8. Our dependent variable in columns 1 to 4 is the logarithm of the sterling pound value of export sales and in columns 5 to 8 it is the ratio of export sales to total sales. We focus on the sign and significance of the double-interaction term (PE^*Post), which reveals whether private equity-backed firms are more likely to have a higher exporting intensity compared to our carefully constructed sample of control firms during the post-transaction period. We find that, following the buyout, the intensive margin of exporting is more sensitive for sponsored firms. Specifically, we find a positive and highly significant coefficient on the double-interaction term PE^*Post, which implies that private-equity backed firms increased their value of export sales by approximately 30 percentage points, relative to similar non-private equity-backed firms. When we control for firm-level covariates, the statistical significance and economic magnitude of our baseline coefficient are barely affected. Considering the exporting intensity, in columns 4, 5 and 6, we, likewise, detect a significant effect of private equity ownership on the share of export sales to total sales. In particular, we find that the share of exports in total firm sales of buyout targets increases by around 2.5% more than their matched control firms. Once again, this is robust to the inclusion of various sets of fixed effects and firm-level control variables. In columns 3 and 6 we adjust our model and include (industry*year) fixed effects to control for any potential time-varying, industry-specific variables such as contemporaneous changes in demand, or other time-varying industry characteristics. The results are unaffected.

In summary, our results provide strong empirical support for H1b as we show that private equity-backed firms sell more abroad and have a higher exporting intensity relative to similar non-private equity-backed firms. Private equity firms provide market specialization and financial and active strategic support to help companies accelerate their growth. Exporting firms can reap the benefits of PE sponsorship by experiencing a growth in international sales.

Table 8: Intensive margin of exporting

This table investigates the effect of private equity buyouts on the intensive margin of exporting. The dependent variables are the log of the value of exports and the ratio of export sales to total sales. PE is a dummy taking the value one for buyout target firms and zero otherwise, Post takes the value one after the transaction and zero before. Standard errors are clustered at the firm-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	LogExport			Export/sales		
	(1)	(2)	(3)	(4)	(5)	(6)
PE*Post	0.305***	0.293***	0.289***	0.024***	0.024**	0.023**
	(0.073)	(0.074)	(0.074)	(0.010)	(0.009)	(0.010)
Post	-0.003	-0.254	-0.269	-0.007	-0.030	0.033
	(0.036)	(0.283)	(0.282)	(0.005)	(0.032)	(0.032)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	Yes	Yes	No
Year FE	Yes	Yes	No	Yes	Yes	No
(Industry x Year) FE	No	No	Yes	No	No	Yes
Firm controls	No	Yes	Yes	No	Yes	Yes
Observations	16,970	16,970	16,970	16,970	16,970	16,970

5.6.3 Evolution of exports over PE buyouts

While estimates in Tables 7 and 8 capture the average change in exporting from the pre-buyout to post-buyout period, they do not indicate the timing of the relative increase in exports of private equity-backed companies. We, therefore, examine how firms' exporting evolves over time after buyout transactions by estimating the regression in Equation 5, where we estimate a different β_k for each year between t-4 and t+4 relative to the transaction, using the last year before the transaction, t-1, as a reference year. If β_k accurately captures the causal effect of private equity ownership on firms' exporting, we would expect to see an effect arise only at the onset of the buyout transaction. The dependent variable is the log of export value and exports as a percentage of total sales, while the firm controls are the same as before. The β_k coefficients will capture the difference between firm exports in year K relative to the buyout year and firm exports in the pre-buyout year.

The results, presented in Table 9, are in line with the pattern we see in Figure 2. There is very little difference between private equity-owned firms and the matched control firms in the pre-buyout period for both the value of exports (columns 1 and 2) and the exporting intensity (columns 3 and 4). After the buyout occurs, we then see a marked divergence between the two sets of firms, as private equity firms increase their value and proportion of export sales in the post-buyout years, as illustrated in Figure 2. Moreover, the magnitude of the coefficients increases over time in the post-transaction period, again echoing the increasing divergence we witness in Figure 2.

Table 9: Evolution of exports over time

This table reports the estimates from a time-varying fixed effects model. Specifically, the table reports β_k of Equation 5. Even-numbered columns augment the baseline model with a set of firm-level controls measured before the transaction and interacted with the Post dummy. In Columns 1 and 2 the dependent variable is the log of export value and in Columns 3 and 4 the dependent variable is the ratio of export sales to total sales. Standard errors are clustered at the firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%

	LogExport		Export/sales	
PE*t-4	-0.063	-0.060	0.001	0.001
	(0.083)	(0.084)	(0.011)	(0.010)
PE*t-3	-0.004	-0.002	0.011	0.010
	(0.072)	(0.071)	(0.008)	(0.007)
PE*t-2	-0.019	-0.021	-0.002	-0.003
	(0.055)	(0.055)	(0.007)	(0.007)
PE*t0	0.071	0.064	-0.002	-0.003
	(0.051)	(0.052)	(0.006)	(0.006)
PE*t+1	0.114*	0.105	0.012*	0.011
	(0.283)	(0.066)	(0.007)	(0.007)
PE*t+2	0.283***	0.273***	0.019**	0.018**
	(0.072)	(0.072)	(0.009)	(0.009)
PE*t+3	0.351***	0.345***	0.016	0.016
	(0.081)	(0.081)	(0.010)	(0.010)
PE*t+4	0.442***	0.436***	0.025**	0.024**
	(0.097)	(0.097)	(0.013)	(0.013)
Firm FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	9,477	9,477	9,477	9,477

5.6.4 Exporting, firm growth and financial constraints

We now turn to the hypothesis relating private equity investment, financial constraints and exporting. We conduct three tests to observe whether there is evidence of private equity investors alleviating financial constraints. First, in Table 10 we split our sample into our four different deal types (private-to-private buyouts, public-to-private buyouts, secondary buyouts and divisional buyouts). Prior studies document heterogeneity in the firm-level effects of different buyout types. In particular, private-to-private transactions are associated with greater post-buyout growth relative to public-to-private buyouts (Boucly et al. (2011), Amess et al. (2016), Fracassi et al. (2018), Lerner et al. (2019)).

In Panel A of Table 10, we find strong evidence of post-buyout growth in export value and exporting intensity in private-to-private targets, with all coefficients significant at the 1% confidence level. The value of exports grows by just under 40% relative to matched control firms in private-to-private targets, while the coefficient on exporting intensity implies that the ratio of export sales-to-total sales increase by around 3% post-buyout in private-to-private targets. Immediately, it appears that private-to-private buyouts may be driving our main results.

Where take-private deals are concerned (Panel B), the coefficients on export value are statistically insignificant. The estimates on exporting intensity imply there may be a negative effect on the ratio of export sales-to-total sales post-buyout in public-to-private deals. Likewise, the coefficients for divisional buyouts are negative and insignificant in Panel D, suggesting that these target firms may downsize post-transaction (Kaplan (1989), Chung (2011))[30]. More similar in nature to private-to-private transactions, the coefficients on secondary buyouts (Panel C) are positive but remain statistically insignificant. Overall, our results parallel prior work which has noted heterogeneity in post-transaction growth across various deal types, in particular private-to-private deals leading to positive firm growth relative to public-to-private deals (Boucly et al. (2011), Fracassi et al. (2018), Lerner et al. (2019)).

We provide further evidence of private equity investors alleviating constraints in portfolio companies. In Table 11, we partition the sample based on the median size in the pre-buyout year, while in Table 12 we split based on the median pre-deal leverage of firms. Prior literature shows that smaller, and more indebted companies are more vulnerable to credit market downturns and shocks to the availability of

[30]Consistent with Boucly et al. (2011) and Chung (2011), in unreported regressions we find that private-to-private target firms experience significant increases in sales, earnings, employment and capex investment, while public-to-private deals lead to deals lead to declines in sales and employment.

bank financing (Cingano et al. (2016), Bottero et al. (2020)). The results are in line with the findings of Table 9. Indeed, the magnitude of the coefficient on export sales in columns 1 and 2 of Table 11 is considerably greater (around 15-20 percentage points greater) for smaller firms. When we consider firms' exporting intensity in columns 3 and 4, the coefficients are positive and significant at the 1% level for smaller firms and suggest that the ratio of export-to-total sales rises by over 3% in smaller targets post-buyout. However, the same coefficients on larger target firms are substantially smaller in magnitude and are statistically insignificant. Previous papers which find only slight improvements in operating performance, such as Guo et al. (2011) and Cohn et al. (2014), tend to focus on larger deals involving larger targets, which may help in understanding the results.

Finally, in Table 12 we split our sample based on pre-transaction leverage, as measured by the ratio of debt-to-assets. The results presented in Table 12 echo those in Table 10: companies which had higher pre-deal leverage and were therefore more likely to be financially constrained, exhibit considerably higher post-transaction growth in exporting activity relative to firms which had lower pre-deal leverage. Specifically, the coefficients in columns 1 and 2 concerning the value of exports imply that the magnitude of the post-buyout increase in export value is almost twice as high for more leveraged firms. The magnitude of these coefficients are comparable to Table 11, where the sample is split based on pre-buyout size. Likewise consistent with the results when the sample was partitioned based on pre-deal size, the coefficients on exporting intensity in columns 3 and 4 imply that the effect of buyouts on post-transaction exporting intensity is only statistically significant for companies which were ex-ante more likely to be constrained - those which were more leveraged. Similarly, the coefficients indicate that the magnitude of the effect is almost four times greater on target companies which had higher pre-deal leverage.

In summary, our results provide strong empirical support for H2 since we find that private-to-private deals and financially constrained firms are more sensitive to buyout transactions. Thus, availability of outside capital through private equity investment plays an important role when markets face higher trade costs and exporters require more external finance to meet these costs.

Table 10: Deal types

The following analyses the effects of private equity ownership on exporting and other firm variables for different types of buyout transaction: private-to-private buyouts , public-to-private deals, secondary buyouts and divisional buyouts. PE is a dummy taking the value one for buyout target firms and zero otherwise and Post takes the value one after the transaction and zero before. Standard errors are clustered at the firm-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	LogExport		Exports/sales	
	(1)	(2)	(3)	(4)
Panel A: Private-to-private				
PE*Post	0.390***	0.380***	0.031***	0.030***
	(0.090)	(0.089)	(0.012)	(0.012)
Post	-0.043	-0.036	-0.005	-0.030
	(0.044)	(0.325)	(0.006)	(0.040)
Observations	11,631	11,631	11,631	11,631
Panel B: Public-to-private				
PE*Post	0.139	-0.111	-0.072	-0.081*
	(0.354)	(0.412)	(0.062)	(0.046)
Post	0.086	0.303	0.026	-0.123
	(0.219)	(1.936)	(0.032)	(0.195)
Observations	678	678	678	678
Panel C: Secondary buyout				
PE*Post	0.213	0.197	0.010	0.007
	(0.186)	(0.192)	(0.023)	(0.024)
Post	0.123	-0.676	-0.002	-0.069*
	(0.084)	(0.660)	(0.010)	(0.058)
Observations	2,994	2,994	2,994	2,994
Panel C: Divisional buyout				
PE*Post	-0.043	-0.096	0.031	0.035
	(0.178)	(0.185)	(0.024)	(0.025)
Post	0.057	-0.087	-0.044	-0.100
	(0.125)	(0.863)	(0.019)	(0.091)
Observations	1,625	1,625	1,625	1,625
Firm FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes

Table 11: Financial constraints: Size

The following analyses the effects on firms which were below and above the median level of firm sales in the pre-buyout year, and hence more or less likely to be financially constrained. PE is a dummy taking the value one for buyout target firms and zero otherwise and Post takes the value one after the transaction and zero before. Standard errors are clustered at the firm-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	LogExport		Exports/sales	
	(1)	(2)	(3)	(4)
Panel A: Smaller firms				
PE*Post	0.394***	0.361***	0.036**	0.034**
	(0.111)	(0.109)	(0.016)	(0.016)
Post	-0.095*	0.392	-0.014*	0.088
	(0.048)	(0.968)	(0.008)	(0.155)
Observations	7,087	7,087	7,087	7,087
Panel B: Larger firms				
PE*Post	0.239**	0.234**	0.014	0.015
	(0.097)	(0.098)	(0.011)	(0.12)
Post	0.041	-0.232	-0.004	-0.039
	(0.052)	(0.652)	(0.006)	(0.069)
Observations	9,445	9,445	9,445	9,445
Firm FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes

Table 12: Financial constraints: Leverage

The following analyses the effects on firms which were above and below the median level of firm leverage (the ratio of total debt-to-assets) in the pre-buyout year, and hence more or less likely to be financially constrained. PE is a dummy taking the value one for buyout target firms and zero otherwise and Post takes the value one after the transaction and zero before. Standard errors are clustered at the firm-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	LogExport		Exports/sales	
	(1)	(2)	(3)	(4)
Panel A: High leverage firms				
PE*Post	0.412***	0.393***	0.041***	0.041***
	(0.109)	(0.112)	(0.013)	(0.014)
Post	-0.004	0.455	-0.010	-0.014
	(0.060)	(0.416)	(0.007)	(0.039)
Observations	7,304	7,304	7,304	7,304
Panel B: Low leverage firms				
PE*Post	0.227**	0.206**	0.010	0.012
	(0.098)	(0.097)	(0.013)	(0.013)
Post	0.002	-0.875**	-0.005	-0.055
	(0.045)	(0.362)	(0.007)	(0.046)
Observations	9,666	9,666	9,666	9,666
Firm FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes

5.6.5 Private equity, exporting & the crisis

We then turn our attention to examine the role of private equity investors on firm-level exporting during the recent global financial crisis. The profound impact the financial crisis had on international exporting is well-documented: from September 2008 to January 2009, world trade contracted by 30%. To put this into perspective, global GDP fell by only 3% over the same period (Bricongne et al. (2012)). Within the UK, from 2008 to 2009, exports fell by 22.1%[31]. This collapse in international trade has been attributed to various factors: a decline in demand, a rise in protectionism, and a restricted access to finance for exporters (Bricongne et al. (2012), Görg and Spaliara (2014a)).

More constrained firms tend to suffer more as a result of economic shocks (Cingano et al. (2016), Bottero et al. (2020)). Specific to exporting, empirical evidence indicates that more constrained firms were left worse off during the financial crisis. In particular, Görg and Spaliara (2018) show that more constrained firms and those operating in more vulnerable industries were more likely to exit the export market during the crisis. Furthermore, Bricongne et al. (2012) find that smaller exporting firms reduced the range of destinations served or stopped exporting altogether. Coupled with the aforementioned evidence of private equity investors softening the impact of the crisis on their portfolio companies (Bernstein et al. (2019)) and generally mitigating financial constraints facing companies (Boucly et al. (2011), Amess et al. (2016), Fracassi et al. (2018)), we can plausibly speculate that private equity-backed firms' exporting was more resilient to the negative effects of the crisis relative to that of non-sponsored firms.

Our data set and sample period encompass the financial crisis and, as such, provide fertile grounds for investigating whether or not private equity investors were able to soften the impact of the crisis on the exporting of portfolio companies. Recent work by Bernstein et al. (2019) has shown that private equity investors helped their portfolio companies in the UK outperform similar non-sponsored firms during the crisis by relaxing credit constraints. In particular, private equity-backed firms reduced their investment rate and equity and debt issuance by significantly less relative to other firms at the onset of the crisis. Consequently, they were able to increase their asset base and market share.

5.6.5.1 Data, descriptive statistics & model In order to assess impact of private equity ownership on firms' exporting around the crisis, we follow the sample

[31] As measured in USD. This equates to a decline of 8.6% in sterling due to exchange rates.

construction of Bernstein et al. (2019). Specifically, for our treated sample of private equity-backed firms, we keep all those who had received private equity investment before the end of 2007. We then keep those which had not experienced some form of exit before the end of 2008. This leaves us with an initial 387 private-equity backed firms who received private equity investment from 2004 to 2007. The data set includes data from 2004 to 2011, a symmetrical window around the crisis.

Our matching technique is the same as in our earlier analysis. The only noteworthy difference is that whereas we previously matched on firms' characteristics in the pre-deal year, we now match on firm's size, profitability and leverage in 2007 - the year before the onset of the crisis. As such, we select up to 5 companies for each portfolio company which: 1) operate in the same 2-digit SIC code; 2) have total assets within 50% of the private equity-backed firm in 2007; 3) have return on assets within a 50% bracket of the target company, and 4) have leverage (total debt/assets) within 50% of the target in 2007. Using this method, we are able to match 199 private equity-backed firms to adequate control firms.

In order to ensure our matching is sufficiently appropriate, we show some brief summary statistics of key variables in 2007 for both the treated and control samples in Table 13. The two groups of firms are very similar across all variables in 2007, prior to the crisis. As expected, profitability and leverage are almost identical given that they formed part of the matching process, as is firm's cash flow. Size, as measured by total assets or sales, is not significantly different between the two groups. The only difference is that private equity-backed firms have higher earnings scaled by assets. The exporting variables are similar in both sub-samples. Each of the logarithm of total export value, the ratio of export sales to total sales and the 1- and 2-year growth rate in exports in 2007 are not statistically significantly different between each group.

Figure 3 offers the first insight into the potential cushioning impact private equity sponsorship may provide to firm's exporting in the midst of the crisis. The graph presents the median growth rate of the logarithm of exports for each year for both private equity-backed and control firms. A comparison of pre-crisis export growth trends in buyout targets and control firms reveals no obvious differences, suggesting that the parallel trends assumption required for difference-in-differences estimation is largely satisfied. Once the crisis ensues, the median export growth of control firms drops considerably from 14% to 2%, while that of private equity-backed targets remains relatively stable, experiencing only a modest decline relative to the control firms.

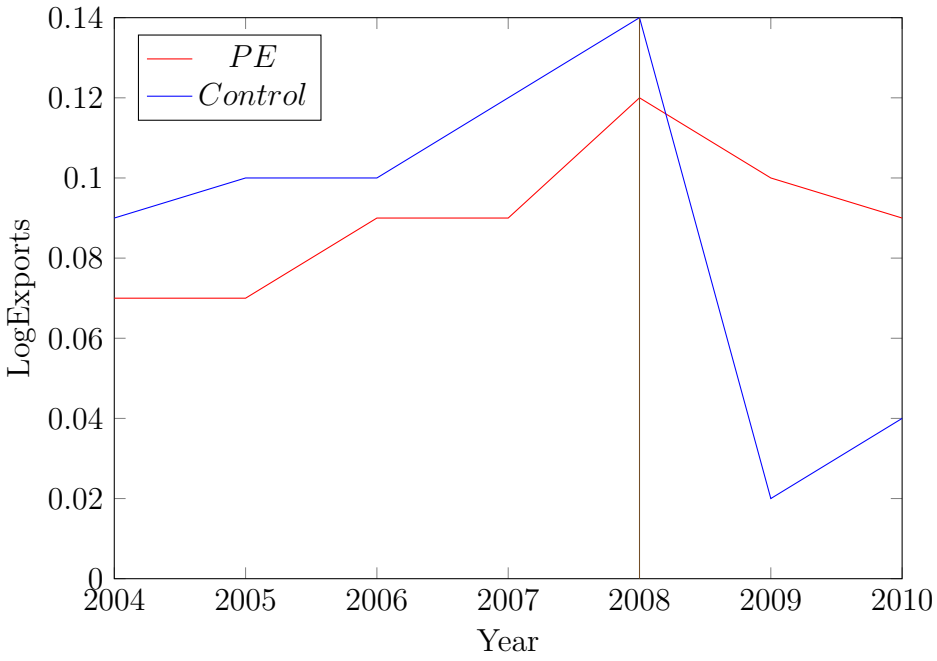
Table 13: Pre-crisis descriptive statistics

The below table 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 2 digit SIC code, ROA (net income/total assets) (within a 50% bracket) and total assets (size) (within a 50% bracket) in the pre-crisis year, 2007. Log(export) is the log of the value of export sales. Cash flow is defined as a firm's net income plus depreciation and is scaled by total assets, earnings is EBITDA normalized by total assets, while ROA is net income divided by total assets. Leverage is calculated as a firm's ratio of debt to total assets. Other variables are self-explanatory.

	PE				Control				
Variable	N	Mean	Median	SD	N	Mean	Median	SD	t-test
Exporting									
Log(export)	67	8.48	8.59	1.74	219	8.67	8.76	1.82	-0.19
Export/total sales	67	0.28	0.18	0.27	219	0.34	0.23	0.31	-0.05
1-year export growth	67	0.10	0.09	0.28	172	0.14	0.13	0.30	-0.04
2-year export growth	54	0.19	0.18	0.44	164	0.25	0.21	0.47	-0.06
Firm Variables									
Total assets	189	175,151	26,545	738.588	773	125,329	20,961	568.266	49,822
Sales	181	159,784	36,097	815.920	652	95,923	30,933	269.300	63,860
Profitability (ROA)	189	0.13	0.11	0.12	773	0.12	0.10	0.10	0.01
Leverage	189	0.61	0.62	0.24	773	0.62	0.62	0.23	-0.01
Earnings	189	0.19	0.16	0.13	767	0.13	0.15	0.28	0.06***
Cash flow	186	0.16	0.14	0.13	713	0.16	0.14	0.11	0.00

Figure 3: Export growth over the crisis

This figure graphs the median one-year growth rate of the logarithm of export value for both private equity-backed firms and control firms around the crisis.



5.6.5.2 Empirical model & results In a more formal examination of private equity ownership and exporting around the crisis, we adopt a standard difference-in-differences model where we estimate the following equation:

$$(y_{it}) = \alpha_t + \alpha_i + \alpha_c + \beta_1(Post_t) + \beta_2(PE_i * Post_t) + \theta X_{it} + \varepsilon_{it} \quad (6)$$

Where the dependent variable is the one- and two-year growth rate in export value. As in previous sections, we include firm and year fixed effects, denoted by α. Industry fixed effects are also included to control for any unobserved time-invariant industry factors. The covariate of firm-level controls is the same as before and includes firm sales, earnings, leverage, cash flow, earnings and profitability, taken in 2007 and interacted with the Post variable. PE takes the value one for all private equity-backed companies and zero for controls. Post is equal one after 2007 and zero otherwise. Standard errors are clustered at the firm-level.

The regression results of Equation 7 are displayed in Table 14. In columns 1 and 2, we find that buyout target companies' export growth fell by less than non-private equity-backed companies during the financial crisis. The effect of private equity ownership is both statistically significant and large in economic magnitude. Target companies' export growth fell by around 7% less than that of control firms during the crisis. This is consistent with the graphical plots in Figure 3. The inclusion of firm-level control variables has no impact on the coefficients. When we consider the two-year growth rate in export value in columns 3 and 4, our results remain significant and increase in magnitude. The two-year growth rate in exports falls by around 15% less for target companies relative to control firms at the onset of the crisis. Again, the coefficient is robust in statistical significance and economic magnitude to the inclusion of a host of firm-level covariates and fixed effects.

As in section 6.3, and to further validate the parallel trends assumption, we extend the analysis to gain an insight into how firm's export growth evolves over time around the crisis. We explore how export growth evolves over time around the crisis in more detail by estimating the following equation, which shows year-by-year private equity effects:

$$(y_{it}) = \alpha_t + \alpha_i + \alpha_c + \Sigma\beta_k(PE_i) + \theta X_{it} + \varepsilon_{it} \quad (7)$$

Where we estimate a different β_k for each year between 2004 and 2011, using the pre-crisis year, 2007, as the reference year. If β_k is correctly capturing the causal

effect of the financial crisis on firms' exporting then we would expect the effect of private equity ownership to appear at the onset of the crisis. The results are presented in Table 15. The pattern is consistent with that in Figure 3. There is a lack of consistent, significant patterns between the two groups of firms in the pre-crisis period. However, the positive impact of private equity ownership becomes clear during the crisis years. Again, this is consistent with the trend in Figure 2, where there is a substantial decline in the median export growth of control firms, and a far modest change in buyout targets' export growth which remains more stable during the crisis. Consistent with Bernstein et al. (2019), the results suggest that private equity investors were able to soften the impact of the crisis on their portfolio companies.

Table 14: Exporting & the crisis

This table investigates the effect of private equity buyouts on the firms' exporting growth during the global financial crisis. The dependent variables are the one- and two-year growth rate of export value. PE is a dummy taking the value one for buyout target firms and zero otherwise, Post takes the value one for years 2008 to 2011. Standard errors are clustered at the firm-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	1-year export growth rate		2-year export growth rate	
PE*Post	0.068**	0.069**	0.153**	0.157**
	(0.029)	(0.030)	(0.062)	(0.061)
Post	0.016	0.147	0.010	0.496**
	(0.062)	(0.116)	(0.101)	(0.241)
Firm FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1,780	1,780	1,511	1,511

Table 15: Evolution of exports over time around the crisis

This table reports the estimates from a time-varying fixed effects model. Specifically, the table reports β_k of Equation 8. Even-numbered columns augment the baseline model with a set of firm-level controls measured in 2007 and interacted with the Post dummy. In Columns 1 and 2 the dependent variable is the one-year growth of export value and in Columns 3 and 4 the dependent variable is the two-year growth of export value. Standard errors are clustered at the firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%

	1-year export growth rate		2-year export growth rate	
PE*2004	-0.304**	0.315*	-0.277	-0.285
	(0.131)	(130)	(0.206)	(0.202)
PE*2005	0.037	0.029	-0.379*	-0.391*
	(0.065)	(0.066)	(0.189)	(0.185)
PE*2006	0.070	0.064	0.067	0.057
	(0.064)	(0.065)	(0.080)	(0.078)
PE*2008	0.011	0.001	-0.014	-0.016
	(0.055)	(0.054)	(0.082)	(0.081)
PE*2009	0.145**	0.136**	0.093	0.087
	(0.066)	(0.067)	(0.090)	(0.089)
PE*2010	0.132**	0.122*	0.273***	0.272***
	(0.065)	(0.063)	(0.093)	(0.091)
PE*2011	0.024	0.014	0.115	0.111
	(0.063)	(0.061)	(0.091)	(0.088)
Firm FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1,789	1,789	1,519	1,519

5.6.6 Working capital mechanism

In Table 16 we outline various measures of firms' working capital management for both private equity-backed and matched control firms in the pre- and post-deal periods. We include the ratio of net working capital to sales, the cash conversion cycle, net working capital, trade debtors, trade creditors and their logarithms[32]. In the pre-deal period, both net working capital (in sterling pounds) and its logarithm are significantly lower in private equity-backed companies relative to control firms. The change in the post-deal period is dramatic, as net working capital is considerably higher in buyout firms and the difference is strongly statistically significant. Similarly, the NWC-sales ratio is significantly less in the pre-deal years for target firms, but rises dramatically and converges on that of the control firms after the transaction, as the ratio improves considerably for private equity targets, but by far less so for control firms. Finally, while the cash conversion cycle is already significantly lower for target firms pre-transaction, the gap between the two sets of firms widens considerably by 8 percentage points post-transaction.

These summary statistics give us an initial idea as to the positive impact private equity investors may be exerting on portfolio companies' financial control and working capital management. In Figures 4 and 5 we plot the year effects estimates (see Equation 1) around the transaction year separately for the private equity-backed companies and matched control companies on the logarithm of net working capital and the ratio of net working capital-to-sales. The divergence in both variables occurring around the year of the deal is clear. In both cases the two sub-samples of firms follow similar paths prior to the transaction. Once the transaction occurs, the buyout firms' working capital increases significantly more during the post-deal years relative to similar non-sponsored firms.

We then turn to a formal estimation of the effect of private equity buyouts on portfolio companies working capital. Our model is a DiD estimation, the same as in Equation 4 and the results are tabulated in Table 17. We use a variety of dependent variables to capture firms' working capital management: the ratio of net working capital (NWC) to sales, the cash conversion cycle, the logarithm of NWC, the logarithm of trade debtors and creditors, the ratio of NWC to total assets and lastly, the ratio of current assets to total assets. The results show an overwhelming improvement in the working capital management of private equity targets relative to control firms post-buyout transaction, suggesting that private equity buyouts are

[32]The cash conversion cycle is calculated as CCC = 365*[(inventory/cost of sales) + (receivables/sales) - (payables/cost of sales)]

followed by a marked enhancement in target companies' working capital structure.

For instance, buyouts are followed by a 1.5 percentage point increase in the ratio of net working capital-to-sales. This represents a meaningful economic magnitude, as the standard deviation of the sample NWC-sales ratio is 0.24, implying that buyouts are followed by a 6% standard deviation increase in the ratio of NWC-to-sales. When we scale NWC by total assets, the magnitude of the effect is similar, however it loses statistical significance when we augment the model with firm controls. The other proxies of working capital are likewise positively associated with private equity sponsorship. In particular, we find that the cash conversion cycle decreases by 8% in buyout targets relative to control firms, post-transaction, while net working capital rises by around 50%. We also find post-transaction rises in both trade debtors and trade creditors. Lastly, the ratio of current assets to total assets rises by around 1.3-1.8% post-buyout. Overall, the results show that private equity-backed companies are strongly associated with improvements in working capital management, which we believe represents an increased ability to finance greater participation in international export markets. Given that the cross-border transporting and delivery of goods can take significantly longer than domestic delivery, exporters working capital is strained relative to that of a domestic producer and have greater working capital needs.

Table 16: Working capital summary statistics

The below table details summary statistics of private equity-backed and non-private equity-backed firms' working capital in the pre- and post-deal periods. The table describes the mean and median values of the ratio of net working capital-to-sales, the cash conversion cycle, working capital, trade debtors and trade creditors (£000s) and the natural logarithm of working capital, trade debtors and trade creditors values in the pre-deal period (Post=0) and in the post-deal period (Post=1) for the private equity-backed sample (PE) and the control sample (Control). The 'diff' columns represent t-tests for the difference in means between the PE-backed sample and the control sample in each period. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Post=0							Post=1						
	PE			Control				PE			Control			
Variable	N	Mean	Median	N	Mean	Median	diff	N	Mean	Median	N	Mean	Median	diff
NWC-Sales (%)	6,233	0.16	0.09	26,200	0.20	0.12	-0.04***	7,136	0.26	0.20	26,391	0.26	0.20	0.00
CCC (days)	3,776	48	40	14,636	64	50	-16***	4,254	43	34	14,176	67	54	-24***
Working Capital (£000)	8,115	5,774	803	35,721	6,343	1,227	-568	7,325	21,076	6,864	31,112	13,561	4,311	7,514***
Log WC	6,054	7.33	7.48	27,298	7.56	7.76	-0.23***	6,005	9.24	9.23	25,746	8.71	8.75	0.53***
Trade Debtors (£000)	6,450	5,969	2,157	25,630	5,285	1,934	684***	6,823	10,059	4,003	23,567	8,805	2,899	1,254***
Log TD	6,450	7.55	7.67	25,630	7.33	7.57	0.22***	6,823	8.17	8.29	23,567	7.72	7.97	0.45***
Trade Creditors (£000)	6,574	4,391	1,239	26,551	3,533	939	857***	6,973	8,056	2,440	24,950	5,670	1,271	2,385***
Log TC	6,574	7.11	7.12	26,551	6.70	6.85	0.41***	6,973	7.81	7.79	24,950	7.04	7.14	0.76***

Figure 4: Effect of being PE-backed on working capital

The below figure illustrates the change in firms' working capital for both PE-backed companies and control companies in our sample around the transaction, where year 0 is equal to the year of the transaction. Specifically, the figure reports the α_t of the following equation: $(y_{it}) = \alpha_t + \alpha_i + \varepsilon_{it}$. Where α_t captures year fixed effects and α_i captures company fixed effects. The year precedent to the transaction is used as the base period and its corresponding coefficient is normalized to zero. The equation is estimated separately for both the PE-backed and control samples, with standard errors being clustered at the company level.

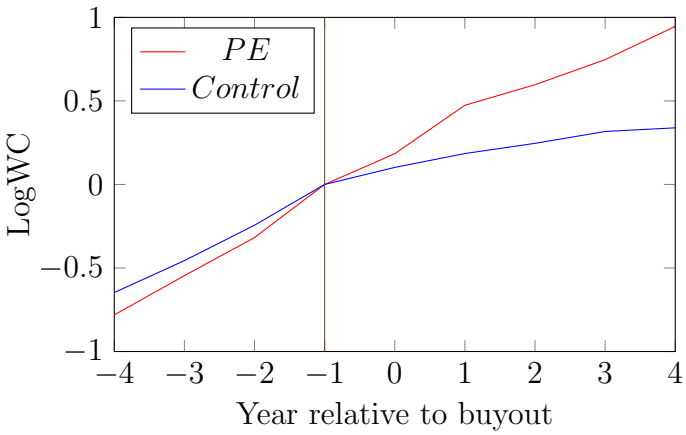


Figure 5: Effect of being PE-backed on NWC-sales ratio

The below figure illustrates the change in firms' net working capital-to-sales ratio for both PE-backed companies and control companies in our sample around the transaction, where year 0 is equal to the year of the transaction. Specifically, the figure reports the α_t of the following equation: $(y_{it}) = \alpha_t + \alpha_i + \varepsilon_{it}$. Where α_t captures year fixed effects and α_i captures company fixed effects. The year precedent to the transaction is used as the base period and its corresponding coefficient is normalized to zero. The equation is estimated separately for both the PE-backed and control samples, with standard errors being clustered at the company level.

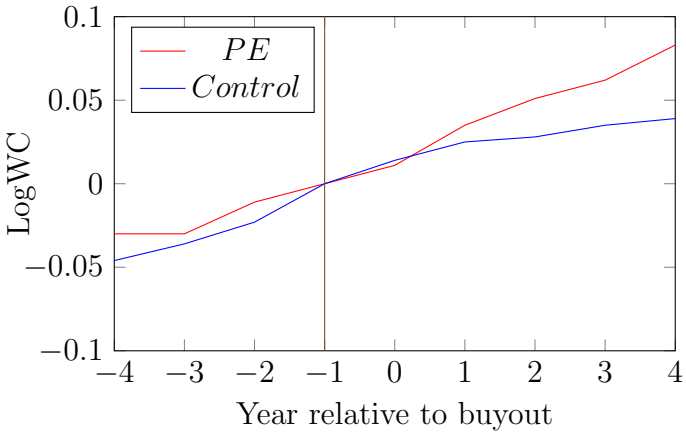


Table 17: Working capital mechanism

This table formally investigates the working capital mechanism behind the growth in firms' exporting and growth in operating performance. The model is the standard DiD equation (see Equation 3). The firm-level controls are the same as before and standard errors are clustered at the firm-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	NWC-Sales		CCC		LogNWC		LogTradeDebtors		LogTradeCreditors		NWC/TA		CA/TA	
PE*Post	0.015**	0.016**	-0.083**	-0.082**	0.590***	0.496***	0.284***	0.266***	0.394***	0.369***	0.014**	0.007	0.018***	0.013**
	(0.060)	(0.059)	(0.014)	(0.041)	(0.038)	(0.039)	(0.007)	(0.006)	(0.006)	(0.006)				
Post	0.022***	0.046**	0.029	0.190*	0.018	-0.405***	-0.035*	-0.144**	-0.073***	-0.198***	0.019***	-0.015*	0.002	-0.004
	(0.025)	(0.095)	(0.019)	(0.069)	(0.019)	(0.070)	(0.003)	(0.010)	(0.003)	(0.010)				
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	65,663	65,663	30,545	30,545	64,736	64,736	62,630	63,630	64,809	64,809	81,784	81,784	81,357	81,357

5.7 Robustness tests

5.7.1 Pre-buyout growth patterns

One potential concern regarding the results presented thus far, is that private equity investors may simply be selecting to invest in companies that were already growing faster than other firms in the pre-transaction period (Boucly et al. (2011)). Indeed, Table 5 illustrates that private equity-equity backed firms have higher growth rates of sales in the pre-deal years, and it may be that this is driving our results. In order to control for pre-buyout growth, we include an interaction term between the three year pre-buyout growth rate in sales and the *Post* variable. Thus, we estimate the following specification:

$$(y_{i_t}) = \alpha_t + \alpha_i + \alpha_c + \beta_1(Post_{it}) + \beta_2(PE_i * Post_{it}) + \beta_3(SalesGrowth * Post_{it}) + \theta X_{i_t} + \varepsilon_{i_t} \quad (8)$$

Where *SalesGrowth* is the 3 year growth in sales prior to the transaction year. We report the results in Table 18. While we find the growth in pre-buyout sales to have a positive effect on the post-buyout growth in the value of exports and exporting intensity, its inclusion does not have a material impact on our estimates of private equity buyouts on firms' exporting activity. In other words, we find that it does not diminish the effect of private equity ownership and our results remain intact after controlling for pre-buyout growth trends.

5.7.2 Additional control variables

Table 13 offers a further robustness check, where we include controls which have been widely used in the firm-level exporting literature to date. Typically it has been found that larger, more productive firms which export (Bernard and Jensen (2004), Greenaway and Kneller (2004), Bernard et al 2007). To test whether these firm-level variables may be driving our results, and not the change in firm ownership, we augment our models in Equations 3 and 4 with further controls, including the size of the firm, as measured by the number of employees, the wage bill of the firm and the productivity of the firm, measured by the amount of profit generated per employee. As before, these controls are taken in the pre-deal year and are interacted with the post variable. The results in Table 19 are consistent with our baseline results. In columns 1 to 4 we find that our results regarding firms' exporting at the extensive margin are unaffected by the inclusion of these further controls. Similarly, at the intensive margin, the coefficients still imply that private equity sponsorship is

associated with an increase in over 30 percentage points in the value of firm's export sales. Where the exporting intensity of firms is concerned, the coefficients imply a similar economic magnitude as our baseline results. In summary, we conclude that our main results are robust to including additional firm-level characteristics, typically associated with exporting firms.

5.7.3 Attrition bias

In order to account for any potential attrition bias from firms exiting via an acquisition or liquidation, we reduce our sample to include only those deals which have experienced an exit. The results are tabulated in Table 20. This process of elimination reduces our sample of private equity-backed firms from 733 to 459. Nevertheless, the significance of our results concerning both the extensive and intensive margins of exporting remain intact. The magnitudes actually increase in size: the coefficients indicate that private equity-backed firms which have experience an exit increase the value of their exports by around 35% relative to control firms, while their export intensity increases by around 2.5%.

5.7.4 Alternative matching methodologies

Lastly, in unreported regressions, we adjust our matching technique to test whether doing so alters our primary findings. Firstly, we follow Bernstein et al. (2019) and tighten our matching bandwidths from 50% to 30%. While this reduces our sample to 651 sponsored firms and 2,184 control firms, our results are upheld. Secondly, we use the matching technique adopted by Boucly et al. (2011) and drop leverage from the matching procedure thereby allowing the two groups of firms to have different leverage ratios in the pre-buyout year. This increases our number of PE-backed firms to 935. Again, our results are unaffected. We continue to find that private equity ownership positively affects firm-level exporting at both the extensive margin and the intensive margin.

Table 18: Robustness: accounting for pre-buyout growth

This table investigates the same as Tables 6 and 7 but also includes an interaction term of the three-year pre-buyout growth in sales interacted with the Post variable. Columns 1 and 2 estimate linear probability models and columns 3 and 4 estimate probit models based on Equation 3. Columns 5 to 8 estimate Equation 4. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level. The other firm controls are the same as before.

	Extensive margin				Intensive margin			
	Exporting dummy				LogExport		Export/sales	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.046***	0.042***	0.224***	0.217***	0.301***	0.291***	0.024**	0.023**
	(0.012)	(0.013)	(0.083)	(0.083)	(071)	(0.073)	(0.009)	(0.010)
Post	-0.005	0.010	-0.025	0.220	-0.044	-0.032	-0.010	-0.031
	(0.06)	(0.023)	(0.045)	(0.202)	(0.037)	(0.031)	(0.005)	(0.032)
SalesGr*Post	-0.001*	-0.001*	-0.004	-0.003	0.075***	0.074***	0.004**	0.004**
	(0.001)	(0.001)	(0.004)	(0.004)	(0.021)	(0.021)	(0.002)	(0.002)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry 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	72,219	72,219	70,699	70,699	16,970	16,970	16,970	16,970

Table 19: Robustness: export literature controls

This table investigates the same as Tables 7 and 8 but also includes controls typically used in exporting literature. These controls are the log of employees (firm size), the log of profits per employee (productivity) and the log of the firm's wages. The controls are taken in the pre-deal year and are interacted with the Post variable. Columns 1 and 2 estimate linear probability models and columns 3 and 4 estimate probit models based on Equation 3. Columns 5 to 8 estimate Equation 4. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level. The other firm controls are the same as before.

	Extensive margin				Intensive margin			
	Exporting dummy				LogExport		Export/sales	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.046***	0.042***	0.246***	0.211**	0.283***	0.271***	0.022**	0.023**
	(0.012)	(0.013)	(0.083)	(0.083)	(0.073)	(0.075)	(0.010)	(0.009)
Post	-0.021**	0.004	0.055	0.325	-0.499	-0.704**	-0.024	-0.052
	(0.010)	(0.022)	(0.122)	(0.207)	(0.197)	(0.301)	(0.028)	(0.039)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Export controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	72,219	72,219	70,699	70,699	16,970	16,970	16,970	16,970

Table 20: Robustness: exited deals only

The following repeats the main estimation on the sub-sample of firms which have experienced an exit. Columns 1 and 2 estimate linear probability models and columns 3 and 4 estimate probit models based on Equation 3. Columns 5 to 8 estimate Equation 4. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level. The other firm controls are the same as before.

	Extensive margin				Intensive margin			
	Exporting dummy				LogExport		Export/sales	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE*Post	0.040***	0.039**	0.217**	0.223**	0.362***	0.343***	0.026**	0.025**
	(0.015)	(0.016)	(0.099)	(0.100)	(0.093)	(0.095)	(0.012)	(0.013)
Post	0.007	0.030	0.069	0.413*	0.007	-0.048	-0.007	-0.021
	(0.008)	(0.027)	(0.056)	(0.232)	(0.047)	(0.334)	(0.006)	(0.039)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry 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	43,966	43,966	42,712	42,712	10,936	10,936	10,936	10,936

5.8 Concluding Remarks

Recent literature on corporate finance has sought to measure the gains from private equity investment in firm performance. Our study builds on these foundations, focusing on PE investment and its effect on firms' export performance. Our results from a panel of 733 private equity-backed firms and 3,104 control firms over the period 2004 to 2017 shows that private equity investors are able to relax credit constraints and allow their portfolio companies to improve their exporting infrastructure. This effect holds for both the intensive and the extensive margin of export.

When we split our sample into different deal types and groups of firms, we uncover significant heterogeneity. In particular, the positive effect of private equity is more potent for targets in private-to-private deals and firms which are ex-ante more likely to be financially constrained in the pre-buyout period. This implies that availability of outside capital through private equity investment plays an important role when markets face higher trade costs and exporters require more external finance to meet these costs. Furthermore, we offer evidence that private equity-backed firms' exporting was significantly more resilient amid the global financial crisis. Finally, we show that as expected, the net working capital ratio increases hand-in-hand with exports. This signals a mechanism through which credit constraints are alleviated: private equity firms help target firms to finance the costly working capital needs associated with exporting. Our results are robust to re-specifications and alternative matching methodologies.

Exporting provides many benefits to firms, including higher survival likelihood amid economic crises. By helping their portfolio companies to increase their exports, private equity firms help them to shield against crises. This is of particular pertinence today as the global Covid-19 pandemic has had a profound impact on the corporate sector.

6 Chapter - Bank-affiliated private equity buy-outs and shocks to the banking sector

6.1 Background

While a rich literature to date has considered how banks can transmit banking sector shocks onto the real economy via their commercial lending arms (see for example Khwaja and Mian (2008); Chava and Purnanandam (2011); Cingano et al. (2016); Fraisse et al. (2020); Acharya et al. (2018); Gropp et al. (2018); Farinha et al. (2019)), there is not yet any empirical evidence on the effect of an exogenous shock to a bank and the consequent impact on its private equity arm and the portfolio companies in which this invests.

Banks have become increasingly important players in private equity markets, as both institutional investors into private equity funds (LPs) and as private equity investors themselves, actively raising and managing funds (GPs). In terms of the latter, from 1990 to 2018, 12% of European private equity deals were made by bank-affiliated investors (see Figure 6)[33]. This is conservative relative to US market figures reported in Fang et al. (2013) who reveal that almost 30% of US deals completed between 1983 and 2009 were sponsored by the private equity arm of a bank. Nevertheless, banks maintain an important role in European private equity markets.

[33]Based on data from S&P Capital IQ

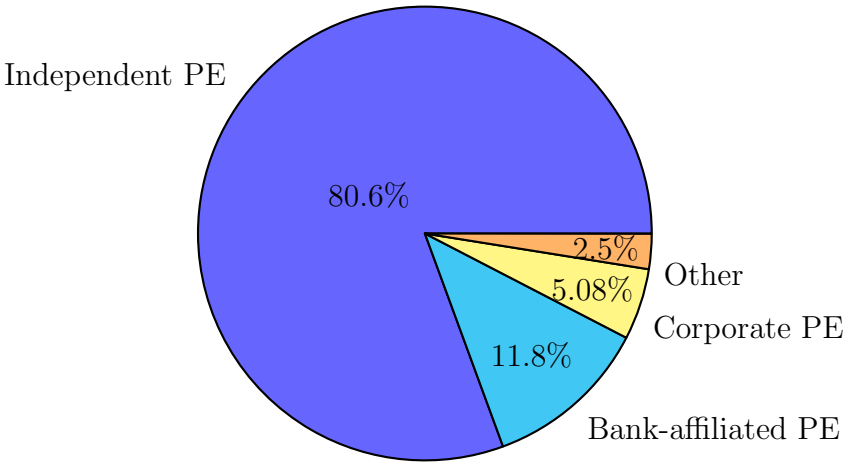


Figure 6: European buyouts 1990 - 2018 by investor type

The above chart shows a breakdown of all private equity deals (excluding venture capital and growth deals) from January 1990 to December 2018, by investor type. 'Independent' deals are those executed by a private/public limited partnership; 'bank-affiliated' are undertaken by the private equity division or subsidiary of a bank; 'corporate' accounts for deals of private equity arms of large corporate organizations; Finally, 'other' accounts for all other deals. Data comes from S&P Capital IQ.

The firm-level benefits of being backed by a private equity investor are well documented in the literature, including improvements in operating performance (Kaplan (1989), Lichtenberg and Siegel (1990), Guo et al. (2011)), employment and job creation (Boucly et al. (2011), Davis et al. (2014), Lerner et al. (2019) Biesinger et al. (2018)), profitability (Cressy et al. (2007), Boucly et al. (2011), Cohn et al. (2014)), productivity (Harris et al. (2005), Davis et al. (2014), Biesinger et al. (2018), Lerner et al. (2019)), operational efficiency (Bernstein and Sheen (2016), Cohn et al. (2019)) and distress risk (Tykvová and Borell (2012), Hotchkiss et al. (2014)). Moreover, empirical work suggests that private equity-backed companies are more recession-resistant than comparable non-sponsored firms (Wilson et al. (2012), Bernstein et al. (2019)).

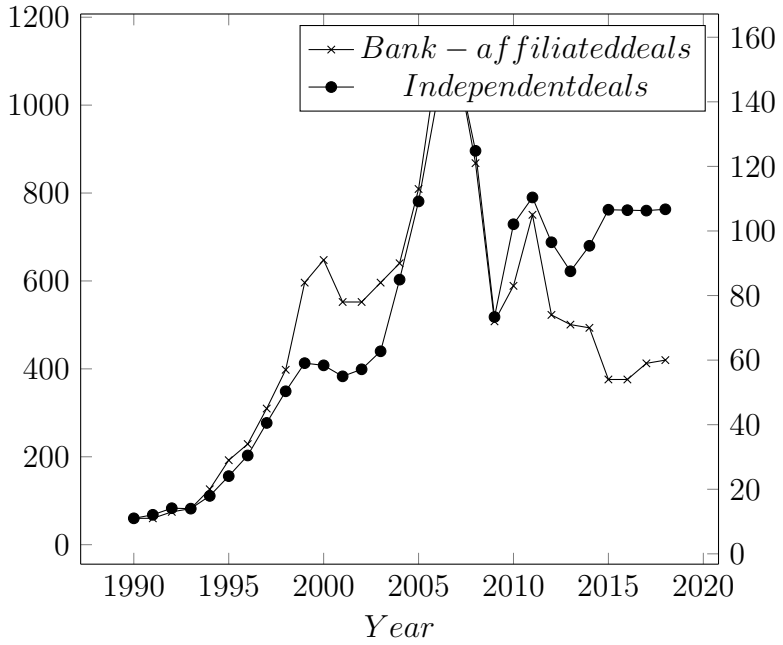
With the diverse firm-level benefits of private equity investment in mind, and given that bank-affiliated deals have accounted for a sizeable portion of private equity deal activity in Europe in recent years, we look to understand how bank-affiliated private equity-backed companies respond to an exogenous shock to their parent bank. In order to do so, we exploit the Capital Exercise conducted by the European Banking Authority (EBA) in 2011, where selected banks had to increase their core tier 1 capital (CT1) ratios to 9% of their risk-weighted assets by June 2012. The regulatory exercise was unexpected not only in its magnitude (Financial Times, 2011), but also in its timing [34].

In Figure 7, we graph the deal activity of the European private equity market, focusing on independent and bank-affiliated deals. In terms of the number of deals executed, both deal types follow a similar pattern in early years, rising during the initial LBO boom of the 1980s and early 1990s, dipping slightly in the aftermath of the dot com bubble before dropping considerably after the recent global financial crisis and, to a lesser extent, after the sovereign debt crisis. Thereafter, and appearing to coincide with the EBA capital exercise, while independent private equity deal activity recovers, bank-affiliated deals drop slightly more around the time of the capital exercise, leading to a divergence and further motivating our study.

[34]The EBA had carried out stress tests across European banks less than 5 months prior to the EBA capital exercise.

Figure 7: Bank-affiliated vs independent buyouts in Europe 1990-2018

This graph shows the number of bank-affiliated private equity buyouts in Europe (right axis) and the number of independent private equity buyouts in Europe (left axis) from 1990 to 2015. A bank-affiliated deal is a transaction in which the equity sponsor is a bank-affiliated private equity firm. An independent deal is one in which the equity sponsor is an independent limited partnership, unaffiliated with any other organization. Private equity transaction information is from S&P Capital IQ.



Recent work by Bernstein et al. (2019) shows that private equity-backed companies outperformed non-private equity-backed companies during the recent financial crisis. Moving a step further, using a sample of bank-affiliated private equity buyouts, we investigate whether the impact of an exogenous banking sector shock affects the portfolio companies of all bank-affiliated private equity investors in the same manner. Specifically, we investigate the differential impact the EBA capital exercise had on the portfolio companies of affiliated investors of affected and unaffected banks, with regards to their investment activity, financing policies and their performance in the aftermath of the shock. Recent work by Gropp et al. (2018) provides evidence that affected banks increased their CT1 ratios relative to unaffected banks by reducing their risk-weighted assets, with the authors initially suggesting that the EBA exercise appeared to be an effective policy instrument to strengthen and stabilise the banking sector. Nevertheless, in parallel with Hanson et al. (2011), their results imply that the exercise may have induced negative real effects, as companies borrowing from these banks through their commercial lending arms consequently suffered weaker asset, investment and employment growth. Further evidence from Fraisse et al. (2020) reveals that a sample of French banks affected by increased capital requirements cut their lending activities which consequently dampened firms' corporate investment[35]. Along similar lines, we extend this analysis and also find that increasing banks' capital requirements may be costly to the real economy. However while prior studies consider the real impact of bank regulation through banks' commercial lending channels, we examine the impact on affected banks' private equity portfolio companies and find that they likewise suffered as result of the increased capital requirements on their parent bank.

Of importance in the understanding of our results is the distinction between the fund structure of a bank-affiliated private equity fund and an independent fund. Given that the parent bank is normally the largest and most important (and often the only) LP in its own PE fund, the economic structure of bank-affiliated funds typically differs from that of an independent fund, where the GP-LP relationship is governed by a Limited Partner Agreement (LPA). Where bank-affiliated funds are concerned, there is unlikely to be a formal LPA structure between the GP and LP, but the parent bank will typically set aside an amount of capital each year designated to its private equity arm. However, unlike capital commitments into an independent PE fund, this capital is not ring-fenced and the amount set aside can

[35]Other work has also investigated the credit supply implications of increasing capital requirements. See for example Aiyar et al. (2014), De Marco and Wieladek (2015), Juelsrud and Wold (2018). De Jonghe et al. (2019)

be adjusted[36]. The unconventional fundraising structure of bank-affiliated funds is highlighted in a note on Lloyd Development Capital's website (the private equity arm of Lloyds Banking Group):

"LDC has a unique funding structure compared to other private equity firms, who generate capital through funds and large institutional investors ... As part of Lloyds Banking Group, LDC does not need to fundraise due to 'evergreen' funding from the bank. This allows the firm to deploy 'patient' capital, working to their portfolio businesses' timetable and investing for as long as necessary."

As such, the parent bank, as an LP into its own PE fund, can simply pull the funding and there is no legal restriction on them doing so given that the bank is the ultimate owner of the private equity fund[37]. Consequently, if a shock hits the parent bank of a bank-affiliated investor, there can be repercussions for the private equity arm as the bank may adjust downward the amount of funding available for its private equity activities.

Our analysis focuses on a sample of over three hundred companies backed by the private equity arms of European banks. In a difference-in-differences setting, we examine how the financing and performance of these companies was affected at the onset of the EBA shock. Our sub-samples of affected and unaffected banks' portfolio companies share similar characteristics and pre-shock growth trends regarding their profitability, size, earnings and leverage. Moreover, we show that the buyout characteristics, deal exits and the industries in which the target companies operate are also very similar.

We start by considering the investment and financing behaviour of these companies around the shock and find that portfolio companies of private equity arms of affected banks reduced their levels of investment relative to portfolio companies of unaffected banks from the onset of the shock. We show that companies affiliated to affected banks reduced their investment by between 5% to 8% relative to companies receiving investment from private equity arms of unaffected banks; a result that is strongly significant when controlling for various fixed effects and firm-level covariates. Moreover, when we look at the timing of the effects, the two sub-samples of companies' investment levels did not significantly differ in the pre-shock period, but

[36]The economic structure of the typical bank affiliated fund and the access to committed capital of the bank's private equity arm was confirmed in conversations with experienced bank-affiliated private equity practitioners.

[37]An institutional LP (such as a pension fund or insurance company) in a standard private equity fund cannot do this as they commit a fixed amount of capital to the fund to which the GP (the PE fund) has a legal right to call down for investment purposes. This committed capital is typically called down gradually over the course of the fund's investment period.

diverged from 2011, the year of the shock.

We then consider the financing of the portfolio companies and show that equity issuance was 1% to 2% lower for companies of affected banks, while debt issuance was between 2% to 4% lower. Again, these results hold with the inclusion of several fixed effects and firm controls. The results suggest that there is a knock-on effect of the shock to the parent bank to the portfolio companies of its private equity arm.

The performance of the portfolio companies of affected banks is also found to be weaker. Specifically, we find that they experienced poorer growth in their assets and employment in the aftermath of the shock, consistent with the weaker investment and financing outlined above. All of these results are robust to a battery of checks. In addition, we include firm, country and (bank x year) fixed effects in all models and the results are unaffected by the addition of company controls.

In further analyses, where we exclude certain deal types, such as management buy-outs (MBOs), public-to-private transactions, club deals or deals transacted in the UK (which has the most active PE market of our sample countries), the results are upheld. Importantly, we also reduce our sample to include only the years 2010 and 2011 to test for any attrition bias and, again, the results are shown to be robust. Finally, the results are unchanged when we include time-varying industry fixed effects around the shock to control for any contemporaneous changes in demand or any other time-varying industry characteristics.

The second part of the chapter expands this analysis by accounting for heterogeneity across the portfolio companies in the sample. We find that the negative impact of the shock on affected banks' portfolio companies' performance is stronger for companies who were ex-ante more likely to be financially constrained at the onset of the shock. This is consistent for various measures of financial constraints, such as dependence on bank finance, size and leverage. In addition, we also find the effect to be stronger for portfolio companies located in countries which were most affected by the European sovereign debt crisis[38], which was ongoing at the time of the EBA exercise.

Finally, we exploit heterogeneity at the private equity firm level. We find that the negative effect on the performance of portfolio companies was weaker for companies of more reputable and experienced private equity investors. Specifically, we look at the number of deals completed by the investor and the number and the value of funds raised prior to entry and find that companies receiving investment from more

[38]Greece, Ireland, Italy, Portugal and Spain

experienced private equity groups fared better. This is consistent with prior literature which has found that PE investor reputation can lead to improved performance post-investment, better deal outcomes and stronger financial health (Nahata (2008); Demiroglu and James (2010); Tykvová and Borell (2012); Hotchkiss et al. (2014)). This also complements the recent work of Bernstein et al. (2019) who find that private equity firms can help soften the negative effects of crises on their portfolio companies.

This chapter contributes to the body of literature examining the impact of bank-affiliated private equity activity on deal outcomes and firm performance (e.g., Fang et al. (2013); Wang (2017)). Our findings extend the work of these studies with regards to bank-affiliated investment by showing that a shock to the parent bank of the PE investor weakens the financial position of its portfolio companies[39].

We also relate to an extensive literature investigating the impact of private equity investment on firm outcomes (e.g., Bernstein and Sheen (2016); Bernstein et al. (2019); Boucly et al. (2011); Davis et al. (2014); Acharya et al. (2012); Guo et al. (2011); Lerner et al. (2011); Lichtenberg and Siegel (1990); Kaplan (1989)). Research to date has typically found that buyouts are a source of value creation for portfolio companies. We extend this line of work by focusing on the specific role of bank-affiliated investors, and the impact of an external shock to the parent bank on the financing policies and performance of its portfolio companies.

Finally, we also contribute to research concerning banking sector shocks and associated outcomes of firms linked to affected banks (Khwaja and Mian (2008); Chava and Purnanandam (2011); Chodorow-Reich (2013); Cingano et al. (2016); Acharya et al. (2018); De Marco (2019); Farinha et al. (2019)). Specifically, we build on recent work considering the impact of bank capital regulation on the real economy by Hanson et al. (2011), Aiyar et al. (2014), De Marco and Wieladek (2015), Fraisse et al. (2020), Gropp et al. (2018), Juelsrud and Wold (2018) and De Jonghe et al. (2019) who investigate the real impact of increasing banks' capital requirements, and show that doing so may come at a cost to the real economy.

The chapter is structured as follows: Section 2 overviews related literature, Section 3 details the EBA capital exercise, Sections 4 and 5 describe our data set and our empirical methodology, Section 6 presents our results and finally Section 7 offers

[39]While we are interested in the role of banks as GPs, Lerner et al. (2007) examine the role of banks as LPs investing in private equity funds and find that banks' selection of private equity funds is poorer relative to other types of LPs (such as endowments, pension funds) and they invest in poorer-performing funds. They show that banks under-perform other classes of LPs across both buyout and VC investments.

concluding remarks.

6.2 Literature Overview

6.2.1 Banks and Private Equity (theoretical literature)

Theoretical work has examined the choice made by companies between bank debt and private equity financing. Ueda (2004) develops a model whereby the choice between bank debt or a venture capitalist depends on the relative importance of more accurate screening and the level of intellectual property rights protection. She assumes VCs are more competent at screening companies, but involve the risk of expropriation ie. they may 'steal' the entrepreneur's business idea and undertake it themselves. The model shows that more sophisticated and risky projects are financed by VCs rather than banks. De Bettignies and Brander (2007) show that there is a two-sided moral hazard problem, as both the entrepreneur and the investor offer unverifiable support. Their model finds that when the venture capitalist provides stronger management support, entrepreneurs prefer this form of financing to bank debt. Finally, Winton and Yerramilli (2008) model the choice between bank capital and VC as influenced by the risk and return of the company's cash flows. Similar to Ueda (2004), they find VC financing is optimal over bank debt for riskier ventures and when the expected liquidation value if the venture fails is low.

Of greater pertinence to this study is Hellmann (2002) who models an entrepreneurs choice between an independent venture capitalist, who seeks a financial return, and a 'strategic' corporate investor (ie the investment arm of a large corporation, such as Intel Capital, the venture capital arm of Intel), who looks to invest in companies to achieve synergies with their core business. Consistent with other work, such as Bottazzi et al. (2007) and Andrieu and Groh (2012), independent investors are assumed to offer greater support. The model shows that the choice between an independent and corporate private equity investor is contingent upon the expected synergies between the venture and the corporate investor's core business. If the venture is a complement to the strategic investor's core business, it is more likely to be financed by the strategic investor, but if it is a substitute, the entrepreneur prefers an independent venture capitalist. In a third setting, if the venture is a significant threat to the strategic investor's core business, a syndication is optimal, where the independent VC is the lead investor and the strategic investor is a passive investor, holding an equity stake so as to reduce the independent VC's support for the 'threatening' venture. Finally, the model also predicts that strategic investors

will be more willing to pay a higher valuation[40].

More recently, and of yet greater relevance to this study, Andrieu and Groh (2012) expand this work and develop a unique model examining an entrepreneur's choice between an independent investor and a bank-affiliated investor. Their model assumes that independent investors offer higher quality support [41] but bank-affiliated investors are less financially constrained with respect to refinancings and subsequent financing rounds, consistent with Gompers and Lerner (2000a) and Hellmann (2002). The entrepreneur then weighs the benefits of each of these and makes a decision contingent on the sophistication (riskiness) of their project, its liquidation value and independent investors' need for future fundraising. They find that less sophisticated ventures with larger liquidation values opt for a bank-affiliated investor, while riskier projects with lower liquidation values prefer contracting an independent investor.

6.2.2 Bank-affiliated vs Independent(non-theoretical)

This theoretical literature provides the foundation for empirical research investigating differences between independent and affiliated private equity investors. The models of Hellmann (2002) and Andrieu and Groh (2012) show that these two types of investor have very different underlying motivations. Independent investors are driven by financial returns on investments, without having any long-term strategic goals from their portfolio companies. Under pressure to raise new funds to ensure survival, these investors must meet performance targets to ensure they build a track record to attract future fundraising [42]. On the other hand, captive investors, such as those affiliated to a bank or a large corporation, have different motives. Hellmann (2002) and Mathews (2006) argue that captive investors' primary concern is strategic, with the impetus being on increasing synergies and the strategic value-added to the parent organization, rather than pure financial gain. Hellmann reasons

[40] Gompers and Lerner (2000a) provide empirical evidence of corporate investors investing at a premium to independent investors

[41] Bottazzi et al. (2007) find that independent private equity investors are more active in their role compared to other types of captive investors, and this increased activism leads to a higher number of successful exits

[42] Independent funds typically receive capital from a wide array of institutional investors (including banks) as well as high net worth individuals. Historically, pension funds have been the most important investor for private equity funds and accounted for 35% of funds raised by European funds in 2016 (InvestEurope, 2016). Captive funds, however, typically have a more concentrated investor base, with their parent organisation generally representing the majority of funds committed into the fund. Concerning bank-affiliated funds, the bank itself typically provides at least 50% of the fund's capital (Fang et al. (2013)) and can often be the sole financial contributor (Andrieu and Groh (2012)). Both the strategic perspective and access to the large capital pool of their parent firms without the need to raise follow-on-capital can reduce the pressure on affiliated funds to perform well.

that strategic, affiliated investors invest in companies so as to enjoy synergies with and future complimentarities from these companies. These investors differentiate themselves by virtue of their complementary assets and exploit synergies between their portfolio companies and their core business. In the case of banks, the main complementary asset is their lending expertise, which may be of future interest to their private equity portfolio.

With respect to strategic corporate investors, Ma (2019) tests different strategic approaches of corporate venture capital investors, examining their activities to determine whether they invest in their portfolio companies to 'fix weaknesses' ie. the acquiring firm's innovation has deteriorated and they seek exposure to new technologies to regain a competitive edge, or to 'build on strengths', ie. they use their strong market position to identify innovative startups to strengthen their own market share. His evidence from analysing corporate investor's behaviour from entry through to exit suggests that they invest to 'fix weaknesses' and that acquirers invest strategically due to deterioration in their key innovation areas.

As for banks acting as private equity investors, Hellmann et al. (2007) provide an empirical interpretation of the motivation of bank-affiliated funds. They show that their private equity investments affect loan market outcomes. Using a sample of US data, they find that companies receiving venture capital investment from bank-affiliated funds are significantly more likely to receive a future loan from the lending arm of the parent bank. Additionally, these companies may also benefit from cheaper lending. Their evidence confirms that banks use the private equity market in order to create relationships that can then be mutually beneficial in the commercial loans market, underlining the strategic nature of banks' activity in private equity investments. Along similar lines, Fang et al. (2013) present evidence that banks' involvement in private equity generates significant cross-selling opportunities for them as it significantly increases the bank's chance of winning future investment banking business (as a future lender, M&A advisor or equity underwriter) from the target firm. Finally, Ivashina and Kovner (2011) find that banks syndicating loans for LBOs price loans cheaper to repeated customers as they want to cross-sell other fee-generating services[43].

Funds of different organizational structures also vary in terms of the policy and governance of the fund itself. Gompers and Lerner (2000a) reason that a parent-subsidiary structure in private equity investing may be sub-optimal due to creating

[43]Aside from their involvement in private equity, Drucker and Puri (2005) show that banks cross-sell investment banking services to their commercial banking clients

distortions in incentives and objectives. These lead to issues in selecting investments, such as promoting cross-selling opportunities and distributing their own risky debt, and issues in managing investments, such as inefficient incentive structures and differing exit incentives. Wang (2017) builds on the idea of distorted incentives and provides some evidence that bank-affiliated LBOs may under perform independent LBOs due to problems arising from their investment selection[44]. In terms of compensation schemes, bank-affiliated funds generally keep the same autonomous partnership structure as independent funds, albeit with a lower share of the carried interest (the share of the fund's profits kept by the GPs) accruing to the investment partners (Gompers and Lerner (2000a)). Dushnitsky and Shapira (2010) note that the limited earnings potential of investment managers is one of the key reasons why affiliated private equity managers often spin-off from their parent company to set up their own independent fund[45].

Given that the structure of affiliated and independent funds differs, as do the motivations behind their respective investing, we would expect that their portfolio companies differ too. On a theoretical note, Andrieu and Groh (2012)'s model finds that bank-affiliated investors are more likely to finance less risky, sophisticated companies with larger liquidation values. Likewise, Ueda (2004) and Winton and Yerramilli (2008) show that riskier companies are financed by venture capital investors, and not banks. Empirical evidence supports this. Hellmann et al. (2007) find that bank-affiliated investors favour less risky, later-stage transactions relative to independent funds, while Mayer et al. (2005) use the European market and reach a similar conclusion, also recognizing that affiliated investors prefer to operate closer to home. On a similar note, Johan and Murtinu (2018) find bank-affiliated venture capital deals are more likely to occur in 'safer' countries with better developed markets, more stringent accounting disclosures and stronger creditor rights. Consistent with banks being more risk-averse investors, Wang (2017) examines UK buyouts and finds bank-affiliated targets to enjoy higher pre-buyout profitability. Risk, as measured by earnings volatility, is correlated with a lower probability of a bank-affiliated buyout. Finally, and in line with banks being strategic private equity investors interested in securing future lending complimentarities, Hellmann et al. (2007) show that bank-affiliated investors target companies with a greater debt capacity, compared to independent funds.

[44] Wang (2017) does not find evidence that bank-affiliated deals under perform a matched sample of independent deals, only that a sample of bank-affiliated deals and similar independent deals under perform other independent deals

[45] A prominent UK example being Montagu Private Equity spinning off from HSBC

There is a substantial amount of research illustrating the firm-level benefits of private equity buyouts, generally showing evidence of value creation and operational efficiency improvements as a result of LBO transactions (Kaplan (1989); Smith (1990); Lichtenberg and Siegel (1990); Lerner et al. (2011); Boucly et al. (2011); Guo et al. (2011); Acharya et al. (2012); Davis et al. (2014); Paglia and Harjoto (2014); Cohn et al. (2014); Hotchkiss et al. (2014); Bloom et al. (2015); Bernstein and Sheen (2016); Bernstein et al. (2019); Cohn et al. (2019)). Moreover, the extant literature on corporate private equity (generally corporate venture capital - CVC) investors generally details firm-level benefits, noting strategic value added (Ma (2019)) and increases in innovation (Dushnitsky and Lenox (2005); Chemmanur et al. (2014); Wadhwa et al. (2016)) and firm value (Dushnitsky and Lenox (2006)).

A small body of research has investigated the firm-level effects of bank-affiliated private equity investment. Bottazzi et al. (2007) examine the level of activism of different types of private equity investors and find that bank-affiliated investors are significantly less active in their role compared to independent investors, in terms of the level of interaction between themselves and their portfolio companies and their contribution to helping with recruitment and fundraising. They then establish a positive link between levels of activism and exit performance, with a positive exit being an IPO or acquisition. Hence, bank-affiliated deals are less likely to enjoy a better exit. Fang et al. (2013) show that bank-affiliated deals tend to have poorer financing terms than independent deals and likewise have worse ex-post outcomes, particularly those executed during credit market peaks, albeit the difference is slight. However, the authors make the distinction between bank-affiliated deals , where the bank provides only equity, and parent-financed deals, where the bank provides both the debt and equity. Parent-financed deals enjoy better financing terms relative to independent deals, particularly during credit market peaks and enjoy similar outcomes, as measured by debt downgrades/upgrades and the likelihood of bankruptcy. They conclude that these deals enjoy better financing terms due to banks successful timing of the credit market when financing in-house deals, rather than improved deal quality. Focusing on the post-transaction firm-level operating performance and profitability of the portfolio companies, Wang (2017) find no statistically significant difference between the performance of a sample of UK bank-affiliated deals and a matched sample of independent deals. Moreover, the bank affiliated deals actually exhibit a higher profit margin on average, albeit the result is only significant at the 10% level. Johan and Murtinu (2018) consider venture capital investment and find that syndicates involving bank-affiliated investors have a large, positive impact on the likelihood of an IPO or acquisition. As for the effect on investee companies op-

erating performance, they find only a small, positive effect. Finally, Meuleman et al. (2020) investigate the relationship between private equity investors as agents and their investors, including LPs and banks, as principals, and how this relationship impacts the ultimate outcome of buyout transactions. In this regard, they uncover significant evidence that bank-affiliated PE investors are more effective in resolving financial distress, implying that bank-affiliated investors are better aligned with their creditors to resolve distress.

6.2.3 Bank shocks literature

A rich body of literature has investigated the transmission of banking shocks to the real economy via the credit channel. Earlier work investigated the impact on large, listed companies (Peek and Rosengren (2000); Ongena et al. (2003)). More recently, the proliferation and availability of data on matched firm-bank relationships has fostered an in-depth analysis of banking shocks and their effects on firm's corporate policies.

At the firm-level, Khwaja and Mian (2008) examine liquidity shocks to banks caused by unexpected nuclear tests. They show that affected banks tightened lending and transmitted liquidity shocks onto firms, and smaller firms suffered as they were unable to secure alternative credit. De Jonghe et al. (2018) show a moderate drop in investment and asset growth for firms in Belgium that borrow from banks affected by an external funding shock. Moreover, Popov and Rocholl (2018) and Dwenger et al. (2018) show that exogenous funding shocks affect firm's employment decisions. Both papers use German data and conclude that firms associated with banks affected by the subprime mortgage crisis experienced a significant decline in employment.

In the aftermath of the global financial crisis, Ivashina and Scharfstein (2010) document that banks' lending activities were greatly reduced, particularly banks who had previously co-syndicated credit lines with Lehman Brothers. Chodorow-Reich (2013) shows that U.S. bank exposure to the Lehman bankruptcy had a substantial impact on employment for SMEs that had pre-crisis relationships with more exposed lenders. Cingano et al. (2016) exploit the 2007 liquidity drought in interbank markets and show that the ensuing credit shock dampened Italian firms' investment and employment, particularly that of those who were more likely to be constrained. Bucă and Vermeulen (2017) report that firms operating in more bank-dependent industries reduced their level of investment after banks restricted their lending in the aftermath of the crisis. Bentolila et al. (2017) show that Spanish firms attached to weaker banks that were eventually bailed out by the government suffered a greater

fall in employment. On a similar note, Chava and Purnanandam (2011) exploit the Russian crisis of 1998 and document that affected banks reduced their lending and increased interest rates. Consequently, bank-reliant firms suffered a greater decline in their capital expenditures and profitability, relative to firms who were better able to access debt markets. Finally, Balduzzi et al. (2018) study the effects of banks' financial market valuations on corporate policies, such as investment and employment. They use both the financial and sovereign debt crises and report significant, negative credit-channel effects of the two crises.

In the context of the sovereign debt crisis, De Marco (2019) reveals that smaller, younger firms experienced reduced investment and asset growth after affected banks cut lending and increased interest rates. Larger firms who were ex-ante less likely to be financially constrained, performed better. Acharya et al. (2018) use syndicated loan data to investigate the effect of the sovereign debt crisis on firm's decisions. Their findings imply that borrowers with a strong relationship with a GIIPS bank suffered from reduced investment, sales growth and job creation. Moreover, Farinha et al. (2019) use Portuguese data on firm-bank relationships to examine the real effects of bank shocks on firms' survival prospects. They document that firms borrowing from banks which were affected by a funding outflow, and consequently reduced their credit supply, are more likely to fail. Finally, Bottero et al. (2015) reveal that in the aftermath of the Greek bailout in 2010, financial intermediaries exposed to government securities reduced credit, which in turn caused smaller firms to curtail investment and employment.

6.2.4 Impact of bank capital regulation on the real economy

Higher capital requirements for banks can be met by adjusting one of two mechanisms: by increasing regulatory capital or by reducing risk-weighted assets. Juelsrud and Wold (2018) and Gropp et al. (2018) provide evidence that in recent years, European banks have fulfilled stricter requirements by means of contracting their risk-weighted assets and both studies document negative real effects on the economy. Banks appear reluctant to raise capital in the short run, so an increase in equity requirements forces them to delever, which can have real consequences on firms (Fraisse et al. (2020); Juelsrud and Wold (2018)). On the other hand, stress tests in the US in 2009 specifically stated banks were to issue new equity, which appears to have mitigated such negative effects (Hanson et al. (2011).

In recent years, literature has began to analyze the credit supply implications and the consequent real effects of adjusting banks' capital regulation. Aiyar et al. (2014)

shows that UK banks reduced their cross-border lending by 5.5 percentage points in response to a 100 basis point increase in capital requirements. The negative effect is found to be weaker is found to be weaker in banks' 'core' countries, revealing that banks tend to favour their most important lending relationships. De Marco and Wieladek (2015) examine the effects of tighter bank-specific capital regulation on UK SMEs and show that SME's asset growth and investment are negatively affected by stronger requirements. The impact is greater where the affected bank has tighter capital buffers, but the real effects are found to diminish over time.

Fraisse et al. (2020) use a sample of French banks and show that increasing capital requirements by 1% (under the Basel II framework) leads to a reduction in lending of 10%. In turn, this negatively affects firms' corporate investment policies. Also taking advantage of the 2011 EBA capital exercise, Gropp et al. (2018) show that European banks responded to capital requirements by reducing their risk-weighted assets, as opposed to issuing new equity capital. Firms which obtained more of their bank credit from affected banks suffered a consequent decline in asset and investment growth. Degryse et al. (2019) also relate to the EBA capital exercise and underline the impact stricter capital requirements has on the collateral of bank lending in the aftermath of the shock. Affected banks are more likely to demand collateral from the same company compared to unaffected banks, but less so for long-term relationship borrowers. They also show that the risk-weighted structure of the collateral differs between affected and unaffected banks after the shock. Consistent with banks reducing their risk-weighted assets in response to tighter regulation, Juelsrud and Wold (2018) show that there is a substantial decline in credit supply to the corporate sector relative to the household sector in Norway after a country-specific policy reform. The credit supply effect is greater on smaller firms, and leads to a deterioration in firms' employment growth. They also note that affected banks raised interest rates in the aftermath of the shock. Using Pillar 2 capital requirements, De Jonghe et al. (2019) also note that banks cut lending in response to stricter capital requirements. They document variation in their results across banks: smaller, less profitable banks reduce credit the most. Finally, Blattner et al. (2019) expose that not only did Portuguese banks cut lending after the EBA capital exercise, but they reallocated credit to distressed firms whose loan losses had been underreported by banks prior to the shock. They show that this contributed to a substantial decline in productivity in Portugal at the time.

While the above research provides a rigorous examination of the transmission of banking shocks to firms and the real economy via the commercial credit channel, we complement this literature by considering the transmission of a banking shock to

the real economy via a bank's private equity arm. We show that companies receiving private equity investment from banks affected by an external capital shock (ie increased capital requirements) significantly reduce their investment and financing and suffer weaker growth relative to private equity portfolio companies of unaffected banks. In addition, we exploit heterogeneity at the investor- and company-level to enrich our understanding of the results.

6.3 2011 EBA Capital Exercise

In October 2011, in a bid to restore confidence in the European banking sector, the EBA required certain banks to set aside additional, temporary capital buffers, while leaving requirements unchanged for all other banks. Specifically, selected banks were deemed to have large exposures to sovereign debt and were required to increase their core tier one (CT1) ratios to 9% of their risk-weighted assets by the end of June 2012, in order to mitigate risks related to exposure to sovereign bonds and increase confidence across the banking sector. In order to meet the new regulatory requirement, banks could increase their CT1 ratios by either issuing more capital, or reducing their risk-weighted assets. In a recent study, Gropp et al. (2018) provide evidence that European banks achieved this target by reducing their risk-weighted assets rather than by issuing new equity in response to the requirements[46].

Just as the magnitude of the shock was unexpected, as it exceeded market expectations (Financial Times, 2011), so was the timing. Less than 5 months prior, the EBA had carried out stress tests across European banks. As a result, it is safe to assume that the new capital requirements plausibly came as a surprise to the participating banks. The previous stress tests, however, were not without criticism. The integrity of these tests was questioned after the Belgian bank, Dexia, failed only a few months later. The tests had previously revealed that Dexia was one of the healthiest banks in Europe. Furthermore, the difference in magnitude of the shortfall reported by each of these regulatory actions was striking. The stress tests in June 2011 revealed the banks to be riding a 2.5 billion Euro deficit, while the capital exercise of October 2011 documented a shortfall of 215 billion Euros.

Banks were selected based on their total assets as of year end 2010, ensuring that selection was not based on bank-specific events in the months prior to the capital exercise. In each country, the EBA sorted banks in descending order of their market share by total assets, such that the exercise then covered at least 50% of the national banking sector. The June 2011 stress tests had followed a similar selection criteria. The country-specific selection threshold lead to a considerable size overlap between banks selected and those not selected for the exercise. For example, the smallest bank included in the exercise, Slovenian bank Nova Kreditna banka Maribor, reported 6 billion euro in total assets in 2010, while the largest bank not included, Credit Mutuel, had 591 billion euro in total assets in the same year (Gropp et al. (2018)). This capital regulation shock has been exploited by recent research and has

[46] Juelsrud and Wold (2018) find that Norwegian banks responded in a similar manner to a 2013 Norwegian policy reform, reducing their risk-weighted assets to achieve the new capital requirement

been used as a quasi-natural experiment to examine how banks responded to these new regulatory requirements (Gropp et al. (2018); Degryse et al. (2019); Blattner et al. (2019)). We likewise take advantage of this exogenous banking sector shock to study the differential effect of the shock on the portfolio companies of affected and unaffected banks' private equity arms.

6.4 Hypothesis Development

6.4.1 Portfolio company investment and financing

We underline four testable hypotheses on the back of the discussion thus far. First, we consider the investment and financing of companies and look to identify whether companies linked to banks affected by the EBA shock suffered more relative to companies attached to unaffected banks. Gropp et al. (2018) show that banks achieved the targets set out by the EBA by reducing their assets and not by issuing fresh equity. In their subsequent empirical analysis, they illustrate the effects this had on the real economy: firms borrowing from affected banks are found to experience significantly weaker investment rates and asset and sales growth in the aftermath of the shock. In light of this, we speculate that private equity portfolio companies of affected banks will suffer more in terms of their investment and financing relative to portfolio companies of unaffected banks:

H1: Portfolio companies of the private equity arms of EBA-affected banks will suffer from weaker investment and financing at the onset of the shock

6.4.2 Portfolio company growth

Our second hypothesis follows on naturally from the first. If firms attached to affected banks suffer from lower investment and financing as a result of banks restructuring their balance sheets in order to comply with the new capital requirements, we would expect these firms to experience weaker subsequent growth. In particular, we investigate the effect on their growth in assets and employment. Prior research has found evidence implying that firm-level growth of firms borrowing from banks affected by capital requirements can be hampered. Specifically, Gropp et al. (2018) show that firms borrowing from banks affected by the EBA capital exercise suffered weaker asset and sales growth, while De Marco and Wieladek (2015) show that SME's asset growth and investment falls after their lender bank's capital requirements increasing. Lastly, Juelsrud and Wold (2018) identify a fall in employment growth for firms borrowing from low-capitalized banks affected by reformed capital requirements.

As such, our second hypothesis is as follows:

H2: Portfolio companies of the private equity arms of EBA-affected banks will consequently suffer from weaker growth in their assets and employment

6.4.3 Portfolio companies & financial constraints

We then turn our attention to heterogeneity in our sample of portfolio companies. We distinguish between more- and less-constrained firms by virtue of their size, leverage, dependence on bank finance and their location in Europe in relation to the sovereign debt crisis. Smaller firms have been shown to be more vulnerable to credit market downturns (Chodorow-Reich (2013)) and to bank capital policy regulation adjustments (Juelsrud and Wold (2018)). Likewise, more leveraged companies are more sensitive to credit shocks (Tsoukas (2011)) and firms which are more dependent on bank finance are typically riskier, lower-credit firms (Guariglia et al. (2016)). Finally, the GIIPS countries which were the most severely affected by the European sovereign debt crisis experienced a reduction in their supply of credit available to firms and loan interest rates rose relative to other countries in Europe (Popov and Van Horen (2014), De Marco (2019)). Taken together, we would therefore expect the effects of the EBA shock to be stronger on portfolio companies which were more likely to be in a constrained position at the time of the shock.

H3: The effect of the EBA shock will be stronger on portfolio companies which are more likely to be financially constrained

6.4.4 Private equity investor experience

Lastly, we consider heterogeneity amongst our sample of private equity investors. We focus on the experience and reputation of investors. Prior work has noted investor experience to be important in a multitude of settings, such as fundraising (Barber and Yasuda (2017)), deal structure (Demiroglu and James (2010)), exit (Jenkinson and Sousa (2015)) and portfolio company distress (Tykvová and Borell (2012), Hotchkiss et al. (2014)). Particularly pertinent to our analysis, Hotchkiss et al. (2014) find that portfolio companies of more experienced investors are associated with a higher likelihood of survival, implying they are less likely to fall into distress relative to portfolio companies of inexperienced investors. More reputable or experienced investors may be better placed to support their portfolio companies in times of distress as they are able to obtain external financing at more favourable rates (Demiroglu and James (2010)). We therefore hypothesize that the EBA shock will have a stronger impact on the portfolio companies of less experienced private equity investors.

H4: The effect of the EBA shock will be stronger on portfolio companies of less experienced private equity investors

6.5 Data and Descriptive Statistics

6.5.1 Data

Given our study utilises the 2011 EBA capital exercise as an external shock to the banking sector, it is natural we focus on bank-affiliated private equity investors attached to European banks. Specifically, we also only consider deals where the target company is located in Europe, as European companies are required to file annual accounting information in the public domain. There is no reason to believe that restricting our sample to all-European deals (ie both the investor and the target being based in Europe) should bias our results in any way. Indeed, from 1990 to 2016, 95% of all private equity investments made by European bank-affiliated private equity investors were in European companies[47]. Our sample , which encompasses 16 European countries, should therefore be representative of the European market for bank-affiliated private equity buyouts[48].

Following a broad line of literature (For example, Bernstein et al. (2019); Jenkinson and Sousa (2015); Bernstein and Sheen (2016); Fang et al. (2013); Davis et al. (2014); Faccio and Hsu (2017)), we use Capital IQ to identify private equity transactions executed by bank-affiliated investors prior to the 2011 EBA capital exercise. This then allows us to recognize whether the parent bank of the private equity sponsor in each deal was affected by the EBA capital exercise or not[49]. We extract all private equity transactions, excluding growth equity and venture capital deals, where investors typically acquire a minority stake and use little or no leverage to finance the deal. As such, and in line with prior literature, we select transactions labelled as "leveraged buyout", "management buyout", "going private", "platform", or a similar term, excluding deals classified as "expansion capital" and "growth buyout" (see for example: Davis et al. (2014), Faccio and Hsu (2017), Bernstein et al. (2019)). We select transactions based on the following criteria, given that we are examining the effects of the 2011 EBA capital exercise: We select deals where the target company is headquartered in Europe at the time of the transaction; the company had received private equity investment by the end of 2010; the bank-affiliated investor had not exited by the end of 2011. Moreover, we exclude cases where only a minority stake is acquired and we exclude divisional buyouts, where accurate accounting information distinguishing the division from the parent company is often unavailable. Where

[47] Based on data from Capital IQ

[48] Our sample includes transactions executed in the following countries: Austria, Belgium, Denmark, France, Germany, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland and the UK.

[49] We also supplement our sample using Thomson Reuters Eikon database (formerly VenturExpert)

club deals are concerned, where two or more PE firms jointly sponsor a deal, we drop all cases (55) which involve both the PE arm of an EBA-affected bank and an unaffected bank. Finally, we exclude deals of sponsors involved in any merger or acquisition during the sample period. We extract all relevant transaction information, such as the entry date, the private equity sponsor, the transaction type, the locations of the target and the acquirer, the number of investors and the transaction value.

We apply further filters to our sample. First, we include only companies whose full accounts are available in Amadeus, a Bureau van Dijk database of European companies. In doing so, we exclude companies who file abbreviated accounts. Following prior literature, we exclude companies operating in the financial and utility sectors (Michaely and Roberts (2011); Bernstein et al. (2019)). We extract full accounting information of relevant firms from Amadeus, and occasionally Capital IQ. To identify exits, we use Capital IQ to search for corporate events related to the target firm in each transaction, such as bankruptcies, trade sales, secondary buyouts and IPOs of the above transactions and use relevant news articles (Prior research has used similar methods to identify deal exits: Arcot et al. (2015); Bernstein et al. (2019)). This allows us to note the date and type of exit for each deal, where an exit has been experienced. We also use Amadeus to establish whether any companies went into liquidation during the period. Amadeus categorises companies as being active, dissolved, dormant or in liquidation.

Furthermore, we gather data on the bank-affiliated private equity investors and their funds. In particular, Capital IQ and Thomson Reuters Eikon are used to gather firm and fund-level information, such as the private equity firm's year of incorporation, their fund names and vintage years, the number and value of funds raised by each investor and the number and dates of all individual investments made by the firm. Following Jenkinson and Sousa (2015), where more than one private equity firm is identified in the same transaction, if one of the private equity firms led the transaction (received a higher percentage of shares) only the information about the leader and their deals and funds is used. If none of the private equity firms receive more shares than the other(s) or no information on this is available, information on all private equity firms and funds is obtained and the data on firm and fund characteristics is averaged. Finally, in line with previous research, if the private equity firm was founded before 1970, we use 1970 as the founding year, as there was very little activity in European private equity markets prior to that date (Jenkinson and Sousa (2015); Krishnan et al. (2011)).

6.5.2 Descriptive Statistics

Before preliminary analysis of our data, we introduce our sample distribution of transactions and banks. Table 21 presents the private equity transactions in our study by the year of execution of the deal. As expected, given that the holding period of leveraged buyouts is typically 5 to 7 years, most of the deals are concentrated in the 7 years prior to 2011, the year of the shock. Unsurprisingly, the pre-crisis years of 2006 and 2007, when markets were buoyant, are the most active years for deal execution, and deal activity then drops significantly once the repercussions of the crisis take effect in 2009.

Table 21: Deal time series distribution

This table shows the time series distribution of the private equity transactions in our study

Year	Number of deals	% deals
1995	2	0.7%
1996	0	0.0%
1997	2	0.7%
1998	0	0.0%
1999	4	1.4%
2000	3	1.0%
2001	8	2.7%
2002	4	1.4%
2003	13	4.5%
2004	20	6.8%
2005	19	6.5%
2006	47	16.1%
2007	61	20.9%
2008	53	18.2%
2009	27	9.2%
2010	29	9.9%

We then look at the country distribution of our deals, based on the location of the portfolio company receiving the investment. Table 22 confirms that France and the UK are the most advanced markets in our sample, consistent with Bernstein et al. (2019), who show that based on the value and the number of transactions over the period of 2002 to 2013, these two countries' markets were the most active in Europe. Incidentally, the largest bank by asset size in Europe not to be affected by the EBA capital exercise was the French bank, Credit Mutuel.

Table 22: Deal country distribution

This table shows the country distribution of the private equity transactions in our study

Country	Number of deals	% deals
Austria	3	1.0%
Belgium	8	2.7%
Denmark	1	0.3%
France	125	42.6%
Germany	17	5.8%
Hungary	1	0.3%
Ireland	1	0.3%
Italy	22	7.5%
Netherlands	6	2.1%
Norway	1	0.3%
Poland	1	0.3%
Portugal	5	1.7%
Spain	9	3.1%
Sweden	2	0.7%
Switzerland	1	0.3%
UK	89	30.5%

Finally, in Table 23 we consider the country distribution of the banks. In total, there are 39 banks in the sample. Consistent with expectations, the larger, more advanced economies have more active banks in private equity markets during our sample period. Germany, traditionally a bank-based economy, has the most banks (8) with other larger economies such as the UK, France and Italy also having several entries.

Table 23: Banks country distribution

This table shows the country distribution of the parent banks in our study

Country	Number of banks	% banks
Austria	1	2.6%
Belgium	1	2.6%
Denmark	1	0.6%
France	6	15.4%
Germany	8	20.5%
Italy	7	17.9%
Netherlands	3	7.7%
Norway	2	5.1%
Portugal	1	2.6%
Spain	4	10.3%
UK	5	12.8%

To allow us to appreciate that our two sub-samples of EBA-affected bank-affiliated deals and unaffected bank-affiliated deals are similar in nature, Tables 24 and 25 report the industry distribution of the target companies and the transaction characteristics of the deals.

Table 24: Industry distribution

This table shows the industry distribution at the broad industry level (1-digit SIC) for the EBA and non-EBA sample of private equity-backed companies, but excludes financial and utility sectors

Industry distribution	EBA	non-EBA
Agriculture, Forestry & Fishing	1%	0%
Construction	5%	6%
Manufacturing	42%	36%
Retail Trade	4%	13%
Services	25%	19%
Transport, Communication, Electric & Gas	9%	9%
Wholesale Trade	12%	17%

Table 25: Sample statistics

This table provides sample statistics on the deal types, characteristics and exits of each of our two sub-samples of transactions. *Private-to-private* is private-to-private buyouts, *Public-to-private* denotes public to private transactions and *Secondary buyout* deals are secondary buyouts from one private equity investor to another. In Panel B, *management participation* relates to the management team of the target company taking an equity stake and a *club deal* occurs where two or more PE firms jointly sponsor a transaction. In Panel C, *sale* and *secondary buyout* relate to a sale to a strategic acquirer and to another private equity firm respectively. *Write-off* refers to investments which went into liquidation and *not yet exited* shows deals which have not experienced an exit as of 2016.

	EBA (n=251)	non-EBA (n=53)
Panel A: Deal Type		
Private-to-private	87.6%	84.9%
Public-to-private	4.4%	1.9%
Secondary buyout	6.8%	13.2%
Unknown	1.2%	0.0%
Panel B: Deal Characteristics		
Management participation	44.6%	37.7%
Club deal	28.2%	22.6%
Number of investors (mean)	1.39	1.26
Holding period (mean)	7.25	7.45
Panel C: Exits		
Sale	25.5%	26.4%
Secondary buyout	26.6%	28.3%
IPO	0.8%	0.0%
Write-off	2.3%	5.6%
Unknown	3.9%	5.6%
Not yet exited	40.6%	33.9%

Table 24 shows the industry distribution of the portfolio companies of both the affected (EBA) and unaffected (non-EBA) banks' private equity arms in the sample at the broad industry level (1-digit SIC). The two samples exhibit similar properties. The majority of the firms in each sub-sample are concentrated in manufacturing and, to a lesser extent, services. Other important industries include wholesale trade, construction, and retail. The industry distribution is also comparable with other recent studies examining European private equity transactions (Tykvová and Borell (2012); Jenkinson and Sousa (2015); Bernstein et al. (2019)).

Table 25 continues the descriptive analysis by examining the breakdown of transactions between the two samples. Panel A illustrates types of deal across the sample. Both the EBA and non-EBA samples are predominantly characterized by private-

to-private buyouts with a smaller sample of secondary buyouts between different private equity groups. Only a minority of deals are classified as public-to-private transactions, consistent with Strömberg (2008), Boucly et al. (2011) and Bernstein et al. (2019). Later in our robustness section, we show that our results are not driven certain deal types. Likewise, the deal characteristics are comparable across both sub-samples. Management participation (ie where the target companies' management team take an equity stake in the company) is only slightly higher in the EBA sample, while around a quarter of deals in each sample are club deals, where more than one PE investor sponsors the deal[50]. As previously noted, in order to isolate EBA-bank sponsored deals from non-EBA bank-sponsored deals, we drop all deals (55 in total) which are club deals involving the PE arms of both EBA-affected and unaffected banks. The holding period of the investment is approximately 7 years in both cases. Finally, the distribution of exits in the sample is similar to that found in the literature. Consistent with recent work, the majority of deals in both of our sub-samples are exited via a sale to a corporate acquirer or a secondary buyout by another private equity group (Strömberg (2008); Jenkinson and Sousa (2015); Wang (2017)). Far fewer deals are taken public via an IPO or go into liquidation and roughly one third of the deals in each sub-sample are yet to experience an exit.

6.6 Empirical methodology

6.6.1 Difference-in-difference approach

We use a difference-in-differences setting where we compare portfolio companies of private equity groups affiliated to banks which were affected by the EBA capital exercise to portfolio companies of private equity groups affiliated to unaffected banks. Tables 24 and 25 have already shown that the private equity transactions which affected and unaffected banks were undertaking during the sample period were similar in terms of their deal type, their exits and various deal characteristics. Moreover, the industry distribution of their target companies is very similar, and consistent with prior research.

Following previous firm-level studies such as Brav (2009), Michaely and Roberts (2011) and Bernstein et al. (2019), we construct several measures of firm activity, using data from Amadeus. Specifically, we calculate capital investments as the change in assets plus depreciation. Equity issuance is defined as the change in equity minus profit and debt issuance is measured as the change in total liabilities.

[50] Colla et al. (2012) notes a similar distribution of club deals and of management participation in a global sample of 238 LBOs, as does Guo et al. (2011) in a sample of large US LBOs.

Each of these variables are scaled by total assets. The underlying assumption of a difference-in-differences estimator requires that companies receiving private equity investment from the affected banks and companies receiving investment from unaffected banks would follow a similar trend in absence of the EBA capital exercise. Figure 8 graphically illustrates the evolution of the levels of investment and the financing policies of the two sub-samples. In particular, the graphs present the α_t of the following regression equation:

$$(y_{it}) = \alpha_t + \alpha_i + \varepsilon_{it} \tag{9}$$

Where α_t captures year fixed effects and α_i captures company fixed effects. The year precedent to the shock, 2010, is used as the base period and its corresponding coefficient is normalized to zero. The equation is estimated separately for both the EBA and non-EBA samples, with standard errors being clustered at the company level. The two groups of companies present relatively similar growth paths before the shock in terms of their levels of investment and their financing policies, which alleviates concerns that either group was substantially outperforming the other in the run up to the EBA capital exercise. Thereafter, at the onset of the shock, there is a divergence between the two groups, particularly in terms of levels of investment and equity issuance.

Furthermore, in Tables 26 and 27, we compare the characteristics and growth rates of the two groups of firms in 2010 in the pre-shock period. Across both groups, firms are very similar in terms of profitability (ROA), revenue, earnings, cash flow, leverage and working capital. The differences in these variables between the two sub-samples are small in magnitude and statistically insignificant. These preliminary sample statistics are comparable in size and profitability to the bank-affiliated sample of UK LBOs used by Wang (2017). We enrich this analysis by examining companies' growth rates in the aforementioned characteristics, in Table 27. Again, we find that the two sub-samples share similar pre-shock trends in revenue, leverage, cash flow, earnings etc. This supplements Figure 8, which illustrates the investment and financing policy of firms in the lead up to the shock, and the subsequent divergence at the onset of the EBA exercise.

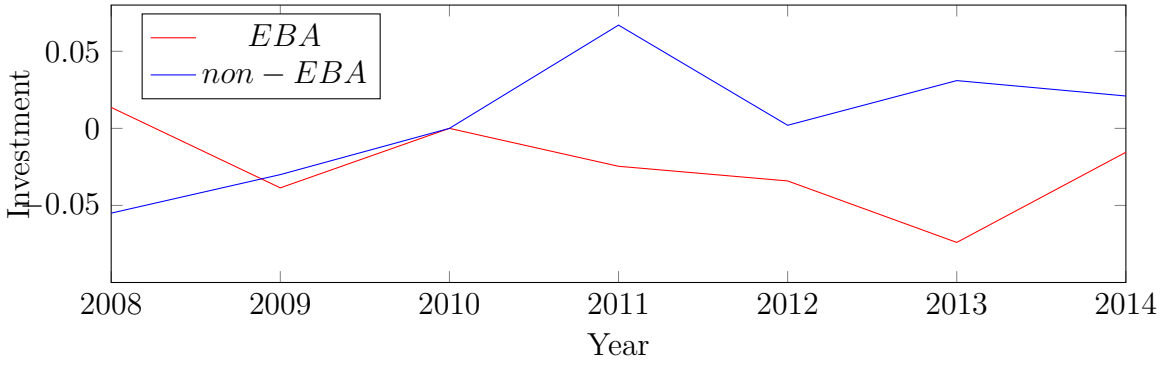
Overall, these analyses suggest that companies receiving PE investment from EBA-affected banks were similar in nature and characteristic in the pre-shock period to companies receiving investment from unaffected banks. They also share similar pre-shock growth rates and time-series trends in investment and funding. Finally, as

illustrated in Table 24 and 25, the industry distribution is comparable between the two sub-samples, as are the various deal characteristics relating to the PE transactions. Taken together, this underlines that there is no reason to doubt that there were any significant differences between the two sub-samples in the run up to the EBA capital exercise. In the next section, we further show that our empirical results hold when we include firm-level controls taken from the pre-shock year, 2010, which should absorb any residual differences in observables across the two groups (Bernstein et al. (2019)).

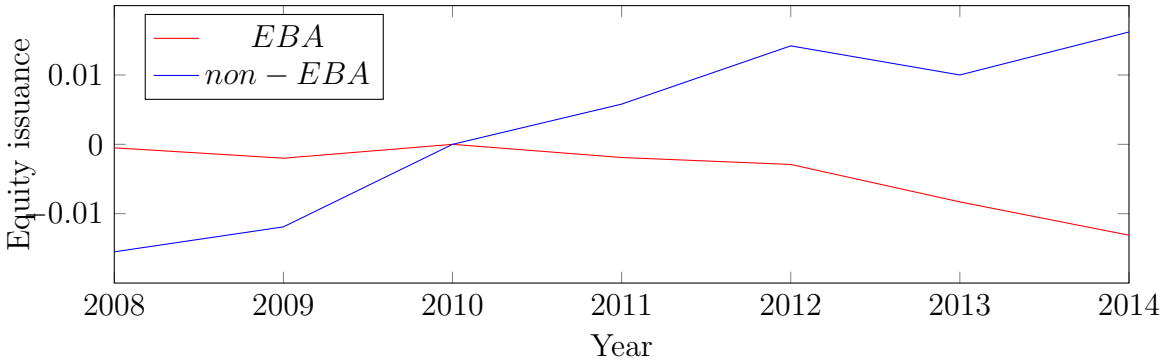
Figure 8: Effect of EBA-affected bank PE-backed companies on firm behaviour over time

This figure illustrates the change in investment, equity issuance and debt issuance separately for both EBA and non-EBA companies in our sample. Investment is defined as the change in assets over the past year, plus depreciation. Equity issuance is calculated as the change in equity minus profit while debt issuance is measured as the change in total liabilities. Specifically, the figure reports the α_t of the following equation: $(y_{it}) = \alpha_t + \alpha_i + \varepsilon_{it}$. Where α_t captures year fixed effects and α_i captures company fixed effects. The year precedent to the shock, 2010, is used as the base period and its corresponding coefficient is normalized to zero. The equation is estimated separately for both the EBA and non-EBA samples, with standard errors being clustered at the company level.

Investment



Equity issuance



Debt issuance

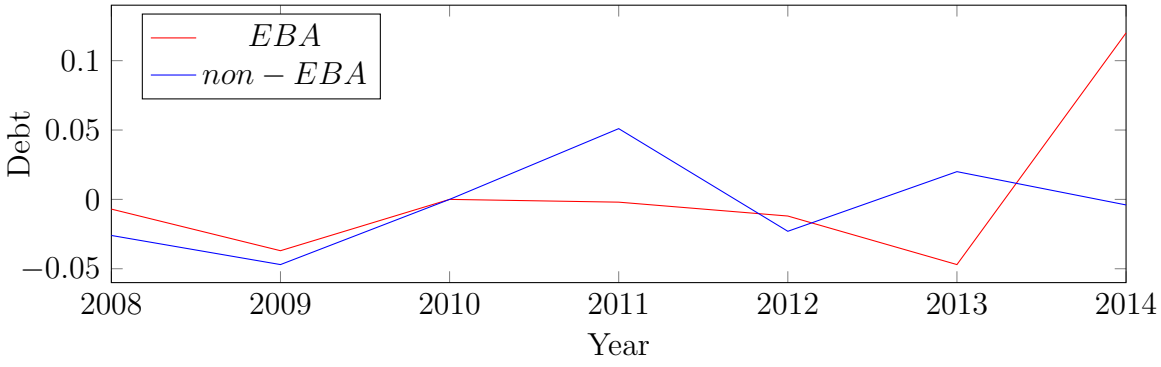


Table 26: Portfolio company characteristics in 2010

The below table reports descriptive statistics of sample firms in the last pre-shock year (2010) across treated (EBA companies) and untreated firms (non-EBA companies). *ROA* shows return on assets, as measured by net income over assets; *EBITDA* is earnings before interest, taxes, depreciation and amortization; *Cash flow (CF)* is net profit (loss) for the period less minority interest plus depreciation and amortization; *Cost of debt* is measured as the ratio of total interest expenses to total debt; *Leverage* is defined as total debt over total assets; *Current ratio* is the ratio of current assets to current liabilities. The last column reports the mean difference across the two groups where ***, **, and * denote statistical significance at the 1, 5, and 10% levels respectively. All ratios are winsorized at 1%.

	EBA				non-EBA				
Variable	N	Mean	Median	SD	N	Mean	Median	SD	t-test
ROA	243	0.02	0.04	0.20	51	0.03	0.05	0.15	-0.01
Total assets	248	108.91	27.23	247.57	52	101.72	24.77	219.74	7.19
Revenue	246	82.14	31.06	167.80	52	67.58	13.51	118.19	14.56
Log(rev)	246	1.39	1.49	0.81	52	1.27	1.13	0.76	0.12
EBITDA	224	9.96	9.25	16.37	50	13.14	8.16	24.85	-3.18
EBITDA/revenue	224	1.44	0.20	12.45	50	1.76	0.31	16.96	-0.32
EBITDA/assets	236	0.10	0.10	0.17	51	0.10	0.09	0.11	-0.01
CF/assets	232	0.06	0.07	0.18	50	0.06	0.07	0.15	0.01
Cost of debt	205	0.08	0.02	0.27	50	0.16	0.03	0.59	-0.08
Leverage	247	0.66	0.67	0.32	52	0.63	0.63	0.22	0.03
Current ratio	245	1.75	1.42	1.26	52	1.69	1.41	1.33	0.06

Table 27: Portfolio company growth rates in 2010

The below table reports the 1-year growth as a percentage increase in the characteristics in 2010. *ROA* shows return on assets, as measured by net income over assets; *EBITDA* is earnings before interest, taxes, depreciation and amortization; *Cash flow (CF)* is net profit (loss) for the period less minority interest plus depreciation and amortization; *Cost of debt* is measured as the ratio of total interest expenses to total debt; *Leverage* is defined as total debt over total assets; *Current ratio* is the ratio of current assets to current liabilities. The last column reports the mean difference across the two groups where ***, **, and * denote statistical significance at the 1, 5, and 10% levels respectively.

	EBA				non-EBA				
Variable	N	Mean	Median	SD	N	Mean	Median	SD	t-test
ROA	234	0.15	0.07	5.19	51	0.66	0.24	6.25	-0.51
Total assets	242	0.05	0.05	0.24	52	-0.02	-0.01	0.19	0.07**
Revenue	235	0.06	0.06	0.22	52	0.06	0.03	0.26	0.01
Log(rev)	232	0.03	0.01	0.17	52	0.07	0.01	0.29	-0.04
EBITDA	211	0.06	0.06	2.08	49	0.18	0.01	1.60	-0.12
EBITDA/revenue	213	-0.48	-0.01	4.40	50	0.17	0.02	1.58	-0.65
EBITDA/assets	222	-0.14	0.06	2.60	49	-0.28	0.05	3.74	-0.14
CF/assets	201	-0.35	0.08	3.70	45	0.14	0.02	1.32	0.49
Cost of debt	174	-1.07	-0.24	2.98	45	-0.56	med	1.23	0.51
Leverage	241	-0.02	-0.13	0.23	52	0.01	med	0.15	-0.03
Current ratio	238	-0.03	0.01	0.41	52	-0.20	-0.03	0.67	0.17**

6.6.2 Empirical model

We estimate our model using a panel data set from 2008 to 2014, a symmetric window around the 2011 EBA capital exercise. We estimate the following equation:

$$(y_{it}) = \alpha_t + \alpha_i + \alpha_c + \beta_1(EBA_i * Post_t) + \theta X_{it} + \varepsilon_{it} \tag{10}$$

where y_{it} is an outcome variable for company i at time t and α_i, α_t and α_c are sets of firm, (bank x year) and country fixed effects. *EBA* takes the value one where a company receives private equity investment from a bank-affiliated investor of an affected bank, and zero where the bank is unaffected by the EBA capital exercise. *Post* is a dummy variable for years 2011 onwards, while X_{it} represents a set of company-level covariates. Finally, standard errors are clustered at the company level.

Throughout the analysis, we control for firm fixed effects, therefore removing time-invariant characteristics of the EBA and non-EBA companies. Moreover, we show that our findings are not affected by the inclusion of company controls. We augment our specifications with controls that capture the heterogeneity across firms prior to the EBA capital exercise. In particular, we control for firm size, revenue growth, cash flow normalized by total assets, profitability (ROA), and leverage. To avoid concerns regarding the endogeneity of these variables, they are measured in the pre-shock period (2010) and then interacted with the *Post* dummy to allow them to have a differential impact around the shock (Gormley and Matsa (2013); Bernstein et al. (2019)). Finally, as a robustness test for our main results, we also add a full set of time-varying industry fixed effects, which can account for contemporaneous changes in industry demand and other industry characteristics around the time of the shock. In particular, we interact two-digit industry fixed effects with the *Post* dummy. All robustness checks used are detailed in the next section.

As discussed in the previous section, the main identification concern regarding a difference-in-differences approach is that of the parallel trends assumption, ie. that in the absence of the EBA capital exercise, both sub-samples of companies would have continued behaving in similar manners and we would not see any of the divergence that is visible in Figure 8. Figure 8 and Tables 24 - 27 have shown that our two sub-samples of firms shared similar industry distribution, deal characteristics, accounting data (profitability, size, leverage, earnings, cash flow) prior to the capital exercise and similar pre-shock growth trends in these variables.

We formally develop this analysis by empirically examining the time-varying behaviour of the effect of being attached to an EBA bank for the main outcome variables in our analysis by estimating the following equation:

$$(y_{it}) = \alpha_t + \alpha_i + \alpha_c + \Sigma\beta_k(EBA_i) + \theta X_{it} + \varepsilon_{it} \tag{11}$$

Where we estimate a different β_k for every year between 2008 and 2014, using the last year before the EBA shock, 2010, as a reference year. If our parameter β_k is correctly capturing the causal effect of the EBA capital exercise, then we expect the effect to appear only at the onset of the shock. The results in the following section illustrate this.

6.7 Results

6.7.1 Investment and financing policies

We start by considering whether companies backed by PE groups affiliated to EBA-affected banks were more affected after the EBA capital exercise required these banks to increase their CT1 ratios, relative to companies backed by the PE arms of unaffected banks. Gropp et al. (2018) show that banks achieved these target ratios by reducing their risky assets, as opposed to issuing new equity. They subsequently show that companies borrowing from these banks experienced lower investment and weaker asset and sales growth in the aftermath of the exercise. We extend this analysis by examining whether the capital exercise had an impact on the investment and financing decisions of their private equity portfolio companies.

Firstly we examine the relative change in investment policies of EBA and non-EBA portfolio companies. In Columns 1 and 2 of Table 28, we find that companies receiving investment from PE firms affiliated to EBA shock-affected banks reduced their levels of investment relative to those receiving investment from unaffected banks. The effect is strong in statistical significance and in economic magnitude. Specifically, EBA companies lowered their investment (normalized by total assets) by between 5% and 8% after the shock relative to unaffected banks' portfolio companies. Moreover, in column 2, the effect remains significant and actually strengthens in magnitude when we control for a host of firm-level covariates. The coefficients are consistent with Figure 8, which plots the year effects estimates around the shock, separately for our EBA and non-EBA samples. Both groups follow relatively similar paths in the lead up to the shock, but at the onset of the shock, there is a substantial divergence, as EBA affected companies decreased their levels of investment signifi-

cantly more after the shock. This is in line with the estimates in Table 28. In Table 29, we estimate Equation 11 to capture year-by-year EBA effects. The coefficients confirm the lack of statistical significance prior to the EBA capital exercise and that the divergence occurs from 2011 onwards. Furthermore, the results are likewise robust to the inclusion of a host of firm-level controls and fixed effects. These results are consistent with those of Gropp et al. (2018) who show that companies who obtained a larger share of their bank credit from EBA-affected banks suffered weaker relative investment. Moreover, our results are of a similar economic magnitude: Gropp et al. find that companies borrowing from affected banks suffered a relative decrease in investment of around 6 percentage points.[51] The key difference between our respective analyses is that while Gropp et al. (2018) analyse the impact on the real economy via the bank's commercial lending arm, we consider the effect coming through the bank's private equity investments.

We then investigate the financing decisions of the portfolio companies, firstly considering their level of equity issuance. The results in columns 3 and 4 of Table 28 show that equity issuance decreased at the onset of the shock for EBA portfolio companies relative to portfolio companies receiving PE investment from unaffected banks. Specifically, EBA-affected portfolio companies experienced a relative fall in equity issuance of between 1% to 2%, normalized by total assets. The magnitude of our result is in parallel with Bernstein et al. (2019) who find that non-PE-backed companies' equity issuance dropped by around 2% relative to PE-backed companies during the global financial crisis. Our finding is robust in statistical significance and in magnitude to the inclusion of several firm level covariates and various fixed effects. Figure 8 graphically illustrates this, showing that at the onset of the EBA capital exercise, EBA affected companies suffered a decline in equity issuance, while our control group, portfolio companies of unaffected banks, increased their equity issuance. Similar conclusions arise from columns 3 and 4 of Table 29, where we estimate Equation 3 to capture year-by-year EBA effects (we add company controls in Column 4). The findings confirm the lack of statistically significant patterns before the shock. The results imply that banks which were unaffected by the EBA exercise were better able to support the financing of their PE portfolio companies around the EBA shock.

Finally, we examine the debt financing of the portfolio companies. While the nega-

[51] The magnitude of our result also echoes that of Bernstein et al. (2019) who find that non-PE-backed companies' level of investment dropped by around 5% to 6% relative to PE-backed companies during the global financial crisis. Moreover, Acharya et al. (2018) report that firms with a high exposure to banks most affected by the sovereign debt crisis reduced capital investments by 5.9% relative to comparable firms affiliated to less affected banks.

tive coefficient implies that unaffected portfolio companies were better able to access debt markets at the onset of the shock, the coefficient is insignificant. When we control for firm-level controls, the coefficient is significant, but only at the 10% level. We find similar results when estimating debt issuance on a yearly basis in Table 29, albeit the effect is less significant. Nevertheless, taken together, the results suggest that the portfolio companies of EBA-affected banks had weaker financing around the shock and poorer access to capital markets.

The results so far suggest that EBA-affected banks were less able to support their PE portfolio companies around the EBA capital exercise, which required them to increase their CT1 ratios. On the contrary, portfolio companies of unaffected banks were able to increase their financing, and increase their levels of investment relative to EBA-affected companies. In the next section, we examine whether or not this affected the relative performance of our two groups of EBA-affected and unaffected companies.

Table 28: Investment and financing

This table reports the estimates of a difference-in-differences fixed effects model on the investment and financing variables. All specifications include firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the *Post* dummy, which takes the value one in years 2011 onward, and the *EBA* company dummy variable, which takes the value one where the company is backed by the PE arm of an EBA-affected bank. Odd-numbered columns contain the baseline regression (see Equation 2), and even-numbered columns augment the baseline model with a set of firm-level controls measured before the EBA shock in 2010 and interacted with the Post dummy. These variables include firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the dependent variable is investment scaled by assets; in Columns 3 and 4 it is equity issuance over assets; in Columns 5 and 6 it is debt issuance scaled by assets. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Investment		Equity issuance		Debt issuance	
	(1)	(2)	(3)	(4)	(5)	(6)
EBA*Post	-0.051**	-0.085***	-0.011*	-0.023**	-0.017	-0.042*
	(0.021)	(0.028)	(0.007)	(0.011)	(0.018)	(0.025)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	2,252	2,058	2,532	2,245	2,337	2,037
R-squared	0.020	0.031	0.006	0.032	0.013	0.023
Companies	297	266	300	275	302	266

Table 29: Investment and financing over time

This table reports the estimates from a time-varying fixed effects model. All specifications include firm, country and (bank*year) fixed effects. Specifically, the table reports the β_t of the following equation: $(y_{it}) = \alpha_t + \alpha_i + \alpha_c + \Sigma\beta_t(EBA) + \theta X_{it} + \varepsilon_{it}$. Odd-numbered columns contain the baseline regression (see Equation 2), and even-numbered columns augment the baseline model with a set of firm-level controls measured before the EBA shock in 2010 and interacted with the Post dummy. These variables include firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the dependent variable is investment scaled by assets; in Columns 3 and 4 it is equity issuance over assets; in Columns 5 and 6 it is debt issuance scaled by assets. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Investment		Equity issuance		Debt issuance	
	(1)	(2)	(3)	(4)	(5)	(6)
EBA*2008	0.086	0.087	-0.142	-0.056	0.039	0.044
	(0.074)	(0.073)	(0.266)	(0.291)	(0.068)	(0.073)
EBA*2009	-0.014	-0.028	-0.234	-0.229	0.032	0.041
	(0.052)	(0.053)	(0.192)	(0.197)	(0.045)	(0.047)
EBA*2011	-0.092**	-0.099**	-0.217**	-0.302***	-0.044	-0.050
	(0.040)	(0.042)	(0.101)	(0.114)	(0.033)	(0.035)
EBA*2012	-0.043	-0.058	-0.009	-0.091	0.009	0.012
	(0.037)	(0.038)	(0.080)	(0.094)	(0.033)	(0.035)
EBA*2013	-0.208***	-0.119***	-0.016	-0.087	-0.063*	-0.056*
	(0.039)	(0.040)	(0.103)	(0.122)	(0.033)	(0.033)
EBA*2014	-0.053	-0.069*	-0.142	-0.228*	0.008	-0.002
	(0.039)	(0.042)	(0.114)	(0.128)	(0.030)	(0.031)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	2252	2058	2532	2245	2337	2037
R-squared	0.022	0.031	0.015	0.040	0.019	0.040
Companies	297	266	300	275	302	266

6.7.2 Company Performance

We then look at company performance, as measured by asset growth and employment growth, in Tables 30 and 31. We find that companies receiving PE investment from unaffected banks' assets and employment grew faster than those of EBA-bank-sponsored companies. This pattern is consistent with prior findings that EBA-affected companies decreased their investment relative to unaffected companies at the onset of the shock. The coefficients in columns 1 and 2 of Table 30 imply that PE portfolio companies of the private equity arms of EBA-affected banks suffered weaker asset growth relative to non-EBA bank backed companies. The coefficients are strongly significant and robust to the inclusion of firm-level control variables and a multitude of fixed effects. Consistent with our previous analysis, in Table 31, we estimate the variables on a yearly basis to capture year-by-year EBA effects allowing us to examine the effect of being a EBA bank-backed company in every year of our panel (see Equation 3). On this note, we reach similar conclusions as before in columns 5 and 6 of Table 31. This formally estimates the significance of the differences between the two groups, confirming the lack of statistically significant patterns before the shock, and a divergence in performance at the onset of the EBA capital exercise. These findings are consistent with Gropp et al. (2018) who find that firms who were dependent on credit funding from capital exercise-affected banks experienced a significant relative reduction in investment and asset growth, and with De Marco and Wieladek (2015), who show that SME's asset growth and investment declines in response to their lender bank's capital requirements increasing. The economic magnitude of our results is meaningful. We find that EBA-affected companies' asset growth fell by 6%-9% relative to non-EBA bank-backed companies. Similarly, Gropp et al. (2018) report a 4% difference between companies borrowing from EBA-affected and unaffected banks, while De Marco and Wieladek (2015) highlight a 3.5-7% decline in asset growth of SMEs borrowing from UK banks which were faced with stricter capital requirements.[52]

We then turn our attention to the employment growth of our two groups of firms where our results are in line with our previous findings. The coefficients in columns 3 and 4 of Table 30 underline the negative impact of being sponsored by the PE arm of an EBA-affected bank around the time of the capital exercise. In particular, portfolio companies of EBA-affected banks suffered 2%-4% weaker employment growth relative to portfolio companies of unaffected banks. Again, our findings are

[52]Our results are also of a similar economic magnitude to Acharya et al. (2018) who find that firms with a high exposure to banks most affected by the sovereign debt crisis suffered a fall in employment growth of 4.7% relative to comparable firms affiliated to less affected banks.

of a comparable magnitude to the literature. Juelsrud and Wold (2018) document a 3% fall in employment growth for firms borrowing from low-capitalized banks affected by reformed capital requirements. Finally, column 4 confirms the finding is unaffected by the inclusion of firm-level controls, and we find similar results as before when estimating employment growth on a yearly basis in Columns 7 and 8 of Table 31.

Finally, as a means of preliminary robustness, in columns 1 to 4 of Table 31, we estimate the standard model but using only data from 2008 to 2012 to capture the effect in the earliest post-shock years. We find that during the immediate shock period, EBA-backed companies experienced an larger drop in performance relative to the control group.

Table 30: Company Performance

This Table reports a difference-in-differences fixed effects model exploring company performance measures. All specifications include firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the *Post* dummy, which takes the value one in years 2011 onward, and the *EBA* company dummy variable, which takes the value one where the company is backed by the PE arm of an EBA-affected bank. Odd-numbered columns contain the baseline regression (see Equation 2), and even-numbered columns augment the baseline model with a set of firm-level controls measured before the EBA shock in 2010 and interacted with the Post dummy. These variables include firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the dependent variable is 1-year assets growth and in Columns 3 and 4 it is 1-year employment 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

	Asset growth		Employment growth	
	(1)	(2)	(3)	(4)
EBA*Post	-0.058**	-0.097***	-0.049**	-0.054**
	(0.025)	(0.033)	(0.022)	(0.023)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1713	1512	1699	1512
R-squared	0.010	0.030	0.004	0.015
Companies	303	266	302	266

Table 31: Company performance over time

This table investigates the effects of being backed by the PE arm of an EBA-affected bank over time. Columns 1 to 4 show estimates from the standard DiD model but using a restricted sample with only years 2008 to 2012. Columns 5 to 8 report the estimates from a time-varying fixed effects model for the full sample. All specifications include firm, country and (bank*year) fixed effects. Specifically, the table reports the β_t of the following equation: $(y_{it}) = \alpha_t + \alpha_i + \alpha_c + \Sigma\beta_t(EBA) + \theta X_{it} + \varepsilon_{it}$. Odd-numbered columns contain the baseline regression (see Equation 2), and even-numbered columns augment the baseline model with a set of firm-level controls measured before the EBA shock in 2010 and interacted with the Post dummy. These variables include firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1, 2, 5 and 6 the dependent variable is 1-year assets growth and in Columns 3, 4, 7 and 8 it is 1-year employment 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.

	Asset Growth		Employment Growth		Asset Growth		Employment Growth	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EBA*Post	-0.046	-0.100**	-0.082**	-0.101***				
	(0.029)	(0.040)	(0.037)	(0.051)				
EBA*2009					-0.030	-0.035	-0.050	-0.044
					(0.067)	(0.071)	(0.044)	(0.045)
EBA*2011					-0.119**	-0.144**	-0.108**	-0.085*
					(0.053)	(0.057)	(0.047)	(0.049)
EBA*2012					-0.048	-0.088**	-0.033	-0.013
					(0.039)	(0.043)	(0.036)	(0.036)
EBA*2013					-0.132**	-0.139***	-0.017	-0.024
					(0.053)	(0.050)	(0.038)	(0.037)
EBA*2014					-0.049	-0.076*	-0.056	-0.044
					(0.039)	(0.043)	(0.047)	(0.048)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1129	1001	731	656	2252	2058	2532	2245
R-squared	0.009	0.027	0.014	0.129	0.016	0.040	0.026	0.079
Companies	303	266	228	204	297	266	300	275

Our findings so far suggest that in the face of stringent balance sheet requirements such as those laid out in the EBA capital exercise, the PE portfolio companies of the PE subsidiaries of affected banks suffered weaker investment and poorer access to external financing and poorer performance relative to the PE portfolio companies of unaffected banks. Intuitively, the above findings makes sense. As capital is restricted while banks make efforts to increase their CT1 ratios, they have less funds available for other activities such as their commercial lending and private equity portfolios.

Given that the parent bank is normally the largest and most important (and often the only) LP in its own PE fund, the economic structure of bank-affiliated funds typically differs from that of an independent fund, where the GP-LP relationship is governed by a LPA. Where bank-affiliated funds are concerned, there is unlikely to be an LPA, but the parent bank will typically set aside an amount of capital each year designated to its private equity arm, but this capital is not ring-fenced as is committed capital from institutional LPs under an independent fund structure. Should an external shock hit the bank, such as increased capital requirements, they can simply pull this funding and there is no legal restriction on them doing so given that the bank is the ultimate owner of the private equity fund. Consequently, their portfolio companies' investment and financing are adversely affected by the reduction in capital available to their parent banks. Therefore, while the EBA capital exercise may have helped to shape a more resilient banking sector in Europe as banks had to reinforce their tier one capital, as suggested by Gropp et al. (2018), our results so far imply that this strengthening of banks' balance sheets may have come at a cost to the real economy. It resulted in banks' private equity portfolio companies suffering from weaker investment and financing, and subsequently poorer performance compared to portfolio companies of banks which were unaffected by the EBA capital exercise. This is consistent with the findings of De Marco and Wieladek (2015), Fraisse et al. (2020), Gropp et al. (2018) and Juelsrud and Wold (2018) who recognize that companies borrowing from capital requirement-affected banks consequently suffered negative real effects.

As a result of the requirements, EBA-affected banks may have had less capital available to deploy and to support their PE portfolio companies with additional financing and to help refinance any debt. Given that banks are the primary source of capital in bank-affiliated funds, and sometimes the sole investor in the case of captive funds, the EBA requirements may have restricted the fund's access to additional capital and the bank's ability to financially support their portfolio companies. Consequently, the investment activity and performance of their portfolio companies suffered.

Finally, Bottazzi et al. (2007) show that banks are less active investors and spend less time supporting their portfolio companies relative to independent investors. Hence, when faced with demanding requirements of the EBA capital exercise, they may have devoted even less time to their PE arm as restructuring their balance sheet took priority over the banks' secondary activities. In turn, the performance of their portfolio deteriorated.

6.7.3 Robustness

In the following section, we detail a number of robustness measures. Firstly, we exclude all UK deals. The UK has the most advanced and most active private equity market in Europe (Colla et al. (2012); Wang (2012); Jenkinson and Sousa (2015); Wang (2017)). In order to see whether the large size of the UK market is driving our results, we remove all UK transactions from our sample and re-estimate our baseline specifications. The results, presented in Tables 32 and 33, show that is not the case and that our main findings are upheld and similar in magnitude to our baseline model[53]. Moreover, in unreported analysis, these results are robust to the inclusion of time-varying industry fixed effects.

Next, we drop management buyouts from the main sample. MBOs have been characterized by lower engagement by PE firms (Bernstein et al. (2019)). To explore whether their inclusion generated the results found, we drop MBOs from the sample and repeat the main analysis. As we show in Table 34 and **??**, we find similar results across investment, financing policies and company performance. In Tables 36 & 37, we drop all secondary buyouts from our sample and rerun our regressions. Recent research has found the rationale for secondary buyouts to differ from primary LBOs. Arcot et al. (2015) develop pressure indexes and find that SBOs are evidence of PE fund managers acting under pressure. They find that buying pressure increases the likelihood of a purchase being made via an SBO more likely and that selling pressure makes an exit via an SBO more likely. Similarly, Wang (2012) shows that secondary buyouts are more likely to occur when private equity firms' liquidity demand changes and they are then under more pressure to exit. As such, we repeat our analysis excluding all secondary buyout transactions and, as before, the main results are upheld. We then examine whether our results are driven by public-to-private (PTP) transactions in Tables 38 and 39. Again, the main results are upheld and the results are of a similar economic magnitude. This is no surprise given the small portion of sample which PTP transactions account for.

Finally, we exclude all club deals (where two or more PE firms jointly sponsor a transaction) which reduces our sample by roughly one third. Club deals may be motivated by a need to improve the certification of deal quality or to facilitate and improve the financing of deals by attaching multiple investor's names to the deal, given that LBOs are highly levered transactions (Officer et al. (2010)). Syndication literature has found club deals to outperform sole-sponsored deals in both LBOs

[53]We also exclude all deals executed in France, as France is the most active country in our sample, accounting for around 40% of transactions. The main findings are again upheld.

(Guo et al. (2011)) and in VC investments (Brander et al. (2002)). When we drop these deals, our results concerning both the financing and performance of firms are upheld, as presented in Tables 40 and 41. Similarly, the economic magnitude of the coefficients resembles that of the baseline specification. Additionally, in unreported analysis, these findings are also robust to the inclusion of time-varying industry fixed effects.

We then control for any attrition bias which may be present in our results as endogenous exit through acquisition or bankruptcy may bias the results. First, in Tables 29 and 31 where we estimate the effect of being back by an EBA-affected bank on a yearly basis, the significant change in investment and financing policies occurs from 2011. We can also illustrate this pattern more directly by estimating our standard model using data from 2010 and 2011 only. Tables 42 and 43 capture this model and the main results remain unchanged. This shows that much of the change in our outcome variables policy occurred soon after the onset of the shock, alleviating any concern of bias by attrition in our sample. In unreported analysis, as a supplementary check for attrition bias, we rerun the baseline models using the sample of firms which did not experience an exit before 2014 and the main findings are intact.

Finally, we provide evidence that our results are robust to the inclusion of time-varying industry fixed effects. This strengthens our findings as a concern may be that companies backed by EBA-affected banks may be more or less susceptible to any change in demand around the time of the shock. Accordingly, we supplement our main specification with a full set of (2 digit) industry fixed effects which we interact with our *Post* dummy variable, to control for time-varying industry variables, such as a change in demand. Tables 44 and 45 report the results and our primary results remain intact. The coefficients remain statistically significant and similar in economic magnitude to our baseline specification coefficients.

Table 32: Excluding UK deals: Investment & financing

This Table reports a robustness test, where we estimate the standard difference-in-differences fixed effects model on the main outcome variables dropping UK-based transactions. Every specification contains firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy identifying PE-backed companies of EBA-affected banks. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the outcome is investment scaled by assets; in Columns 3 and 4 the outcome is equity issuance; in Columns 5 and 6 the outcome is the debt issuance. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Investment		Equity		Debt	
	(1)	(2)	(3)	(4)		
EBA*Post	-0.048**	-0.081**	-0.024**	-0.032***	-0.021	-0.054
	(0.022)	(0.029)	(0.010)	(0.012)	(0.022)	(0.028)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	1115	1030	1249	1142	1139	1032
R-squared	0.015	0.031	0.018	0.055	0.006	0.037
Companies	188	172	187	171	189	172

Table 33: Excluding UK deals: Company performance

This Table reports a robustness test, where we estimate the standard DiD fixed effects model on the company performance variables dropping UK-based transactions. All specifications contain firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the independent variable is the 1-year growth rate in assets and in columns 3 and 4 it is the 1-year growth rate in employment. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Asset growth		Employment growth	
	(1)	(2)	(3)	(4)
EBA*Post	-0.074**	-0.120***	-0.072**	-0.026
	(0.033)	(0.039)	(0.030)	(0.030)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1084	981	613	543
R-squared	0.013	0.044	0.021	0.069
Companies	190	172	152	136

Table 34: Excluding MBOs: Investment & financing

This Table reports a robustness test, where we estimate the standard difference-in-differences fixed effects model on the main outcome variables dropping management buyouts (MBOs). Every specification contains firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy identifying PE-backed companies of EBA-affected banks. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the outcome is investment scaled by assets; in Columns 3 and 4 the outcome is equity issuance; in Columns 5 and 6 the outcome is the debt issuance. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Investment		Equity		Debt	
	(1)	(2)	(3)	(4)	(5)	(6)
EBA*Post	-0.072**	-0.109**	-0.020**	-0.025***	-0.022	-0.036
	(0.030)	(0.043)	(0.010)	(0.008)	(0.027)	(0.035)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	972	895	1122	1004	1012	898
R-squared	0.021	0.038	0.023	0.048	0.015	0.040
Companies	166	151	169	151	170	151

Table 35: Target size and investor experience

This Table reports the mean total assets and sales of portfolio companies in the pre-buyout year based on PE investor's prior experience at acquisition. EXP is a dummy variable taking the value one where the investor involved in the deal is in the top quartile based on its level of experience, and zero otherwise. The p-value is the difference in means of targets' assets and sales between more and less-experienced investors. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	PE firm age			Number of funds raised			Value of funds raised			Number of deals made		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	EXP=1	EXP=0	P-value	EXP=1	EXP=0	P-value	EXP=1	EXP=0	P-value	EXP=1	EXP=0	P-value
Total assets	103,283	93,339	9,944	158,268	68,745	89,523***	229,858	45,825	184,573***	113,781	94,452	19,329
Sales	77,586	73,727	3,859	55,575	15,438	40,137***	178,746	46,678	132,068***	98,817	69,755	29,062*

Table 36: Excluding SBOs: Investment & financing

This Table reports a robustness test, where we estimate the standard difference-in-differences fixed effects model on the main outcome variables dropping secondary buyouts (SBOs). Every specification contains firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy identifying PE-backed companies of EBA-affected banks. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the outcome is investment scaled by assets; in Columns 3 and 4 the outcome is equity issuance; in Columns 5 and 6 the outcome is the debt issuance. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Investment		Equity		Debt	
	(1)	(2)	(3)	(4)	(5)	(6)
EBA*Post	-0.052**	-0.095***	-0.014**	-0.031***	-0.017	-0.048*
	(0.022)	(0.034)	(0.007)	(0.011)	(0.019)	(0.029)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	1584	1442	1826	1614	1639	1445
R-squared	0.014	0.033	0.009	0.049	0.013	0.033
Companies	272	244	276	243	278	244

Table 37: Excluding SBOs: Company performance

This Table reports a robustness test, where we estimate the standard DiD fixed effects model on the company performance variables dropping secondary buyouts (SBOs). All specifications contain firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the independent variable is the 1-year growth rate in assets and in columns 3 and 4 it is the 1-year growth rate in employment. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Asset growth		Employment growth	
	(1)	(2)	(3)	(4)
EBA*Post	-0.062**	-0.102***	-0.059**	-0.061**
	(0.028)	(0.039)	(0.026)	(0.027)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1572	1383	1054	927
R-squared	0.010	0.030	0.017	0.077
Companies	279	244	236	207

Table 38: Excluding PTPs: Investment & financing

This Table reports a robustness test, where we estimate the standard difference-in-differences fixed effects model on the main outcome variables dropping public-to-private (PTPs). Every specification contains firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy identifying PE-backed companies of EBA-affected banks. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the outcome is investment scaled by assets; in Columns 3 and 4 the outcome is equity issuance; in Columns 5 and 6 the outcome is the debt issuance. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Investment		Equity		Debt	
	(1)	(2)	(3)	(4)	(5)	(6)
EBA*Post	-0.053***	-0.086***	-0.012*	-0.023**	-0.019	-0.045*
	(0.020)	(0.030)	(0.007)	(0.010)	(0.018)	(0.025)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	1671	1522	1920	1700	1721	1526
R-squared	0.015	0.032	0.008	0.041	0.011	0.031
Companies	285	256	289	255	290	256

Table 39: Excluding PTPs: Company performance

This Table reports a robustness test, where we estimate the standard DiD fixed effects model on the company performance variables excluding public-to-private transactions (PTPs). All specifications contain firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the independent variable is the 1-year growth rate in assets and in columns 3 and 4 it is the 1-year growth rate in employment. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Asset growth		Employment growth	
	(1)	(2)	(3)	(4)
EBA*Post	-0.064**	-0.102***	-0.038*	-0.048*
	(0.027)	(0.035)	(0.020)	(0.026)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1647	1457	1076	952
R-squared	0.010	0.031	0.014	0.026
Companies	291	256	242	213

Table 40: Excluding club deals: Investment & financing

This Table reports a robustness test, where we estimate the standard difference-in-differences fixed effects model on the main outcome variables dropping club deals. Every specification contains firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy identifying PE-backed companies of EBA-affected banks. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the outcome is investment scaled by assets; in Columns 3 and 4 the outcome is equity issuance; in Columns 5 and 6 the outcome is the debt issuance. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Investment		Equity		Debt	
	(1)	(2)	(3)	(4)	(5)	(6)
EBA*Post	-0.055**	-0.096**	-0.011*	-0.025**	-0.013	-0.034
	(0.024)	(0.037)	(0.006)	(0.011)	(0.020)	(0.031)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	1238	1119	1436	1251	1293	1123
R-squared	0.017	0.045	0.011	0.059	0.016	0.042
Companies	213	189	217	188	219	189

Table 41: Excluding club deals: Company performance

This Table reports a robustness test, where we estimate the standard DiD fixed effects model on the company performance variables excluding club deals. All specifications contain firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the independent variable is the 1-year growth rate in assets and in columns 3 and 4 it is the 1-year growth rate in employment. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Asset growth		Employment growth	
	(1)	(2)	(3)	(4)
EBA*Post	-0.060**	-0.086**	-0.046**	-0.058**
	(0.026)	(0.037)	(0.021)	(0.026)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1241	1075	874	763
R-squared	0.014	0.042	0.018	0.072
Companies	220	189	186	161

Table 42: Only 2010-2011: Investment & financing

Here we estimate the standard DiD model using only data from 2010 and 2011. This corresponds to the last year before the shock and the first year of the shock. Every specification contains firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA-bank dummy. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. In Columns 1 and 2 the outcome is investment scaled by assets; in Columns 3 and 4 the outcome is equity issuance; in Columns 5 and 6 the outcome is the debt issuance. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Investment		Equity		Debt	
	(1)	(2)	(3)	(4)	(5)	(6)
EBA*Post	-0.060*	-0.103**	-0.048**	-0.050**	-0.001	-0.031
	(0.032)	(0.043)	(0.014)	(0.019)	(0.026)	(0.036)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	568	524	578	524	589	524
R-squared	0.017	0.033	0.047	0.196	0.010	0.020
Companies	292	266	297	266	293	259

Table 43: Only 2010-2011: Company performance

Here we estimate the standard DiD fixed effects model using only data from 2010 and 2011. This corresponds to the last year before the shock and the first year of the shock. All specifications contain firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the independent variable is the 1-year growth rate in assets and in columns 3 and 4 it is the 1-year growth rate in employment. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Asset growth		Employment growth	
	(1)	(2)	(3)	(4)
EBA*Post	-0.074*	-0.128***	-0.019	-0.102*
	(0.040)	(0.059)	(0.032)	(0.058)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	590	523	388	348
R-squared	0.019	0.035	0.020	0.239
Companies	303	266	212	188

Table 44: Time-varying industry fixed effects: Investment & financing

Here we estimate the standard DiD fixed effects model on the main outcome variables augmented with a set of fixed effects generated as the product of industry (two-digit SIC) and the Post dummy. Every specification contains firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with the same firm-level controls measured before the shock and interacted with the Post dummy. In Columns 1 and 2 the outcome is investment scaled by assets; in Columns 3 and 4 the outcome is equity issuance; in Columns 5 and 6 the outcome is the debt issuance. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Investment		Equity		Debt	
	(1)	(2)	(3)	(4)	(5)	(6)
EBA*Post	-0.075**	-0.025**	-0.024**	-0.050**	-0.034	-0.036
	(0.032)	(0.043)	(0.011)	(0.011)	(0.027)	(0.026)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	1728	1579	1991	1765	1790	1583
R-squared	0.027	0.045	0.020	0.047	0.021	0.043
Companies	295	266	300	265	302	266

Table 45: Time-varying industry fixed effects: Company performance

This Table reports a robustness test, where we estimate the standard DiD fixed effects model on the company performance variables augmented with a set of fixed effects generated as the product of industry (two-digit SIC) and the Post dummy. All specifications contain firm, country and (bank*year) fixed effects. The main parameter of interest is the interaction between the Post dummy and the EBA dummy. Odd-numbered columns contain the baseline regression and even-numbered columns augment the baseline model with a set of firm-level controls measured before the shock and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. In Columns 1 and 2 the independent variable is the 1-year growth rate in assets and in columns 3 and 4 it is the 1-year growth rate in employment. Standard errors are clustered at the firm level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level

	Asset growth		Employment growth	
	(1)	(2)	(3)	(4)
EBA*Post	-0.068*	-0.090***	-0.077***	-0.056*
	(0.036)	(0.036)	(0.028)	(0.030)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1713	1512	1136	1001
R-squared	0.024	0.043	0.028	0.076
Companies	303	266	254	223

6.8 Portfolio companies and financial constraints

In order to enrich our understanding of our main findings, we now exploit heterogeneity at the portfolio company-level. Specifically, we look to determine whether the negative effect on company performance of being sponsored by an EBA-affected bank is stronger for portfolio companies which were ex-ante more likely to be financially constrained in 2010.

In order to do so, we estimate the following model:

$$(y_{it}) = \alpha_t + \alpha_i + \alpha_c + \beta_1(EBA_i * Post_t) + \beta_2(Constrained * Post_t) + \beta_3(Constrained * EBA_i * Post_t) + \theta X_{it} + \varepsilon_{it}$$

Where *Constrained* is a dummy taking the value one where the company is more likely to be constrained in the pre-shock year, 2010. We adopt four measures of financially constrained. First, we use firm size as measured by their total revenue. Prior literature has shown that smaller companies are more vulnerable to credit market downturns (Chodorow-Reich (2013); Bottero et al. (2015); Cingano et al. (2016)). Closely associated to our own work, Juelsrud and Wold (2018) document that smaller firms were more vulnerable to the negative employment effects of a Norwegian bank capital regulation policy reform. Likewise, Bernstein et al. (2019) find smaller private equity-backed firms to experience a more pronounced rise in investment and financing relative to non-PE-backed firms at the onset of the financial crisis. In our sample, we identify small firms by looking at those with below median revenue in 2010, the last year prior to the EBA capital exercise.

Second, we consider the leverage of companies, as defined as the ratio of debt to total assets. More indebted firms typically have weaker balance sheets, higher interest payment burdens and therefore have greater difficulty in obtaining external financing, particularly when credit markets freeze. Consistent with this, literature has shown that firms with higher leverage are more sensitive to external credit shocks (Zingales (1998); Bougheas et al. (2006); Tsoukas (2011)).

Third, we identify constrained firms as those more dependent on bank finance, as it is typically riskier and lower-credit firms which rely more heavily on bank finance (Cingano et al. (2016); Guariglia et al. (2016)). These firms are more likely to encounter rising interest rates and experience difficulties in rolling over debt (Preve et al. (2005). Consistent with previous work, we define dependence on bank credit

as the ratio of short-term debt to total liabilities.

Finally, we define companies located in Greece, Ireland, Italy, Portugal and Spain (GIIPS) as being more financially constrained. The timing of the EBA shock was parallel with the sovereign debt crisis, which lead to severe credit shortages in the aforementioned countries. During the period of 2010 to 2012, the growth rate of bank credit available to firms in the GIIPS countries declined rapidly, and loan interest rate spreads increased relative to those in other European countries, such as Germany and France, implying that the sovereign debt crisis had a negative impact on the supply of credit in these countries (Popov and Van Horen (2014); De Marco (2019)). As such, we would expect companies operating in these countries to be more constrained and have greater difficulty in accessing external credit.

The results are presented in Table 46. Panel A shows that the negative effect of being backed by the PE arm of an EBA-affected bank on companies' employment growth is stronger for those that were more likely to ex-ante constrained, when measured based on firm size. However, there is no statistically significant difference between the effect on the asset growth of more and less constrained firms. In Panels B and C, we find similar conclusions when partitioning the sample on the basis of leverage and the dependency on bank finance. In each case, we find that more constrained firms suffer a larger loss in terms of their employment growth. Furthermore, the economic magnitude is very similar in each case. Employment growth falls by between 6% and 9% more in EBA-sponsored firms who were more likely to be financially constrained, relative to firms who were less likely to be constrained. Together, these results imply that portfolio companies of EBA-affected banks which were more likely to be in a constrained position at the onset of the shock, subsequently suffered a greater decline in employment growth compared to those which were more financially resilient.

Finally, in Panel D of Table 46, we investigate the impact of the sovereign debt crisis, which occurred during the same time period as the EBA capital exercise. The coefficients on the triple interaction term suggest that portfolio companies of EBA-affected banks which are located in the GIIPS countries are worse off relative to those located elsewhere in Europe. The coefficients are statistically significant for both asset and employment growth. In particular, they suggest that portfolio companies of EBA-affected banks located in the GIIPS countries countries suffered a 17% greater decline in asset growth and 12% greater decline in employment growth following the EBA shock, relative to those located in other European countries. Prior research has shown that firms borrowing from GIIPS banks suffered greater declines in investment and sales growth relative to other firms (Acharya et al, 2018). We

complement this by showing that PE portfolio companies of the EBA shock-affected banks located in the GIIPS countries experienced a greater reduction in both asset and employment growth following the shock, compared to those located elsewhere in Europe.

Taken together, the results of this section imply that while the portfolio companies of EBA-affected banks suffered at the onset of the shock relative to portfolio companies of unaffected banks, the effect is not standardized across all types of companies. Instead, we find that the negative effect on company performance is stronger for firms which were more likely to be financially constrained.

Table 46: Portfolio companies & financial constraints

These tables estimate the standard difference-in-differences fixed effects model on company performance outcomes, repeating the specification of Table 7 while exploring various proxies of financing constraints in 2010 (pre-shock). All specifications include firm, country and (bank*year) fixed effects. In Panel A, the *constrained* proxy is based on firm size, and is equal to one if the firm has below median revenue in 2010. The *constrained* proxy in Panel B relates to company leverage. The variable equals one if the firm has above median leverage in 2010. The *constrained* proxy in Panel C relates to companies' dependence on bank finance, as measured by the ratio of short-term debt to total liabilities. The *constrained* dummy equals one if the firm has above median bank dependence in 2010. Finally, in Panel D, we explore the impact of the sovereign debt crisis. Here, the *constrained* variable. takes the value one if the target company is located in a GIIPS country (Greece, Ireland, Italy, Portugal and Spain). Even-numbered columns augment the baseline model with a set of firm-level controls measured before in 2010 and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. Standard errors are clustered at the firm level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level

	Asset growth		Employment growth	
Panel A: Size				
EBA*Post*Constrained	0.007	0.059	-0.080**	-0.091**
	(0.058)	(0.071)	(0.040)	(0.044)
Constrained* Post	0.023	-0.022	0.067**	0.079**
	(0.046)	(0.059)	(0.027)	(0.033)
EBA*Post	-0.075*	-0.144**	-0.030	0.003
	(0.039)	(0.058)	(0.032)	(0.033)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1713	1512	1136	1001
R-squared	0.011	0.031	0.017	0.066
Companies	303	266	254	223
Panel B: Leverage				
EBA*Post*Constrained	0.020	0.056	-0.080**	-0.071**
	(0.063)	(0.061)	(0.036)	(0.040)
Constrained* Post	-0.026	-0.087	0.066**	0.056
	(0.057)	(0.056)	(0.031)	(0.036)
EBA*Post	-0.059**	-0.117***	-0.033	0.024
	(0.029)	(0.038)	(0.024)	(0.025)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1713	1512	1136	1001
R-squared	0.010	0.033	0.016	0.066
Companies	303	266	254	223

Continued on next page

Table 46 – *Continued from previous page*

	Asset growth		Employment growth	
Panel C: Bank dependency				
EBA*Post*Constrained	-0.033	-0.037	-0.070**	-0.066*
	(0.045)	(0.041)	(0.034)	(0.037)
Constrained* Post	-0.013	-0.033	0.044*	0.029
	(0.039)	(0.036)	(0.026)	(0.028)
EBA*Post	-0.045*	-0.082**	-0.035	-0.028
	(0.027)	(0.036)	(0.025)	(0.026)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1713	1512	1136	1001
R-squared	0.013	0.036	0.017	0.067
Companies	303	266	254	223
Panel D: Located in GIIPS countries				
EBA*Post*GIIPS	-0.181**	-0.163*	-0.144*	-0.110*
	(0.084)	(0.095)	(0.080)	(0.079)
GIIPS* Post	0.015	-0.032	0.065	0.049
	(0.060)	(0.073)	(0.057)	(0.061)
EBA*Post	-0.036	-0.079**	-0.028	-0.029
	(0.024)	(0.037)	(0.023)	(0.021)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1713	1512	1136	1001
R-squared	0.020	0.045	0.019	0.067
Companies	303	266	254	223

6.9 Private equity group reputation

In the final section, we turn our attention to heterogeneity at the private equity firm-level, where we consider the impact of the reputation and experience of the private equity investor at entry to the investment.

We estimate the same DiD estimator as before:

$$(y_{it}) = \alpha_t + \alpha_i + \alpha_c + \beta_1(EBA_i * Post_t) + \beta_2(Reputation * Post_t) \\ +\beta_3(Reputation * EBA_i * Post_t) + \theta X_{it} + \varepsilon_{it}$$

Where *Reputation* is a dummy variable taking the value one where the PE investor is more likely to be *inexperienced* [54].

Prior literature has found private equity investor reputation to be important in a multitude of settings, including (but not limited to) fundraising (Barber and Yasuda (2017)), deal sourcing (Hsu (2004)), deal structure and financing terms (Demiroglu and James (2010); Ivashina and Kovner (2011); Achleitner et al. (2011); Colla et al. (2012)), syndication (Plagmann and Lutz (2019)), exit (Jenkinson and Sousa (2015)), investment outcomes (Sørensen (2007); Nahata (2008); Krishnan et al. (2011)) and financial distress (Tykvová and Borell (2012); Hotchkiss et al. (2014)).

Of particular relevance is the study by Hotchkiss et al. (2014), who find that portfolio companies sponsored by older and more reputable investors are associated with a higher likelihood of survival. This implies that portfolio companies of PE investors with more reputational capital are less likely to fall into distress and more likely to perform better than those backed by less experienced investors. Furthermore, Tykvová and Borell (2012) show that more experienced PE investors are better able to manage distress risks than their less experienced counterparts, and that their portfolio companies exhibit lower bankruptcy rates. From a theoretical perspective, a more reputable investor may be better placed to support their portfolio in times of distress as they are able to obtain external financing at more favourable rates (Demiroglu and James (2010); Ivashina and Kovner (2011)). They are also more likely to have more reputational capital at stake to protect with regards to their LPs and any intermediary debt providers, making them yet more determined to avoid any

[54] The dummy takes the value one for inexperienced investors as opposed to experienced, to allow for consistency across the signs of coefficients in all empirical models

failures. Finally, under the 'grandstanding' hypothesis of Gompers (1996), investors who need to establish a reputation are more willing to bring smaller, younger, and riskier companies to the public market. Consistent with this, less reputable investors may have a higher likelihood of investing in riskier companies in order to 'make a name for themselves'. These companies are more likely to have higher failure rates, but, with a low probability, they may turn into an impressive success story.

Consequently, we would expect the effect of a shock to be stronger on portfolio companies of less experienced and less reputable investors. Presumably, those with more reputational capital would be better placed to engage their portfolio and help them to maintain their level of performance relative to those sponsored by less experienced investors.

It is worth noting that several measures have been used in research to date to proxy for PE investors' level of experience and reputation. Early work used the age of the private equity firm. Despite presumably capturing an investor's staying power in the market, age is a less attractive proxy of experience and reputation as it fails to distinguish between active and inactive investors (Sørensen (2007)). The size of funds raised may purely reflect the success of fundraising, and could favour funds who pursue larger deals. Lastly, the number of recently completed deals may fluctuate depending on the overall pattern of buyout activity, so reputation could increase during credit market booms, when the total number of deals executed rises (Demiroglu and James (2010)). As such, we use several proxies in our analysis.

First, we use the number of investments made by the PE firm prior to entry (Lin and Smith (1998); Sørensen (2007); Demiroglu and James (2010); Atanasov et al. (2012); Tykvová and Borell (2012); Plagmann and Lutz (2019))[55]. The reputation and prominence of an investor are intrinsically linked to its level of activity, and in turn, the success of its investments (Sørensen (2007); Nahata (2008)). By participating in more deals and engaging with more companies, investors can not only learn more about the selection and the monitoring of companies, but also expand their network of deal flow suppliers, customers and other intermediaries. Following Demiroglu and James (2010), we calculate reputation as one plus the logarithm of the number of previous deals executed. Second, we use the number of funds raised prior to entry. For any private equity firm, survival depends on the ability to continually raise new funds. In order to do so, they must be able to present a track record to prospective LPs when marketing a new fund. Hence, experience and reputation is synonymous

[55]In unreported robustness checks, we also use the number of investments made, the number of funds raised and the value of funds raised in the 5 years prior to entry, and the main results are unchanged

with a clear indication of prior fundraising (Hotchkiss et al. (2014); Barber and Yasuda (2017); Plagmann and Lutz (2019)). Finally, we consider the value of funds raised prior to entry. While the number of funds raised indicates the ability to raise funds over time, the size of funds can reflect the success of each fundraising (Demiroglu and James (2010)). Larger organizations are therefore more likely to have established reputations (Gompers and Lerner (2000a)).

The regression results are displayed in Table 47. When we proxy for investor reputation by the number of investments made (Panel A) or the number of funds raised (Panel B), we find evidence that the negative effect of the EBA shock on the asset growth of companies receiving investment from less experienced investors is stronger. The coefficients in Panel A and Panel B imply that the effect is approximately 14% stronger on companies sponsored by less experienced PE firms compared to those sponsored by more experienced firms. The finding is robust to the inclusion of a host of fixed effects and firm-level control variables. When we use the value of funds raised, the coefficients on asset growth remain negative but are statistically insignificant. We do, however, find evidence of a stronger effect on employment growth of companies backed by less experienced investors. The coefficients in columns 3 and 4 of Panel C of Table 47 are of a similar economic magnitude, suggesting that the negative effect is around 10% stronger on less experienced investor's portfolio companies.

Taken together, the results imply that portfolio companies of EBA-affected banks sponsored by less experienced investors were more susceptible to a drop in performance at the onset of the shock. Our results echo somewhat the findings of Hotchkiss et al. (2014), who find companies backed by less experienced PE investors are more likely to default than those backed by experienced investors. We find evidence that PE investors with less experience and reputational capital are less able to help their portfolio companies sustain their levels of performance when hit by an external shock. Their portfolio companies suffer a greater relative fall in performance. Consistent with Hotchkiss et al. (2014) we find evidence of a link between private equity investor reputation and portfolio company outcomes.

Table 47: Private equity group reputation

These tables estimate the standard difference-in-differences fixed effects model on company performance outcomes, repeating the specification of Table 7 while examining the impact of the experience and reputation of the private equity investor sponsoring the deal. All specifications include firm, country and (bank*year) fixed effects. In Panel A, the *reputation* proxy is based on the number of investments made by the PE firm prior to entry, calculated as 1+log(number of deals made prior to entry). The dummy variable takes the value one where this is below the sample median and the PE firm is more likely to be inexperienced and have less reputational capital. The *reputation* proxy in Panel B relates to the number of funds raised prior to entry. The *reputation* proxy in Panel C relates to the value of funds raised by the PE firm prior to deal entry. Where more than one private equity firm is identified as a sponsor in the same transaction, if one of the private equity firms led the transaction (received a higher percentage of shares) only the information about the leader and their deals and funds is used. If none of the private equity firms receive more shares than the other(s) or no information on this is available, information on all private equity firms and funds is obtained and the data on firm and fund characteristics is averaged. Even-numbered columns augment the baseline model with a set of firm-level controls measured before in 2010 and interacted with the Post dummy. These variables are firm size (log of revenue), growth in revenue, cash flow over assets, ROA, and leverage. Standard errors are clustered at the firm level. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level

	Asset growth		Employment growth	
Panel A: Number of investments made prior to entry				
EBA*Post*Reputation	-0.153**	-0.144*	0.028	0.032
	(0.071)	(0.078)	(0.032)	(0.039)
Reputation* Post	0.124*	0.100	0.005	0.005
	(0.065)	(0.070)	(0.012)	(0.023)
EBA*Post	-0.041*	-0.065*	-0.061*	0.069*
	(0.028)	(0.037)	(0.024)	(0.027)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1713	1512	1136	1001
R-squared	0.013	0.032	0.015	0.066
Companies	303	266	254	223
Panel B: Number of funds raised prior to entry				
EBA*Post*Reputation	-0.124***	-0.136**	-0.055	-0.047
	(0.046)	(0.068)	(0.043)	(0.045)
Reputation* Post	0.084**	0.110*	0.062*	0.049
	(0.038)	(0.057)	(0.033)	(0.036)
EBA*Post	-0.027	-0.017	-0.042	0.029
	(0.028)	(0.053)	(0.025)	(0.025)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1713	1512	1136	1001

Continued on next page

Table 47 – *Continued from previous page*

	Asset growth		Employment growth	
R-squared	0.015	0.033	0.016	0.064
Companies	303	266	254	223
Panel C: Value of funds raised prior to entry				
EBA*Post*Reputation	-0.037	-0.036	-0.093*	-0.119**
	(0.064)	(0.074)	(0.050)	(0.053)
Reputation* Post	-0.022	-0.053	0.063*	0.068
	(0.055)	(0.064)	(0.037)	(0.042)
EBA*Post	-0.032	-0.076*	-0.028	-0.003
	(0.029)	(0.044)	(0.026)	(0.024)
Firm FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Bank*Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	1713	1512	1136	1001
R-squared	0.013	0.038	0.016	0.068
Companies	303	266	254	223

6.10 Concluding Remarks

We use the 2011 EBA Capital Exercise as an exogenous regulatory shock to the banking sector in Europe to show the differential impact a bank shock can have on the portfolio companies of private equity subsidiaries of affected and unaffected banks. In a difference-in-differences setting, we examine the effect of the shock on portfolio companies' investment, financing and performance in the aftermath of the shock. Portfolio companies of affected banks are found to be significantly worse off, implying that increasing capital requirements for banks may come at a cost to the real economy (De Marco and Wieladek (2015); Fraisse et al. (2020); Gropp et al. (2018); Juelsrud and Wold (2018)).

Portfolio companies of the PE arms affiliated with affected banks are shown to exhibit weaker investment and financing levels at the onset of the shock. We then show that these companies also under performed portfolio companies of unaffected banks concerning their asset and employment growth. In the latter part of the chapter, we exploit heterogeneity across portfolio companies and across PE investors and show that companies' financial constraints and PE investor's reputation matter. First, we show that the significant, negative effect on company performance is stronger for companies that were more likely to be financially constrained when the shock occurred. Second, the effect is also stronger on companies whose PE sponsor is less experienced and reputable.

The findings of this chapter echo the risks associated with bank capital regulation highlighted by Hanson et al. (2011), who criticize the targeting of the tier one capital ratio. As shown in Gropp et al. (2018), when offered the choice between raising new equity capital or reducing risk-weighted assets to increase their capital ratio, European banks opted for the latter. In turn, recent evidence suggests that adjusting capital requirements in this way can be costly to the real economy (Fraisse et al. (2020); Gropp et al. (2018)). On the other hand, stress tests in the US in 2009 specifically asked banks to issue new equity, which appears to have mitigated the issue Hanson et al. (2011).

7 Chapter - The role of capital market development in international buyout markets

Private equity investment has evolved since the 1980s to play an important role in the functioning of enterprises and of financial markets. Benefits of private equity ownership have been well-documented to date. For example, it has been shown that private equity investment can spur increases in innovation (Amess et al. (2016), Lerner et al. (2011)), employment and job creation (Boucly et al. (2011), Lerner et al. (2019)) and productivity (Harris et al. (2005), Davis et al. (2014), Lerner et al. (2019)). There is also evidence that private equity investment can enhance firms' operating performance (Kaplan (1989), Chung (2011), Boucly et al. (2011), Guo et al. (2011), Cohn et al. (2014)) and, more recently, Cohn et al. (2019) and Bernstein and Sheen (2016) reveal that workplace safety, cleanliness and maintenance can increase following private equity financing. Moreover, research has illustrated that private equity-sponsored companies exhibit lower levels of distress risk than comparable unsponsored firms and that they restructure faster when they do fall into distress (Thomas (2010), Tykvová and Borell (2012), Hotchkiss et al. (2014)) and that they are more resilient in the face of economic downturns (Wilson et al. (2012), Bernstein et al. (2019)). Finally, Bloom et al. (2015) find private equity-backed companies to have better management practices and Bellon (2020) concludes that they are environmentally cleaner.

In spite of the diverse range of potential benefits of a well-developed private equity buyout market, the literature to date has yet to determine significant drivers of an active buyout market. Jeng and Wells (2000) investigate the determinants of venture capital activity using a panel data set of 21 countries. More recently, Bonini and Alkan (2012) and Félix et al. (2013) investigate the macroeconomic and institutional drivers of venture capital investment across countries. Finally, Schertler and Tykvová (2012) examine what drives cross-border venture capital investment and Nahata et al. (2014) ask whether cultural and institutional differences matter for venture capital success. The only research to date which examines buyout investment at the country level is a recent study by Aldatmaz et al. (2020) who investigate the determinants of buyout capital invested across 61 countries from 1990 to 2017. They find better macroeconomic conditions, more active stock markets and regulatory reforms to positively impact buyout markets. We build on this study to examine the role of both stock and debt markets in buyout activity and we extend the analysis to study how this effect varies over time between crisis and tranquil periods, and how countries' level of political risk affects our understanding of the

results.

This chapter aims to extend the analysis of previous research by examining the role of capital market development on private equity buyout investment using a sample of 34 European countries from 2007 to 2019. Capital market development is an example of a factor that influences both the demand for and supply of private equity investment. A deep, liquid stock market positively affects demand for private equity financing from private companies as it gives management the opportunity to enter into an implicit contract on control with private equity investors. While management's control is diluted after a trade sale, going public offers them the chance to partially reacquire control, as they can obtain leading management positions in listed companies (Black and Gilson (1998), Bascha and Walz (2001)). A well-developed stock market also generates supply as it allows private equity investors to enhance their reputation by successfully exiting from their portfolio companies via an IPO. They can then profit from this reputation by raising funds from limited partners at more favourable conditions in the future Gompers and Lerner (1999). Black and Gilson (1998) reason that a well-developed stock market provides an important exit opportunity for venture capital thereby increasing supply. They provide evidence that risk capital, such as private equity, flourishes in countries with well-developed capital markets and argue that the comparative advantage of the US venture market can be explained by its strong IPO market. Jeng and Wells (2000) confirm the finding of Black Gilson, finding the level of IPOs to be the main determinant of venture activity in 21 countries over a period of 10 years. Similarly, Schertler and Tykvová (2012) find stock market capitalization to significantly impact cross-border venture flows in European and North American countries from 2000 to 2008. However, not all firms go public at exit due to liquidity conditions so many are sold to a strategic acquirer (Cumming et al., 2005). Nahata et al. (2014) reason that a stronger stock market also allows strategic acquirers to raise cash and to issue stock for acquisitions and find an active stock market to be an important catalyst for venture capital success. Finally, it is worth noting that the effect of capital market liquidity may be stronger on buyout investment than on venture capital, since it can also be used to gauge financial depth and the availability of leverage, which is vital in structuring buyout transactions. Accordingly, we consider the role of syndicated loans markets as well as stock market development. Syndicated loans are a primary source of debt for buyouts (Poors (2016)). We look to add to this body of literature by investigating the role of both stock and debt market activity in the European buyout market.

The contribution of the chapter is threefold. First, while prior research in this area

focuses solely on venture capital activity, with the exception of Aldatmaz et al. (2020), we consider buyout investment. This is of importance given the heterogeneity across different types of private equity (venture capital versus buyouts) which differ greatly in terms of the purpose, the structure and the associated risks of each investment. Moreover, according to data from the leading European industry body for private equity & venture capital, Invest Europe[56], venture capital investment accounted for around 11% of all European private equity investment in 2019, while buyout investment comprised almost 70%. The literature to date in this field has therefore only considered a fraction of this asset class. Using two different measures (stock market capitalization and syndicated debt issuance), we find capital market development to play an important role in buyout investment markets, in line with previous literature concerning venture capital investment.

The second contribution of this chapter relates to the role played by the recent financial crisis. It is well-documented that the crisis had a profound effect on private equity investment (see for example Shivdasani and Wang (2011), Bernstein et al. (2019)) and we therefore broaden our study to account for the role played by the crisis. The cyclical nature of private equity markets is well-documented throughout the literature (Gompers and Lerner (2000b); Kaplan and Schoar (2005); Acharya et al. (2007); Strömberg (2008); Kaplan and Stromberg (2009); Axelson et al. (2013)). In the case of buyouts, the freezing of credit markets during the crisis reduced the ability of private equity managers to be able to structure leveraged buyouts as they were unable to access the required debt. The impact of the crisis on private equity activity and fundraising in Europe is illustrated in Figure 9. It is clear from the data presented that the crisis had a profound impact on buyout markets.

Initial evidence of this cyclicality shows valuations and the amount of leverage attached to deals rising during market peaks in the 1980s Kaplan and Stein (1993). This is due to more abundant fundraising leading to increased competition amongst private equity investors and increasing amounts of uninvested capital (known as dry powder) held by firms. As a result, with intense competition for deals, valuations rise, while readily available credit allows investors to easily lever-up deals.This pattern has continued in the 1990s and 2000s (Kaplan and Stromberg (2009)). In recent work, Axelson et al. (2013) show that during boom periods, there is overinvestment and investors accelerate their investment rates when interest rates are low, whereas during downturns, there is underinvestment, as some good deals get passed up. They argue that this then leads to countercyclical investment performance: lower aver-

[56]Formerly the European Venture Capital Association (EVCA)

age returns are made in boom periods and more successful deals are made during downturns. The authors consider what drives the amount of leverage in LBOs, and find that the amount of leverage is not correlated with any underlying, idiosyncratic characteristics of the target companies themselves, but with the current state of the credit market. They find periods of high leverage to coincide with high valuations and lower subsequent returns, implying that buyout investors overleverage and overpay when the credit market is hot and debt is cheap. On the other hand, returns rise when valuations fall during downturns. Kaplan and Stromberg (2009) and Brown et al. (2018) provide similar evidence that fund returns are counter-cyclical and decline in fundraising peaks when capital commitments and valuations are both high. Given the intensely cyclical nature of the private equity industry, we test to see if the effect of capital market development on buyouts is similarly cyclical. We find that, under each measure, the effect of capital market development is positive and significant during non-crisis periods. Moreover, the difference between the effect during crisis and non-crisis periods is statistically significant, underlining the cyclical nature of the effect.

Finally, we extend the analysis by splitting our sample based on measures relating to a country's level of political and legal risk to identify whether the impact of capital market development on buyout investment varies between different sub-samples of countries depending on their political and institutional landscape. Given that our sample includes a wide array of European countries which vary in terms of their institutional setting, it offers fertile grounds for investigating the role of political and legal risk with regard to buyout activity.

The extant literature has acknowledged the importance of a robust legal and political environment in a private equity setting. On a broad perspective, the institutional environment must offer sufficient protection, yet not deter firm creation. The legal environment in a country affects the market for private equity, as it influences investor and shareholder protection. Mauro (1995) detects a significant relationship between property rights and investment, and Desai et al. (2003) extend this analysis, finding a significant link between property rights and venture capital investments. La Porta et al. (1997) and Porta et al. (1998) underline the importance of the legal environment, arguing that it determines the size and depth of the country's capital market and plays an important role in determining firms' ability to receive external finance. Specifically, they find that common law countries, such as the US and UK, tend to provide greater investor protection than civil law countries. This is confirmed empirically by Bonini and Alkan (2012), who find early stage financing and new ventures to be greater in the UK than in French, German and Scandinavian law

countries. Moreover, La Porta et al. (2000) find countries with improved investor protection to have a lower cost of capital for companies. Jeng and Wells (2000) includes a measure of accounting standards in their venture capital model, claiming that since new ventures are risky, investors demand a higher risk premium if they have limited information on the company. Such information is cheaper and more accessible in a country with strict accounting standards, so should lead to increased private equity activity. On a more general basis, the more investors and shareholders are protected, the more they are willing to invest, encouraging increased private investment activity, of all types.

Cumming et al. (2006) find that a country's strength of legal institutions is associated with a higher likelihood of exiting via an IPO. This model is extended by Cumming et al. (2010), who find that cross-country differences in legal systems and accounting standards significantly affect the governance of private equity investments, as better laws facilitate investor's board representations, improving the screening of deals. Bottazzi et al. (2009) develop a model showing that optimal contracts in financial intermediaries, such as private equity firms, are dependent upon an efficient and high quality legal system. Lerner and Schoar (2005) reveal that venture capital investments in countries with inefficient legal frameworks have lower valuations while Nahata et al. (2014) show that they turn out to be less successful than investments in countries with stronger legal frameworks and better law enforcement. Groh et al. (2010) show that a country's legal framework affects its attractiveness for private equity and venture capital investments. Nahata et al. (2014) also show that cultural differences matter in venture capital. Investing in a country that is more culturally distant leads to more diligent screening of deals, improving venture capital performance. Finally, Tykvova (2018) finds the effect of legal framework on venture capital success to depend on the type of deal, with the effect being more pronounced in domestic deals and in syndicated deals.

With regards to the political landscape of a country, Brunetti and Weder (1998) suggest a positive link between political stability and private investment. In this respect, an active, well-developed private equity market can indicate a stable political environment. Political risk can also be defined by levels of bribery and corruption. Hain et al. (2016) consider institutional trust in cross-border venture capital investments in China, and find that corruption has a negative effect on venture capital inflows into a country. Yet they note that a positive effect may also be plausible, reasoning that market-driven corruption may have a positive effect in countries with rigid and inefficient legal systems. Specific to buyouts, Faccio and Hsu (2017) examine the employment consequences of leveraged buyouts and find that politically-connected

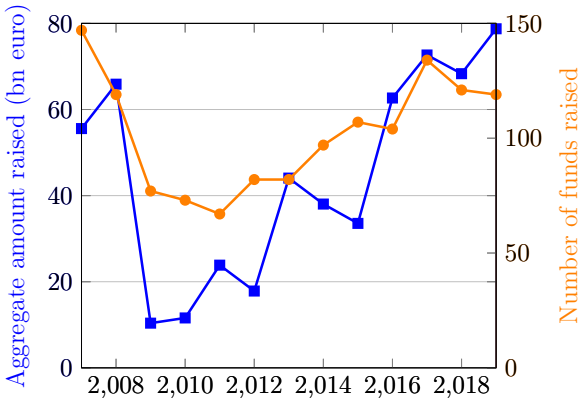
target companies increase employment by more than non-politically-connected target companies following the buyout. To measure a country's level of political and legal risk, we adopt various measures from the PRS International Country Risk Guide database, including political risk ratings, investment profile ratings, and law and order measures.

Our results reflect the seminal work of La Porta et al. (1997) and Porta et al. (1998) who outline the importance of a country's institutional environment for the size and depth of its capital markets. When partitioning our sample based on three different measures of institutional risk, we reveal the effect of capital market development on buyout investment to be significantly stronger in countries which exhibit lower political and legal risk. In particular, countries with lower institutional risk have a stronger sensitivity of buyout investment to capital market development. Overall, our results highlight the importance of capital market development in a buyout setting, with particular importance in countries with low institutional risk and during non-crisis periods.

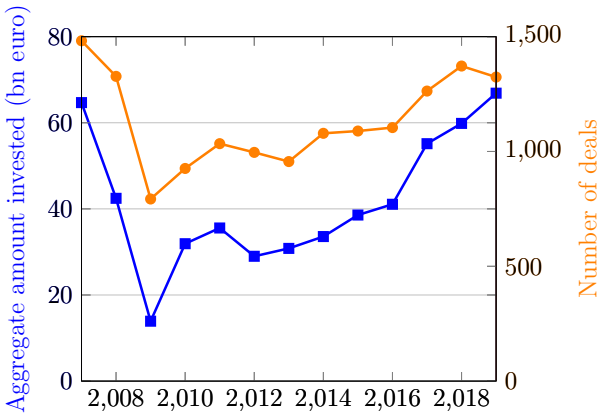
Figure 9: European Buyout Market 2007 - 2019

The below graphs display trends in fundraising, investment and exits in the European buyout market from 2007 to 2019. The left axis shows the aggregate amount in billions of euro and the right axis show the number of funds/deals. Data comes from Invest Europe (formerly the EVCA).

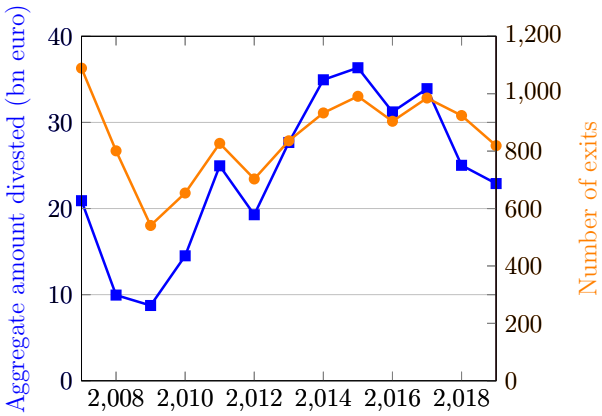
Fundraising



Investment



Exits



7.1 Background & Hypotheses Development

7.1.1 Capital markets and buyout activity

Prior work has provided evidence that a well-developed, liquid stock market is an important promoter of venture capital activity. Black and Gilson (1998) argue that a well-developed stock market provides an important exit opportunity for venture capital thereby increasing supply. They provide evidence that risk capital, such as venture capital, flourishes in countries with well-developed capital markets and argue that the comparative advantage of the US venture market can be explained by its strong and liquid stock market and IPO market. Jeng and Wells (2000) confirm this in a cross-country panel study, finding the level of IPOs to be the main determinant of venture capital activity in 21 countries over a period of 10 years.

While the literature to date has found an active, liquid stock market to be important for venture capital, the effect on buyout markets is yet to be properly examined. Aldatmaz et al. (2020) find the value of stocks traded in countries to be positively associated with the amount of buyout capital invested, among other variables. We extend this analysis to gauge the importance of different capital markets. We study the importance of stock *and* credit markets for buyout activity. We expect active stock and credit markets to also be important for buyout investments for several reasons. An active, liquid stock market provides an attractive exit environment to private equity investors, who often seek to exit deals via IPOs or by selling to trade acquirers. With the latter, a more liquid stock market can provide a means to acquirers of raising cash or stock for any acquisitions. More specific to buyout investments, stronger credit markets allow investors access to leverage when structuring leveraged buyouts, thus we would expect strong capital markets to be particularly important for buyout investment. Specifically, syndicated loans are a primary source of credit for buyout transactions (Poors (2016)).

As such, we predict higher levels of buyout investment to be associated with countries with stronger and more active capital markets.

H1: Country-years with more active and developed stock and credit markets will experience more buyout activity

7.1.2 Business cycles and buyout activity

The pro-cyclical nature of venture capital investment is confirmed by Romain (2004), who provide evidence of the strong, significant correlation between venture capital investment and GDP for 16 OECD countries during the 1990s and 2000s. Theoret-

ically, a higher GDP growth should stimulate demand for and supply of all types of private equity. Gompers and Lerner (1999) argue that a fast-growing economy will provide more attractive opportunities to entrepreneurs, who will be more willing to implement business idea during an economic boom. This should lead to increased demand for venture financing. The effect on buyout investment should be similar, as companies are more likely to expand and restructure during a period of strong economic growth. On the supply side, a fast-growing economy should encourage investment from domestic and foreign investors, stimulating the supply of all types of private equity financing.

Where buyouts are concerned, Kaplan and Stein (1993) provide early evidence of deal valuations and leverage rising during boom periods where fundraising is considerably easier and (Kaplan and Stromberg (2009)) show that this pattern has continued more recently. Axelson et al. (2013) show that during boom periods, investors overinvest and likewise, during downturns, they underinvest. They argue that this leads to a countercyclical buyout performance where lower average returns are made in boom periods when there is overinvestment and investors overpay and performance is therefore stronger during downturns, when access to credit more difficult. The authors also consider what drives the amount of leverage attached to buyouts, and find that deal leverage is uncorrelated with any cross-sectional, firm characteristics, but reflects the wider credit market. Periods of high leverage coincide with high valuations and lower subsequent returns, implying that buyout investors overlever deals and overpay for target companies when the credit market is hot and debt is cheap. On the other hand, returns rise when valuations fall during downturns. Kaplan and Stromberg (2009) and Jenkinson et al. (2018) provide similar evidence that fund returns are counter-cyclical and decline in fundraising peaks when capital flows into buyout funds and deal valuations rise.

Given the intense cyclical nature of stock and credit market movements and of buyout markets, we would expect that the impact of capital market development on buyout market activity is concentrated in boom periods of the business cycle.

H2: The positive effect of capital market development on buyout activity is concentrated in non-crisis years

7.1.3 Institutional setting and buyout activity

Previous studies have stressed the importance of a strong legal environment for financial markets to flourish. Where private equity is concerned, law enforcement has a direct impact on investor and shareholder protection. Mauro (1995) detects

a significant relationship between property rights and investment, and Desai et al. (2003) extend this analysis, finding a significant link between property rights and venture capital investments. La Porta et al. (1997) and Porta et al. (1998) underline the importance of the legal environment, arguing that it determines the development of the country's capital market and plays an important role in determining firms' ability to access credit. Specifically, they find that common law countries, such as the US and UK, tend to provide greater investor protection than civil law countries. On a similar note, Levine (1998) and Levine (1999) provide evidence that countries with stronger contract enforcement and creditor rights have a stronger banking system and La Porta et al. (2000) find that countries with better investor protection have a lower cost of capital thereby improving firms' access to financing.

With regards to venture capital, Jeng and Wells (2000) reason that since new ventures are risky, investors demand a higher risk premium if they have limited information on the company. Such information is cheaper and more accessible in a country with strict accounting standards, so should lead to increased investment activity. Cumming et al. (2006) find that a country's strength of legal institutions is associated with a higher likelihood of exiting venture deals via an IPO and Armour and Cumming (2008) detect a relationship between bankruptcy laws and entrepreneurship across countries. Cumming et al. (2010), find that cross-country differences in legal systems and accounting standards significantly affect the governance of venture investments, as better laws facilitate investor's board representations, improving the screening of deals, and so impact on the success of venture investments. Lerner and Schoar (2005) show that venture capital deals in countries where legal frameworks are less efficient have lower valuations while Nahata et al. (2014) show that they turn out to be less successful. Finally, Tykvova (2018) finds the effect of legal framework on venture capital success to depend on the type of deal, with the effect being more pronounced in domestic deals and in syndicated deals.

Studies which touch upon buyout deals include Bottazzi et al. (2009), who develop a model showing that optimal contracts in financial intermediaries, such as private equity firms, are dependent upon an efficient and high quality legal system. Groh et al. (2010) develop an index quantifying countries' attractiveness for private equity and venture capital investment and show that a country's legal framework is an important factor in determining its ability to attract investment.

Moving to countries' political landscapes, Brunetti and Weder (1998) suggest a positive link between a country's political stability and level of private investment. As such, an active, well-developed private equity market can indicate a stable political

environment. Political risk may also reflect levels of bribery and corruption. Hain et al. (2016) consider institutional trust in cross-border venture capital investments in China, and find that corruption has a negative effect on venture capital inflows into a country. Lastly, Faccio and Hsu (2017) find that strong political connections can improve target company outcomes. Specifically, they show that post-transaction increases in employment in portfolio companies which have stronger political connections are greater than in non-politically-connected target companies.

Building on the literature which has detected a positive relationship between countries' legal frameworks and levels of financial development and investment activity, we expect that capital market development would have a stronger effect on buyout investment in countries associated with lower levels of political and institutional risk and stronger legal environments.

H3: The positive effect of capital market development on buyout activity is greater in country-years with lower political and legal risk

7.2 Data & Descriptive Statistics

The cross-sectional dimension of the panel data used in the empirical analysis comprises 34 European countries, while the temporal dimension covers time series data from 2007 to 2019. Our primary dependent variable is the amount of buyout investment invested at the country-year level in euros. In order to control for differences in the size of countries, we scale the amount of buyout capital by GDP (Jeng and Wells (2000)). As a robustness check, we repeat our main results using buyout capital invested scaled by population. The data on countries' buyout capital investment comes from Invest Europe (formerly the European Venture Capital Association) who kindly provided annual yearbooks on individual countries in our sample dating back to 2007.

The other country-level variables used in the analysis come from various sources including the World Bank's Development Indicators, the PRS Group's International Country Risk Guide (ICRG) database, and the IMF. These variables are matched to the data on buyout investment by country name &/or country code. Our primary measure of capital market development is countries' stock market capitalization, normalized by GDP, which is taken from the World Bank. An active and well-developed stock market provides an important means of liquidity and exiting transactions to buyout investors, and has been shown to be important stimulant of venture capital markets (Jeng and Wells (2000)). Our second measure is the issuance of syndicated debt normalized by GDP, which is also taken from the World Bank WDI database. The syndicated loans market is one of the most popular way for issuers to access finance to structure leveraged buyouts and is therefore an important and relevant variable to examine (Poors (2016)). As such, we investigate the importance of capital markets development on buyout activity, and not just stock market liquidity.

In order to gauge the importance of countries' legal and political environments, we use three measures of institutional risk, each of which is taken from the PRS Group's International Country Risk Guide (ICRG) database. Firstly, we use the Political Risk Rating, where a higher risk point total indicates a lower level of risk for a given country. This rating is constructed using 12 sub-components[57]. Second, we use countries' Investment Profile rating, where a higher value implies a lower level of risk[58]. Third, we use a Law & Order variable, where the 'Law' element assesses the

[57]The sub-components are Government Stability, Socioeconomic Conditions, Investment Profile, Internal and External Conflict, Corruption, Religious and Ethnic Tensions, Law and Order, Democratic Accountability, Bureaucracy Quality

[58]This variable is constructed based on the sum of three sub-components: Contract Viability/Expropriation, Profits Repatriation and Payment Delays

strength and impartiality of a country's legal system, and the 'Order' asses popular compliance with the law.

In our regressions, we include a host of country-level control variables to control for other factors which may affect international buyout markets. In order to capture the macroeconomic environment, we control for countries' annual GDP growth and the unemployment rate. Aldatmaz et al. (2020) find unemployment rate to be significantly, negatively associated with global countries' buyout investment. We include the amount of domestic credit provided to the private sector (scaled by GDP) to account for the access to finance, and we include R&D expenditure normalized by GDP to control for the level of innovation in countries. Lastly, we include the corporate tax rate. Djankov et al. (2010) finds that corporate tax rates have a negative effect on entrepreneurship across 85 countries, which hinders the demand for venture capital investment. Similarly, Groh et al. (2010) also include taxation as a component of their index gauging how attractive countries are for receiving private equity and venture capital investment.

The data on country-year-level buyout investment is displayed at the in Table 48. The highest country-year value is in the UK in 2007 (19.7bn euros) and the lowest is zero, for which there are 95 country-year observations. Table 49 shows likewise when scaling buyout investment by GDP. Luxembourg-2007 has the highest amount of investment relative to GDP. In Table 50, we present more detailed information on the European market, using similar data from Invest Europe. Panel A details a breakdown in the level of buyout investment by different groups of countries across Europe. France & Benelux have the highest reported levels of investment in terms of the euro amount and the number of transactions over the 2007 - 2019 period. The UK & Ireland follow closely behind with a similar percentage of the total deal value but less transactions, suggesting larger deals occur in the UK. DACH countries, the Nordics and Southern Europe share similar proportions, while Central and Eastern Europe has considerably less buyout investment. Panel B shows the distribution by industry. Similar to firm- and deal-level studies, the majority of investment is in the services and manufacturing sectors (Bernstein et al. (2019)). Lastly, we see the breakdown in deal size in Panel C. Unsurprisingly, small cap deals account for the highest percentage number of transactions, but the lowest percentage of deal value, while the opposite holds for 'mega & large deals'. Finally, Table 51 outlines descriptive statistics of the data. The average country-year level of buyout investment in the sample is 1.19bn euros. Given that the countries vary in size, we scale by population and GDP. The average (median) amount of annual investment as a percentage of GDP is 0.19% (0.10%). If we exclude all country-year observations

with zero buyout investment, this figure rises to 0.24% (0.15%).

Table 48: Buyout investment by country-year (euro,m)

The below table shows the amount of buyout investment in each country in our sample over the years 2007 to 2019 measured in millions of euros.

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	842.7	224.7	51.8	615.8	80.9	346.7	451.9	215.1	856.0	34.1	132.3	898.9	142.4
Belgium	859.7	342.2	494.4	667.5	302.4	1,066.2	451.1	610.6	1,373.9	626.4	1,352.3	1,486.0	609.7
Bosnia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bulgaria	169.3	2.5	181.3	0.9	0.0	19.1	0.0	0.0	17.2	0.0	0.3	0.0	1.7
Croatia	0.0	6.8	13.7	12.2	14.9	9.4	0.0	0.0	0.0	27.2	0.0	72.2	75.0
Czech Rep	60.6	230.4	999.3	93.2	125.7	96.4	126.1	264.1	3.4	83.9	41.5	749.9	41.4
Denmark	1,641.6	963.4	269.2	189.6	287.1	746.3	1,618.2	1,169.3	1,566.9	1,333.0	1,537.5	2,783.6	1,213.7
Estonia	51.8	14.2	0.0	5.4	1.0	0.0	0.5	0.0	7.2	20.5	6.3	138.8	638.6
Finland	949.8	420.2	270.2	229.0	793.0	416.2	534.2	546.3	856.7	654.8	459.3	1,145.4	385.0
France	10,678.6	8,065.8	1,321.6	4,698.1	6,966.9	3,555.6	4,927.5	6,301.1	5,606.3	8,034.6	9,476.4	11,205.7	8,909.1
Germany	9,419.9	7,347.5	1,520.9	3,208.6	5,316.5	5,046.9	4,120.2	5,292.6	4,155.1	5,076.6	8,280.0	8,565.8	11,159.9
Greece	138.2	250.7	0.0	0.0	0.0	35.6	0.0	0.0	250.0	0.0	71.1	0.0	0.0
Hungary	181.6	401.8	202.4	44.5	148.9	34.5	14.4	108.9	95.0	0.3	63.3	255.9	0.05
Ireland	226.9	88.1	141.2	135.0	63.6	152.7	41.2	260.9	471.3	108.0	364.6	200.0	348.2
Italy	3,263.5	4,913.2	1,390.0	1,189.6	2,131.4	1,021.9	2,218.7	1,766.3	2,483.5	4,926.9	3,238.4	6,012.9	5,362.9
Latvia	19.0	39.3	0.5	0.0	12.6	0.0	6.0	4.9	0.0	4.0	12.8	6.2	1.6
Lithuania	146.6	0.0	0.0	0.0	13.6	0.0	6.1	4.5	3.5	151.0	1.0	2.6	208.1
Luxembourg	666.4	817.8	825.3	428.8	162.8	241.1	140.0	6.2	526.1	811.4	228.3	26.6	117.5
Macedonia	13.5	0.0	14.4	0.0	0.0	0.0	7.7	0.0	0.0	0.0	0.0	0.0	0.0
Moldova	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	0.0
Montenegro	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	5,240.5	2,012.6	285.5	1,473.6	2,612.3	1,060.9	1,856.1	2,288.8	2,522.6	2,861.3	3,068.3	5,100.1	5,290.7
Norway	802.9	782.5	441.0	1,418.1	707.7	678.4	1,416.9	1,999.3	1,042.4	419.3	1,477.7	681.9	2,361.5
Poland	330.0	526.3	206.9	523.6	489.5	327.4	203.2	185.9	681.1	605.7	2,294.1	493.9	382.9
Portugal	96.8	239.6	43.3	176.3	459.0	321.9	211.1	142.2	160.6	302.7	329.7	127.2	67.9
Romania	126.1	224.6	147.6	76.0	22.7	17.6	78.3	50.7	148.2	129.8	316.5	124.6	118.2
Serbia	81.9	3.7	0.0	0.0	0.0	8.1	12.8	328.6	228.7	47.4	0.0	30.0	413.1
Slovakia	23.5	22.7	0.0	3.1	0.0	92.5	0.0	6.0	0.0	0.0	0.0	20.5	6.0
Slovenia	4.3	0.0	76.5	0.0	6.9	2.2	0.0	11.2	7.1	53.1	19.4	0.0	0.0
Spain	2,476.3	1,131.6	533.6	2,069.2	1,739.5	1,714.2	1,522.5	1,681.7	1,335.3	2,394.0	3,674.9	4,754.0	7,006.4
Sweden	2,666.9	1,706.9	639.3	2,130.7	2,908.6	2,045.2	598.5	1,781.7	1,448.4	1,650.2	2,108.8	2,551.6	3,280.7
Switzerland	1,450.3	603.0	321.4	948.0	953.2	1,632.1	644.9	714.4	893.6	1,925.4	1,531.7	471.5	2,676.2
UK	19,715.7	11,209.4	2,988.6	9,564.8	7,769.3	8,549.9	7,479.5	7,350.5	10,275.2	6,985.4	13,125.1	12,270.5	14,097.5
Ukraine	0.0	122.1	30.8	3.1	33.2	15.6	7.5	0.0	1.0	0.0	0.0	4.1	0.0
Total	62,345.4	42,739.1	13,410.9	29,904.8	34,123.1	29,254.9	28,695.1	33,091.9	37,016.6	39,267.2	53,211.4	60,191.6	64,916.2

Table 49: Buyout investment by country-year (% of GDP)

The below table shows the amount of buyout investment in each country in our sample over the years 2007 to 2019 measured as a percentage of GDP.

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	0.297	0.077	0.018	0.208	0.026	0.109	0.140	0.065	0.248	0.010	0.036	0.233	0.036
Belgium	0.250	0.097	0.143	0.183	0.080	0.276	0.115	0.152	0.330	0.146	0.303	0.324	0.129
Bosnia	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bulgaria	0.522	0.007	0.485	0.002	0.000	0.045	0.000	0.000	0.038	0.000	0.000	0.000	0.003
Croatia	0.000	0.014	0.030	0.027	0.033	0.021	0.000	0.000	0.000	0.058	0.000	0.140	0.140
Czech Rep	0.044	0.142	0.668	0.059	0.076	0.059	0.079	0.167	0.002	0.047	0.021	0.356	0.018
Denmark	0.703	0.399	0.116	0.078	0.116	0.293	0.625	0.440	0.574	0.471	0.526	0.924	0.392
Estonia	0.316	0.086	0.000	0.037	0.006	0.000	0.003	0.000	0.035	0.094	0.026	0.533	2.277
Finland	0.504	0.216	0.149	0.122	0.401	0.207	0.261	0.264	0.405	0.301	0.203	0.490	0.160
France	0.550	0.405	0.68	0.235	0.338	0.170	0.233	0.293	0.255	0.360	0.413	0.475	0.367
Germany	0.377	0.289	0.062	0.125	0.197	0.184	0.147	0.181	0.137	0.162	0.254	0.255	0.324
Greece	0.059	0.104	0.000	0.000	0.000	0.019	0.000	0.000	0.141	0.000	0.039	0.000	0.000
Hungary	0.178	0.371	0.214	0.045	0.147	0.034	0.014	0.103	0.085	0.000	0.050	0.191	0.000
Ireland	0.115	0.047	0.083	0.081	0.037	0.087	0.023	0.134	0.179	0.040	0.121	0.061	0.098
Italy	0.202	0.300	0.088	0.074	0.129	0.063	0.138	0.109	0.150	0.291	0.186	0.340	0.300
Latvia	0.084	0.161	0.003	0.000	0.062	0.000	0.026	0.021	0.000	0.016	0.048	0.021	0.005
Lithuania	0.505	0.000	0.000	0.000	0.044	0.000	0.017	0.12	0.009	0.388	0.002	0.006	0.430
Luxembourg	1.793	2.145	2.232	1.067	0.377	0.547	0.301	0.013	1.010	1.479	0.402	0.044	0.185
Macedonia	0.222	0.000	0.213	0.000	0.000	0.000	0.094	0.000	0.000	0.000	0.000	0.000	0.000
Moldova	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.109	0.000
Montenegro	0.000	0.806	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Netherlands	0.846	0.311	0.046	0.231	0.402	0.162	0.281	0.341	0.366	0.404	0.416	659	0.653
Norway	0.274	0.247	0.159	0.438	0.198	0.171	0.360	0.532	0.299	0.126	0.418	0.185	0.655
Poland	0.105	0.144	0.065	0.145	0.129	0.084	0.051	0.045	0.158	0.142	0.490	0.099	0.072
Portugal	0.055	0.134	0.025	0.098	0.260	0.191	0.124	0.082	0.089	0.162	0.168	0.062	0.032
Romania	0.099	0.153	0.118	0.061	0.017	0.013	0.054	0.034	0.092	0.076	0.169	0.061	0.053
Serbia	0.260	0.010	0.000	0.000	0.000	0.024	0.035	0.926	0.640	0.129	0.000	0.070	0.890
Slovakia	0.042	0.034	0.000	0.004	0.000	0.126	0.000	0.008	0.000	0.000	0.000	0.023	0.006
Slovenia	0.012	0.000	0.211	0.000	0.018	0.006	0.000	0.030	0.183	0.132	0.045	0.000	0.000
Spain	0.230	0.102	0.050	0.192	0.166	0.166	0.149	0.163	0.124	0.215	0.316	0.395	0.563
Sweden	0.743	0.481	0.203	0.569	0.705	0.476	0.135	0.406	0.318	0.354	0.439	0.542	0.692
Switzerland	0.414	0.159	0.082	0.215	0.189	0.314	0.124	0.134	0.146	0.317	0.254	0.079	0.426
UK	0.871	0.561	0.172	0.512	0.406	0.405	0.356	0.318	0.389	0.287	0.555	0.506	0.558
Ukraine	0.000	0.095	0.035	0.003	0.027	0.011	0.005	0.000	0.001	0.000	0.000	0.004	0.000
Total	0.452	0.306	0.102	0.217	0.239	0.200	0.195	0.218	0.232	0.245	0.322	0.353	0.371

Table 50: Sample statistics

This table provides sample statistics on the buyout investment activity in Europe over the period 2007 to 2019. Panel A shows the geographic distribution of our sample. 'CEE' denotes Central & Eastern Europe; 'DACH' is Germany, Austria & Switzerland; 'France & Benelux' is France, Netherlands, Belgium & Luxembourg; 'the Nordics' are Denmark, Finland, Norway & Sweden; 'Southern Europe' accounts for Greece, Italy, Portugal & Spain. Panel B shows the industry distribution of buyout investment activity. Finally, Panel C shows the breakdown by deal size. 'Small' refers to deals below 15; 'Lower mid-market' captures deals between 15 and 50; 'Core mid-market' is deals between 50 and 100; 'Upper mid-market' relates to deals between 100 and 150; 'Large' refers to buyouts between 150 and 300; Finally, 'Mega' is transactions above 300 in size.

	Total deal value (euro bn)	% of total	Number of firms	% of total
Panel A: Geographic Distribution				
CEE	17.26	3%	540	4%
DACH	98.17	19%	2,122	15%
France & Benelux	140.66	27%	5,691	39%
Nordics	62.72	12%	1,687	12%
Southern Europe	75.37	14%	1,812	12%
UK & Ireland	133.98	25%	2,683	19%
Panel B: Industry Distribution				
Agriculture	3.35	1%	102	1%
Business products & services	133.03	25%	4,479	31%
Chemicals & materials	18.75	4%	415	3%
ICT	88.57	17%	2,096	14%
Construction	15.00	3%	631	4%
Consumer goods & services	129.39	23%	3,755	26%
Energy	20.35	4%	476	3%
Financial & insurance	40.67	8%	633	4%
Real estate	3.67	1%	146	1%
Healthcare	60.06	11%	1,249	9%
Transportation	14.74	3%	410	3%
Other	1.23	1%	154	1%
Panel C: Deal Size Distribution				
Small	54.14	10%	10,090	64%
Lower mid-market	108.76	21%	3,622	23%
Core mid-market	64.99	12%	890	6%
Upper mid-market	51.98	10%	404	3%
Large	110.46	21%	494	3%
Mega	138.47	26%	273	2%
Total	528.80		15,773	

Table 51: Descriptive statistics

This table provides descriptive statistics on the buyout investment activity over the period 2007 to 2019. Buyout investment* denotes only country-years with positive amounts of buyout investment.

	Obs	Mean	Median	Std Dev	Min	Max
Buyout investment (euro,m)	442	1,194.95	149.93	2,495.049	0.00	19,715.65
Buyout investment (% GDP)	442	0.19	0.10	0.28	0.00	2.28
Buyout investment (euro,m)*	347	1,522.11	364,575	2,726.75	0.05	19,715.65
Buyout investment (% GDP)*	347	0.24	0.15	0.30	0.01	2.28
GDP Growth	442	1.75	2.07	3.58	-14.81	25.16
Unemployment	442	9.90	7.76	6.41	2.01	34.93
Stock market capitalization	238	56.93	41.09	52.93	3.73	326.36
Syndicated debt issuance	170	4.52	4.09	3.18	0.17	22.97
Loans	422	84.37	77.72	40.94	22.76	201.26
R&D expenditure	393	1.45	1.28	0.91	0.02	3.75
Corporate tax rate	437	19.92	20.00	7.03	8.50	44.43
Political risk rating	403	76.78	77.00	8.34	57.50	94.00
Investment profile	403	9.67	10.00	1.69	5.50	12.00
Socioeconomic conditions	403	7.52	7.50	1.85	2.50	11.00

7.3 Univariate Analysis

Moving a step further and giving us an early indication as to the relationship between buyout investment and capital market development, Table 52 presents some univariate analysis, making comparisons between countries with different levels of buyout investment. In Panel A, we compare country-year observations with zero buyout investment and country-year observations with positive buyout investment, while Panel B repeats this but by distinguishing between country-year observations with high and low buyout activity. This initial analysis shows some preliminary evidence on the positive association between buyout investment and capital market development. The mean (and median) stock market capitalization in country-year observations with positive buyout investment is more than double that of country-year observations. Likewise, a similar pattern emerges for syndicated debt issuance. All of these differences are significant at the 1% level. What's more, these differences persist, and increase in magnitude, when we distinguish between country-year observations with high and low buyout investment. The average stock market capitalization in high buyout country-years (74%) is considerably higher than in low-buyout country-years (30%). Again, these differences are paralleled for countries' syndicated debt issuance and the differences in means are strongly statistically significant. We then turn our attention to the other variables in our study. Country-years with positive (high) amounts of buyout investment have significantly lower unemployment than country-years with zero (low) buyout investment. Likewise, domestic lending and expenditure on research and development is significantly higher in the former. Finally, all of our measures of political risk associated with countries are significantly higher in country-years with positive and high amounts of buyout investment, giving an early indication that high levels of buyout investment scaled by GDP are associated with lower political risk.

Finally, in an effort to obtain an initial insight into the role played by political risk in driving countries' level of buyout investment, in Table 53 we split our sample of observations based on the associated political risk, using our three measures described in the previous section. We split observations based on their position relative to the median (ie country-years with above median ratings are classified a slow risk and country-years with lower ratings are classified as high risk). The results are telling: under all three measures of risk, country-years with lower risk have significantly higher buyout investment normalized by GDP. For example, when we use the political risk rating assigned to countries, we find that countries with a higher rating (and therefore less risk) have, on average, buyout investment of 0.29% relative

to GDP. Countries with a lower rating and which are riskier have a mean buyout investment-to-GDP ratio of 0.11%. This gives us an initial insight to the relationship between countries' level of buyout investment and their political risk. Buyout investment appears to prevail in countries associated with less political instability. Considering our variables capturing capital market development, under each proxy for political risk, countries with less political risk have more liquid capital markets. The differences between high and low risk countries are strongly statistically significant. Overall, the univariate analysis indicates that countries with less political risk have more liquid capital markets and receive more buyout investment.

Table 52: Buyout vs No Buyout

The following table compares country-level variables between country-years with positive buyout investment and zero buyout investment (Panel A) and between country-years with above-median buyout investment and below-median buyout investment (Panel B).

	Positive buyout		Zero buyout		
Variable	N	Mean (Median)	N	Mean (Median)	P-value-mean
GDP Growth	347	1.79 (1.96)	95	1.57 (2.58)	0.22
Unemployment	347	8.34 (7.14)	95	15.60 (15.17)	-7.25***
Stock market cap	219	60.92 (44.60)	30	29.24 (21.90)	31.68***
Loans	337	90.51 (86.52)	85	59.96 (57.50)	30.55***
R&D expenditure	310	1.66 (1.48)	83	0.66 (0.60)	1.00***
Corporate tax rate	347	21.30 (21.00)	90	14.58 (12.00)	6.72***
Political risk rating	343	78.30 (78.00)	60	67.94 (69.50)	10.39***
Investment profile	343	9.90 (10.50)	60	8.36 (8.25)	1.53***
Law & order	343	7.86 (8.00)	60	5.54 (5.50)	2.32***
	Buyout=High		Buyout=Low		
GDP Growth	221	1.63 (1.71)	221	1.86 (2.63)	-0.23
Unemployment	221	7.67 (6.93)	221	12.14 (9.62)	-4.46***
Stock market cap	145	74.25 (57.19)	93	29.93 (22.58)	44.32***
Syndicated debt issuance	129	5.14 (4.57)	41	2.54 (2.09)	2.59***
Loans	217	105.29 (97.00)	205	62.21 (56.66)	43.08***
R&D expenditure	195	2.00 (1.84)	198	0.91 (0.79)	1.09***
Corporate tax rate	216	17.06 (18.00)	221	22.72 (24.00)	-5.65***
Political risk rating	221	81.14 (82.00)	182	71.49 (72.50)	9.65***
Investment profile	221	10.36 (11.00)	182	8.83 (9.00)	1.52***
Law & order	221	8.51 (8.50)	182	6.31 (6.50)	2.19***

Table 53: High vs low institutional risk

The following table compares country-level variables between country-years with high and low political and legal risk. Specifically, Panel A distinguishes between country-years with above median political risk rating and below-median political risk ratings. Panel B does likewise but partitioning the sample based on country-years' investment profiles, while Panel C splits the sample based on country-years' law & order rating.

	High political risk		Low political risk		
Variable	N	Mean (Median)	N	Mean (Median)	P-value-mean
Buyout investment (euro,m)	210	721,079 (15,232)	193	1,951,716 (749,975)	1,230,637***
Buyout investment (% GDP)	207	0.11 (0.03)	193	0.29 (0.21)	0.18***
GDP Growth	210	1.46 (2.03)	193	1.89 (1.96)	0.42
Unemployment	210	10.75 (9.40)	193	6.23 (5.85)	4.51***
Stock market cap	101	34.35 (25.44)	133	73.35 (53.96)	39.00***
Syndicated debt issuance	49	3.02 (2.64)	121	5.12 (4.46)	2.10***
Loans	200	69.75 (59.67)	188	104.43 (96.53)	34.68***
R&D expenditure	196	1.05 (0.86)	167	2.12 (1.97)	1.07***
Corporate tax rate	193	22.14 (22.88)	205	19.78 (19.00)	2.36***
	Weak investment profile		Strong investment profile		
Buyout investment (euro,m)	220	723,887 (58,366)	183	2,015,588 (654,801)	1,291,701***
Buyout investment (% GDP)	217	0.13 (0.05)	183	0.29 (0.20)	0.16***
GDP Growth	220	1.63 (2.03)	183	1.70 (1.95)	0.07
Unemployment	220	10.29 (8.85)	183	6.52 (6.11)	3.77***
Stock market cap	115	37.46 (29.82)	119	74.94 (53.31)	37.47***
Syndicated debt issuance	67	3.37 (2.59)	103	5.27 (4.90)	1.90***
Loans	213	73.46 (61.70)	175	102.48 (95.07)	29.02***
R&D expenditure	208	1.29 (1.01)	155	1.89 (1.67)	0.60***
Corporate tax rate	183	21.18 (22.00)	215	20.71 (20.00)	0.47
	Weak legal system		Strong legal system		
Buyout investment (euro,m)	295	1,266,922 (93,167)	108	1,429,3128 (764,382)	162,389
Buyout investment (% GDP)	292	0.13 (0.07)	108	0.37 (0.29)	0.24***
GDP Growth	295	1.62 (2.07)	108	1.76 (1.82)	0.13
Unemployment	295	9.41 (8.10)	108	6.33 (5.85)	3.07***
Stock market cap	170	51.34 (34.61)	64	70.27 (61.20)	18.92**
Syndicated debt issuance	57	2.86 (2.40)	113	5.36 (4.79)	2.50***
Loans	213	73.46 (61.70)	175	102.48 (95.07)	29.02***
R&D expenditure	208	1.29 (1.01)	155	1.89 (1.67)	0.60***
Corporate tax rate	202	19.36 (19.00)	196	22.54 (24.25)	-3.17***

7.4 Empirical Model

Our baseline model looks to examine the impact of capital market development on buyout investment and the country-level using a sample of 34 European countries over the period 2007 to 2019. Specifically, we estimate multivariate panel regressions with country and year fixed effects to gain a clearer understanding of the role played by capital market development in international buyout markets. We estimate the following regression equation in our primary analysis:

$$(y_{i_t}) = \alpha_t + \alpha_i + \beta_1(CapMkt) + \theta X_{i_t} + \varepsilon_{it} \tag{12}$$

Where Y_{i_t} represents buyout investment at the country-year level, normalized by GDP. *CapMkt* refers to capital market development, which is stock market capitalisation scaled by GDP and syndicated debt issuance scaled by GDP. We include year fixed effects, denoted by α_t, to control for any time-orientated shocks affecting global buyout capital. Likewise, we include country fixed effects, denoted by α_i, to control for any time-invariant country characteristics. θX_{i_t} is a vector of country-specific factors to control for macroeconomic, technological and legal environment. These include GDP growth, the unemployment rate, R&D expenditure relative to GDP, domestic lending relative to GDP and the corporate tax rate.

We provide several robustness checks to our main results. First, we scale buyout investment by population as opposed to GDP. Second, we control for lagged values of capital market development to allow for investors using prior knowledge over previous years when making investment decisions. We also run a Tobit model left-censored at zero, to control the fact that many country-year observations have zero buyout investment. Next, we rerun our main specifications and only include country-year observations with positive buyout investment. We show the results are not driven by the large size of the UK buyout market by removing all UK observations from the sample. Finally, we scale buyout investment by other important international investment flows to observe the relative importance of capital market development for buyout markets. Our main results are robust to these checks.

We then investigate the role played by the recent financial crisis. After assessing the effect of capital market development on buyout investment, we assess the sensitivity of the effect of capital market development on buyout investment to the recent financial crisis. The impact of the crisis on private equity buyout markets is well documented, and as the economic downturn ensued, portfolio companies struggled. Moreover, the freezing of credit markets restricted investors access to the leverage

required to structure transactions. Accordingly, we augment **??** by interacting our variable for capital market development with a Crisis dummy variable which takes the value one in the years 2008 to 2010 and zero otherwise. If the interaction terms are significantly different during the crisis period from the same interaction during the tranquil period, we can identify the additional response of buyout investment to the variables during different periods of the business cycle. The model is as follows:

$$(y_{i_t}) = \alpha_t + \alpha_i + \beta_1(CapMkt * Crisis) + \beta_2(CapMkt * 1 - Crisis) + \theta X_{i_t} + \varepsilon_{it} \quad (13)$$

All of the fixed effects and control variables used in the model are the same as those used in Equation 12.

Lastly, we extend the model to account for countries' varying degrees of political risk. We investigate whether the effect of capital market development on buyout activity differs between countries with different levels of political risk. Given the wide variation in countries levels of buyout investment, we are keen to understand if these cross-country differences can be explained by varying levels of capital market development across our sample. La Porta et al. (1997), Porta et al. (1998) argue that a country's legal environment determines the size and depth of its capital markets and plays a significant role in firms' ability to obtain external financing. As a result, we would therefore expect countries with less political and legal risk to be characterised by a stronger effect of capital market development on buyout investment. The model estimated is as follows:

$$(y_{i_t}) = \alpha_t + \alpha_i + \beta_1(CapMkt * Risk) + \beta_2(CapMkt * 1 - Risk) + \theta X_{i_t} + \varepsilon_{it} \quad (14)$$

Risk is a dummy variable taking the value on for countries exhibiting above-median risk measures, and zero otherwise. As before, we cluster standard errors at the country-level. All fixed effects and control variables are the same as in Equation 12.

7.5 Regression Analysis

7.5.1 Role of capital market development for buyout capital investment

The univariate analysis implied that capital markets are more liquid and active in countries with more buyout capital and in countries with lower levels of political and legal risk. We now move to a multivariate analysis to gain a clearer understanding of the role of capital market development for international buyout markets. In Table 7, we display the results from estimating Equation 12. Under both capital market measures, we find strong evidence that more developed capital markets are associated with higher levels of buyout investment. The coefficients are robust to the inclusion of country and year fixed effects which are included in each specification. Moreover, the coefficients are unaffected by the inclusion of a host of country-level controls, including GDP growth, unemployment, R&D expenditure, corporate tax rates and domestic credit provided to the private sector. The estimates indicate that a country's level of capital market activity and development, specifically it's stock market and market for syndicated debt issuance, help to determine how much buyout investment it receives. Venture capital literature has arrived at similar conclusions, arguing that more active markets provide liquidity and exit routes for investors (Black and Gilson (1998), Jeng and Wells (2000)). The magnitude of the effect is meaningful. Taking columns 1 of Table 54, a one-standard deviation increase in stock market capitalization (52.93) is associated with an average increase of approximately 11% in buyout investment. Similarly, in column 3, a one-standard deviation increase in syndicated debt issuance (3.18) is associated with an average increase of approximately 4% in buyout investment.

These baseline results are robust to a battery of robustness checks. Firstly, in Table 55, we scale buyout investment at the country-year level by population as opposed to GDP. The magnitude of the coefficients falls slightly, however they remain strongly statistically significant, particularly where stock market capitalization is concerned. Second, we remove the UK from our sample. The UK has the largest and most active buyout market in Europe (see Bernstein et al. (2019)), and so to check if the UK market is driving our results, we exclude the UK from our analysis. The results, in Table 56, are upheld. Third, we include lagged values of capital market development. This allows for the fact that investors may use knowledge of capital markets in prior years when making investment decisions at the country-level. Accordingly, we include one-year lagged values of capital market development in Table 57, and our results are largely unaffected [59]. Fourth, we control for the distributions of our

[59] In unreported regressions we also include two-year lagged values and the main results remain

dependent variable, buyout investment relative to GDP. The sample contains many country-year observations with zero buyout investment, so the data is naturally truncated at zero. We therefore run a Tobit model which is left-censored at zero. Again, our results in Table 58 remain unaffected by the different choice of econometric model. Lastly, and on a similar note, we rerun our baseline specification in 12 on the sub-sample of country-years with positive buyout investment, and present the results in Table 59. The results are robust to the type of specification used: in country-years with positive buyout investment, the results indicate that countries with more developed capital markets receive higher amounts of buyout investment.

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Table 54: Effect of capital market development on buyout markets

This table investigates the effect of capital market development on buyout investment by running the regression equation in Equation 12. In columns 1 and 2 the proxy for capital market development is stock market capitalization scaled by GDP, and in columns 3 and 4 it is syndicated debt issuance scaled by GDP. The dependent variable is the amount of buyout invested scaled by GDP. Even-numbered columns contain a vector of country control variables including GDP growth, unemployment rate, domestic lending, R&D expenditure and the corporate tax rate. Standard errors are clustered at the country-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Market capitalisation		Syndicated debt issuance	
	(1)	(2)	(3)	(4)
CapMkt	0.005***	0.004***	0.013*	0.014*
	(0.002)	(0.001)	(0.007)	(0.0.009)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	249	223	170	163

Table 55: Robustness: buyout investment scaled by population

This table repeats the estimation of Equation 12 in Table 54 but normalizes buyout capital invested by population instead of GDP. In columns 1 and 2 the proxy for capital market development is stock market capitalization scaled by GDP, and in columns 3 and 4 it is syndicated debt issuance scaled by GDP. The dependent variable is the amount of buyout invested scaled by GDP. Even-numbered columns contain a vector of country control variables including GDP growth, unemployment rate, domestic lending, R&D expenditure and the corporate tax rate. Standard errors are clustered at the country-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Market capitalisation		Syndicated debt issuance	
	(1)	(2)	(3)	(4)
CapMkt	0.003**	0.003***	0.007**	0.006*
	(0.001)	(0.001)	(0.003)	(0.003)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	249	223	170	163

Table 56: Robustness: no UK

This table repeats the estimation of Equation 12 in Table 54 but reduces the sample by removing the UK which has the largest private equity market in Europe. In columns 1 and 2 the proxy for capital market development is stock market capitalization scaled by GDP, and in columns 3 and 4 it is syndicated debt issuance scaled by GDP. The dependent variable is the amount of buyout invested scaled by GDP. Even-numbered columns contain a vector of country control variables including GDP growth, unemployment rate, domestic lending, R&D expenditure and the corporate tax rate. Standard errors are clustered at the country-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Market capitalisation		Syndicated debt issuance	
	(1)	(2)	(3)	(4)
CapMkt	0.005***	0.004***	0.012*	0.015*
	(0.002	(0.001)	(0.007)	(0.008)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	236	211	160	153

Table 57: Robustness: lagged values of capital market development

This table repeats the estimation of Equation 12 in Table 54 but also includes lagged 1-year values of our main explanatory variable, capital market development. In columns 1 and 2 the proxy for capital market development is stock market capitalization scaled by GDP, and in columns 3 and 4 it is syndicated debt issuance scaled by GDP. The dependent variable is the amount of buyout invested scaled by GDP. Even-numbered columns contain a vector of country control variables including GDP growth, unemployment rate, domestic lending, R&D expenditure and the corporate tax rate. Standard errors are clustered at the country-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Market capitalisation		Syndicated debt issuance	
	(1)	(2)	(3)	(4)
CapMkt	0.004*	0.004**	0.012**	0.015*
	(0.002)	(0.002)	(0.005)	(0.007)
CapMktLagged	0.002***	0.002***	0.0.003	0.006
	(0.001)	(0.001)	(0.002)	(0.004)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	220	199	153	147

Table 58: Robustness: left censored Tobit model

This table repeats the estimation of Equation 12 in Table 54 but instead uses uses a Tobit model where values are left censored at zero, to account for the fact that many country-year observations have zero buyout investment. In columns 1 and 2 the proxy for capital market development is stock market capitalization scaled by GDP, and in columns 3 and 4 it is syndicated debt issuance scaled by GDP. The dependent variable is the amount of buyout invested scaled by GDP. Even-numbered columns contain a vector of country control variables including GDP growth, unemployment rate, domestic lending, R&D expenditure and the corporate tax rate. Standard errors are clustered at the country-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Market capitalisation		Syndicated debt issuance	
	(1)	(2)	(3)	(4)
CapMkt	0.004***	0.003***	0.016***	0.015***
	(0.001)	(0.001)	(0.004)	(0.004)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	249	223	170	163

Table 59: Robustness: only observations with positive buyout investment

This table repeats the estimation of Equation 12 in Table 54 but only includes country-year observations with positive buyout investment. In columns 1 and 2 the proxy for capital market development is stock market capitalization scaled by GDP, and in columns 3 and 4 it is syndicated debt issuance scaled by GDP. The dependent variable is the amount of buyout invested scaled by GDP. Even-numbered columns contain a vector of country control variables including GDP growth, unemployment rate, domestic lending, R&D expenditure and the corporate tax rate. Standard errors are clustered at the country-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Market capitalisation		Syndicated debt issuance	
	(1)	(2)	(3)	(4)
CapMkt	0.005***	0.004***	0.014*	0.016*
	(0.002)	(0.001)	(0.007)	(0.008)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	219	170	196	163

7.5.2 Buyout capital investment relative to other capital flows

Our results so far imply that well-developed and active capital markets play a important part in attracting and stimulating buyout capital investment at the country-year level. Nevertheless, a plausible concern could be that other forms of investment flows into countries may well be affected in a similar way, and buyout investment may be no different to other investment flows. Accordingly, we examine the importance of capital market development for countries' *relative* buyout investment. That is, we scale countries' buyout investment by two other important capital flows: foreign direct investment inflows (FDI), and gross fixed capital formation (GFCF). By scaling buyout capital flows by FDI flows and GFCF flows, we can obtain a better understanding as to the importance of capital market development for buyout investment relative to other capital flows of countries.

Our model is the same as in 12, however our dependent variable is now relative buyout investment. We present the results in Table 60. where in columns 1 to 4 the dependent variable is the ratio of buyout investment to FDI inflows, and in columns 5 to 8 it is buyout capital scaled by GFCF flows. As before, all models include year and country fixed effects and the control variables remain the same. When scaled relative to countries' FDI inflows, there is no discernible effect of capital market development on countries' relative buyout investment activity. However, in columns 5 to 8 where we scale buyout capital by countries' gross fixed capital formation, we are able to distinguish a significant positive effect on relative buyout activity under both stock market capitalization and syndicated debt issuance. The coefficients are robust to the inclusion of year and country fixed effects and the vector of control variables. The reason the effect is insignificant where FDI flows are concerned may be due to the volatility of countries' levels of FDI affecting the results. Incidentally, the standard deviation of buyout investment scaled by FDI inflows is 1.82 while that of buyout capital scaled by gross fixed capital formation is 0.01. Taken together, we build upon our main results and improve our understanding of the importance of capital market development for markets for buyout capital relative to other international capital flows.

Table 60: Buyout capital relative to other capital flows

This table repeats the estimation of Equation 12 in Table 54 but the dependent variable is instead buyout capital scaled by FDI inflows (columns 1 to 4) and gross capital fixed formation (columns 5 to 8). In columns 1, 2, 5 & 6 the proxy for capital market development is stock market capitalization scaled by GDP, and in columns 3, 4, 7 & 8 it is syndicated debt issuance scaled by GDP. The dependent variable is the amount of buyout invested scaled by GDP. Even-numbered columns contain a vector of country control variables including GDP growth, unemployment rate, domestic lending, R&D expenditure and the corporate tax rate. Standard errors are clustered at the country-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Buyout/FDI				Buyout/GFCF			
	Market capitalisation		Syndicated debt issuance		Market capitalisation		Syndicated debt issuance	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CapMkt	-0.001	-0.001	0.012	0.013	0.001**	0.001***	0.005*	0.006*
	(0.005)	(0.003)	(0.026)	(0.029)	(0.001)	(0.001)	(0.003)	(0.003)
Country 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	248	223	170	163	249	223	170	163

7.5.3 Accounting for the financial crisis and political environments

We then assess the sensitivity of the effect of capital market development on buyout investment to changes in the business cycle. The buyout market has been shown to be intensely cyclical (Kaplan and Stein (1993), Axelson et al. (2013)). Accordingly, we run Equation 13 in Table 61 to better understand if the positive effect of capital market development on buyout markets exhibits is similarly cyclical. The coefficients on the interaction terms involving the non-crisis period are positive and significant in each model. Moreover, the difference between the crisis and non-crisis interaction terms in each model are statistically significant implying a significant difference in the effect of capital market development on buyout investment between crisis and non-crisis periods. The interaction terms between capital market development and the crisis period are statistically insignificant in each model. All in all, the findings suggest that increasing capital market development during non-crisis periods has a significant positive effect on buyout investment. Buyout investment is therefore more sensitive to changes in capital market development during tranquil periods, while the effect during crisis periods is found to be insignificant. This confirms the well-documented cyclical nature of the private equity market (Kaplan and Stein (1993), Kaplan and Stromberg (2009)), where leverage and valuations rise during downturns, resulting in higher-than average returns (Kaplan and Stromberg (2009), Axelson et al. (2013)). Conversely, during market peaks, leverage and valuations rise and investors overpay for and over-lever investments leading to lower returns. We find the effect of capital market development on buyout investment to show similar cyclicality, having a strong, significant effect during market peaks, while failing to detect a significant effect during crises.

Finally, we turn our attention to the varying levels of political risk in different countries. In our regression analysis in Table 62, we partition our sample into country-year observations exhibiting low and high risk across three measures, where low-risk refers to country-year observations below the median level of risk. All three measures come from the PRS International Country Risk Guide database. The first measure we use is countries' political risk rating. This is an index which assesses the political stability of a country on a comparable basis with other countries by assessing risk points for each of the component factors of government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religious tensions, law and order, ethnic tensions, democratic accountability, and bureaucracy quality. Risk ratings range from a high of 100 (least risk) to a low of 0 (highest risk). Our second measure of risk is the investment profile of

a country, which is a measure reflecting factors which impact the risk to investment that are not covered by other political, economic and financial risk components. Specifically, the rating assigned is the sum of three sub-components: Contract Viability/Expropriation, Profits Repatriation, and Payment Delays. Finally, we use a measure to capture the legal framework of a country. We use the 'Law & order' variable from the PRS database which captures two measures comprising one legal risk component. Each sub-component equals half of the total. The "law" sub-component assesses the strength and impartiality of the legal system, and the "order" sub-component assesses popular observance of the law.

Our results are striking: irrespective of the measure of political or legal risk, our results indicate that capital market development has a significantly greater impact on buyout capital markets in country-years with lower political and legal risk. This holds for each measure of capital market development: stock market capitalization and syndicated debt issuance, and is robust to the inclusion of a host of country-level control variables. In each case, capital market development development exhibits a positive effect on buyout capital invested in countries with lower levels of political and legal risk. This is consistent with our hypothesis, based on our main findings in Table 54 that capital market development is important for international buyout investment, and prior research which has suggested a positive link between levels of private investment and political stability (Brunetti and Weder (1998)). Moreover it reflects our univariate comparison in Tables 14 & 15 where we found political and legal risk to be significantly lower in country-years with positive levels of buyout investment relative to country-years with zero investment, and in country-years with high levels of buyout capital relative to those with low levels of buyout investment. While, syndicated debt issuance is found to significantly affect buyout markets in high risk countries when we split the sample based on the investment profile or the legal framework of country-years, the effect is significantly greater in countries with lower risk and the magnitude is likewise significantly smaller.

Overall, we find evidence confirming our previous findings, that capital market development has an important role to play in buyout capital markets. Moreover, we find it to be of greater importance to countries which are characterised by lower political risk. The results therefore suggest that countries with lower levels of political risk exhibit a higher sensitivity of buyout investment to capital market development and that increasing capital market development in countries with less political risk can be an important stimulant to buyout investment. Our results align with prior research which considers the effect of institutional risk on different aspects of private capital. Lerner and Schoar (2005) find early-stage investments in countries

with inefficient institutional frameworks have lower valuations and Cumming et al. (2010) find that cross-country differences in institutional systems and accounting standards significantly affect the governance of private equity investments, as it facilitates investor's board representations, improving the screening of deals. Brunetti and Weder (1998) suggest a positive link between a country's political stability and level of private investment. As such,an active, well-developed private equity market can indicate a stable political environment. Political risk may also reflect levels of bribery and corruption. Hain et al. (2016) consider institutional trust in cross-border venture capital investments in China, and find that corruption has a negative effect on venture capital inflows into a country. Furthermore, a country's legal setting plays a role too: capital market development has a stronger positive impact on buyout capital in countries with a more robust legal system. This is in line with La Porta et al. (1997), Porta et al. (1998) who reason that a country's legal system is important in determining the size and depth of its capital markets. Nahata et al. (2014) show that transactions executed in countries with weak institutional frameworks turn out to be less successful than investments in countries with stronger legal frameworks and better law enforcement. Similarly, Tykvova (2018) finds the effect of legal frameworks on venture capital success to depend on the type of deal, with the effect being more pronounced in domestic deals and in syndicated deals. Moreover, Bottazzi et al. (2009) develop a model illustrating how optimal financial contracts depend on a country's legal system. Groh et al. (2010) develop an index quantifying countries' attractiveness for private equity and venture capital investment and show that a country's legal framework is an important factor in determining its ability to attract private capital investment. We add to this literature by examining the effect of capital market development on buyout investment and how it varies across countries characterised by higher and lower legal risk. Specifically, we find countries with lower legal and political risk to exhibit a higher sensitivity of buyout investment to capital market development.

Table 61: Accounting for the financial crisis

This table reports the estimates of Equation 2 to address whether capital market development affects buyout investment differently in crisis and non-crisis periods. In columns 1 and 2 the proxy for capital market development is stock market capitalization scaled by GDP, and in columns 3 and 4 it is syndicated debt issuance scaled by GDP. The dependent variable is the amount of buyout invested scaled by GDP. Even-numbered columns contain a vector of country control variables including GDP growth, unemployment rate, domestic lending, R&D expenditure and the corporate tax rate. Standard errors are clustered at the country-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Market capitalisation		Syndicated debt issuance	
	(1)	(2)	(3)	(4)
CapMkt*Crisis	-0.001	0.001	0.007	0.002
	(0.002)	(0.002)	(0.018)	(0.017)
CapMkt*NonCrisis	0.004**	0.003**	0.014**	0.14**
	(0.002)	(0.001)	(0.0.006)	(0.0.006)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	249	223	170	163

Table 62: Accounting for countries' political risk

This table reports the estimates of Equation 3 to address whether capital market development affects buyout investment differently across country-years with varying degrees of political risk. In columns 1 and 2 the proxy for capital market development is stock market capitalization scaled by GDP, and in columns 3 and 4 it is syndicated debt issuance scaled by GDP. The dependent variable is the amount of buyout invested scaled by GDP. Even-numbered columns contain a vector of country control variables including GDP growth, unemployment rate, domestic lending, R&D expenditure and the corporate tax rate. Standard errors are clustered at the country-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Political risk rating				Investment profile				Law & Order			
	Market capitalisation		Syndicated debt issuance		Market capitalisation		Syndicated debt issuance		Market capitalisation		Syndicated debt issuance	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CapMkt*LowRisk	0.006***	0.003***	0.015*	0.014	0.006***	0.003*	0.030**	0.029*	0.007***	0.003*	0.036***	0.042***
	(0.001)	(0.001)	(0.008)	(0.009)	(0.001)	(0.002)	(0.0.015)	(0.0.016)	(0.001)	(0.002)	(0.009)	(0.004)
CapMkt*HighRisk	-0.001	0.001	0.014*	0.019	0.001	-0.001	0.008***	0.007***	0.001	0.001	0.007*	0.008*
	(0.002)	(0.002)	(0.010)	(0.0.016)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.003)	(0.004)	(0.004)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	141	123	121	114	128	109	103	97	121	117	131	124

7.6 Concluding Remarks

In spite of the dramatic increase in global buyout activity over the last three decades, there is a lack of understanding as to what stimulates buyout activity at the macro-level. We study the role of capital market development in driving buyout activity in 34 European countries over the period of 2007 to 2019. In particular, we consider stock and credit markets and their relation with buyout capital investment. We find robust evidence that more liquid and active capital markets are positively associated with increased levels of buyout capital investment. Our findings are robust to a battery of checks and re-specified models, and moreover, we show that capital market development is more important to buyout investment relative to other types of international investment flows. Lastly, we underline the importance of legal and political landscapes for fostering buyout activity. The positive effect of capital market development is found to be significantly greater in country-years exhibiting lower levels of political and legal risk.

Our contribution is important as it further develops our understanding of the drivers of private capital markets. Given the diverse range of benefits of buyout investment at the industry-level (Bernstein et al. (2017), Aldatmaz and Brown (2020)), the firm-level (see for example Boucly et al. (2011), Lerner et al. (2011), Bernstein and Sheen (2016), Lerner et al. (2019)) and the employee-level (Agrawal and Tambe (2016)), an enriched knowledge of what spurs buyout capital investment across countries is of rich importance. This is all the more important given the spectacular growth of global buyout activity since the turn of the century.

8 Conclusion

In this thesis we explore issues related to the private equity buyout market from three different perspectives. First, we explore the exporting behaviour and activity of private equity-backed firms relative to similar non-sponsored firms. We find robust evidence that private equity ownership is associated with increases in exporting at the extensive margin and at the the intensive margin relative to similar non-sponsored firms. That is, private equity-backed firms have a higher probability of exporting, they experience a greater increase in the value of their exports and they similarly experience a greater increase in their exporting intensity (the ratio of their export sales to their total sales) relative to control firms. The findings are found to be significantly higher for target firms which are more likely to be in constrained positions: smaller targets, those with higher pre-deal leverage, and private firms. This implies that private equity firms can mitigate financing constraints facing portfolio companies. Moreover, we find that private-equity firms had a stronger exporting resilience amid the global financial crisis. In a bid to explain why buyout-backed firms are able to outperform similar non-backed firms in the export market, we explain the apparent outperformance by virtue of improvements in their working capital management relative to control firms. In light of the associated benefits of exporting to firms and the exponential growth of private capital markets in recent decades, our findings enrich our understanding of how firms respond to important changes in ownership.

Second, we examine bank-affiliated private equity buyouts and study how portfolio firms respond to external shocks affecting their parent banks. We investigate how the 2011 EBA Capital Exercise impacted the portfolio companies of the private equity arms of affected and unaffected banks. We find that companies associated with affected banks experience weaker investment and financing at the onset of the shock. We then show that these companies under-performed companies linked to unaffected banks in terms of their asset and employment growth. We document heterogeneity in our results. First, the negative effect on company performance is stronger for companies which were more likely to be constrained. Second, the effect is stronger on portfolio companies whose private equity owner is less experienced. These findings are important in enriching our understanding of how adjustments to banks' capital requirements transmit to the real economy.

Third, we explore the drivers of aggregate buyout activity. Specifically, we assess the role played by capital market development in international buyout markets. We conclude that well-developed capital markets drive buyout activity. Our results are

upheld after a range of robustness checks and alternative models, and moreover, we show that capital market development is more important to buyout investment relative to other types of international investment flows. Finally, we show that countries' institutional environments matter for their buyout activity. That is, the positive effect of capital market development on buyout capital is stronger in country-years with lower legal and political risk.

Th research in this thesis is not without limitations. In particular, the samples of data used in the second and third chapters expose weaknesses. Our sample of portfolio companies of unaffected banks' private equity arms is relatively small, while in chapter 3, our dataset of country-level buyout investment flows is considerably smaller than the dataset used in Aldatmaz et al. (2020), who are able to use data from Burgiss and access a sample of 61 countries over a time span of 27 years, which is more than twice the size of our panel. Finally, in the first chapter, while we successfully examine the effect of private equity ownership on the extensive and intensive margins of firm exporting, it would be interesting to gain a clearer understanding of what firms are exporting and where they are exporting to. With more granular data, we could uncover more detail regarding country-level patterns of international trade, and the effect private equity investment can have at the industry- and aggregate-level. Investigating potential spillover effects of portfolio companies' exporting may also merit attention. Nevertheless, we lay the foundations and groundwork for potential future avenues of research to explore this.

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