

Private Equity and Financial Fragility during the Crisis

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Abstract

Does private equity increase financial fragility during economic crises? To investigate this issue, we examine the financial decisions and performance of private equity-backed companies in the United Kingdom during the 2008 financial crisis. We find that PE-backed companies experienced a smaller decline in investment, relative to a carefully selected control group. PE-backed companies also experienced a larger increase in debt and equity issuances, while overall leverage remained unchanged. The effects are particularly strong for companies that were more likely to be financially constrained and those where private equity sponsors were more likely to have resources to help the portfolio company. The results are consistent with the hypothesis that PE sponsors relax financing constraints during a sudden tightening of credit markets and inconsistent with the hypothesis that private equity increase financial fragility during periods of financial turmoil.

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1 Introduction

The recent global financial crisis increased the attention paid by policy makers, regulators, and academics to the financial stability of the economy. While much attention has been devoted to the banking system in this (Fahlenbrach, Prilmeier, and Stulz, 2012) and earlier (Bernanke and Gertler, 1990) crises, high levels of corporate debt may also trigger financial distress during a crisis, exacerbating cutbacks in investment and employment. The practices of the private equity (PE) industry in particular have raised such concerns. In the three years leading up to the crisis (between 2005 and mid-2007), global PE transaction value reached over \$1.6 trillion, frequently financed with 70 percent debt or higher (Kaplan and Stromberg, 2009). This is not a phenomenon of the recent crisis only. Private equity markets are prone to distortions introduced by credit cycles. As documented by Axelson, et al. (2013), periods characterized by booming financial markets also experienced more private equity fundraising, higher transaction valuations, and critically the greater use of leverage.

The impact of PE investment patterns on the economy during periods of financial turmoil, however, remains relatively poorly understood. On the one hand, the cyclicity of private equity activity may exacerbate the negative effects of shocks to the financial sector, aggravating the boom and bust dynamic of the economy. In line with this idea, the Bank of England suggests that buyouts should be monitored for macro-prudential reasons, because “the increased indebtedness of such companies poses risk to the stability of the financial system” (Bank of England Quarterly Bulletin, 2013Q1). Moreover, the pressure to complete deals during boom times may lead to the selection of lower-quality firms (Kaplan and Stein, 1993), leaving PE-backed companies more exposed to changes in underlying economic conditions. Finally, the increased fundraising and investment during boom periods may reduce the ability of private equity groups to effectively monitor and

fund their portfolio companies once economic conditions deteriorate. These concerns have led to efforts to cap the amount of leverage used in PE transactions by the Federal Reserve Bank in the US and the European Central Bank.

Alternatively, PE-backed companies may be resilient to downturns, and can therefore play a stabilizing role during bad times. In particular, these companies may be better positioned to obtain external funding when financial markets are dysfunctional. First, PE groups have strong ties with the banking industry (Ivashina and Kovner, 2011) and may be able to use these relationships to access credit for their firms during periods of crisis. Second, because PE groups raise funds that are drawn down and invested over multiple years—commitments that are very rarely abrogated—they often have “deep pockets” during downturns, which allows them to make equity investments in their firms when accessing other sources of equity is challenging.

Motivated by these alternative considerations, this paper seeks to understand whether private equity contributed to the fragility of the economy in the United Kingdom (UK) during the recent financial crisis. The UK is a perfect environment to study this question. First, the UK had the largest private equity market as a share of GDP before the crisis (Blundell-Wignall, 2007) – with PE assets at about 11% of GDP¹ - and one of the largest in absolute value. In line with these numbers, the Bank of England estimated that before the crisis, PE-backed firms had issued more than 10 percent of all non-financial corporate debt in the UK.² Second, the UK provides detailed income statement and balance sheet information for almost every active company, whether public or private (Brav, 2009; Michaely and Roberts, 2012). Finally, the UK experienced a severe credit market freeze during the 2008 crisis, with a dramatic decline in private sector investment and

¹ This number is obtained by dividing the total fundraising between 2004 and 2008, as estimated by the European Venture Capital Association and PEREP Analytics, by GDP in 2008 (World Bank).

² Bank of England Quarterly Bulletin, 2013Q1

lending (Riley, Rosazza Bondibene, and Young, 2014). As illustrated in Figure 1, aggregate investment declined by more than 20% during 2008 in the UK, which simultaneously experienced a sharp credit contraction (Figure 2).

To address the above questions, we study the relative evolution of PE-backed and non-PE companies in the wake of the financial crisis. We focus on the financial decisions and performance of these firms during this period, with an eye to understanding whether private equity exacerbates or dampens the sensitivity of the economy to credit cycles.

Our main analysis focuses on a final sample of almost five hundred companies that were backed by PE prior to the financial crisis. Using a difference-in-difference approach, we study how the financial decisions and performance of the PE-backed companies were affected by the onset of the crisis relative to a control group. The control group employs companies that were operating in the same industry as the PE-backed firms and had similar sizes, leverage, and profitability in 2007, following the methodology of Boucly, Sraer and Thesmar (2011). The matching firms have similar growth rates, equity and debt issuances, and investment rates as the PE-backed ones entering into the financial crisis. Therefore, this approach allows us to focus on the heterogeneity between our treatment and control groups that stems from their difference in organization structure, rather than their balance sheet or investment characteristics.

We start by comparing the PE-backed firms and their peers' behavior during the financial crisis. We show that PE-backed firms decreased investments relatively less than non-PE companies did during the financial crisis, with between five and six percent greater spending, an effect that is strongly statistically significant. Looking at the timing of the effects, the two groups did not differ significantly in the pre-crisis period, but the investment rate of the PE group substantially diverged from the control group beginning in 2008. This result is robust to controls

for other firm characteristics in the pre-crisis period. In fact, the divergence of the PE group occurred exactly when aggregate investments and credit growth in the UK started to decline sharply.

We then show that the higher investments by PE-backed companies reflect the fact that these firms appear to have been less bound by financial constraints. Again employing a difference-in-difference approach, we show that firms in private equity portfolios issued four percent more debt and two percent more equity during the crisis than their peers. As before, these effects appeared first in 2008 and continued through the remainder of the period (with varying levels of statistical significance).

The idea that private equity can help relax the financial constraints of portfolio companies is also consistent with two other findings. First, the positive effect on investment was particularly large among companies that were *ex-ante* more likely to be financially constrained during the crisis. We find this result using various proxies like size (measured using employment), industry dependence on external finance (using the measure pioneered by Rajan and Zingales, 1998), and pre-crisis leverage.

Second, the increase in investment was larger when the private equity sponsor had more resources available to help the portfolio company. To explore this dimension, we exploit the heterogeneity across private equity firms as to whether their most recent fund was relatively recent or more mature at time of the financial crisis. Our intuition is that firms with younger funds should have more resources – both financial and operational – to invest in their portfolio companies. In addition, they may have greater access to banks, which Kovner and Ivashina (2011) argue is an important source of competitive differentiation between groups. Our results confirm this hypothesis.

Taken together, these results show that PE-backed companies do not appear to be more sensitive to the onset of the financial crisis, as critics of the industry have suggested. Rather, during a period in which capital formation dropped dramatically, PE-backed companies invested more aggressively than peer companies did. This ability to maintain a high level of investment appears related to the superior access of PE-backed firms to financing, both equity and debt.

These results are robust to a battery of checks. Throughout the analysis, we always remove time-invariant characteristics of the control and treatment firms by the addition of firm fixed effects. We also show that the results are not driven by non-parallel trends in the pre-crisis period. Second, our main results generally do not change when we exclude companies whose private equity deals were management buyouts (MBOs), a class of transactions in which the engagement of private equity firms traditionally was lower. Third, we argue that our results do not simply reflect the difference in attrition between PE and non-PE companies. Fourth, the results of our analysis are very similar if we control for time-varying industry shocks around the crisis. Lastly, we also confirm our results using an alternative matching sample.

In the final part of the paper, we examine the performance of PE-backed companies during the financial crisis. First, we show that PE-backed companies experienced greater growth in their stock of assets in the years after the crisis, consistent with the greater investment seen above. At the same time, the PE-backed firms did not underperform the control groups: that is, they did not become relatively less profitable, whether measured by the ratios of earnings before interest, taxes, depreciation, and amortization (EBITDA) to revenue or net income to assets. These findings are contrary to what would be expected if they were pursuing value-destroying investments during this period.

As an alternative measure of performance, we also examine the exit patterns of PE-backed companies relative to the control group during the crisis period. We find that PE-backed companies were not more likely to go bankrupt, but they were more likely to be sold in non-distressed M&A transactions. Overall, these results regarding exits—while by their nature limited—are inconsistent with the hypothesis that PE financing increases the financial fragility of the firms

This paper relates to the extensive body of work examining the behavior of financial institutions during the financial crisis and their consequences for operating firms (e.g., Ivashina and Scharfstein, 2010; and Ben-David and Franzoni, 2012). The conclusions, though, are more benign here than many of the studies examining other financial institutions, including banks, rating agencies, and hedge funds. The role of private equity groups seems more akin to those of the Japanese banks during the 1980s documented by Hoshi, Kashyap, and Scharfstein (1990, 1991), where better information and aligned incentives allowed bank-affiliated firms to overcome the capital constraints that limited investments of their peers without such relationships. During the financial crisis, the greater alignment and relatively longer time horizons of private equity investors may have allowed firms to more successfully respond to the economic dislocations.

The paper is organized as follows. In Section 2, we present the data used in this study, as well as the matching methodology developed to construct the control group. Section 3 then describes the empirical approach employed in the paper. Sections 4 and 5 present the main results on investment and performance, discussing the possible mechanisms behind our results and presenting a large set of robustness tests. Finally, Section 6 summarizes our results and conclusions.

2 Data

2.1 Sample Construction

We started our data construction by extracting from Capital IQ the sample of all UK companies backed by private equity before the financial crisis. We identified private equity deals in Capital IQ by searching for events such as “going private,” “leveraged buyout,” “management buyout,” and “platform.” In so doing, we excluded “growth buyouts,” “venture capital” and “expansion capital” investments, where investors generally buy a stake in the company using little or no leverage. Since we were interested in studying the behavior of UK PE-backed firms around the financial crisis, we selected only firms that (i) were headquartered in United Kingdom at the time of the deal; (ii) had received a PE investment by the end of 2007; and (iii) did not experience an exit by the PE group or a failure before the beginning of 2009.

We then further filtered our data, keeping only those firms that had balance sheet and income statement information in Amadeus, a Bureau Van Dijk (BvD) data set on European companies. Amadeus collects data from the “Companies House,” the United Kingdom official national registrar office. As already pointed out by other authors (Brav, 2009; Michaely and Roberts, 2012), the United Kingdom is a perfect setting for studies on private companies. According to current regulations, every registered limited company is required to provide financial and income information annually to the public register.

The extent of the requirement to disclose financial information in the UK, however, varies with the size of the firm. Small³ (and some medium-sized) firms are allowed to file abbreviated accounts. Since the amount of information small firms disclose to Companies House (and hence

³ Since 2008, a small company is defined as one meeting at least two of the following criteria: total assets less than £3.26 million, annual turnover less than £6.5 million, and an average number of employees fewer than 50. This group usually reports only assets, revenue and profits.

in the Amadeus dataset) is very limited, we excluded this group from our analysis. The reliability of the source and its coverage of the remaining private firms is a key strength of our study. Most of the companies in our sample consist of middle-sized private enterprises, for which similar financial data are not available in the United States.

We supplemented Amadeus data with Orbis, another data product from BvD. While both Amadeus and Orbis collect information from the Companies House, Amadeus generally removes firms from the sample after a few years of inactivity. This is not the case for Orbis. Since the post-financial crisis period has been characterized by an increase in firm exit, using only Amadeus would have generated concerns about selection and undermined the reliability of our results.⁴

Therefore, we further restricted the sample to firms meeting the following criteria: (i) matched to Amadeus; (ii) is not a small firm, as defined by the Companies House; and (iii) does not operate in the financial (SICs 600-699), public (SICs 900-999), or utility sector (SICs 489-493).⁵ This led to an initial sample of 987 unique firms. Once we excluded those firms that did not meet the minimum data requirements for the matching process described below, the sample was composed of 722 firms.⁶

2.2 Control Group

Private equity-backed companies are clearly not a random sample of the population: for instance, in general they are larger and more leveraged than the average firm. Therefore, the first step in our analysis is to identify a proper control group for the set of PE-backed companies.

⁴ Orbis and Amadeus are essentially the same data product. The main two differences are the deletion of exited firms, as discussed above, and the interface used to distribute the data.

⁵ This industry sample selection is common to the whole literature on private equity. For instance, Michaely and Roberts (2012) apply similar filter with the same data set.

⁶ In particular, we require to the firms to have data on industry, return on assets, capital expenditures, asset, and leverage in 2007.

Following Boucly, Sraer and Thesmar (2011), we identify a suitable control group through a matching procedure for each PE-backed company in our sample. We identify a set of control firms that operate in the same industry and had a similar size, leverage, and profitability in 2007. This procedure involved two steps. First, for all private equity-backed firms in our data, we selected every firm in the Amadeus/Orbis sample that (a) belonged to the same two-digit SIC; (b) had a return on assets (ROA), defined as net income over total assets, within a 30% bracket around our PE firm; (c) had assets within a 30% bracket around our PE firm; and (d) had leverage within a 30% bracket around our PE firm. Second, when this first step identified more than five firms, we selected the closest five, based on quadratic distance computed based on the variables. Overall, this procedure is a more conservative version of Boucly, Sraer and Thesmar (2011), since we add an additional variable to the matching – leverage – and use a narrower matching bandwidth.⁷ Using this methodology, we were able to match 434 of the 722 firms, generating a total sample of 1,984 firms. In the robustness section, we present an alternative matching procedure that is closer to Boucly, Sraer and Thesmar (2011), by eliminating leverage in the matching.⁸

For every firm in the final sample, we extracted from Amadeus/Orbis the full set of income and financial information available for the period from 2004 to 2011. Using this data, we constructed the measures of firm activity used throughout the paper. In particular, we proxy for firm capital investments by looking at the change in asset plus the reported depreciation. Furthermore, we identify equity injections into the firm by measuring the change in equity minus the profit. Similarly, debt issuance is computed as the change in total liabilities in the year. All

⁷ The other difference is that we measure size in terms of assets and not employment. The reason for this choice is that employment in Amadeus is a much less well-populated variable than assets. However, in a robustness test, we added employment as a fourth variable in our matching procedure and show that this does not affect the results.

⁸ In a previous version of the paper, we have used wider matching boundaries (50% instead of 30%), which is in line with what they do in Boucly, Sraer and Thesmar (2011). In general, these changes increase the size of our final sample and marginally reduce the quality of our matches, but do not affect our main results.

these variables were normalized by total assets. Lastly, we measured firm leverage as total liabilities over total assets. In order to limit the influence of outliers, we winsorize every ratio at 1%. The Data Appendix provides more information about the variables and the sample.

Panel A of Table 1 shows the industry distribution in the sample. We compare it with the universe of the UK firms, after we eliminate small businesses and companies in the financial or regulated sectors. The majority of the sample firms are in either the service (38%) or manufacturing (32%) industries. Other important industries include Wholesale Trade, Construction, and Retail. The sample industry distribution is relatively close to the universe of companies: the major difference is that PE-backed firms tend to be more concentrated in manufacturing, and less represented in the construction industry and services. These small differences in industry distribution are not a problem for our study, since our treatment and control samples have the same industry distribution due to the matching procedure.

In Panel B of Table 1, we compare the characteristics of firms across the treatment group and the matched control group in 2007. The average firm in the sample is a mid-sized firm with around \$80 million in revenue. The PE-backed companies are slightly larger than the control group, a difference is statistically significant at the 10% level. Across the two groups, firms have very similar ROA, leverage, investment, and equity and debt issuance. These differences are insignificant, with the sole exception of investment. More importantly, all these differences are small in economic magnitude.

While some of these results are not surprising and simply reflect the quality of our matching procedure, others are more interesting. In particular, this matching suggests that differences in investment and funding across the treated and control groups mostly disappear when we compare firms with similar sizes, leverage ratios, and profitability within the same industry.

This analysis suggests that the observable characteristics of the treatment and control groups are relatively close entering into the financial crisis. Important for our diff-in-diff analysis is the assumption of pre-crisis parallel trends. We turn to explore whether this assumption holds based on observables, in Panel C. In particular, we compare the one and two-year growth rate ending in 2007 for the main firm characteristics considered so far. We find that differences in growth rates between the two groups are never significantly different from zero. In other words, pre-crisis growth rates across the two groups do not appear to be different.

Overall, these analyses are reassuring. The PE-backed firms were similar in 2007 to the control group. In principle, this is not a necessary condition for our identification – which instead hinges on the presence of parallel trends between the two groups – but it allows us to exclude the possibility that differences in behavior around the crisis may be due to differences in other observable characteristics. Later in the paper, we further show that our results are stable when we augment our model with a set of controls for firm characteristics in 2007, which should absorb any residual differences in observables across the two groups.

Similarly, the two groups present very similar growth paths before the crisis. These results eliminate the possibility that the PE-backed firms were just outperforming the control group before the crisis. Our estimates are consistent with the assumption of parallel trends between treated and control groups during the pre-crisis period, the main identification assumption in our difference-in-difference design. A more formal and direct test of the parallel trend assumption will be discussed in Section 4.

2.3 Other Data

We supplement the data from Amadeus/Orbis to identify potential acquisitions and bankruptcies during the crisis. We start by constructing two different variables that identify whether a firm went out of business. In particular, we generate a dummy “Out of Business,” which is equal to one if the firms’ information went missing in Amadeus/Orbis by 2011, suggesting that the firm no longer exists.⁹ On its own, the interpretation of this variable is unclear, since a firm can exit from the company registry for many different reasons.

We thus further refine this measure by generating a dummy – “Bad Exit” – that identifies companies that went out of business unambiguously because of distress. We generate this variable using the firm status history, available through Orbis. The data provider collects information from the Companies House and assigns to each firm a status, such as active, dissolved, dormant, or in liquidation, which may change over time. We define a company status as a “bad exit” if (a) the firm was not active by 2011 and (b) before disappearing from the data, its status implied that the firm was in liquidation or in insolvency proceedings.

Similarly, we use Capital IQ to identify potential profitable exits by looking at firms involved in M&A transactions from 2008 onwards. Since M&A transactions may also arise because of distress, we provide an alternative measure by excluding companies that were involved in M&A but were also identified in the same period as in distress, as discussed above. Therefore, we identify non-distressed M&A activity.

Lastly, we also collect information on the history of the PE investors in each sample firm. When available, we collect the list of investors for the firm’s last PE financing using Capital IQ.

⁹ In particular, we look at the total assets to see when a firm completely exits the data. Information on total assets is always required by UK reporting rules, and therefore when this field disappears from the data, the firm did not provide any information.

We then manually search the private equity investors in ThomsonOne and Capital IQ and collect information about their fundraising history. In particular, we identify the year before the crisis in which the PE group had the first closing on its last fund. If multiple PE groups are identified as investors, we look to the most recent fund raised across all the groups. As we discuss later in the paper, we use this measure to proxy the availability of resources at PE investor level.

3 Empirical Strategy

To understand how the crisis affected the financial and investment policies of PE-backed companies, we developed a difference-in-difference design where we compare these companies to a control group of non-PE companies around the financial crisis. We estimate this model using a panel data set from 2004 to 2011, a symmetric window around the 2008 shock.¹⁰

The choice of 2008 as the first year of the crisis is in line with a large body of empirical evidence on the crisis (e.g., Duchin, Ozabas and Sensoy, 2010; Kahle and Stulz, 2013), as well as official statistics on UK provided by the Bank of England. As we show in Figure 1, aggregate investment in UK declined by more than 20% between the beginning of 2008 and mid-2009. At the same time, growth in credit experienced a sharp contraction starting on the first quarter of 2008 (Figure 2).¹¹ We estimate the following equation:

$$y_{it} = \alpha_t + \alpha_i + \beta_1(PE\ firm_i * Crisis) + \theta X_{it} + \varepsilon_{it}$$

where y_{it} is an outcome of firm i at time t , $Crisis$ is a dummy for the period from 2008 to 2011, (α_i, α_t) are a set of firm and time fixed effects, and $PE\ firm_i$ is a dummy for the firms that are backed by PE investors. We augment our specification with a set of time-varying firm covariates

¹⁰ For consistency, both PE-backed companies and each corresponding control group enter in the sample at the same time, which is 2004 or the year of the last PE deal if after 2004.

¹¹ See the various editions of the Bank of England “Trends in Lending” publication for summaries of evidence, in particular “Trends in Lending - April 2009” (2009).

X_{it} . To avoid endogeneity issues with controls (Angrist and Pischke, 2008; Gormley and Matsa, 2014), these variables are measured in 2007, right before the post-period window, and then interacted with the crisis dummy to allow them to have a differential impact before and after the shock.¹² We cluster standard errors at the firm level (Bertrand, Duflo and Mullainathan, 2004).

The inclusion of firm fixed effects removes time-invariant differences between treatment and control firms. However, the causal interpretation of the results crucially depends on the parallel trend assumption. In particular, we need to assume that PE-backed companies would have experienced the same change in behavior as non PE-backed companies in the absence of the financial crisis.¹³ The parallel trend assumption is intrinsically untestable, since we cannot observe the true counterfactual in the absence of the shock. However, we can strengthen the interpretation of our analysis by providing evidence consistent with this assumption, exploring pre-shock trends.

First, it is important to recognize that our treatment and control groups are very similar, at least in terms of observable characteristics. By construction, both groups have the same industry distribution. Furthermore, as we discussed before, size, profitability, investment, and leverage are similar across these groups. Even more importantly for the parallel trend assumption, the PE and non-PE companies have similar growth rates in the years leading up to the crisis.

Pushing this argument one step forward, we can also formally examine the time-varying behavior of the treatment effects for the main outcomes in our analysis. With this test, we can rule out the possibility that a positive (or negative) effect for PE-backed firms merely reflects the higher (or lower) growth rate of this group of firms before the crisis. In particular, we can estimate:

$$y_{it} = \alpha_t + \alpha_i + \beta_t(PE\ firm_i) + \theta X_{it} + \varepsilon_{it}$$

¹² When constructing the controls, to minimize the loss of observations because of some idiosyncratic missing values in 2007, we use the 2006 value if the 2007 one is missing.

¹³ For instance, it would be problematic if treated firms differed from untreated firms along some characteristics that would be affected by the financial shock independently from their status as a PE-backed company.

where we estimate a different β_t for every year between 2004 and 2011, using the last year before the crisis, 2007, as the reference year. If our parameter β_t in the standard equation is correctly capturing the causal effect of the crisis on private equity firms – rather than a differential trend between the two groups – then we expect the effect of private equity to appear only after the onset of the crisis. In the next section, we will show that our main results are not caused by a lack of parallel trends across the two groups.

We take two extra steps to strengthen the analysis further. First, we augment our specifications with controls that capture the heterogeneity across firms in important balance sheet characteristics before the crisis. In particular, we control for firm size (log of revenue), growth of revenue, normalized cash flow (cash flow over assets), profitability (ROA), and leverage. These controls enable us to rule out the possibility that our results are driven by the presence of some unbalanced observable characteristics across treatment and control groups before 2008.

Second, as a robustness test for our main results, we add a full set of time-varying industry fixed effects, which can account for changes in industry demand and other industry considerations around the financial crisis. In particular, we interact two-digit industry fixed effects with the post dummy. This test and other robustness are discussed at length later in the paper.

4 Investment and Funding

4.1 Main Results

We start by examining whether the investments of companies backed by PE investors by 2007 were more or less affected by the financial crisis. While overall investments dropped significantly in United Kingdom during the crisis period, it is important to understand whether PE played any role in exacerbating the effects of this negative financial shock (Figure 1).

We start our analysis by studying the change in investment policies in PE- and non PE-backed firms. In Table 2, we find that PE-backed companies decreased investments less than non-PE companies around the financial crisis. This effect is not only statistically significant, but also large in economic magnitude. In terms of assets, the PE firms saw their investments increase almost 6% relative to the non-PE companies in the post-crisis period. In column (2), we find that the results are unchanged – both in terms of size and precision – when we add the standard set of firm-level controls, which account for observable heterogeneity between PE and non-PE firms before the onset of the crisis.

In Figure 3, we show that this result is not driven by non-parallel trends in the investment behavior of companies before the crisis. PE-backed companies did not behave differently from control companies in the years before the financial crisis. They did change their investment behavior, however, as the financial crisis hit. Most of the shift happened in the first year of the crisis, 2008. After this shock, the positive effect on investment did not disappear and stayed roughly at the same level in the coming years. The same conclusion follows from column (1) of Table 3, where we also show that the addition of firm controls does not alter our conclusions (column 2). Note that the timing when the investment by PE-backed firms substantially diverged from the control group coincided with the sharp decline in aggregate investments and credit in the UK, as illustrated in Figures 1 and 2.

Overall, this result suggests that companies financed by private equity were more resilient in the face of the financial crisis than a similar set of non-PE companies, therefore contradicting the claim that PE firms increased financial fragility. The next step is to understand the mechanism behind this result. One hypothesis is that private equity firms help their portfolio companies to maintain high investment levels by relaxing their financial constraints, particularly during periods

of financial upheaval. This can happen in two ways. First, private equity firms have fund commitments that are rarely abrogated and may therefore be in a better position to inject equity into the companies if access to financial markets is barred. Second, private equity firms have strong ties with banks (Ivashina and Kovner, 2011) and should therefore find it easier to access credit markets during periods of turmoil. We find evidence that is generally consistent with both these channels in Table 2.

First, net equity contributions increased more for PE-backed firms than for the control group around the crisis (Table 2, columns 3 and 4).¹⁴ In terms of assets, equity contributions during the financial crisis were 2% higher for PE-backed companies relative to non-PE firms. This suggests that PE funds were willing to support the operations of their portfolio companies by injecting equity into the firms. Similar to investment, this effect was not driven by non-parallel trends before the crisis and this divergence in financial policy appeared in 2008 (Figure 4).

At the same time, PE-backed firms also experienced a relative increase in debt issuance (Table 2, columns 5 and 6).¹⁵ While on average debt issuance declined during the financial crisis, for PE-backed firms, this decline was 4% smaller. The result is similar when adding controls. Nor was it driven by non-parallel trends in debt financing around the time of the crisis, as shown in Figure 5. Again, the relative increase in debt issuance took place in 2008, exactly when lending conditions and aggregate investment started to decline in the UK. While overall debt issuance was greater, PE companies did not materially increase their leverage, as is evident from columns 7 and 8 in Table 2. The PE coefficient in this regression is positive, but it is non-significant and small in magnitude. This null result reflects the joint increase in equity and debt.

¹⁴ Notice that we define equity contribution by looking at the changes in equity that are not explained by profit (see Data Appendix). Therefore, we cannot distinguish whether positive effects are due to raising more capital or paying out fewer dividends.

¹⁵ As discussed in Appendix, this is measured as the change in total debt, scaled by assets.

These analyses suggest that private equity companies alleviated the financing constraints of portfolio companies during the financial crisis, allowing them to invest more when credit markets were frozen and economic uncertainty high. In particular, private equity firms appear to have taken advantage of their fund structure and bank relationships to provide both equity and debt financing to their portfolio companies.

4.2 Robustness

In this section, we examine a set of robustness analyses. First, we drop management buyouts from our main sample. Eliminating MBOs leads to a substantial drop in total observations, since these firms constitute about 25% of deals. At least historically in the UK, MBOs were characterized by lower engagement of private equity firms. If their inclusion completely drove the results, the interpretation and generalization of the analysis might be more difficult. As we show in Table A.1 in the Appendix, this is not the case. In columns (1) and (2), we find that the effect on investment when MBOs are dropped is even larger than the effect in our baseline model. Similarly, we confirm in the smaller sample the expansion in equity contribution and debt issuance, and the relative stability in the leverage ratio. Therefore, the exclusion of MBOs does not affect our results.

Second, we show that our results are robust to concerns related to attrition. As usual with panel data, the endogenous exit of firms from the data may bias results. Exit may be particularly problematic if PE-backed companies may be more likely to enter into distress or be targeted by M&A transactions. Therefore, it is important to understand whether our results are driven by differences in survivorship across the treatment and control groups.

To start, it is important to notice that this concern is unlikely to drive our results given the timing of the effects. As we noted when discussing the construction (Section 2.1), our sample of PE firms is conditional on not going out of business before the beginning of 2009. In addition, we found in Table 3 that the shift in investment and financing policies occurred in 2008 – the first year of the financial crisis – when by construction no firms went out of business. We can also illustrate this pattern more directly by estimating our standard model using data from 2007 and 2008 only (Table A.2). In other words, much of the shift in corporate policy happened soon after the inception of the crisis.

Second, we show that results are similar when we exclude firms that exit before the end of the sample. In particular, in Table A.3, we take a conservative approach and drop every firm where either the PE-backed company or one firm in its control group exited the database before 2011.¹⁶ This approach leads to a drop of almost 15% of our observations. Even with this reduced sample, we replicate our main results. Private equity appears to experience a lower decline in investments (columns 1 and 2) and a relative increase in equity (columns 3 and 4) and debt issuance (columns 5 and 6). At the same time, the leverage ratio stays constant (columns 7 and 8).

Third, we show that our results are robust to changes in industry dynamics. One concern is that PE-backed firms may be more or less sensitive than the control group to changes in demand that are contemporaneous to the shock. In principle, this should not be a problem, because the treatment and control groups are matched across industries. Nonetheless, we augment our analysis with a full set of (two-digit) industry fixed effects interacted with the crisis dummy. This set of fixed effects can control non-parametrically for changes in demand and other industry characteristics. As we show in Table A.4, despite the large number of fixed effects that the model

¹⁶ For every PE-backed firm, there are up to five matched control firms. There are 310 companies that exit before 2011, which corresponds to 245 groups of companies that are dropped.

introduces, the main results are unchanged. The estimates are still close in magnitude and statistical power to the one presented before.

Lastly, we confirm that our results are not driven by the specific matching sample used. We repeat the main analyses using an alternative sample that is constructed matching only on size, ROA, and industry, therefore allowing the two groups to have different leverage ratios in the pre-crisis period. Apart from using a different set of matching variables, the methodology is the same as the one used in our main results. This approach has two main advantages. First, this matching is closer to the approach of Boucly, Sraer and Thesmar (2011). Second, using fewer matching variables allow us to match a larger number of observations. In Table A.5, we confirm our main results with this alternative sample. In columns (1) and (2), we still find that PE-backed companies experienced a smaller decline in investment during the crisis. The effect is still highly statistically significant, but slightly smaller in magnitude. Similarly, we confirm the results about equity (columns 3 and 4) and debt (columns 5 and 6) financing. The only difference with our main results is a positive increase in the relative leverage ratio for PE-backed companies (columns 7 and 8), but the effect is small in size and only of borderline significance.

4.3 Firm Heterogeneity: Investment and Financial Constraint

The decline in investment by PE-backed firms during the crisis was significantly smaller than that of non-PE companies. This divergence appeared in the first year of the financial crisis and did not revert over the next few years. In particular, PE sponsors helped their portfolio companies by injecting more equity and facilitating access to credit markets. Overall, these results are consistent with the idea that private equity can play an important role during financial turmoil by relaxing the financial constraints faced by their portfolio companies. In this section, we provide

more evidence consistent with this hypothesis by studying the heterogeneity of the results, focusing on financially constrained firms.

We identify heterogeneity in the likelihood of being financially constrained in various ways. First, we study how the effect of PE backing on investment differs between large and small firms (Table 4, Panel A). Consistent with the idea that small companies are more likely to be financially constrained, small businesses have been shown to be more sensitive to credit market shocks (Petersen and Rajan, 1994; Chodorow-Reich, 2014; Bottero, Lenzu and Mezzanotti, 2015). In our sample, we identify large firms by looking at the top quartile of employment at 2007, the last year in our pre-shock period. Using this measure, we show in columns (1) and (2) that the positive effect on investment was stronger for small companies. Carefully comparing the magnitude of the interactions, we find that that the PE effect was essentially zero for firms in the top size quartile, while it was economically significant for smaller firms.

Second, we find similar results when we look across companies that operate in industries that are differentially dependent on external finance, identified using the standard Rajan-Zingales (RZ) index (Rajan and Zingales, 1998). In particular, we define more financially dependent firms as companies operating in two-digit SIC industries characterized with an above-median share of capital expenditure that is externally financed.¹⁷ In principle, firms that were more dependent on external finance should have been more affected by the financial crisis. Therefore, if private equity provides some relief to financial stresses, companies in industries characterized by larger RZ indices should have benefited more. Consistent with this idea, in columns (3) and (4) of Panel A of Table 4, we show that the positive effect of being backed by private equity was even larger for

¹⁷ In line with the literature, this measure is computed using data from US corporations between 1980 and 2008, available through Compustat. In particular, for each two-digit SIC industry, we measure the RZ index as the median of CAPEX minus cash flows from operation, scaled by CAPEX.

firms in more financially dependent industries: the effect of PE-backing was almost three times larger.

Third, we find similar results when comparing firms that were more or less leveraged entering into the crisis. In general, firms with higher leverage are characterized by less financial flexibility. Therefore, they face more risks when markets seize up and should suffer more during a financial crisis. Comparing companies based on their 2007 leverage levels, we find that higher pre-crisis leverage predicted lower investment post-crisis. But among firms in the top quartile of leverage, PE-backed companies increased investments particularly more than their non-PE counterparts (columns 5 and 6, Table 4, Panel A). The presence of a PE investor counter-balanced the negative effect on investments of high leverage.¹⁸

Similarly, the positive effect of PE on debt issuance was magnified for firms that are more likely to be financially constrained (Table 4, Panel B). This is true when looking across size (columns 1 and 2), and dependence on external finance (columns 3 and 4). However, when sorting by leverage (columns 5 and 6), the result was positive but not statistically significant. For equity, the coefficients were generally in the expected direction but never statistically significant (Table 4, Panel C).

These results show that the positive effect of private equity on investments was even stronger when looking at companies that were ex-ante more likely to be financially constrained. Differences in funding strategies in response to the financial crisis —particularly with regard to debt—seems to explain this result.

¹⁸ Clearly, leverage at 2007 is endogenous to many firm characteristics, in particular debt capacity. If anything, firms that expect to respond more successfully to a negative credit shock should ex-ante employ more debt. Therefore, it is reasonable to think that our results are actually characterized by a downward bias.

4.4 Fund Heterogeneity: Investment and Financial Constraints

To further explore the underlying channel for the investment results, we examine how our effects differ across PE funds of differing maturities. If private equity relaxes the financial stress faced by companies, PE firms that raised the last fund closer to the inception of the financial crisis should have been better positioned to help their portfolio companies. Private equity groups typically raise funds every three to five years, based on when their last fund has been largely exhausted. Firms with recently raised funds should have more resources to help portfolio firms.

In order to examine this issue, we used Capital IQ and ThomsonOne to identify the PE investors in each PE-backed firm. We then identify the year in which these investors raised their last fund before the financial crisis. If we are able to identify more than one investor, we use the most recent fund across the groups. As we discussed above, this information is not available for every company. Thus, the sample is smaller than the previous analyses

Furthermore, since variation at investor level is only available for the PE-backed firms, this analysis differs from the rest of the paper in two aspects. First, it only uses the sample of PE-backed firms. Second, since most of the movement in both investment and funding happened right at the beginning of the crisis, we only employ data from 2007-2008 to increase the precision of our analysis.¹⁹ We expected the effects on investments to be stronger when looking at PE firms that had raised funds more recently before the financial crisis.

In line with this hypothesis, in Table 5 we find a larger increase in investment when PE investors had raised a fund more recently, suggesting that the availability of resources is an important explanation of our results. We look at this effect both with a continuous measure – the year in which the last fund was raised, which is reported in columns (1) and (2) – and a dummy,

¹⁹ Results using the full period are very similar. The only difference is that we find slightly noisier results for equity contributions. The rest is essentially unchanged.

where instead we compare companies whose investors raised any fund in the previous ten years to the rest of the population (columns 3 and 4). The effects are consistent across the two measures, albeit more precisely estimated with the dummy specification. In terms of magnitude, we find that companies whose investors raised at least one fund in the previous ten years increased investment about 25% more than the other group.

Furthermore, we find similar patterns for both equity and debt issuance. In particular, equity injections increased much more for companies where the investors raised a fund more recently (Table 5, columns 5-8). The effects are both economically and statistically significant and are consistent across the two sorting variables. The same patterns hold for debt issuance, suggesting that better-resourced PE investors also positively affected companies' ability to raise debt.

Overall, in this section we show that PE-backed companies during the financial crisis decreased investments relatively less than the control group. Their ability to maintain high growth levels was related to the superior ability of PE to access funding during a time of financial turmoil.

5 Performance Analysis

5.1 Change in Performance

The next step is to understand to what extent greater investment increased the long-term prospects of PE-backed companies. In this section, we examine this question by looking at various measures of company performance. Were the investment by PE-backed firms imprudent or wasteful, we would expect that these decisions would have had detrimental effects on their performance.

We start by examining accounting measures of firm performance around the crisis period. Using the same specification as before, we test how the performance of PE-backed companies changed relative to non-PE companies around 2008. In Table 6 (Panel A), we find the PE-backed firms did not experience any change in performance relative to the control group around the crisis. In particular, we find no significant change either in terms of EBITDA scaled by revenue (columns 3 and 4) or ROA (columns 5 and 6). However, consistent with the results on investment, we find higher asset growth for the PE-backed group (columns 1 and 2).

Similar to the results for investment and financing policies, the performance results are robust to various concerns raised before. We find a similar result when we exclude MBOs. There is no difference when we account for the possible survivorship bias or control for variations in industry characteristics over time. Using ROA as an outcome, we show these results in Tables A.1 to A.5.

This analysis suggests that the average performance of PE-backed companies was not differentially affected by the financial shock: the greater investment levels did not lead to low quality or excessively risky projects. But given the long-term nature of the returns from many corporate capital expenditures, these accounting measures of performance may fail to capture fully the underlying change in asset quality and company value around the crisis.

In the next section, we consider alternative measures of performance, based on exit patterns in the post-crisis period. In particular, we compare the relative likelihood that PE-backed companies entered into distress or were the target of an M&A deal. Rather than measuring the average performance, these variables can provide insight into the extreme outcomes – positive or negative – that these firms faced.

5.2 Exit Analysis

Even assuming that the financial crisis did not induce any differential effect on average firm performance, PE-backed companies may still have outperformed or underperformed the control group when looking at the extreme outcomes of the distribution. For instance, extensive investments may not have affected profitability in the short run, but may have increased the company's probability of becoming the target of an acquisition. Similarly, it may have boosted the likelihood of negative tail events, like distress and bankruptcy. In this section, we study how PE funding affected the probability of both entering into distress and experiencing a profitable exit in the post-crisis period.

As we discussed in the Data section, we identify “bad exits” by looking at companies that exited from the Amadeus/Orbis data after signs of financial distress in the previous years. We identify “potentially profitable exits” focusing on company sales through M&A transactions without prior company distress.

Thus, we examine how post-crisis exit patterns differed across PE-backed and non-PE companies. The variation under study is only cross-sectional: therefore, the difference-in-difference design is not suitable for these tests. To make PE and non-PE-related companies comparable in the cross-section, we control for industry fixed effects and firm characteristics. Even with these adjustments, a causal interpretation of these results requires much stronger assumptions than the previous set of results. In particular, we estimate the following equation:

$$Exit_i = \alpha_{ind(i)} + \beta(PE\ firm_i) + \gamma X_i^{PRE} + \varepsilon_{it}$$

where $Exit_i$ is a firm-level dummy that identifies the type of exit activity (“bad” or “potentially profitable”), $PE\ firm_i$ is a dummy variable identifying PE-backed companies, $\alpha_{ind(i)}$ are industry-level fixed effects at two digit SIC level, and X_i^{PRE} are the firm-level characteristics

measured before the crisis (2007). Since in this case the outcome is only cross-sectional and discrete, we estimate this model using a conditional logit model. To facilitate interpretation, all the results are presented as marginal effects at the mean.

In Panel B of Table 6, we show the main results of this section. We find that PE-backed firms were more likely to experience a potentially profitable exit (columns 1 and 4). The results were similar with and without controls, but the magnitude was usually smaller with controls. The most conservative estimates suggest that PE-backed firms were about 30% more likely to be acquired in the post-crisis period.

At the same time, PE-backed firms did not appear to be more likely to go out of business (columns 5-8). In particular, we show that PE-backed firms were not more likely to enter into distress or to go out of business in the post-crisis period. The results are not only not significant, but also small in magnitude: across the whole set of coefficients, PE-backed companies were only between 3 to 9% more likely to go out of business.

Overall, in the post-crisis period, PE-backed companies were more likely to be targeted in a potentially profitable M&A transaction, but were not more likely to go out of business. Despite the limitations of the cross-sectional analysis, the results are inconsistent with the hypothesis that PE financing increases the financial fragility of the firms.

6 Conclusion and Discussion

In this paper, we have studied how PE-backed companies responded to the turmoil caused by the 2008 financial crisis. In particular, we have examined how companies backed by private equity firms reacted in terms of investment, financing, and performance. One of the main objectives of this analysis was to explore whether PE-backed firms increased fragility during the

financial crisis, as recently articulated by the Bank of England and others. Furthermore, this analysis can improve our understanding of the connection between economic cycles and financial intermediaries more generally.

PE-backed companies decreased investments relatively less than the control group during the financial crisis. This result can be explained by the ability of PE-backed companies to utilize the financial and reputational capital of their private equity sponsors to raise equity and debt funding when markets seized up. Furthermore, we find that the positive investment effects of private equity were particularly large in companies more likely to be financially constrained at the time of the crisis. Lastly, we also see stronger investment effects when the private equity sponsor was more likely to have the resources – both financial and operational – to invest in their portfolio companies.

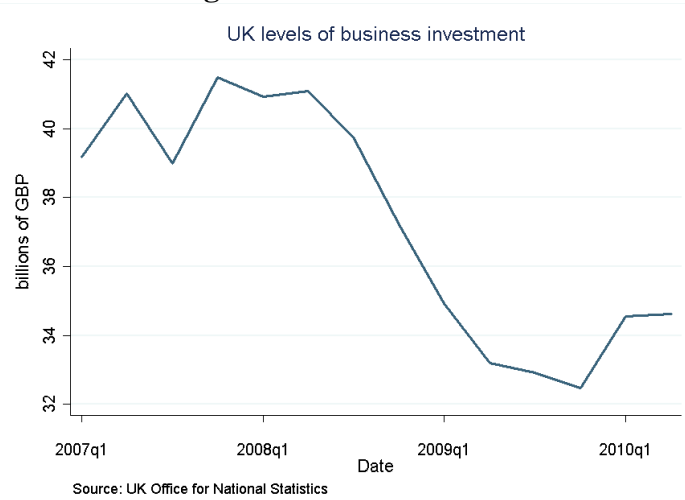
Overall, the results are consistent with the ability of PE sponsors to relax financing constraints during a sudden tightening of capital markets and inconsistent with the hypothesis that private equity increase financial fragility during periods of financial turmoil.

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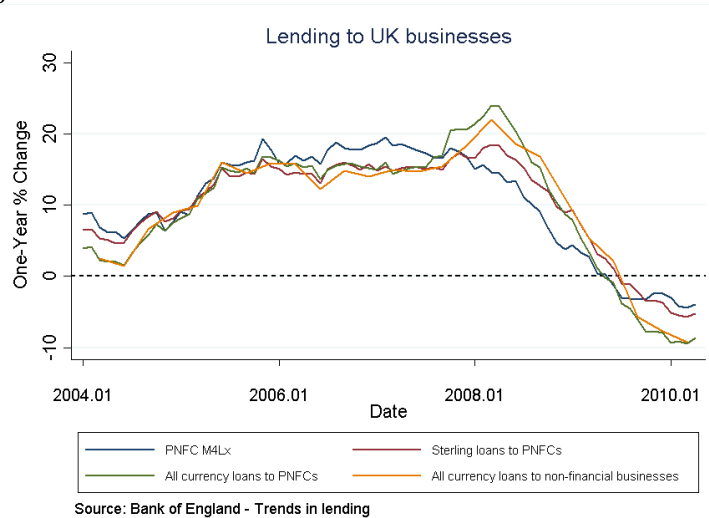
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Figure 1: Investment in United Kingdom around the financial crisis



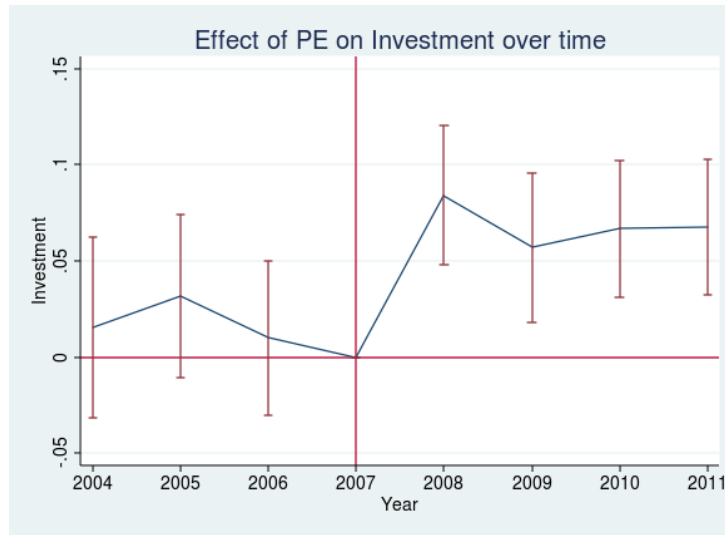
This figure shows the measure of quarterly business investment chained volume (seasonally adjusted) in UK. Currency values are at 2013. The measure does not include expenditure on dwellings, land and existing buildings and costs of ownership transfer of non-produced assets. The data comes from the official UK statistics. Information on data can be found at the website of the “Office of National Statistics” (<https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/businessinvestment/quarter3julytosept2016revisedresults>).

Figure 2: Lending growth in UK around the financial crisis



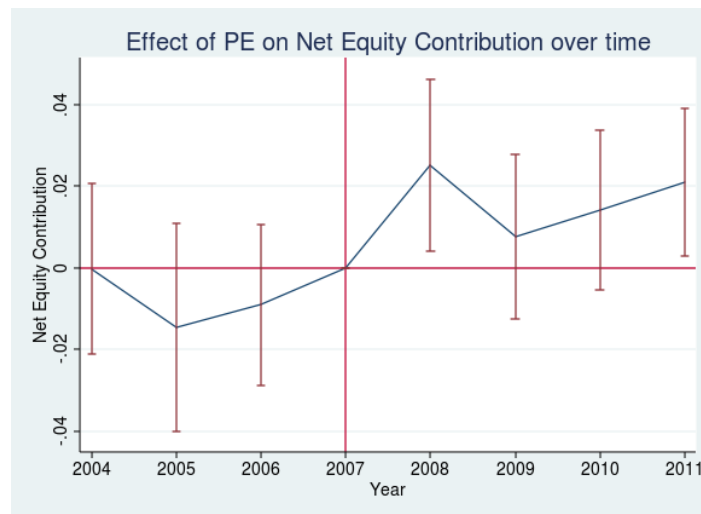
This figure shows the growth rate in the stock of lending by UK monetary financial institutions to private non-financial corporations (PNCF) or non-financial businesses. The stock of lending is the total amount of outstanding net lending. Series included are PNFC M4Lx (seasonally adjusted), sterling loans to PNFCs (seasonally adjusted), all currency loans to PNFCs (seasonally adjusted), all currency loans to non-financial businesses (non seasonally adjusted). PNFC M4Lx is the lending to PNFCs, which includes loans, securities, reverse repos, overdrafts, and commercial paper. The other three measures each includes loans, reverse repos and overdrafts. The data comes from the official statistics of the Bank of England and they are reported in the report “Trends in Lending (2014).” The data is available at <http://www.bankofengland.co.uk/publications/Pages/other/monetary/trendsinlending2014.aspx>.

Figure 3: Effect of PE-backed companies on investment over time



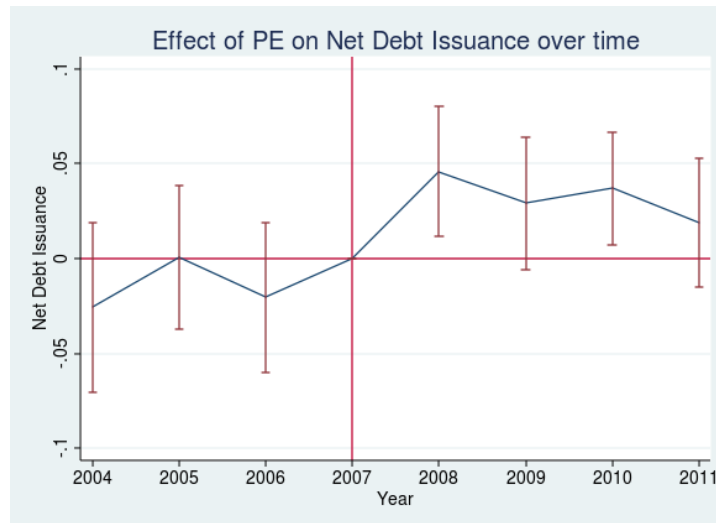
This Figure reports the time-varying effect of being a PE-backed company on investment, that is measured as usual as change in asset plus depreciation, scaled by asset. Specifically, this Figure reports the β_t of the following equation:- $y_{it} = \alpha_t + \alpha_i + \beta_t(PE\ firm_i) + \varepsilon_{it}$. As explained in the paper, the year 2007 is used as base period and therefore the corresponding coefficient is normalized to zero. The central dot reports the point estimate while the straight vertical lines report the 90% confidence interval. The confidence interval is constructed using standard errors clustered at firm level. More info on this measure is available in the paper and in the Appendix.

Figure 4: Effect of PE-backed companies on equity contribution over time



This Figure reports the time-varying effect of being a PE-backed company on equity contribution, that is measured as usual as difference in equity, netting out the profit and scaled by asset. Specifically, this Figure reports the β_t of the following equation:- $y_{it} = \alpha_t + \alpha_i + \beta_t(PE\ firm_i) + \varepsilon_{it}$. As explained in the paper, the year 2007 is used as base period and therefore the corresponding coefficient is normalized to zero. The central dot reports the point estimate while the straight vertical lines report the 90% confidence interval. The confidence interval is constructed using standard errors clustered at firm level. More info on this measure is available in the paper and in the Appendix.

Figure 5: Effect of PE-backed companies on debt issuance over time



This Figure reports the time-varying effect of being a PE-backed company on debt issuance, that is measured as usual as change in total liabilities scaled by asset. Specifically, this Figure reports the β_t of the following equation: $y_{it} = \alpha_t + \alpha_i + \beta_t(PE\ firm_i) + \varepsilon_{it}$. As explained in the paper, the year 2007 is used as base period and therefore the corresponding coefficient is normalized to zero. The central dot reports the point estimate while the straight vertical lines report the 90% confidence interval. The confidence interval is constructed using standard errors clustered at firm level. More info on this measure is available in the paper and in the Appendix.

Table 1: Summary Statistics

Panel A: Industry distribution

Industry Distribution	PE SAMPLE	FULL SAMPLE UK
Mining	1%	2%
Construction	6%	15%
Manufacturing	32%	17%
Wholesale Trade	12%	11%
Retail Trade	7%	6%
Transportation	4%	6%
Services	38%	44%
	100%	100%

Panel B: Firms' characteristics in 2007

	PE SAMPLE				NON PE SAMPLE				Mean Diff.
	N	Mean	Median	SD	N	Mean	Median	SD	
Revenue (M\$)	432	98.05	35.30	240.81	1527	77.64	29.86	184.49	20.41*
ROA	434	0.09	0.09	0.23	1550	0.09	0.09	0.22	0.01
Investment/Asset	434	0.17	0.20	0.28	1550	0.21	0.20	0.24	-0.03**
Equity Contr./Asset	415	-0.02	0.01	0.13	1513	-0.01	0.01	0.13	-0.01
Net Debt Iss./Asset	415	0.09	0.10	0.23	1513	0.11	0.08	0.24	-0.01
Debt/Asset	434	0.71	0.70	0.39	1550	0.69	0.67	0.39	0.02
Bank Debt/Asset	429	0.32	0.25	0.35	1524	0.34	0.27	0.36	-0.01
Debt/EBITDA	433	5.35	3.91	27.35	1549	5.06	4.12	20.97	0.29
Bank Debt/EBITDA	428	2.28	1.20	15.14	1523	2.44	1.37	13.63	-0.16

Panel C: Firms' trends in 2007

	PE SAMPLE				NON PE SAMPLE				Mean Diff.
	N	Mean	Median	SD	N	Mean	Median	SD	
Growth Revenue - 1 year	423	0.37	0.18	1.34	1456	0.35	0.17	1.17	0.02
Growth ROA - 1 year	427	0.71	-0.03	5.21	1483	0.79	0.07	4.48	-0.07
Growth Invest. 1 year	386	1.54	0.10	5.86	1434	1.37	0.05	5.20	0.17
Growth Eq. Contr. - 1 year	372	-0.59	0.39	15.96	1376	-0.93	0.09	13.73	0.34
Growth Net Debt Iss. - 1 year	376	2.95	0.32	15.09	1428	2.25	0.20	12.86	0.70
Growth Leverage - 1 year	418	0.02	-0.03	0.34	1516	0.02	-0.02	0.31	0.01
Growth Revenue - 2 year	393	0.56	0.33	2.08	1362	0.71	0.34	2.33	-0.15
Growth ROA - 2 year	400	1.10	0.05	8.33	1388	1.40	0.11	6.97	-0.29
Growth Invest. 2 year	339	1.85	0.61	6.22	1333	2.39	0.94	6.06	-0.54
Growth Eq. Contr. - 2 year	330	0.43	1.09	23.44	1274	0.70	1.05	18.95	-0.28
Growth Net Debt Iss. - 2 year	343	3.45	0.65	18.73	1359	2.94	0.76	13.99	0.51
Growth Leverage - 2 year	382	0.01	-0.04	0.46	1442	0.04	-0.04	0.60	-0.03

In Panel A, we report the industry distribution at the macro industry level (1-digit SIC) for the PE sample and the whole universe of medium and large UK firms that are not financial, insurance, regulated or public administration, as excluded in the paper. In Panel B, the table reports the summary statistics of the companies at 2007 across treated (PE-backed companies) and untreated firms (non-PE companies), as well as the differences across the two groups. In particular, the last column reports the mean difference. Level variables are in millions of dollars. Panel C reports the one-year and two-year growth in the characteristics at 2007. In particular, the last column reports the mean difference. More information in the variable definition is available in the Appendix or in the paper. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%.

Table 2: Investment and funding policies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Investment/Asset		Net Equity Contr./Asset		Net Debt Issu./Asset		Leverage	
PE firm x Crisis	0.059*** (0.013)	0.056*** (0.013)	0.022*** (0.007)	0.021*** (0.007)	0.042*** (0.011)	0.039*** (0.011)	0.013 (0.015)	0.012 (0.014)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes	No	Yes
Observations	12456	11910	12469	12003	12903	12274	13205	12553
Clusters	1984	1878	1981	1876	1982	1876	1984	1878
Adjusted R-squared	0.160	0.161	0.040	0.059	0.090	0.104	0.011	0.029

This Table reports the main results of the paper, where we estimate the standard difference-in-difference fixed effect model on the investment and funding variables. Every specification contains a set of firm and year fixed effects. The main parameter of interest is the interaction between the crisis dummy and a dummy identifying PE-backed firm. Odd columns contain the baseline regression and instead even columns augment the baseline model with a set of firm level controls measured before the crisis and interacted with the post dummy. These variables are firm size (log of revenue), growth revenue, cash flow over asset, ROA, leverage. In columns (1) and (2) the outcome is investment scaled by asset; in columns (3) and (4) is net equity contribution over asset; in columns (5) and (6) is the net debt issuance; in columns (7) and (8) is the total leverage. More information on the variables are available in the Appendix. Standard errors are clustered at firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%.

Table 3: Investment and funding policies over time

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment/Asset		Net Debt Issu./Asset		Net Equity Contr./Asset	
PE firm x y2011	0.068*** (0.021)	0.064*** (0.021)	0.021* (0.011)	0.018* (0.011)	0.019 (0.020)	0.019 (0.020)
PE firm x y2010	0.067*** (0.021)	0.064*** (0.021)	0.014 (0.012)	0.013 (0.012)	0.037** (0.018)	0.032* (0.018)
PE firm x y2009	0.057** (0.024)	0.050** (0.024)	0.008 (0.012)	0.006 (0.012)	0.029 (0.021)	0.022 (0.021)
PE firm x y2008	0.084*** (0.022)	0.087*** (0.022)	0.025** (0.013)	0.025** (0.012)	0.046** (0.021)	0.043** (0.020)
PE firm x y2006	0.010 (0.024)	0.009 (0.025)	-0.009 (0.012)	-0.010 (0.012)	-0.020 (0.024)	-0.024 (0.024)
PE firm x y2005	0.032 (0.026)	0.032 (0.026)	-0.015 (0.015)	-0.013 (0.016)	0.001 (0.023)	0.000 (0.023)
PE firm x y2004	0.015 (0.029)	0.018 (0.029)	-0.000 (0.013)	0.002 (0.013)	-0.026 (0.027)	-0.028 (0.028)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes
Observations	12456	11910	12469	12003	12903	12274
Clusters	1984	1878	1981	1876	1982	1876
Adjusted R-squared	0.160	0.161	0.040	0.059	0.090	0.104

This Table reports the main results of the paper, but where we estimate the time-varying effect for every year. Every specification contains a set of firm and year fixed effects. Specifically, this table reports the β_t of the following equation: $y_{it} = \alpha_t + \alpha_i + \beta_t(PE\ firm_i) + \varepsilon_{it}$. Odd columns contain the baseline regression and instead even columns augment the baseline model with a set of firm level controls measured before the crisis and interacted with the post dummy. These variables are firm size (log of revenue), growth revenue, cash flow over asset, ROA, leverage. In columns (1) and (2) the outcome is investment scaled by asset; in columns (3) and (4) is net equity contribution over asset; in columns (5) and (6) is the net debt issuance. More information on the variables are available in the Appendix. Standard errors are clustered at firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%.

Table 4: Heterogeneity across firms' financial constraints

Panel A - Investment / Asset

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment/Asset					
PE firm x Crisis	0.014 (0.020)	0.011 (0.020)	0.030** (0.014)	0.023 (0.014)	0.023 (0.017)	0.023 (0.018)
Interaction. x Crisis	-0.025* (0.013)	-0.016 (0.015)	-0.047*** (0.012)	-0.041*** (0.012)	-0.055*** (0.012)	-0.038*** (0.014)
Interaction x Crisis x PE	0.053** (0.026)	0.051** (0.026)	0.067** (0.027)	0.077*** (0.026)	0.072*** (0.025)	0.064*** (0.025)
Interaction Variable		Small	External Dependence		High Leverage	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	No	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes
Observations	11539	11105	12456	11910	12456	11910
Clusters	1824	1742	1984	1878	1984	1878
Adjusted R-squared	0.160	0.162	0.161	0.162	0.162	0.162

Panel B - New Debt Issuances / Assets

	(1)	(2)	(3)	(4)	(5)	(6)
	Net Debt Issu./Asset					
PE firm x Crisis	-0.004 (0.019)	0.003 (0.019)	0.014 (0.013)	0.012 (0.012)	0.036*** (0.013)	0.033** (0.013)
Interaction. x Crisis	-0.015 (0.014)	-0.030** (0.014)	-0.049*** (0.012)	-0.035*** (0.011)	-0.152*** (0.011)	-0.096*** (0.013)
Interaction x Crisis x PE	0.055** (0.024)	0.046* (0.024)	0.062*** (0.024)	0.062*** (0.024)	0.028 (0.021)	0.023 (0.021)
Interaction Variable		Small	External Dependence		High Leverage	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	No	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes
Observations	11891	11400	12903	12274	12903	12274
Clusters	1823	1741	1982	1876	1982	1876
Adjusted R-squared	0.089	0.101	0.091	0.105	0.105	0.109

Panel C - Net Equity Contr./Asset

	(1)	(2)	(3)	(4)	(5)	(6)
	Net Equity Contr./Asset					
PE firm x Crisis	0.035*** (0.012)	0.026** (0.012)	0.016* (0.009)	0.013 (0.009)	0.011 (0.012)	0.013 (0.012)
Interaction. x Crisis	-0.006 (0.007)	0.014 (0.008)	0.002 (0.007)	-0.002 (0.006)	0.067*** (0.006)	0.044*** (0.006)
Interaction x Crisis x PE	-0.016 (0.016)	-0.008 (0.015)	0.015 (0.015)	0.016 (0.014)	0.011 (0.015)	0.009 (0.014)
Interaction Variable	Small		External Dependence		High Leverage	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	No	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes
Observations	11564	11183	12469	11989	12469	11989
Clusters	1823	1739	1981	1873	1981	1873
Adjusted R-squared	0.045	0.063	0.040	0.059	0.053	0.064

These Tables report one heterogeneity of our main results. In particular, we estimate the standard difference-in-difference fixed effect model, adding a further level of interaction with various proxy of the likelihood of financial constraint in 2007. Every specification contains a set of firm and year fixed effects. The main parameter of interest is the interaction between the crisis dummy and a dummy identifying PE-backed firm and the financial constraint dummy. In particular, we employ three measures. First (columns 1 and 2), we divide companies based on size, looking across firms that are in the top quartile of size versus the rest of the sample. In particular, we use employment as a proxy for size. Second (columns 3 and 4), we look across firms characterized by higher dependence on external finance, measured by RZ index (Rajan and Zingales, 1998), splitting the sample at the median. Third (columns 5 and 6), we look across firms with high versus low leverage in 2007, splitting along the first quartile. The regressions are organized in three panels, depending on the outcome. Panel A reports the results using investment as an outcome, Panel B uses instead Debt issuance and lastly Panel C reports the results with Net Equity contribution. Odd columns contain the baseline regression and even columns augment the baseline model with a set of firm level controls measured before the crisis and interacted with the post dummy. These variables are firm size (log of revenue), growth revenue, cash flow over asset, ROA, leverage. More information on the variables are available in the Appendix. Standard errors are clustered at firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%.

Table 5: Heterogeneity across funds

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Investment/Asset				Net Debt Issu./Asset				Net Equity Contr./Asset			
Crisis*Years Last Fund	0.013*** (0.004)	0.014*** (0.004)			0.010*** (0.004)	0.011*** (0.003)			0.003* (0.002)	0.002 (0.002)		
Crisis*1(Fund 98-08)			0.269*** (0.077)	0.290*** (0.077)			0.177** (0.074)	0.188*** (0.071)			0.066** (0.033)	0.057* (0.033)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	513	495	513	495	496	482	496	482	499	484	499	484
Clusters	259	250	259	250	258	249	258	249	258	249	258	249
Adjusted R-squared	0.309	0.354	0.306	0.353	0.062	0.179	0.062	0.181	0.261	0.321	0.252	0.311

This Table reports the heterogeneity to the main results across fund characteristics. In particular, we estimate the a difference-in-difference fixed effect model, where we are interested on how various measures of age of the PE fund backing the company affect our main outcomes around the crisis time. Because measures of age of the PE investors are only available for the PE-backed group, the analyses are estimated using only the set of PE-backed companies. Furthermore, we only use 2007-2008 data to increase precision. Every specification contains a set of firm and year fixed effects. The main parameter of interest is the interaction between the crisis dummy and the fund information. We look at fund age using the year of the last pre 2008 fundraising of the PE firm and a dummy if this fundraising was between 1998 and 2008. Odd columns contain the baseline regression where instead even columns augment the baseline model with a set of firm level controls measured before the crisis and interacted with the post dummy. These variables are firm size (log of revenue), growth revenue, cash flow over asset, ROA, leverage. We look at fund age using the year of the last pre 2008 fundraising of the PE firm and a dummy if this fundraising was between 1998 and 2008. This info is not available for every PE-backed firm. More information on the variables are available in the Appendix. Standard errors are clustered at firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%.

Table 6: Performance Analysis

Panel A - Accounting Performance						
	(1)	(2)	(3)	(4)	(5)	(6)
	Gr. Asset		EBITDA/REV		ROA	
PE Firm x Crisis	0.148*** (0.040)	0.124*** (0.038)	-0.009 (0.013)	-0.010 (0.014)	-0.003 (0.009)	-0.004 (0.008)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes
Observations	13180	12528	12507	12137	12865	12364
Clusters	1984	1878	1960	1878	1984	1878
Adjusted R-squared	0.026	0.042	0.001	0.015	0.005	0.041

Panel B - Exit Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Marginal Eff.	1{M&A}	1{M&A, No Distress}			1{Exit}	1{Bankruptcy}		
PE Firm	0.351*** (0.023)	0.325*** (0.101)	0.351*** (0.024)	0.318*** (0.100)	0.058 (0.085)	0.039 (0.087)	0.092 (0.103)	0.099 (0.106)
Industry (2-digit) F.E.	Y	Y	Y	Y	Y	Y	Y	Y
Firm Controls 2007		Y		Y		Y		Y
Observations	1635	1635	1635	1635	1368	1368	1360	1360

These two tables report the performance analyses. In Panel A, we look at accounting performance. In particular, we estimate the standard difference-in-difference fixed effect model on various performance measures. Every specification contains a set of firm and year fixed effects. The main parameter of interest is the interaction between the crisis dummy and a dummy identifying PE-backed firm. Odd columns contain the baseline regression where instead even columns augment the baseline model with a set of firm level controls measured before the crisis and interacted with the post dummy. These variables are firm size (log of revenue), growth revenue, cash flow over asset, ROA, leverage. In columns (1) and (2) the outcome is (one-year) growth of assets; in columns (3) and (4) is total EBITDA scaled by revenue; in columns (5) and (6) is ROA. Standard errors are clustered at firm level. In Panel B, we report the marginal value (at the mean) of a conditional logit model where we study the effect of being a PE-backed company on various outcomes. In particular, we condition in two-digit industry. Odd columns do not have any additional controls while even columns have firm level controls at 2007. In Columns (1) and (2) the outcome is a dummy equal to one if the company was the target of an M&A activity in the post-crisis period; in Columns (3) and (4) the outcome is instead a dummy equal to one if the company was still target of an M&A activity and the company does not exit from the data in the same time frame; in columns (5) and (6) the outcome is the dummy equal to one if the company exit the data set in the post period; lastly in columns (7) and (8) the outcome is a dummy if the company exit the data and it reported some financial difficulties before the exit. See the Appendix and the paper for more info on the variables. The number of observations corresponds to the number of observations that were effectively used by the logit in the estimation, which are observations that have some within-industry (condition) variation in the outcomes. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%.

Appendix

A.1 Data and variable construction

All the data in the paper comes from Amadeus/Orbis produced by Bureau Van Dijk. To minimize the chances that data errors could drive our results, we winsorize at 1% every ratio and growth variates used in the analysis. The winsorization over the full sample of Amadeus/Orbis, companies, in order to benchmark the ratios to the whole population distribution. All variables in level are in millions of dollars.

The main variables we used in the analysis are the following: (a) Investment/Asset, where investment is constructed as the change in asset over the last year, plus the depreciation; (b) (Net) Equity contribution/Asset, where the equity contribution is measured as the difference in total equity (shareholder value) over the last year, minus the profit; (c) (Net) Debt Issuance/Asset, where the debt issuance is constructed as the overall change in debt; (d) Leverage, which is simply total debt (short and long-term) scaled by asset; (e) ROA: net income over total assets; (f) EBITDA/Asset, where EBITDA represent the earnings before interests, tax and depreciation.

In the paper, we also use different methodologies to determine companies that are more or less likely to be financial constrained as the financial crisis unfolds. First, we use size by looking at the top quartile of revenue at 2007, in the sample of the analyzed firms. Second, we identify firms that are at the top quartile of leverage at 2007. Third, we identify companies operating in industries more dependent on external finance. The index is constructed using Compustat in the following way. Using the whole set of consolidated reports in Compustat between 1980 and 2007, we construct a score for every two digit SIC code which is median of CAPEX minus operating cash flow, scaled by CAPEX.

A.2 Other Robustness Analyses

Table A.1: Robustness excluding MBO

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Investment/Asset	Net Equity Contr./Asset	Net Equity Contr./Asset	Net Debt Issu./Asset	Net Debt Issu./Asset	Net Debt Issu./Asset	Leverage	Leverage	ROA	ROA
PE firm x Crisis	0.068*** (0.017)	0.072*** (0.017)	0.022** (0.010)	0.018** (0.009)	0.047*** (0.015)	0.053*** (0.015)	0.022 (0.020)	0.022 (0.020)	0.004 (0.012)	0.001 (0.011)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	8295	7965	8316	8028	8557	8181	8764	8376	8586	8276
Clusters	1336	1272	1334	1270	1334	1270	1336	1272	1336	1272
Adjusted R-squared	0.157	0.159	0.039	0.064	0.085	0.103	0.009	0.029	0.005	0.045

This Table reports a robustness test, where we estimate the standard difference-in-difference fixed effect model on the main outcome variables dropping the PE-backed companies whose deal is identified as a management buyout (MBO) and the corresponding matched companies. Every specification contains a set of firm and year fixed effects. The main parameter of interest is the interaction between the crisis dummy and a dummy identifying PE-backed firm. Odd columns contain the baseline regression where instead even columns augment the baseline model with a set of firm level controls measured before the crisis and interacted with the post dummy. These variables are firm size (log of revenue), growth revenue, cash flow over asset, ROA, leverage. In columns (1) and (2) the outcome is Investment scaled by asset; in columns (3) and (4) is net Equity Contribution; in columns (5) and (6) is the net Debt Issuance; in columns (7) and (8) is leverage; in columns (9) and (10) is ROA. More information on the variables are available in the Appendix. Standard errors are clustered at firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%.

Table A.2: Robustness using only 2007-2008

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Investment/Asset	Net Equity Contr./Asset	Net Debt Issu./Asset	Leverage			ROA			
PE firm x Crisis	0.083*** (0.022)	0.085*** (0.022)	0.027** (0.013)	0.029** (0.012)	0.047** (0.021)	0.039* (0.021)	0.004 (0.010)	0.001 (0.010)	0.014 (0.012)	0.015 (0.010)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3924	3715	3860	3672	3892	3696	3948	3737	3914	3711
Clusters	1984	1878	1981	1876	1982	1876	1984	1878	1984	1878
Adjusted R-squared	0.385	0.399	0.139	0.262	0.234	0.296	0.002	0.020	0.007	0.145

This Table reports a robustness test, where we estimate the standard difference-in-difference fixed effect model on various outcomes using only data from 2007 and 2008. This correspond to the last year before the crisis and the first one in the crisis. Every specification contains a set of firm and year fixed effects. The main parameter of interest is the interaction between the post dummy and a dummy identifying PE-backed firm. Odd columns contain the baseline regression where instead even columns augment the baseline model with a set of firm level controls measured before the crisis and interacted with the post dummy. These variables are firm size (log of revenue), growth revenue, cash flow over asset, ROA, leverage. In columns (1) and (2) the outcome is Investment scaled by asset; in columns (3) and (4) is net Equity Contribution; in columns (5) and (6) is the net Debt Issuance; in columns (7) and (8) is leverage; in columns (9) and (10) is ROA. More information on the variables are available in the Appendix. Standard errors are clustered at firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%.

Table A.3: Robustness using only companies not experiencing exit

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Investment/Asset	Net Equity Contr./Asset	Net Equity Contr./Asset	Net Debt Issu./Asset	Net Debt Issu./Asset	Leverage	Leverage	ROA	ROA	ROA
PE firm x Crisis	0.044*** (0.014)	0.040*** (0.014)	0.017** (0.008)	0.016** (0.008)	0.030** (0.013)	0.025** (0.012)	0.003 (0.014)	0.000 (0.014)	-0.003 (0.010)	-0.003 (0.009)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	9658	9271	9700	9367	10020	9567	10242	9776	9984	9630
Clusters	1525	1452	1525	1452	1525	1452	1525	1452	1525	1452
Adjusted R-squared	0.160	0.160	0.046	0.061	0.090	0.102	0.029	0.040	0.006	0.041

This Table reports a robustness test, where we estimate the standard difference-in-difference fixed effect model on various outcomes using only data only for groups of matched firms where no company is identified as leaving the data by 2011 (survivorship bias free). Every specification contains a set of firm and year fixed effects. The main parameter of interest is the interaction between the post dummy and a dummy identifying PE-backed firm. Odd columns contain the baseline regression where instead even columns augment the baseline model with a set of firm level controls measured before the crisis and interacted with the post dummy. These variables are firm size (log of revenue), growth revenue, cash flow over asset, ROA, leverage. In columns (1) and (2) the outcome is Investment scaled by asset; in columns (3) and (4) is net Equity Contribution; in columns (5) and (6) is the net Debt Issuance; in columns (7) and (8) is leverage; in columns (9) and (10) is ROA. More information on the variables are available in the Appendix. Standard errors are clustered at firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%.

Table A.4: Robustness adding time-varying industry fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Investment/Asset		Net Equity Contr./Asset		Net Debt Issu./Asset		Leverage		ROA	
PE firm x Crisis	0.055*** (0.013)	0.053*** (0.013)	0.022*** (0.007)	0.021*** (0.007)	0.039*** (0.011)	0.037*** (0.011)	0.012 (0.015)	0.013 (0.014)	-0.004 (0.009)	-0.005 (0.008)
Industry X Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	12456	11910	12469	12003	12903	12274	13205	12553	12865	12364
Clusters	1984	1878	1981	1876	1982	1876	1984	1878	1984	1878
Adjusted R-squared	0.163	0.163	0.042	0.060	0.093	0.105	0.019	0.040	0.010	0.045

This Table reports a robustness test, where we estimate the standard difference-in-difference fixed effect model on various outcomes adding set of fixed effects generated as the product of industry (two digit SIC) and the post dummy. Every specification contains a set of firm and year fixed effects. The main parameter of interest is the interaction between the post dummy and a dummy identifying PE-backed firm. Odd columns contain the baseline regression where instead even columns augment the baseline model with a set of firm level controls measured before the crisis and interacted with the post dummy. These variables are firm size (log of revenue), growth revenue, cash flow over asset, ROA, leverage. In columns (1) and (2) the outcome is Investment scaled by asset; in columns (3) and (4) is net Equity Contribution; in columns (5) and (6) is the net Debt Issuance; in columns (7) and (8) is leverage; in columns (9) and (10) is ROA. More information on the variables are available in the Appendix. Standard errors are clustered at firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%.

Table A.5: Robustness main results with alternative matching sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Investment/Asset	Net Equity Contr./Asset	Net Debt Issu./Asset	Net Debt Issu./Asset	Net Debt Issu./Asset	Net Debt Issu./Asset	Leverage	Leverage	ROA	ROA
PE firm x Crisis	0.057*** (0.012)	0.053*** (0.012)	0.025*** (0.007)	0.022*** (0.007)	0.040*** (0.011)	0.037*** (0.011)	0.026* (0.015)	0.024* (0.015)	-0.002 (0.008)	-0.003 (0.008)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Control	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	16318	15672	16347	15790	16872	16150	17259	16512	16840	16249
Clusters	2598	2477	2596	2475	2596	2475	2598	2477	2598	2477
Adjusted R-squared	0.153	0.153	0.040	0.076	0.075	0.103	0.009	0.026	0.006	0.054

This Table reports a robustness test, where we estimate the standard difference-in-difference fixed effect model on various outcomes using an alternative sample which is constructed with a simpler matching (only ROA, industry and size). Every specification contains a set of firm and year fixed effects. The main parameter of interest is the interaction between the post dummy a dummy identifying PE-backed firm. Odd columns contain the baseline regression where instead even columns augment the baseline model with a set of firm level controls measured before the crisis and interacted with the post dummy. These variables are firm size (log of revenue), growth revenue, cash flow over asset, ROA, leverage. In columns (1) and (2) the outcome is Investment scaled by asset; in columns (3) and (4) is net Equity Contribution; in columns (5) and (6) is the net Debt Issuance; in columns (7) and (8) is leverage; in columns (9) and (10) is ROA. More information on the variables are available in the Appendix. Standard errors are clustered at firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%.