The Impact of Private Equity on Firm Resilience and Performance During Crisis

A Study of Portfolio Companies in Sweden

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Abstract:

Do PE-backed firms contribute to financial stability, and do PE-backed firms perform superior compared to their non-PE-backed peers during crises? These are the two central questions of this paper when company data from 2004 – 2010 is examined for the Swedish market amid the Great Recession, 2008. A sample of 79 PE-backed and 129 non-PE-backed firms are compared. We find evidence that portfolio companies experience improved access to equity capital amid the recession, a finding that is traced to the PE investor relationship. This appears to have enabled the PE-backed firms to reduce investments less and maintain a higher level of investments post-crisis, suggesting that PE-backed firms contribute to stability and not fragility. Furthermore, PE-backed firms are shown to outperform non-PE-backed firms, measured in ROA and market share growth. To add a dimension to the results and explore complementary explanations, we conducted a survey of PE professionals that indicated that also operational assistance in portfolio companies might be an explanatory factor for their stability and performance.

Keywords:

Recession, Portfolio Company, Private Equity

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Introduction

The COVID-19 pandemic has raised questions regarding whether or not some companies are better positioned to overcome steep economic downturns. Private equity (PE) is a phenomenon that has been subject to a large degree of scrutiny, and hypotheses regarding their unique ownership structure in relation to firm performance have been explored. The majority of the literature concerning PE-backed companies has focused on firm performance during "normal" economic times, and the results indicate that these firms perform better than their peers.[1] However, important to note is that contradictory evidence has also been presented, which instead argues that there is no difference between firm performance and that PE firms mainly concentrate their efforts on growth instead of overall performance.[2] The main argument brought forward by the advocates of PE is that the individual firms' financial constraints are relaxed due to the PE fund, which, combined with expert knowledge, allow the companies to outperform their peers.

Circulating back to the COVID-19 pandemic thus further emphasizes questions regarding firm performance in the wake of economic downturns. Followingly, data illustrates that PE transactions are highly cyclical (MacArthur et al., 2019), where both deal values and numbers of transactions tend to follow the economy's overall health. Furthermore**,** Kaplan and Stein (1993) also presented data implying that transactions made during economic booms tend to be structured in a problematic manner with an increased risk exposure compared to regular times. A phenomenon they referred to as "overheating". Former literature within the field of comparing PE-backed firms to non-PE-backed firms during economic downturns has thus stemmed from the hypothesis that the overwhelming amount of deals during economic booms combined with poorer structuring of the transactions will contribute to financial fragility during economic crises.

Bernstein et al. (2017) explored the above-mentioned hypothesis (main hypothesis) and concluded that it was not the case. Instead, they found evidence supporting the importance of PE funds, mainly that industries chosen by the funds experience faster growth. Consequently, Bernstein et al. (2019) then explored an alternative hypothesis; that PE-backed companies, in fact, are *more* resilient to economic downturns and thus act as stabilizers during economic downturns. Motivated by primarily three assumptions; the first one that PE-backed firms perhaps could obtain external financing to a larger extent due to the PE funds' connections with the banking industry (Kovner & Ivashina, 2011; Fang et al., 2013). Secondly, PE funds may have capital ready to be invested during economic downturns since they raise capital which they invest over many years (capital referred to as "dry powder"). Thirdly, PE investors can dedicate their human capital to their current commitments rather than finding new ones when a crisis hits (Bernstein & Sheen, 2016; Gompers et al., 2012). Why the latter adds value has been researched by several prominent academics advocating the advantages of PE. They conclude that a part of the added firm-value that PE investments lead to is because of the extension of the management team's knowledge to the portfolio companies (Cressy et al., 2007; Kaplan & Strömberg, 2009). Nonetheless, what Bernstein et al. (2019) found in their study of the market in the United Kingdom (UK), was that PE-backed companies, during the 2008 crisis, decreased their investments less than their peers, gained more equity contribution, experienced greater debt inflows, higher asset base growth and also increased market share.

[1]Examples of research on the area: Boucly et al. (2011), Bernstein & Sheen (2016), Jensen et al. (2006), Jensen (1986), Hammer et al. (2021), Kaplan (1989), Smith (1990), Cohn et al. (2014), Kaplan et al. (2014), Smart & Waldfogel (1994), Cressy et al. (2007), Cohn et al. (2020).
[2]Examples of research on the area: Koo (2016), Leslie & Oyer (2008), Sheen et al. (2020), Hedberg & Bergström (2013).

The purpose of this study is to contribute to the existing literature regarding firm performance and stability during economic downturns. The COVID-19 pandemic would therefore be a suitable and interesting period to investigate. However, as the pandemic is currently ongoing, and the financial statements for the companies have not yet been made public, a comprehensive analysis is therefore difficult to perform. Consequently, the 2008 crisis was chosen as the core of our study, principally due to two reasons. The first is that the particular crisis in 2008 is the latest economic recession that resulted in negative world-GDP growth (The World Bank, 2018), as COVID-19 presumably led to during 2020 (International Monetary Fund, 2020). The second reason is owing to contemporary literature, which focuses on the 2008 crisis but in different markets, why we aim to contribute with a focus on the Swedish market. It is also of significance to underline that the two economic downturns, the 2008 recession, and the COVID-19 pandemic, differ to a certain extent concerning the drivers of the respective crises. The 2008 recession was primarily linked to disruptions in financial institutions. In contrast, the COVID-19 downturn can be considered a result of declining economic activity due to the efforts to hinder the spread of the virus. Moreover, the governments moved more quickly to provide additional liquidity to the economy compared to the Great Recession (Osterland, 2020). Despite these differences, the core effect of the two events can be argued to have impacted the overall economic health in similar ways. However, due to the earlier mentioned reason regarding limitations of studying the COVID-19 crisis, 2008 will be the focus of the study.

The focus of the study will be Sweden, and the alternative hypothesis brought forward by Bernstein et al. (2019) will be explored. By exploring the alternative hypothesis (our first research question), we will attempt to establish whether or not PE contributes to stability or not during times of economic recession. Additionally, we will explore if portfolio companies perform superior compared to non-PE-backed companies (our second research question). We chose to distinguish between stability and performance because the first research question primarily focuses on investment and funding policies, whereas the second research question focuses on firm performance metrics. We argue that investments and performance are not fully dependent on each other, why it is of value to analyze them separately. In summary, the following two research questions are the focus of this paper:

R1: Do PE-backed firms contribute to financial stability during economic crises?

R2: Do PE-backed firms perform superior compared to non-PE-backed peers during crises?

The rationale for choosing Sweden as the country of our study is due to the following reasons. Firstly, the Nordic region has not been thoroughly examined in this context, as opposed to the, e.g., the UK (Bernstein et al., 2019) and France (Boucly et al., 2011), which means that a valuable contribution to the current body of literature may be achieved. In the Scandinavian region, Sweden is an essential part as it is the country where most of the deals are made - by a large margin (Argentum, 2018). Secondly, PE plays a central role in the Swedish economy. As of 2018, over 1000 companies had received investments from PE funds in Sweden, which accounted for approximately 150 billion SEK in funding. Amounts that correlated to roughly 7.5% of the workforce in the private sector, and 5.5% of the total national GDP (Næss-Schmidt et al., 2017). Thirdly, even though Sweden ranks 24th when the world's countries are ranked by their GDP, the 8th largest PE fund is based in Sweden. To contextualize, eight of the top ten funds are based in the US (Wallach, 2020), implying that the PE industry in Sweden is cutting-edge. Fourthly, each limited company in Sweden is required to file annual financial statements with varying lengths to the Swedish Companies Registration Office every year (Årsredovisningslag,

2020).[3] This requirement enables analyses of private companies of varying sizes. Lastly, lending to both households and non-financial corporations took a big hit during 2008 when the growth rate for lending dropped from more than 6% to less than 2% (Figure 1). In addition, aggregated investments during the year in Sweden plunged (OECD, 2008). The combination of the stagnated lending with plunging investments implies that Sweden was indeed severely affected by the crisis. Therefore, further indicating that Sweden is a prominent environment for the study.

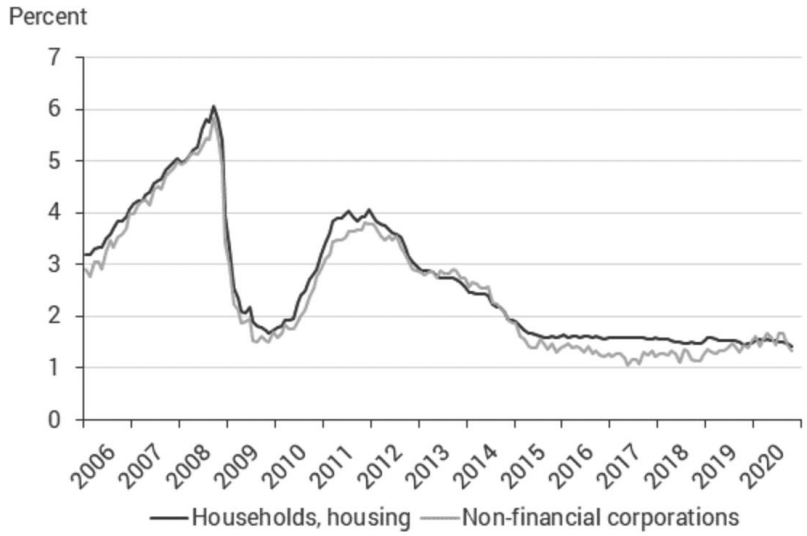

Figure 1
Lending growth rates in Sweden 2006-2020
This figure illustrates the growth rate of lending to both household and non-financial corporations in Sweden during 2006 and 2020. The part which is primarily of interest is the time around the financial crisis (2006-2010). Data and figure from the Government Agency, Statistics Sweden (SCB, 2020).

Our final treatment group (PE-backed or portfolio company) consisted of 79 PE-backed firms, and the control group (non-PE-backed) consisted of 129 non-PE-backed peer companies, meaning that the analysis was based on 208 firms. In this sample, we included firms defined as small[4] to keep the sample as vast as possible. The foundation of our analysis was a difference-in-difference (DID) regression, which requires that the sample and control group are alike prior to the event/treatment effect. A prerequisite referred to as the "parallel trend assumption". In the context of this paper, the event/treatment effect is the Great Recession. To satisfy the model's requirement, we have chosen sample groups from the same industry and used a sampling technique similar to Bernstein et al. (2019) which based their approach on Boucly et al. (2011). Furthermore, we excluded certain industries in line with Michaely and Roberts (2012). Based on a combination of these three papers, we sampled the peers based on asset base (a proxy for size), leverage (in absolute values), and return on assets (ROA) (a proxy for profitability). Calculations on revenue, ROA, investments, net equity contribution, net debt issuance, and leverage (where all metrics except revenue were normalized by assets) were then made in order to show that the two groups had similar trends prior to 2008 and at the onset of the crisis. This was indeed the case. The benefit of this approach is that we were able to establish whether or not any differences

[3]Swedish Accounting Legislation for Swedish firms. We have checked that the legislation affecting our study was in place and legislated at the time of 2007 to make sure that we do not use present legislation that was not in place as of 2007.
[4] To maintain comparability between our results, we followed the definition of small companies used by Bernstein et al. (2019). Although this may be misrepresentative as that definition concerns UK firms. We consider it as irrelevant for the purpose of our study. Our aim is not to examine the definition of small firms in different countries. Definition used by Bernstein et al. (2019) is as follows: *small company is defined as meeting at least two of the three 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.* The values denoted in pound sterling was calculated to SEK as of 2007 exchange rate GBP/SEK

we discovered after the crisis stemmed from organizational structure instead of any differences from the respective firms' financial reports.

After establishing that the DID method could be used, as the parallel trend assumption was fulfilled, we continued by comparing our groups' financial statements during the economic downturn through our main regression (main analysis). As investments depend on capital, debt or equity, and is most often the foundation of firm performance, we began our analysis there. Our analysis shows that the PE-backed firms invested more, approximately 11.4%, during the period. The direction in which the finding points is in line with contemporary research, but the magnitude stands out. Important to note, however, is that both groups decreased their investments, meaning that PE-backed firms only decreased their investments *less*. This part of the main analysis was statistically significant.

In order to explain the increased investments (relative to assets) compared to their peers, we then explored if the PE-backed firms experienced more net equity contribution and net debt issuance. It was concluded that our treatment group experienced a higher net equity contribution, by 2.4%, which was strongly statistically significant. Net debt issuance showed a similar result, where PE-backed firms experienced a 1.9% higher debt issuance. This result, however, was not statistically significant. Even though both capital-related metrics were not strongly statistically significant, the result hints that the higher investment rate for our treatment group compared to the control group could be attributed to improved access to capital markets through their relationship with a PE investor.

As PE-backed firms appeared to be less bound by financial constraints, we then also found that their leverage increased by roughly 2% more than the control group, which is in line with the higher net debt issuance ratio. This finding was statistically significant at 10%. Thus far, our findings support what Bernstein et al. (2019) found in their study, except for the magnitude of investment difference. However, we then found what was partly contradictory, namely that the PE-backed firms' relative cost of debt (COD) increased by 1.9% in relation to the control group, opposed to cheaper COD which Bernstein et al. (2019) found. Nevertheless, as the statistical significance of the finding is 10%, the implications might be limited.

After establishing the balance sheet metrics, we moved on to analyze performance metrics during the post-crisis period. As previously stated, PE-backed firms invested more than their peers. In line with this, we found evidence supporting that our treatment group increased their market shares more (statistically significant at 10%). Both of these metrics - heightened investments and increased market share - may be seen as growth indicators, which means that our treatment group managed to grow more amid the crisis. These results raise several other questions, such as whether the PE-backed firms' growth focus comes at the expense of profitability. Such a finding would be in line with Bernstein et al. (2019), as they concluded that their treatment group did not outperform their peers. Based on our findings, it appears like this is not the case as our treatment group experienced both greater ROA and EBITDA over revenue, however, with varying statistical significance. Another finding which contradicts current literature. Nonetheless, PE firms appear to experience both higher profitability *and* higher growth.

Each definition of the used metrics and our chosen cut-off point in terms of statistical significance will be presented in more detail in the following sections. Additionally, as previously stated, all of the observed differences appeared in 2008 and the period afterwards. Before 2008, the differences between the two groups were not significant for any of the metrics.

In order to get an understanding of the discrepancies compared to the findings by Bernstein et al. (2019), i.e., a higher investment rate, a relative heightened COD, and superior ROA for our treatment group,

we included a discussion in Section 4. An alternative regression (alternative analysis) was performed - where we excluded the small firms from the sample and then repeated the analysis - the rest of the section merely attempted to find plausible qualitative explanations to the discrepancies. A few potential reasons appeared, where the size of our firms and other issues relating to, e.g., our treatment group's relationship to their PE investor and capital structure were of interest, but no exhaustive explanation was found.

To complement the above-mentioned discussion, we also executed a survey. The survey was aimed at professionals in the PE industry who have experienced a severe market downturn in the Swedish market. As we managed only to find 11 respondents, this section should be analyzed accordingly. Nonetheless, the received answers did offer us insights into some of the surprising results. It thus became a valuable alternative - although qualitative - complement to previous sections.

Relating back to the previously mentioned hypotheses, we do not find evidence for the main hypothesis, that PE-backed firms are more sensitive to aggregated shocks in the economy. Our findings instead point to the alternative hypothesis. Namely, in the wake of an extensive economic crisis, the PE-backed companies managed to maintain higher levels of investments, indicating that they were able to contribute with a more resilient stance to the overall economy compared to their non-PE-backed peers. Therefore, providing insights to the first research question. The higher resilience, i.e., the more aggressive investment approach during the post-crisis period, is mainly explained through PE-backed firms' enhanced ability to access the financial markets with regards to debt and particularly equity. However, we find evidence that the increased leverage ratio our treatment group experiences also results in an increased relative COD. Nonetheless, the PE-backed firms still manage to exhibit superior profitability and higher relative market shares compared to their non-PE-backed peers. Even though the statistical significance of the findings in terms of performance vary, they provide an explanation and plausible answer to our second research question. In particular, that PE-backed firms outperform their non-PE-backed peers. Furthermore, our survey respondents also indicated that PE funds' human capital might have enabled their portfolio companies to outperform their peers. Taken together, the findings mentioned above imply that PE-backed firms are more resilient to economic downturns and instead act as financial stabilizers while simultaneously managing to outperform their non-PE-backed peers.

The following sections will detail the process and techniques that lead to the results. In the upcoming Section (**1.0)**, the data will be scrutinized, and the overall methodology behind the data collection will be explained. The matching of the control group will also be clarified. In the next Section (**2.0**), the empirical strategy will be introduced. Afterwards, in Section (**3.0**), our main analysis will be presented. That particular section will also include various robustness tests that attempt to validate and verify the results. When the robustness of our analysis has been discussed, Section (**4.0**) will review our results in relation to earlier research on the area. The focus will be on the deviations in our data sample compared to previous research where possible explanations to our diverging results are discussed. The alternative analysis will also be presented in this section. Section (**5.0**) includes a discussion of the survey's results. Lastly, Section (**6.0**) summarizes and concludes our findings with a discussion of future research and implications of our results.

1. Method for Data

1.1 Data-Collection - Treatment Group

The first step of our data gathering was to find companies that were PE-backed at the onset of the crisis. To do this, we used S&P Capital IQ and searched for "PE-transactions" from 1989 to 2008. Deals that were announced during this period but finalized after 2008 were excluded. As the database does not recognize "PE-transactions", we had to find various proxies for the search engine. Therefore, we used keywords in line with Bernstein et al.'s (2019) method, which included words/phrases such as "Leveraged Buyout", "Private Equity", "Mergers & Acquisitions", "M&A" and "Management Buyout". In doing so, we chose not to include any transactions made by investment firms or venture capital firms. To further narrow the sample, we included only PE-transactions within the geographic area of Sweden.

Similar to the approach of Boucly et al. (2011), we chose to include companies that had reports within a corporate consolidated structure. To control for this, we read the administration report and controlled for data on revenue and employees as Boucly et al. (2011), to make sure that we included data from the correct company with regards to the transaction. As some of the companies in our treatment group consolidated their reports for the corporate structure as an effect of the leveraged buyout (LBO) or management buyout (MBO), we backtracked the assets and revenue to the year prior to the finalization of the deal to make sure that we were consistent in using the same company. Most commonly, this resulted in the use of the parent company's report, instead of the consolidated report.

Approximately 400 transactions became the result of the search - meaning that we were able almost to capture all the transactions made in Sweden during our given time-frame, please compare Figure 5 to Figure A.1 for a closer look - which was later reduced further to 79 respective firms. In that process, we manually went through the deals and made sure that the target company still was PE-backed by the end of 2007 and that the PE fund had not yet made an exit by the end of 2008. The reasoning for this was to make sure that the PE fund still had operational and financial influence in the target company following the onset of the crisis. We also ensured that each of the portfolio companies that fulfilled our requirements had financial reports available for the period 2003-2010 in the database Retriever.[5] At this time, we decided to exclude 2011 as its own year because our sample would have been reduced further otherwise. Instead, we made sure that the specific company did not declare bankruptcy or liquidate the company during 2011, which meant that we also checked for the availability of reports showing an ongoing business for that year. As mentioned earlier, each limited company in Sweden, independent of size, is required to file annual financial statements, meaning that it was rather effortless finding reports even for private companies, independent of size, that dated back almost 20 years. In contrast to previous literature, where the research has been limited to medium-sized companies because of limitations relating to the availability of certain items in the financial reports, we have included small companies to a large extent as Swedish regulations demand thorough financial reports for these firms. However, some of the smaller firms were excluded as their reports were too vague as they lacked key information for this study.[6] The inclusion of smaller size firms might also contribute to the existing literature by adding a new dimension, and it also allowed us to keep the sample as vast as possible. Lastly, we followed Michaely and Roberts' (2012) industry selection by excluding companies within the financial and public sector.

[5] Retriever is a database which, inter alia, stores official financial reports from the Swedish Companies Registration Office (Bolagsverket).
[6] Examples included lack of information of depreciation and interest payments which resulted in exclusion.

Afterwards we manually went through each of the companies' financial statements and extracted the following items: total assets, depreciation, total debt, EBIT, equity, net profit, revenue, and interest payments. In addition to these items, we also derived industry data from the Swedish Agency for Economic and Regional Growth (Tillväxtverket), which allowed us to establish the respective companies' market share. The two first digits of the SNI-code were then used in order to find industry revenue (Tillväxtverket, 2021). These items meant that we could calculate our sought-after metrics, which are: investment over assets, net equity contribution over assets, net debt issuance over assets, debt over assets, ROA, EBITDA over revenue, COD, and market share (please footnote 7 for definitions).[7] To limit the influence of outliers, we winsorized all of the metrics at 2%.

1.2 Data-Collection - Control Group

Important to keep in mind is that PE-backed companies often exhibit higher leverage ratios in combination with larger asset bases as a result of help from the PE fund (Frontier Economics, 2013). These factors have to be taken into consideration when the control group is constructed. Simply because we aim to have a control group that is as similar as possible to the characteristics of the PE-backed firm when the crisis hit. It would be ideal to find peer companies that were truly identical to our PE-backed firms; the only difference is that one company is PE-backed, and the other is not. However, as those kinds of comparable firms do not exist in the real world, we circle back to controlling for the aforementioned differences. During the remainder of this section and the next one, we will discuss how the control group was constructed and if the DID model we aspire to utilize may be used.

When collecting data on our control group, we followed a variant of Bernstein et al.'s (2019) methodology, which, in turn, used a more conservative method than Boucly et al. (2011). In order to find a proper control group, we selected peer companies operating in the same 5-digit SNI-code. If the company was operating within multiple SNI-codes, we chose the SNI-code most fitting to its core business.[8] Furthermore, in those cases where no comparable firms within the 5-digit SNI-code were found, we instead used Bernstein et al.'s (2019) method of only using the first two digits[9] in the SIC-code (equivalent to SNI-code). We then further restricted our search for companies on the basis of leverage, ROA, and asset base. We included companies that were alike, in the sense that they were within a 30% bracket of the PE-backed firm. However, as Sweden is a smaller market than the UK, we had to alter the alike factor to get a meaningful size of the control group. This alternative method thus became a middle-ground between the two mentioned papers' methods. In the cases when necessary, a 50% bracket was used, similar to the method Boucly et al. (2011) adopted. With our method, this meant that we controlled that the matching sample fulfilled at least two out of three criteria within the 50% bracket or one within the 30% bracket. A rather obvious exclusion criterion was that the peer companies were not allowed to be PE-backed at the onset of the crisis. We ended up with 129 companies in the

[7] Investment:Assets(t)-Assets(t-1)+Depreciation(t)
Net equity contribution: Equity(t)-Equity(t-1)-Net Profit(t)
Net debt issuance: Total Debt(t)-Total Debt(t-1)
Leverage over assets: Total Debt(t) / Total Assets(t-1)
ROA: Net profit(t) / Total Assets(t-1)
EBITDA over revenue: EBITDA(t) / Revenue(t) where EBITDA is calculated as our EBIT item + Depreciation (we included both depreciation and amortization in that item), and EBITDA means: Earnings Before Interest, Taxes, Depreciation and Amortization
Market Share: Firm Revenue(t) Total Industry (2-digit SNI code) Revenue(t)
CoD: Interest payment (t) / Total debt (t-1)

[8] Many of the bigger companies for instance had "70100" as one of their SNI codes, which most often only represented that the company had a headquarter. In those cases we instead chose an industry-code closer to the actual business by reading the company report, specifically the administration report.

[9] Bernstein et al. (2019) used a 3-digit SIC code for industry classification. The 3 digit is equivalent to the 2 digit, which is why we have described it as two digit code. See page. 1341 in Bernstein et al. (2019).

control group. Later on, we manually went through their financial reports and extracted the sought-after items (similar to the method described in Section 1.1).

1.3 Comparison of the Two Groups

Table 1. Industry Distribution

Industry Distribution	PE Group	Control Group	Total:
Services	26 (33%)	45 (35%)	**71 (34%)**
Wholesale Trade	18 (23%)	33 (26%)	**51 (25%)**
Manufacturing	29 (37%)	36 (28%)	**65 (31%)**
Retail Trade	5 (6%)	13 (10%)	**18 (9%)**
Construction	1 (1%)	2 (2%)	**3 (1%)**
Total:	**79**	**129**	**208**

Table 1 illustrates the industry distribution for both our groups. No companies within the financial and public sector are included, as previously stated. The chosen industry is based on their respective SNI codes. If the company operates within multiple industries, and thus has more than one SNI-code, the industry closest to the core operations was chosen.

Table 2. Summary of Chosen Metrics 2007

	PE sample				Control Group					
	N	Mean	Median	SD	N	Mean	Median	SD	Mean Difference (In %-points, except Revenue)	T-value
Revenue (MSEK)	79	469	223	528	129	405	159	684	64	0,1941
ROA	79	11,04%	10,4%	8,77%	129	8,32%	8,12%	10,83%	2,72%	0,0799*
Investment/asset	79	14,93%	14,87%	22,90%	129	11,03%	9,14%	22,19%	3,90%	0,2162
Net Equity contribution/asset	79	-7,25%	-3,13%	15,70%	129	-4,81%	-1,82%	16,21%	-2,44%	0,1291
Net Debt Issuance/asset	79	8,14%	4,73%	18,21%	129	4,01%	3,09%	19,20%	4,13%	0,0602*
Debt/Assets	79	59,68%	62,64%	21,32%	129	61,01%	61,77%	36,56%	-1,33%	0,491

In Table 2 we find a summary statistics table for our chosen metrics at the end of 2007. The last two columns show the difference between the two groups' means and the respective T-values. The differences were not statistically different from one another in any of the cases. Please read the continuation of this section for a more detailed description of the test and which cut-off point was used.

Table 3. One Year Growth Trends for Chosen Metrics (2006-2007)

	PE sample				Control Group					
	N	Mean	Median	SD	N	Mean	Median	SD	Mean Difference	T-value
Revenue	79	26,24%	11,91%	89,30%	129	15,91%	9,80%	39,23%	10,33%	0,2311
ROA	79	33,24%	-9,59%	361,72%	129	18,34%	1,70%	524,31%	14,89%	0,6956
Investment/asset	79	17,23%	22,54%	431,42%	129	-9,43%	37,45%	291,22%	28,00%	0,1182
Net Equity contribution/asset	79	-31,84%	-40,84%	875,11%	129	-28,21%	-70,77%	469,72%	-3,63%	0,6345
Net Debt Issuance/asset	79	37,82%	-6,54%	545,19%	129	-41,56%	9,93%	650,78%	79,38%	0,0678*
Debt/Assets	79	1,48%	-1,75%	21,23%	129	2,83%	-1,24%	25,89%	-1,35%	0,1302

Table 3 shows how the two groups evolved during the period until the crisis. The table shows the growth rate in percentage points for the year up until the crisis. The last two columns show the difference between respective groups' mean, and also the following T-values. None of the differences in the table are statistically significant at our chosen cut-off point.

Table 4. Two Year Growth Trends for Chosen Metrics (2005-2007)

	PE sample				Control Group					
	N	Mean	Median	SD	N	Mean	Median	SD	Mean Difference	T-value
Revenue	79	95,23%	33,05%	489,17%	129	23,82%	10,45%	69,45%	71,41%	0,1525
ROA	79	102,45%	-9,56%	1126,25%	129	114,23%	14,01%	2751,62%	-11,78%	0,4305
Investment/asset	79	12,15%	4,39%	231,83%	129	10,15%	-6,32%	325,36%	2,00%	0,071*
Net Equity contribution/asset	79	-61,25%	-58,75%	170,17%	129	-100,01%	-45,67%	256,11%	38,76%	0,1988
Net Debt Issuance/asset	79	80,72%	33,78%	600,36%	129	34,15%	-1,26%	2027,70%	46,57%	0,527
Debt/Assets	79	-1,51%	-0,04%	74,54%	129	6,26%	2,11%	65,64%	-7,77%	0,0587*

Table 4 shows how the two groups evolved in terms of our chosen variables, in percentage points, for the two years leading to the crisis. The last two columns show the difference between respective groups' mean, and also the following T-values. None of the differences are statistically significant at our chosen cut-off point.

Table 1 shows how our treatment group and control group are distributed based on their industries. Columns 2 and 3 in Table 1 report that the differences between each industry's share of the total distribution are alike in all cases. This implies that the companies in each of the groups originate from the same industries to a large extent. The differences that exist are rather derived due to the process we chose to adopt if a company had multiple SNI-codes. In those cases, we, as mentioned above, chose the industry we believed was closest to the individual company's core business. Minor differences may therefore arise in the selection. Nonetheless, the similarities in industry distribution are thanks to our rigorous control group selection, which originated from pairing based on the 5-digit SNI-codes. Furthermore, as the table suggests, the companies within our study are mainly concentrated around three industries, namely Services (34%), Manufacturing (31%), and Wholesale Trade (25%). The rest of the sample (10%) is either within the Retail Trade (9%) or Construction (1%) sector.

Table 2 indicates a sample of rather mid-sized companies that show tendencies of similarities. This is partly in regards to revenue, with averages of around 469 and 405 million SEK for the treatment group and control group, respectively. The similarities are not only attributed to revenue but also the rest of the metrics. Both groups appear to issue debt to almost the same extent, have approximately the same equity contribution, essentially have the same leverage ratios, and be equally profitable (based on ROA).

Following, in order to establish if differences, in fact, existed based on statistical significance instead of merely seeing that they appear to be alike, we performed t-tests on the variables. These variables were defined in Section 1.2, and they are part of the firms' investment and funding policy, capital structure, and operational performance. Before we did so, we developed two hypotheses that were fitting for our setting:

H_0 = *The investment and funding policies/capital structure/operational performance are* ***the same*** *for the PE-backed firms and their comparable peers*

H_a = *The investment and funding policies/capital structure/operational performance are* ***different*** *for the PE-backed firms and their comparable peers*

After the construction of the hypotheses mentioned above, we began testing them. We performed t-tests for all of the respective variables. Followingly, the t-tests revealed no p-values that would imply that

the null hypothesis should be rejected in favor of the alternative one.[10] Additionally, this formal test of the differences was our first part in testing if the parallel trend assumption that the DID model relies upon was fulfilled. For the assumption to hold, it is important that the companies do not differ prior to the study's event/treatment effect, which, in this case, is the 2008 financial crisis.

Table 2 thus summarizes the chosen metrics and also reports the mean difference between the two groups. If there would be two or more asterisks (*) next to the t-values, it would imply that the mean differences indeed were significant.[11] As neither of the differences were significant according to the t-tests, no t-values are accompanied by two or more asterisks. The groups' financial health thus appear to be alike right before the Great Recession.

In Tables 3 and 4 we attempt to verify the pre-crisis parallel trend assumption that Table 2 began investigating. To do so, we used both 1-year and 2-year growth rates that both stretched until the end of 2007. These tables consist of the same metrics used in Table 2, but are now written as percentage points instead of absolute values. In order to establish whether or not the differences are significant, we once again performed t-tests on all of the respective variables based on the same hypothesis (H_0 and H_a). The results were similar to the ones in the previous tests. None of the differences were statistically significant at our cut-off point, meaning that the null hypothesis could not be rejected in any of the cases.

Adding to the tables mentioned above, we also included Figures 2,3, and 4. The figures show growth patterns for three of the used metrics (investments, net equity contribution, and net debt issuance). As exhibited by these figures, the treatment and control group developed similarly prior to the recession, where the two groups' standard error bars overlapped for each of the years. Thus, these figures further strengthen the conclusion that the two groups were alike and not statistically different pre-recession.

Taken together, our treatment and control group appear to be alike at the onset of the crisis. Not only based on the three dimensions we used when selecting the companies, but also in regards to investments, equity contribution and debt issuance. The parallel trend assumption thus appears to hold, which is a crucial part of our study, since the DID-model would not be applicable otherwise.

[10] We used a p-value of 5% as the cut-off point. This is the most commonly used value, and might be seen as a more conservative one rather than 1%. Meaning that even though a more conservative cut-off point was used, neither of the differences were significant.
[11] One * equals 10% significance, two ** indicates 5% significance and three asterixis means 1% significance (see footnote 10 for more information regarding the cut-off).

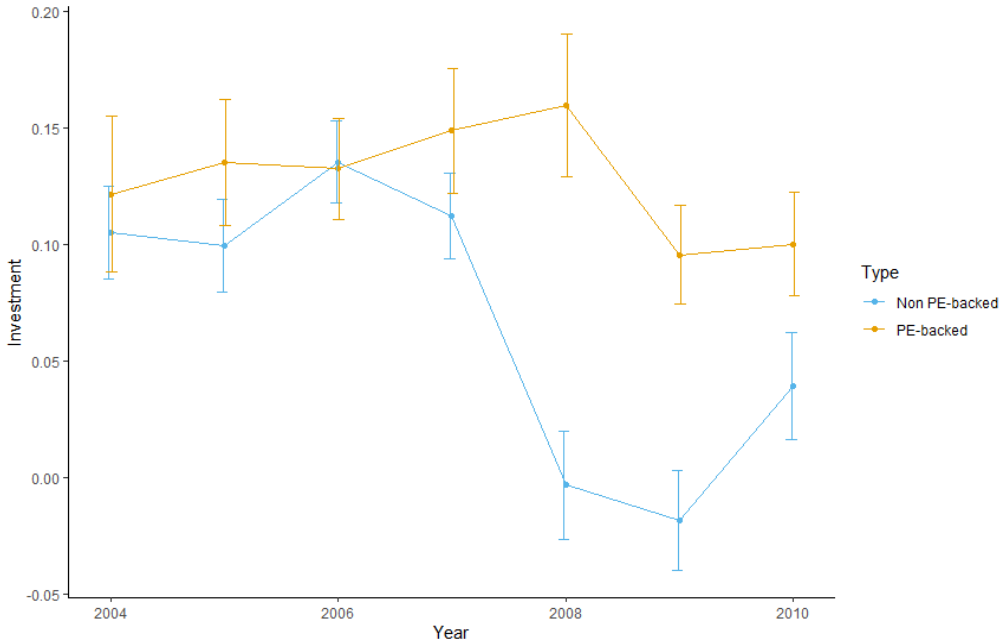

Figure 2

Average Investment over Assets (2004-2010)

Figure 2 illustrates the change in the variable 'investment over assets' for PE-backed and non-PE-backed companies, respectively for the Swedish market. The time period starts 2004 and ends 2010. Annual observations illustrate the year effects with standard errors at group level. Computed at default confidence interval of 95%.

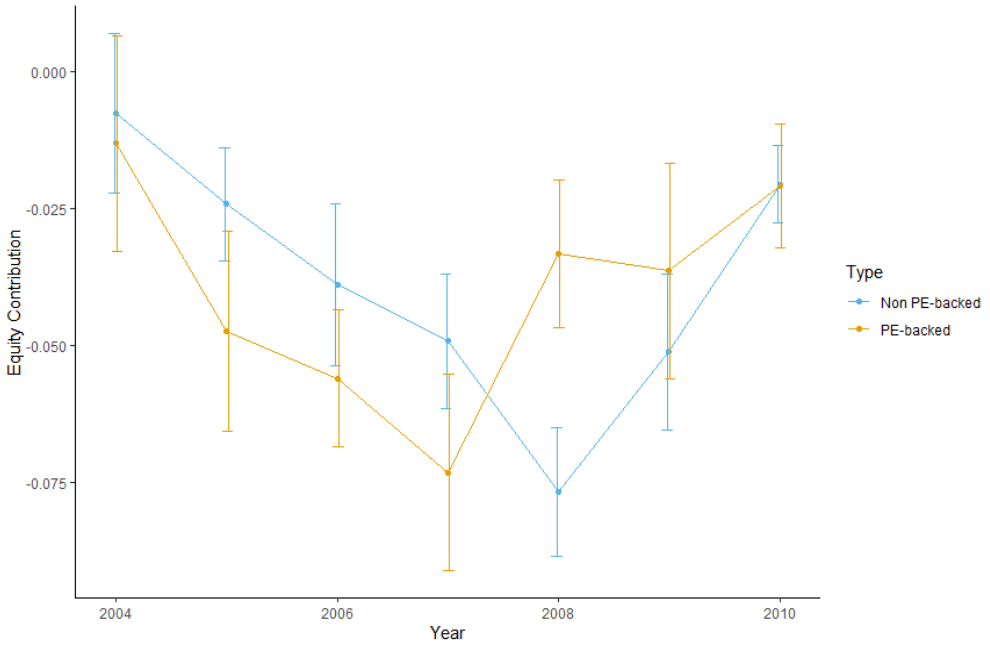

Figure 3

Average Net Equity Contribution (2004-2010)

Figure 3 illustrates the change in the variable 'net equity contribution' for PE-backed and non-PE-backed companies, respectively for the Swedish market. The time period starts 2004 and ends 2010. Annual observations illustrate the year effects with standard errors at group level. Computed at default confidence interval of 95%.

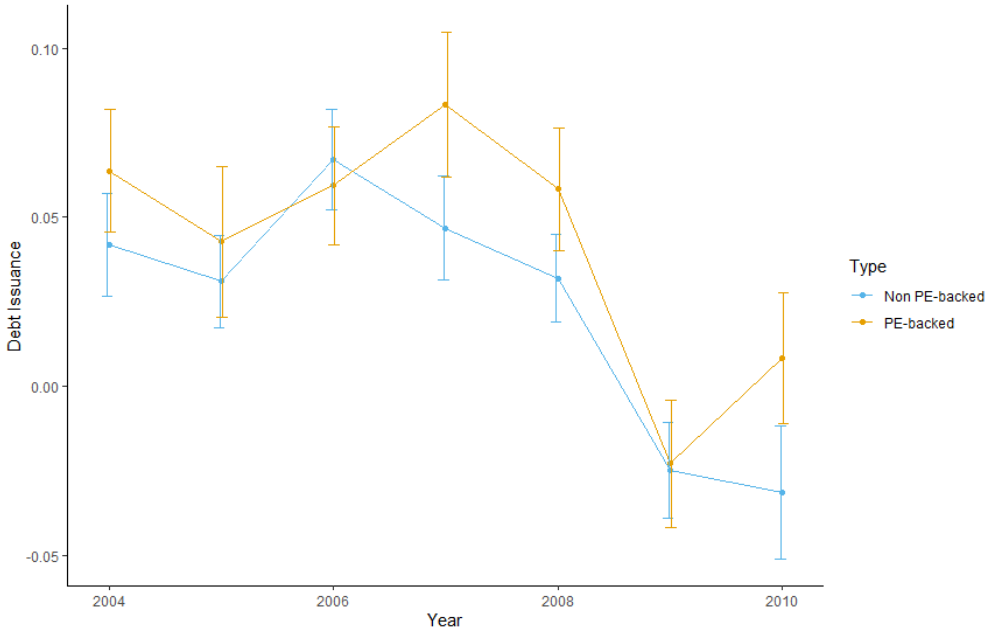

Figure 4

Average Net Debt Issuance (2004-2010)

Figure 4 illustrates the change in the variable 'net debt issuance' for PE-backed and non-PE-backed companies, respectively for the Swedish market. The time period starts 2004 and ends 2010. Annual observations illustrate the year effects with standard errors at group level. Computed at default confidence interval of 95%.

1.4 Is the PE market in Sweden similar to other PE markets?

Before we start with the core of the analysis, it is first meaningful to establish that the findings of this study are representable for private equity in a broader sense. At least in the sense that the results will add value to existing literature. Sweden is, as mentioned earlier, a rather small country compared to other nations if each country's national GDP is taken into consideration. Therefore, we will examine if Sweden's PE market despite this is fairly similar to PE markets in other countries in a general way.

The first part of the analysis is to examine whether or not the PE market in Sweden follows similar growth patterns as the rest of Europe. Figure 5 shows Sweden's growth patterns from 1988 to 2006, and Figure 6 shows the same growth metric for Europe as a whole for the same period of time. The two graphs exhibit noticeably similar patterns. Around the year 2000, both of the graphs display a maximum point, followed by a decrease during a few years, which is then followed by a steep uphill curve. From this general comparison, it thus looks like Sweden follows the growth patterns of Europe.

The next part of the analysis is to explore if Europe can be assumed to be similar to the US. These two geographic areas were chosen because they, together with Canada, accounted for at least 92% of the global PE market between 1985 and 2007 (Kaplan & Strömberg, 2009). The two markets' similarities have been thoroughly researched, and the conclusion from these studies is that Europe follows similar patterns to the US (Bernstein et al., 2019; Kaplan & Strömberg, 2009).

Therefore, the general conclusion is that Sweden does follow the growth pattern of the aggregated PE market. An argument that further strengthens this conclusion is that Europe's second-largest PE fund is located in Sweden, and that Sweden is an important actor in the European PE market (Copenhagen Economics, 2020; Wallach, 2020). Meaning that even though the first part of the analysis (Sweden's similar growth patterns in relation to Europe as a whole) might be vague, the conclusion can instead mainly be attributed to the well-documented second part of the analysis. Namely, the similarities

between Europe and the US. Despite this analysis being of a more general character, we believe it to be an acceptable proxy for Sweden's similarities with other PE markets. Sweden is a unique country (e.g., because of its size); however, despite this uniqueness, we still argue that findings in relation to the Swedish PE market can be generalized in a broader sense due to the arguments mentioned above.

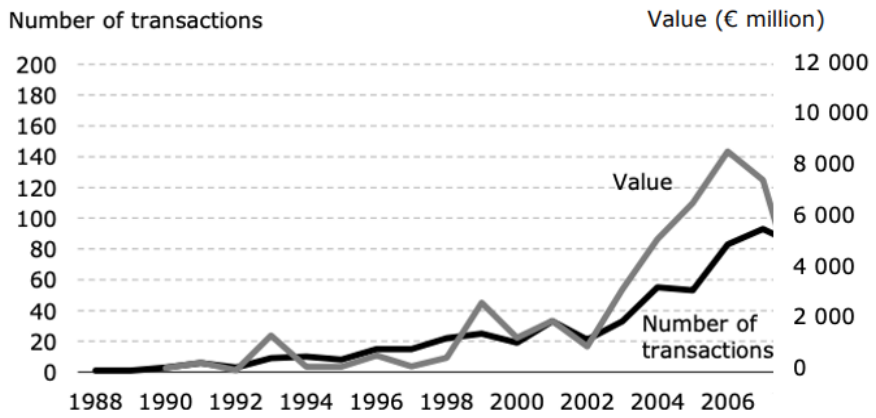

Figure 5
Number of PE transactions and by value during 1988-2006 in Sweden
This figure portrays the activity on the Swedish PE market from 1988 to 2006 (Næss-Schmidt et al., 2017). Both deal value, and number of transactions are included in the figure. The important part for this part of the analysis, namely for section (1.4) is mostly the graph showing the deal values, as this is the metric that figure 6 shows. Furthermore, the other graph, "number of transactions" shows a similar pattern to what we found in our own numbers. We managed to include almost all the transactions on the Swedish market, which further strengthens the reliability of our data (see Figure A.1).

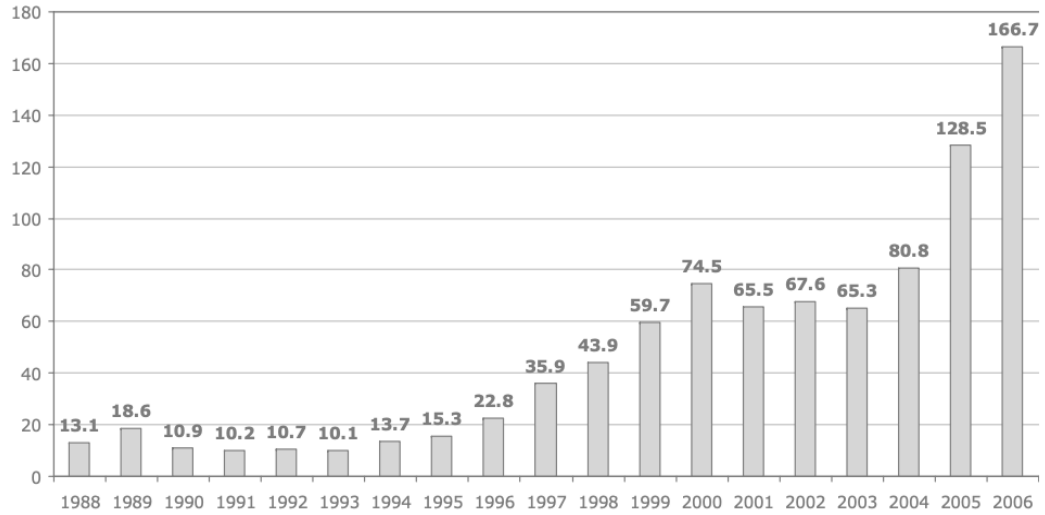

Figure 6
PE transactions' deal value during 1988-2006 in Europe
This figure depicts the deal value of all the PE transactions in the Europe region between 1988 and 2006. The values are depicted in billions of euros. (Guennoc, 2007)

2. Empirical Strategy

The empirical strategy of this paper has its base the years prior to 2008, i.e., 2004-2007, and is compared to the years during and after the recession (2008-2010). The rationale for this time-span is to establish a comparison between our treatment group and control group before and after the financial downturn in 2008, and how it potentially has affected the respective firms' 1) investment and funding policy, 2) capital structure, and 3) financial performance. With the basis of our identified treatment group and control group, we have earlier (Section 1.3) performed statistical hypothesis tests showing similarities prior to the recession, and later on, we will compare the groups post-crisis with the help of our DID model (which will be introduced in this section). As our distinction of the time period suggests, we assume 2008 to be the first year of the recession. This is both in line with Figure 1, which illustrates that the availability of credit dropped steeply during 2008, and with existing literature within the subject (Kahle & Stulz, 2013; Duchin et al., 2010).

As previously stated, our groups displayed similar trends prior to the crisis and also similarities relating to the chosen metrics - in absolute values - at the onset of the crisis. Therefore, indicating that the parallel trend assumption, which our chosen model relies upon, holds. This is an integral part of our analysis since the DID model relies on the two groups - treatment and control group, respectively - evolving equivalently in the absence of the financial crisis, 2008. Primarily, Tables 3 and 4, combined with Figures 2-4, offer insight into this by depicting similarities in growth patterns prior to the Great Recession. Ergo, implying that equivalent progress in the absence of the recession is probable.

Owing to these relationships, the DID regression helped us establish differences during the post-2007 downturn that are attributed to variations in organizational and operational character, i.e., that one group is PE-backed and one is not. Pursuant to this isolation of the organizational character, we were able to isolate it from differences that otherwise could have been influenced by aspects from respective groups' financial reports or performance prior to the crisis. Furthermore, the DID model also informs us whether or not the differences found are statistically significant or caused by chance.[12] The model we have developed and used throughout this paper is closely linked and influenced by Bernstein et al. (2019):

$$y_{it} = \alpha_t + \alpha_i + \beta_1(PE\_firm * Time) + \epsilon_{it}$$

The model consists of multiple parts. y_{it} varies with the chosen outcome variable (e.g., ROA or Investment / Assets) and is based on company (i) at time (t). Furthermore, the two next variables, namely α_t and α_i, represent both year (t) and company (i) fixed effects. The rationale for having firm fixed effects is because we wanted to control for any time-invariant differences between our two groups (similar to what Bernstein et al. (2019) did). The next part of the model is two dummy variables where PE_firm gets the value of 1 if the specific company is PE-backed, and the $Time$ variable turns into 1 if the year is later than 2007 (i.e., 2008). Lastly, the ϵ_{it} variable display that we chose to cluster our standard errors at the firm level (Bertrand et al, 2004).[13]

[12] See either section 1.3 or 3 for definitions regarding statistically significant

[13] Bertrand et al. (2004) found that because of serial correlation, conventional DID standard errors may overestimate the significance levels. Meaning that findings may not be as significant as previously thought. In order to minimize this risk we chose to cluster the standard errors at the firm level, a decision in line with Bernstein et al. (2019).

3. Main Results

In line with our first research question (the alternative hypothesis) - our main analysis provides insight into whether or not PE-backed companies contribute to stability or not during a crisis. This analysis suggests that the PE-backed firms were more resilient. Our findings also offer insights into our second research question, whether portfolio companies perform superior compared to their non-PE-backed peers. Relating to the first research question, this is implied by the investment policy. The findings in terms of ROA and revenue growth post-2008 provides an understanding of the second research question. However, the findings from the DID regression indicated results that in part are in contradiction to contemporary literature. This was in regards to noticeably larger investments levels as well as a higher relative COD and a higher ROA for the treatment group compared to the control group.

The results from our main regression, as a whole, will be analyzed in-depth in the ensuing section. Starting with investment and funding policies and later continuing by presenting findings in terms of performance metrics and lastly, a robustness check. Followingly, Section 4 will attempt to explore probable explanations for the diverging results and their implications compared to previous literature.

3.1 Investment and Funding

Table 5, Column 1, shows that the treatment groups' investment policy differs compared to that of the control group. Coalesce, the entire sample of our Swedish firms, both PE-backed and non-PE-backed, experienced an overall decline in investments post-2007 (Figure 2). However, as Column 1 in Table 5 indicates, the PE-backed companies experienced higher investment over asset levels (11.4% - meaning that they decreased their investment *less*) compared to the control group after 2007. A substantial part of the significantly contrasting result in Column 1 stems from a set of factors that have had a collective impact. The first is the PE-backed firms' slight increase in investments 2007-2008, when the non-PE-backed peers, in contrast, experienced a sharp decrease (Figure 2). The second is the higher investment levels in the subsequent years, as implied by Figure 2. As indicated, the treatment group maintained higher levels of investments throughout the crisis, which adds to the higher investment over assets in Column 1, Table 5.

Column 2 in Table 5 demonstrates net equity contribution over assets and illustrates a similar contrast between our treatment and control group, respectively. This is with regards to the infusion of equity capital which was 2.4% higher for our treatment group. A possible explanation for this might be PE-backed companies' relationship with PE funds. This partnership enables high accessibility of equity capital even in the event of economic downturns. Predominantly, this is made possible due to the concept of "dry powder" (see the following footnote for a reminder of the definition).[14]A more in-depth discussion of this will be held in upcoming sections; however, in this section, it is worth mentioning that this superior access to equity capital may partly explain the higher investment rate our treatment group exhibited. This line of reasoning is also partially supported by our hypothesis testing prior to the crisis that indicated similarities in both investments and equity contribution (Table 2). Consequently, when the treatment group, later on, experienced a higher inflow of equity, it is not unlikely that investments also increased.

Our results in Table 5 imply that other factors may have influenced the PE-backed firms' investment policy. These findings are not mutually exclusive from net equity contribution, meaning that the metrics in Columns 3-5 in Table 5 could also have impacted the respective firms' investment policy. The results

[14] "Dry powder" refers to capital which PE-funds have raised, but not invested, meaning that this capital can be used on their current commitments in their portfolio, instead of finding new investments when a recession hits.

in Column 3, Table 5, for example, suggest that the treatment group issued 1.9% more debt relative to the control group. Furthermore, as shown by Column 4, the treatment group also increased their leverage relatively more. Similar to the above discussion regarding access to equity, it is possible that the treatment group, through their connection with their PE investor, can access debt financing more easily as well.[15] However, the results in Column 5 suggest that although the treatment group is capable of taking on more leverage, they experience a higher relative COD by doing so.

The findings relating to Columns 3-5 (Table 5) should, however, be read with caution due to the respective columns' statistical significance levels. Both Columns 4 and 5, respectively, were statistical significance at 10%, and Column 3 was non-significant. Albeit the statistical significance, our data imply a trend of higher net debt issuance and consequently higher leverage growth for our treatment group (Figure 4 & Columns 3-4). As seen in Figure 4, debt issuance remained more stable and at higher ratios at all times compared to the control group. Thus, our data points towards, although with the possibility of being caused by chance, that the treatment group expanded their debt more.

Binding the above together, it is evident that the treatment group experienced what can be considered a softened downturn regarding their investment policy, net equity contribution, and expansion of debt. Relating to our first research question (the alternative hypothesis), our results, therefore, suggest that PE-backed firms do not contribute to financial fragility. Instead, they contribute to financial stability as they experienced a higher resilience amid the financial downturn. As indicated by Table 5, this is possibly enabled through superior access to capital markets, where equity appears to be the most crucial metric. This indicates that portfolio companies were less financially restrained amid the crisis. As previous sections highlighted that the parallel trend assumption holds, our observed results are plausibly explained by the PE funds' relationship with the portfolio companies. This implies that the PE funds enable infusion of capital when access to external capital otherwise may be restrained because of economic outlooks deteriorating. Part of our findings diverges from contemporary literature, specifically concerning Columns 1 and 5 in Table 5.[16] The following section explores what these findings in Section 3.1 meant for the performance of the firms.

[15] Ivashina & Kovner (2011) show that repeated bank relationships through the PE investor may reduce information asymmetry and enable easier access to debt financing.

[16] Findings by Bernstein et al. (2019) are in line with our results in Column 1, Table 5. However, the magnitude of the investment stands out (11.4% in our results compared to 5.9%). Moreover, the results in Column 5, Table 5, goes against the findings in their paper as the relative COD for our treatment group increased, as opposed to decreased as in the Bernstein et al. (2019) paper (significant at 5%). Additionally, Ivashina & Kovner (2011) found that credit spread should be lower for the treatment group owing to PE-funds bank relationships.

Table 5. Investment and Funding Policies

	(1) Investments/Assets	(2) Net Equity Cont./Assets	(3) Net Debt Iss./Assets	(4) Leverage	(5) Cost of Debt
PE_Firm * *Time*	0,114**	0,024**	0,019	0,021*	0,019*
	(0,034)	(0,03)	(0,011)	(0,019)	(0,012)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	608	582	597	615	602
R-Squared	0,06	0,004	0,01	0,06	0,02

Table 5 illustrates our result of the DID regression in relation to the groups' investment and funding policies. More specifically, the investments of the firm, capital inflow metrics, leverage ratios and also whether or not their COD changed. Section 2 contains a breakdown of the regression model, and as can be seen in the table, all of the calculations include firm and year fixed effects. Furthermore, all standard errors are clustered at the firm level. The first part shows what component of the model we are mostly interested in, namely the $PE\_firm * Time$ parameter, as the rest of the variables rather work as noise-reduction. Please see section 1.1 for definitions of the particular metrics. Lastly, ** denotes statistical significance at 5% and * at 10%.

3.2 Performance Metrics

After establishing that our treatment group chose a more aggressive investment policy approach to tackling the crisis, it will now be investigated whether or not this had any impact on their performance. Compared to their peers, our treatment group invested more, experienced larger capital inflow, higher relative leverage ratios, and higher relative increase in COD (at varying significance levels). The increased capital outflow in terms of investments and higher cost of capital suggest that PE-backed firms' performance ought to be affected negatively, but simultaneously that their share of the total market should increase as a result of the investments. The metrics chosen to answer this question are ROA, EBITDA over revenue, and market share, where the latter primarily works as a proxy for growth. To start this particular analysis, we begin by examining if the expansive investment policy paid off in regards to increasing market share.

Market share can be interpreted in various ways. However, we believe it functions as an effective proxy for growth in this case. This is because it cannot, without doubt, be attributed to "performance" in its purest form as the metric solely reports firm revenue in relation to total industry revenue, meaning that expenses are not considered. As PE-backed firms decided to invest more during the crisis, a reasonable conjecture is that their market share also increased relative to their peers. Table 6, Column 3, explores this hypothesis by using our DID model. It can be seen that PE-backed companies increased their market share more than their peers (2.1%), a result in line with our conjecture which also is statistically significant at 10%.

Inevitably, the question which now arises is if PE-backed firms' focus on growth has hampered their overall performance. This phenomenon has been thoroughly researched, where multiple contemporary papers have concluded that PE funds' focus on growth has a limited effect on their portfolio companies' performance (Koo, 2016; Bernstein et al., 2019; Hedberg & Bergström, 2013). Furthermore, Table 6 contains our two chosen performance metrics, where Columns 1 and 2 depict their results. Both ROA and EBITDA over revenue imply that the PE-backed companies were able to outperform their non-PE-backed peers. However, the statistical significance of these results vary. Although the low significance of the EBITDA over revenue metric in isolation should not be an indicator of superior performance, we argue that the aggregated performance indication with ROA's strong statistical significance should be taken into consideration. Furthermore, one might also reason that EBITDA is a metric that in its nature is more lagging than ROA, if related to the increased investments, meaning that it might take longer for

it to appear in the financial statements. An argument that further strengthens the improved performance case.

Pursuant to the above, it is implied that the PE-backed firms' investment-focused strategy appears to have paid off in multiple ways. Not only did their market share increase relative to their peers. The market share growth was also accompanied by improved performance. This implies that the treatment group outperformed the control group, a finding that provides explanatory value to our second research question. Initially, we believed this was unlikely as the accounting principles generally tell us that a strategy that entails increased cash outflow (larger investment rate and heightened COD) with no direct link to increased cash inflows is detrimental for the company's performance. However, that somewhat naive and straightforward way of thinking forgets to keep in mind that investments are made to hopefully boost future revenue. In this case, the higher investment levels appears to have been beneficial and therefore managed to enhance both growth and performance. Furthermore, even though the finding might be unlikely, and that the result is not completely in line with Bernstein et al. (2019), it is not in contrast with other previous research (Cohn & Towery, 2014; Boucly et al., 2011). However, these studies are performed during regular economic times, but nonetheless illustrating that the result is indeed plausible.

The key results of Section 3.1 and 3.2 provide insights into our two research questions. PE-backed companies appear to be *more* resilient to economic downturns compared to their non-PE-backed peers. Not only were our treatment group able to pursue a more capital-intensive growth strategy following the crisis. They were *also* able to transform that growth into improved performance. Most of the findings are in line with contemporary research concerning this topic. However, some parts of the results stand out. In particular, the magnitude of the investment differences (11.4%), partly statistically significant differences relating to COD and the treatment group's superior ROA. These aspects are of interest for future studies as insights into those might offer additional explanatory value within this topic; we will also attempt to explain them further in Section 4. An understanding of the differences may result in further knowledge surrounding the Swedish PE market. Ultimately, this could provide insights into how both extraneous macroeconomic conditions domestically may impact PE-backed firms but also how this may be considered in terms of future market volatility. Besides the possible explanations covered above, the differences in terms of company size will be discussed. Prior to this, the differences between the treatment and control group, respectively, will be tested for robustness in order to determine whether or not our findings appear to be reliable.

Table 6. Performance Metrics

	(1) ROA	(2) EBITDA/Revenue	(3) Market Share
PE_Firm * *Time*	0,017**	0,005	0,021*
	(0,012)	(0,007)	(0,011)
Year Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	611	605	615
R-Squared	0,07	0,01	0,002

Table 6 shows the difference in performance metrics, namely ROA, EBITDA/Revenue and Market Share, calculated through our DID model. As the table indicates, year and firm fixed effects are included in all cases. Also, the standard errors are clustered at the firm level. For a more detailed explanation of the model used, please see section 2. Furthermore, please see section 1.1 for the definitions of the metrics used in the table. The parameter of interest in this case is $PE\_firm * Time$. Finally, ** denotes statistical significance at 5% and * at 10%.

3.3 Robustness

As the study's findings are now in place, we will continue by performing various robustness tests in this section to validate the results and verify their reliability. The first of which is the same hypothesis test as we performed in "Section 1.3". We believe this to be a favorable test because we executed an identical one the year prior to the crisis, which indicated that our treatment group and control group were similar as none of the differences in Tables 2, 3 and 4 were statistically significant at our cut-off point.

During the period after the initial economic shock to the world economy, we managed to find evidence that the two groups evolved and performed differently. This would, therefore, suggest that our two sample groups indeed would be different from one another after the crisis (as measured in 2010). The following table reports the result of the tests:

Table 7. Summary of 2010

	PE sample				Control Group				
	N	**Mean**	**Median**	**SD**	**N**	**Mean**	**Median**	**SD**	**Mean Difference (in %-points except revenue)**
Revenue (MSEK)	79	649	313	755	129	457	151	640	192 ***
ROA	79	10,42%	1,27%	15,07%	129	5,78%	-0,09%	8,90%	4,64% **
Investment/asset	79	9,59%	9,81%	20,30%	129	3,98%	6,69%	23,92%	5,61% **
Net Equity contribution/asset	79	-2,15%	0,24%	18,99%	129	-2,01%	1,86%	8,24%	-0,14%
Net Debt Issuance/asset	79	0,82%	0,92%	16,69%	129	-3,12%	1,26%	39,19%	3,94% **
Debt/Assets	79	62,18%	57,75%	18,77%	129	62,8%	57,11%	24,26%	-0,62%

Table 7 reports a summary statistics of the two groups at the end of 2010. This table can be related to Table 2, which had the same characteristics, but in an earlier year. The last column shows the difference between the two groups' means. As before, *** denotes statistical significance at 1%, ** at 5% and * at 10%.

In order to replicate the earlier t-tests to the extent possible, the same hypothesis-tests were executed. Meaning that the following hypothesis were used:

H_0 =*The investment and funding policies/capital structure/operational performance are* ***the same*** *for the PE-backed firms and their comparable peers*

H_a =*The investment and funding policies/capital structure/operational performance are* ***different*** *for the PE-backed firms and their comparable peers*

Furthermore, the same cut-off point at 5% was also used to increase the comparability. As Table 7 shows, all metrics except two are statistically different from one another at least at 5%. In other words, the t-tests return p-values four out of six times that indicated that the null hypothesis actually could be rejected. Therefore, these metrics are statistically ***different*** from one another, a result that emphasizes that our previous results indeed appear to be correct.

In addition, a point worth emphasizing once again is the process that was adopted in order to limit the influence of outliers. Instead of excluding data points (through e.g., detection of extreme values through the standard R-analytics formula - $Q1 - 1{,}5 * IQR$ and $Q3 + 1{,}5 * IQR$- and consequently declaring those values as N/A), we instead chose to winsorize the data. This is a favorable approach due to various reasons. First of all, our sample is rather limited to begin with due to the nature of the Swedish market, meaning that exclusion of data is not preferred if the goal is to keep the sample size as vast as possible. Secondly, winsorizing of data is an accepted phenomenon within academic circles, and contemporary

literature has used the same technique, e.g., Bernstein et al. (2019). Followingly, in terms of reliability of the finding, this means that the neutralization of certain data was objectively executed and not affected or biased by our own beliefs. Simply put, we had no knowledge regarding the origin of the respective outlier that was normalized.

This section has attempted to validate our results by illustrating that the sample groups were significantly different regarding the majority of our metrics at the end of our chosen period of time, which was indicated by our findings in earlier parts of Section 3. Furthermore, we also covered the method we adopted when manipulating the data to show the reader that the selection was not biased in any direction. The normalization of data was based on objective measures for the entire data set.

The upcoming section will critically discuss some of our results that diverged compared to contemporary research. Section 4.4 will also include a new - alternative - regression on a smaller sample, which to some extent also functions as a robustness check. Lastly, a survey we performed will be discussed to evaluate the robustness of our findings further.

4. Qualitative Discussion

The interpretation of the regression in section "3.1. Investment and Funding and 3.2. Performance Metrics" may be dissected further by analyzing the differences that were seen and by comparing to the UK market as covered in Bernstein et al. (2019). This will be done by discussing; 1) contrast in investment policy between treatment- and control group, 2) a relative increase in COD for the treatment group, and 3) our treatment groups' superior performance, primarily measured in ROA. Additionally, as we also decided to include small firms, our sample group's revenue on average is smaller than the sample group's revenue in the Bernstein et al. (2019) paper. Our entire sample had an average revenue of approximately 435 million SEK during 2007. In comparison, Bernstein et al.'s (2019) sample roughly had 80 million USD as average (equaling to ~ 541 million SEK based on the average USD/SEK exchange rate in 2007) (Sveriges Riksbank, 2007).[17] Therefore, throughout this section, we will also investigate if the size of our firms has affected the results. This is done because research suggests that smaller firms experience more volatile investments and returns, meaning that the sheer size of the sample perhaps can offer insights into our findings (Tsyplakov, 2008; Reinganum, 1983).

The upcoming sections will focus primarily on finding plausible explanations to the contradictory results through qualitative manners. However, Section 4.4 will include an alternative regression to investigate if our findings hold to be true even if we exclude the small firms in our sample.

4.1. Investment and Funding Policy

The degree to which our treatment group, in relation to the control group, invested (defined as investment over assets) during the crisis was the first finding that warranted additional discussion. Not because of the implication that PE-backed firms invest more, but mainly due to the magnitude of the difference (11.4%, which was statistically significant at 5%). Questions surrounding the possibilities of such a result thus inevitably surfaces. Section 3.1 brought up two parts of the observed trends, which, to a large extent, accounted for the significant investment difference. The main part of interest from this section is the resilience to the general economic outlook the PE-backed group exhibited in 2007-2008 and their continuously higher investment over assets rate after the downturn in 2008.

[17] Average exchange rate was 6.7607 (1 USD to 6.7607 SEK) in 2007.

Earlier sections introduced the concept of "dry powder", which we explained may be infused to the portfolio companies, opposed to searching for new investment opportunities, in the events of deteriorating economic outlooks. That available capital, combined with the PE funds' beneficial connections with the banking industry (Ivashina & Kovner, 2011), allows the PE-backed firms to have superior access to gaining additional capital when the general supply of credit is limited. For instance, McKinsey & Company (2019) recently released a study where they argued that the dry powder could function as a "war chest" in the face of a crisis. Furthermore, EY's Saenz (2020) also implies that owing to this capital that is easy to access, PE-backed firms are more resilient (mainly due to PE funds' diversification, human capital, and the availability of dry powder) to economic downturns. In combination with improved banking relationships, this allows portfolio companies to invest more.

Unfortunately, we were unable to perform our own tests regarding that it is partly the improved availability of capital that influenced our findings, such as our treatment groups' higher investment rate. This was mainly since we were unable to find adequate data regarding dry powder or other related proxies for the PE funds in our sample. However, Bernstein et al. (2019) tested this particular hypothesis (focusing on the equity aspect with regards to dry powder) and concluded that it was indeed the case for the UK market. Their main findings were further strengthened when they accounted for dry powder in their treatment group.[18] This means that portfolio companies backed by PE funds with more available capital at the onset of the crisis invested more than the other PE-backed companies. A finding which is in line with our conjecture that it is partly PE-backed companies' availability of capital which derived our results in Table 5.

The above discussion highlights possible explanations why the PE-backed firms managed to exhibit higher levels of investments at the onset of the crisis and later on greater levels of investments, implying a higher resilience in the ensuing years. Our discussion suggests that this can be traced to the PE-backed firms' superior access to capital. PE-backed firms' beneficial access to capital was evident in our results, where equity was the statistically significant capital measure, meaning that an overall less decrease in investments is justified. This particular finding is in line with Bernstein et al.'s (2019) paper (see footnote 18). However, the discussion so far does not explain the significant contrast of our results compared to Bernstein et al.'s (2019) paper. Therefore, it is of interest to further analyze possible explanations for this substantial difference in investment levels (11.4% compared to 5.9%).

Coupling with the above, our treatment group demonstrated a higher net equity contribution (2.4%) compared to Bernstein et al. (2019) (2.1%). A possible explanation for this difference is that our sample group was backed by PE funds, which had relatively more dry powder available at the onset of the crisis. Following the argument that dry powder plays a key role in regards to different levels of investments thus imply that a higher investment rate is justifiable in our case. However, whether it is net equity contribution that on its own caused this significant difference in investments cannot be statistically established. Furthermore, we cannot establish that our PE funds actually had more capital at their disposal at the onset of the crisis; our data merely implies this.

Another possible explanation can be discussed from a perspective of access to debt. Our PE-backed firms' higher net debt issuance and leverage, seen in Columns 3 and 4 (Table 5), align to some extent with other research on this area (Bernstein et al., 2019; Ivashina & Kovner, 2011). The latter paper describes that PE investors' repeated bank relationships reduce information asymmetry and allow for

[18] Bernstein et al. (2019) found that PE-backed companies decreased their investments less than their peers, gained more equity contribution, experienced greater debt inflows, higher asset base growth and also increased market share. Overall, these findings are in line with our findings in Table 5. Please see appendix for an excerpt from their regression.

more leverage. However, the magnitude of differences between the treatment and control group in our sample appear to diverge from the UK market findings (Bernstein et al., 2019). With respect to Column 3, our treatment group experienced a relative increase in net debt issuance (1.9%) compared to the control group. In comparison, the UK market exhibited an increase of 3.9% in terms of the same metric. This difference of 2%-points gives an alternative focus for the discussion; there may be other factors besides equity contribution and dry powder affecting the investment. Important to note, however, the finding in Column 3 is not statistically significant, meaning that our results in regards to debt issuance could be caused by chance.

Nonetheless, an interesting finding is the opposite trend that the growth in leverage illustrates. Column 4 (Table 5) shows a growth of 2.1% for the Swedish market, and Bernstein et al. (2019) found 1.2% for the British market when it comes to a comparison between treatment vs. control group. This tells us that although our treatment group on the Swedish market experienced lower net debt issuance levels compared to the British market, our treatment group still experienced higher growth in leverage (significant at 10%) compared to the treatment group on the UK market (not significant at 10%).

The discussion of the firms' debt policy does not necessarily help us explain the significant difference in investments. However, it implies that our sample is more volatile (which is in line with our decision to include small firms). Owing to the statistical significance of the results, combined with the ambiguities presented above, establishing a probable link between debt issuance and increased leverage to the significantly higher investment rate thus appears problematic. Although findings from other papers (Ivashina & Kovner, 2011) imply that our results in regards to debt may be reasonable, the high statistical significance of equity contribution makes it the preferred capital-measure to focus the discussion on.

Coupling the above together, it can be reasoned that our findings imply - backed by the idea that dry powder has enabled infusion of capital - that the significant difference in investments is predominantly attributed to the higher equity contribution. Simply because "dry powder" indicates the importance of availability of capital, and debt, in this case, does not appear to be the explanatory capital measure. However, such a hypothesis cannot be substantiated by statistical proof. Hence it should be read with caution. Other factors such as operational assistance by PE investors and our samples' firm size might also partially have caused the differences in investments. These aspects will be discussed in later sections.

4.2 Cost of Debt

The COD discrepancy, where the PE-backed firms experienced a higher relative increase in COD post-crisis when compared to their equivalent non-PE-backed firms (Column 5, Table 5), can be discussed further. Although the statistical significance (10%) of our findings is questionable, the following discussion will attempt to find a probable answer to the discrepancy.

An initial perspective is the macroeconomic conditions in Sweden, which was volatile regarding the interest rate during the time span of our study. The Swedish National Bank (Sveriges Riksbank) had during the period up until 2008 slightly increased the interest rate, and this spiked in 2008 when the interest rate hit its maximum for the period 2004-2012/13 (Figure A.2). However, proceeding years - starting 2009 - experienced a drastic decrease due to adjusted monetary policy aimed at ameliorating economic conditions. A line of reasoning is that this may explain the relative increase in COD for our sample of Swedish firms. However, compared with the monetary policy in the UK at the time, it indicates a similar monetary policy (Figure A.2). This contradicts the above belief that Sweden's

domestic monetary policy would be the cause for the higher relative increase in COD for PE-backed firms in Sweden as a similar trend with regards to COD is not evident on the British market (Bernstein et al., 2019). Furthermore, such a discussion fails to account for why PE-backed firms experienced a relative higher COD compared to their non-PE-backed counterparts, as it can be assumed that the interest rate environment affects all firms equally regardless of financial backing.

An alternative explanation could be according to previous research on capital structure relationships and cost of capital, which seeks to explain an increase in leverage as a factor for increased COD. This phenomenon is widely researched - but also intuitive - where increased leverage ratios on the firm's balance sheet result in higher firm risk (Poledna et al., 2014; Palmer & Sanders, 2008). The additional risk, in turn, leads to a higher cost of capital, where both equity and debt investors demand a higher price in order to compensate for additional risk-taking (Baxter, 1967; Modigliani & Miller, 1958). Additional risk-taking in the form of increasing leverage is evident in our treatment group, which can be seen in Column 3, Table 5, where the PE-backed firms issued 1.9% more debt which, in turn, can be seen to have resulted in higher leverage (Column 4). A side note here is that the higher issuance of debt for our treatment group is not the focus of this argument, it is rather the increased leverage.

The heightened leverage could explain the discrepancy relating to COD for the treatment group (Column 5, Table 5), as the PE-backed firms are taking on more risk as a consequence of the increased leverage, which results in a higher cost of capital (COD). The same linkage between higher net debt issuance and increased leverage is not observed in the Bernstein et al. (2019) paper. They could not establish that the higher net debt issuance resulted in higher leverage ratios with a p-value of less than 10%. Therefore, the discrepancy between the two papers' COD can, at least partly, be explained by research on capital structure and cost of capital. However, this argument is further conflicted by the results of Ivashina and Kovner (2011). They found that credit spreads ought to decrease for portfolio companies through PE funds' repeated and continuous bank relationship.

Altogether, macroeconomic factors do not appear to offer explanatory value to the COD discrepancy. Other markets exhibited similar trends relating to interest rates, and in the absence of those similarities, the inevitable question regarding why only PE-backed firms then would be affected surfaces. Furthermore, a possible explanation for the difference is the different development in terms of capital structure that the sample groups exhibited. Bernstein et al. (2019) did not find evidence supporting increased leverage for their treatment group with a p-value of less than 10%, which we did. Following the logic of increased cost of capital in the event of higher leverage (risk) thus results in a higher relative increase in COD for our treatment group. Despite the capital structure reasoning, contemporary research (Ivashina & Kovner, 2011) gives a contrasting angle. As our statistical significance of the COD finding is inadequate, we cannot conclude which of the two perspectives that are most in line with our results. The findings may be random and thus actually in line with the contrasting angle. However, if our findings are true, the above-mentioned arguments offer some insight into why that discrepancy might exist.

4.3 Return on Assets

Despite our treatment group's growing market shares, they also managed to outperform their peers with regards to ROA (1.7% higher) - statistically significant at 5%. As mentioned in previous sections, this is in contrast to traditional accounting principles as increased cash outflow - relatively higher COD and more investments - without any direct indications of higher cash inflow should result in reduced profits. However, as this is not the case, it appears like the investments managed to pay off during our time frame. As earlier mentioned, our treatment group managed to keep investing during 2007-2008 when

the control group steeply decreased theirs. Investments are generally long-term, especially in the sense of seeing their effects, meaning that one year more might be enough to see a part of the financial returns from the capital expenditures. A part of the superior performance might therefore stem from the time perspective.

Furthermore, our findings imply that our sample increased their leverage relatively more than their peers. Increased leverage effect on firm performance is a widely explored subject, where much of the current research from different countries during the period of the crisis conclude that leverage is negatively correlated with firm performance (Vithessonthi & Tongurai, 2015; Mule & Mukras, 2015; Akram et al., 2015). Other research shows that the link between leverage and firm performance varies between countries. Mainly, two factors determine the link: companies' access to bank credit and the efficiency of the legal system (Weill, 2008). Followingly, our findings thus suggest that the Swedish market offers its companies superior access to bank debt financing and has a more efficient legal system. However, based on our data, these implications cannot be substantiated without any doubt. The difference in terms of the UK market and Swedish market in terms of those two factors is questionable. We can, therefore, not explain the difference in regards to profitability merely by the leverage factor.

The final point which will be brought up is that the size of the firms in our sample might be the reason for the higher ROA, in combination with the investment horizon. As previously touched upon, small firms are in general more volatile, and their investments' returns also tend to follow that pattern. The following section will thus discuss the possibility that the sheer firm size in our sample is a part of the reason why our treatment group exhibited superior returns, among the other contradictory findings.

4.4 Size

A difference between this paper and Bernstein et al.'s (2019) paper is the size of the companies in our sample. In our sample, some of the companies included are what Bernstein et al. (2019) would consider small firms and exclude as they use medium- and large-sized companies. This may impact the findings in our paper as smaller companies may result in more skewed results with regards to higher volatility (as evident in our results). Due to this, we repeat the main analyses with an alternative matching procedure. Instead of including all (except certain exclusions as described in Section 1.1) firms, we now exclude those defined as "small". Using the definition of small companies, which Bernstein et al. (2019) used[19], but with emphasis on asset base and revenue, we now get 68 PE-backed firms and 99 non-PE-backed firms (a total of 167 companies, meaning that approximately 20% of our original sample size was excluded).

Our alternative matching process has primarily one advantage and one disadvantage. The advantage is that this matching is closer to the approach which contemporary research (e.g., Bernstein et al., 2019) predominantly uses. The reason being that researchers most often are unwilling to include small firms due to the flaws mentioned earlier. However, that reluctance is one of our reasons for including smaller firms, as we aim to contribute to the current body of literature by adding a new perspective. This is especially as markets outside of the traditional economies (UK, France, US) for PE transactions consist of smaller companies. The disadvantage is that the Swedish market is limited in size to begin with, which means that the sample size is further slimmed as a result of this alternative approach. Although

[19] As we aim to achieve comparability to Bernstein et al.'s (2019) paper by adding a new dimension of smaller companies we based the definition of small companies on the definition proposed by them. Although this can be misrepresentative of the official definition of small firms in Sweden, we consider this as the preferred choice as our objective is to explore the size-factor and not the definition as proposed by regulations. Therefore, the definition as proposed in Bernstein et al. (2019) was used: *a small company is defined as meeting at least two of the three 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.* The values denoted in pound sterling were calculated to SEK as of 2007 exchange rate GBP/SEK.

we argue that the sample size remains satisfactory to run statistical tests upon, as this analysis mainly aims to function as a robustness check and therefore potentially add insights into the differences we encountered in the main analyses.

In Tables 8 and 9, we repeat the main analysis with the alternative sample. What can be seen is that the results are relatively unchanged. The main differences (in terms of investment and funding policies) are that the magnitude of the investment difference now is reduced (11.4% to 7.9%) and the statistical significance of the net equity contribution finding is reduced (5% to 10%). Furthermore, the net debt issuance finding instead becomes significant at 10%, and the COD difference is reduced (1.9% to 0.9%) and no longer significant at 10%. Moreover, Table 9 is noticeably similar to Table 6, where the major difference is ROA's lowered statistical significance (5% to 10%). Nonetheless, the implications of the findings remain unchanged. Our PE-backed firms reduced their investments less, experienced higher equity - and debt - contribution, exhibited heightened leverage ratios, and also faced a relatively higher increase in COD.

Overall, this implies that the smaller firms indeed impacted the results in the main analysis. In terms of investments, the difference was 3.5%-points lower when small companies were excluded. The discrepancy in performance was reduced, both in terms of magnitude and statistical significance. Furthermore, the COD difference now became non-significant with a magnitude of 0.9%. In other words, the differences we encountered in the main analysis, which was in contrast to contemporary research, are reduced when small firms are excluded from the sample. The difference in terms of investments is still considerable but only 2%-points larger (instead of 5.5%-points) compared to the finding by Bernstein et al. (2019). Superior performance for our treatment group became ambiguous as the regression indicates that the PE-backed firms exhibited 0.9% higher ROA, which was statistically significant at 10%. Due to the small magnitude and borderline significance, it is problematic to establish whether or not any of the two groups actually performed better or not. A finding in line with Bernstein et al. (2019), as they were unable to conclude that neither of their sample groups managed to outperform the other. Lastly, Bernstein et al. (2019) found that the relative COD decreased by 0.3% for their treatment group (significant at 5%), and our alternative analysis suggests that our treatment group experienced a relative increase of 0.9% in COD (not significant at 10%). This implies that we cannot provide evidence supporting that there actually were any differences between the groups in terms of COD. As 0.3% is almost negligible with zero, our finding is fairly similar.

Nonetheless, important to keep in mind is that the size of the firms in our sample is still smaller in terms of revenue compared to the sample in the Bernstein et al. (2019) paper. The new average in revenue for the entire sample with both treatment and control group (when small firms are excluded) is 480 million SEK (compared to 435 million before the exclusion). In comparison, they had 80 million USD as average (approximately 541 million SEK). Therefore, it is likely that the characteristics of the Swedish market (most notably its size compared to the UK market), combined with the other factors that the discussion section has brought forward, at least partly account for the remaining differences.

Table 8. Investment and Funding Policies (with alternative sampling technique)

	(1) Investments/Assets	(2) Net Equity Cont./Assets	(3) Net Debt Iss./Assets	(4) Leverage	(5) Cost of Debt
PE_Firm * *Time*	0,079**	0,028*	0,022*	0,027*	0,009
	(0,021)	(0,012)	(0,007)	(0,022)	(0,006)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	495	480	488	502	491
R-Squared	0,084	0,009	0,04	0,055	0,013

Table 8 reports the same DID regression which was executed in Section 3.1 (relating to the groups' investment and funding policies). The difference being that the sampling technique now excludes small companies. Section 2 includes a more thorough description of the regression model which was adopted. Nonetheless, as the table shows, all calculations include firm and year fixed effects. Additionally, the standard errors are clustered at the firm level. The main parameter of interest is the $PE\_firm * Time$ parameter, as the rest of the variables rather work as noise-reduction. Please see section 1.1 for definitions of the particular metrics. Lastly, ** denotes statistical significance at 5% and * at 10%.

Table 9. Performance Metrics (witch alternative sampling technique)

	(1) ROA	(2) EBITDA/Revenue	(3) Market Share
PE_Firm * *Time*	0,009*	0,011	0,024*
	(0,01)	(0,005)	(0,015)
Year Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	498	492	501
R-Squared	0,058	0,011	0,004

Table 9 illustrates the same DID regression which section 3.2 performed (in terms of performance metrics), however with the alternative sampling technique. As the table indicates, year and firm fixed effects are included in all cases. Furthermore, the standard errors are clustered at the firm level. Please see section 2 for a more in-depth explanation of the regression model which was used. Additionally, please see section 1.1 for the definitions of the metrics used in the table. The parameter of interest in this case is $PE\_firm * Time$. Finally, ** denotes statistical significance at 5% and * at 10%.

4.5 Amalgamation of Discussion

Taking the above discussions in Section 4 into consideration, it is probable that the size of the firms, among other factors in our sample, both in the control and the treatment group, have affected our results. As an example, it is not an unfamiliar finding that PE funds' portfolio companies invest (measured in % of assets) more than their non-PE-backed peers. However, the magnitude of the discrepancy we found in our main analysis is not in line with current research. The smaller size of our companies in the study, combined with our treatment group's PE funds' potentially larger relative quantity of dry powder, appears to offer some explanation to the difference. Furthermore, our treatment group experienced a higher relative increase in COD in the main analysis. We argue that this difference might have been caused by our treatment group's increased leverage (resulting in heightened risk). However, due to the problematic p-value, which was further worsened when we excluded small firms, we instead see it as likely that the discrepancy predominantly is attributed to the size of our sample firms. Moreover, our treatment group's superior performance in the main regression might be attributed to their higher investment rate in 2007-2008. This means that the higher ROA might be due to the investments realizing returns earlier than their peers' investments. Although, our alternative regression indicated that the superior performance was mostly a result of including smaller-sized firms in our sample. Meaning that

the two groups' performance was no different from one another when the small firms were excluded. Nevertheless, an exhaustive explanation for any of the diverging results could not be found.

As mentioned at the beginning of Section 4, most parts presented, with the exception of Section 4.4, lack statistical tests. Their implications should therefore be interpreted accordingly. Consequently, to gain a better understanding of our results and ambiguities, and complement the earlier robustness tests, we have included a survey aimed at professionals in the Swedish PE industry.

5. Survey

The survey's main objective was to get a possible and alternative explanation of the discrepancies our results presented compared to previous literature. The target group of the survey was professionals who have, or currently are, worked/working in the PE sector in Sweden. Respondents who had not been working amid one of the major economic/financial downturns (the 90s, 2008, or the COVID-19 crisis) were excluded. Furthermore, the survey also attempted to check if additional factors, such as operational improvements, may have caused our results, opposed to only financial activities. To make a distinction of this, our survey is inspired by the one that Bernstein et al. (2019) executed on the British market, with a focus on the following blocks: 1) Operational activities, 2) Financial activities, and 3) Possible explanations with regards to capital market and debt.

It is important to point out that this survey is not attempting to find new results. This is because of the limited sample of respondents (11). Instead, it is a way to verify our findings and get a qualitative perspective of our data. Therefore, the following section should be read accordingly and considered a complement to the quantitative analysis in our study. We will first discuss the answers in regards to our contradictory or diverging findings (investment over asset levels) and will end with a short discussion in terms of operational improvements.

A core part of our previous discussions has revolved around PE-backed firms' superior access to capital. This capital, we argued, has enabled the treatment group to pick a more aggressive approach to tackle the crisis. Consequently, our survey consisted of two questions regarding equity and debt financing to shed light on this. The result of the respondents' answers is supportive of this assumption. 64% answered that PE funds infuse "more" additional equity capital to alleviate financial constraints for their portfolio companies during a crisis. This was further strengthened by 18% who responded that this is done "significantly more" during a crisis. Furthermore, 54% responded that assistance with debt financing was done "more" during a crisis, and 37% believed it to be significantly more.

In combination with the responses mentioned above supporting the conjecture that PE-backed firms enjoy increased access to capital, approximately 73% of the respondents believed PE funds to help their portfolio companies find new investments. One respondent believed this was not the case amid crises. Taken together, these findings imply that our treatment group's increased investments are probable. However, the magnitude of the difference (11.4% than their peers) cannot be fully explained.

Followingly, we discovered another interesting perspective in our survey; 45.5% of the respondents did not know or answered no, to whether PE funds enable *cheaper* debt financing for their portfolio companies. This is of interest as it points towards one of the problematic aspects of our data results, i.e., with regards to the higher relative COD for the treatment group. This particular part of our survey can supposedly strengthen the robustness of our findings in one of two ways. Firstly, the spread in terms of the answers illustrates that PE-backed firms indeed *may* experience higher COD. Secondly, our

respondents showed a clear ambiguity to the question, 54.5% of the respondents believed PE funds to enable cheaper debt, and the rest believed this not to be the case. Taking this finding one step further might then infer that our finding regarding the higher relative COD, which was only statistically significant at 10%, actually was caused by chance. This is because our respondents showed no clear stand in regards to the question, and our p-value was not satisfactory.

Lastly, we found that a majority of the respondents - 73% - believe that portfolio companies were assisted “more” with operational problems during a crisis. This may explain some of the unexplainable factors for the results in regards to the control and treatment group, respectively. Such a line of reasoning would thus point toward that operational improvement and assistance is one of the factors that resulted in superior performance (measured in ROA) and higher investment rates.

In summary, the survey illustrated a picture of PE-backed firms' superior access to capital, their advantageous access to operational assistance, but also an ambiguity from our respondents in terms of PE-backed firms’ COD. To a large extent, these responses validate our results in the main analysis. Particularly in regards to our findings which exhibited either contradictory or extreme tendencies compared to contemporary literature.

6. Conclusion & Implications

Firms backed by private equity and the implications of this type of financing have been widely researched. We conducted a study on the Swedish market from 2004-2010 amid the Great Recession, 2008. The objective of this paper was to explore whether PE-backed firms contribute to financial fragility or stability amid crisis and whether they outperform non-PE-backed peers. The sample consisted of 79 PE-backed firms and 129 non-PE-backed peers, resulting in 208 firms. In order to scrutinize these questions, we executed a main regression (including small firms), an alternative regression (where those small companies were excluded), and added a qualitative discussion together with a survey to get additional insights.

The main regression shows that the PE-backed companies maintained higher investment levels throughout the post-crisis period (2008-2010) compared to their non-PE-backed counterparts, indicating that the treatment group was more resilient amid the financial crisis. Our findings further indicate that the treatment group's relationship with their respective PE fund enabled superior access to capital, where the equity metric was statistically significant while debt was non-significant. Despite the portfolio companies' partnership with PE funds, the main analysis shows that our treatment group experienced a relative increase in COD compared to the control group. Nonetheless, they achieved superior performance and growth - measured in ROA and market share - compared to their non-PE-backed peers. Overall, these results from the main regression are in line with current research. However, three findings stand out compared to contemporary literature. Namely, the magnitude of the investment differences, heightened relative COD, and superior ROA that portfolio companies experienced compared to the non-PE-backed sample. In combination with the qualitative discussion and survey, our alternative analysis was leveraged to get plausible explanations for the diverging results.

Our alternative regression pointed towards that the size of our sample firms affected the magnitude of the investment differences, however, simultaneously suggesting that other factors predominantly accounted for the differences. Consequently, the more expansive investment policy was mainly attributed to the portfolio companies' relationship with the PE funds, which enables advantageous access to capital. In our case, dry powder appeared to offer insights into the higher equity contribution and the accompanied higher investment levels. Moreover, in terms of COD, our additional analysis highlighted that the companies' size, combined with a higher cost of capital in events of increased leverage, could plausibly explain the observed discrepancy. Relating to ROA, it is possible that the treatment group's higher investment levels at the onset of the crisis were able to pay off earlier compared to their peer's investments. However, the alternative regression offered an additional perspective, where a part of the superior performance instead appeared to be attributed to the smaller companies in our sample.

All things considered, the alternative regression indicated similar findings as our main regression, where the uncertainties mentioned above surrounding the contradictory results were reduced. Thus, the inclusion of small firms appeared to have impacted our results by providing increased volatility to the overall sample. In addition, a survey of 11 PE industry professionals supported the findings in the main analysis by providing complementary insights regarding access to capital. The respondents also offered a new angle concerning operational improvements, which partly might justify some of the unexplainable factors we encountered.

Amalgamating, in our main analysis we found that the PE-backed firms maintained a higher investment rate, primarily explained by equity contribution from their PE funds. This enabled a more resilient stance amid the 2008 crisis, where the PE-backed firms functioned as stabilizers as opposed to

contributing to financial fragility during the Great Recession. Finally, we found strong support that the PE-backed companies outperformed their non-PE-backed peers.

The implications of our results could provide insights into the financial industry's impact on economic stability. To further study this, an interesting angle would be to replicate our study but focus on specific industries to examine if the results hold. Alternatively, one could conduct a study on markets similar to Sweden to examine if similar results are found. Additionally, we believe the three diverging findings, combined with the size factor, to be of interest for further studies. Lastly, a longer time horizon post-crisis might also offer explanatory value as some metrics are more lagging in their nature and would thus benefit from more time.

A potential shortcoming of our study is the process that was adopted when gathering the data. We manually went through thousands of annual reports, meaning that mistakes might have occurred due to the human factor. With that said, our ambition has been to report the findings as objectively as possible. Hopefully, the number of mistakes is therefore negligible. Furthermore, a limitation of the data used in our analysis is that the respective firms' accounting numbers were used. This can be seen as an issue as balance sheet items are reported at book value instead of fair value which means that discrepancies might exist. Finally, the sample size can be considered as low compared to contemporary research on the same area. In itself, this is not necessarily problematic. However, this increases the likelihood of extreme values affecting the results in our data.

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8. Appendixes

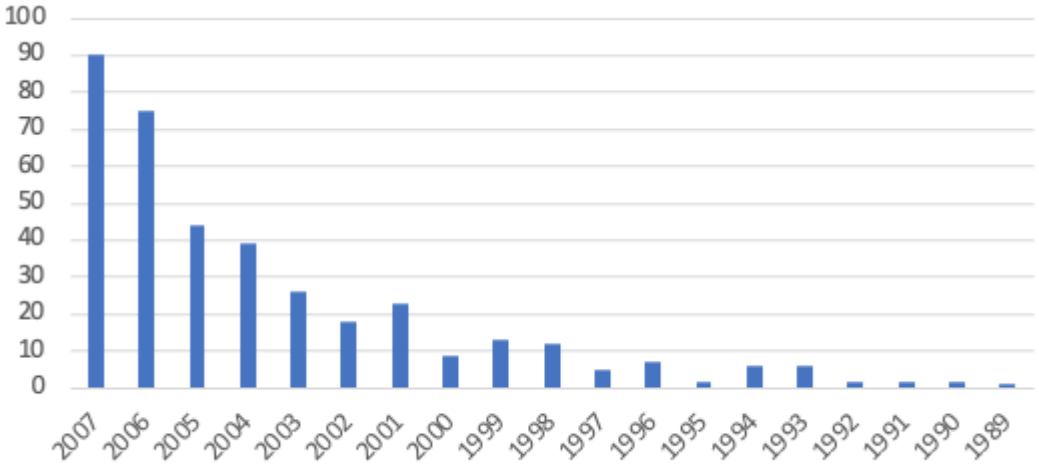

Figure A.1
Number of transactions each year from our own (full) sample
The following figure illustrates what figure 5 also showed, in other words, the amount of PE transactions being made in Sweden during 1989 and 2007. The differences between the two figures are that figure 5 shows PE-transactions from Sweden as a whole between 1988 and 2007, and this figure shows our (full) sample of transactions between 1989 and 2007. The important takeaway from this figure is that only a few transactions appear to be missing from our data, meaning that our sample was a good proxy for the full Swedish market.

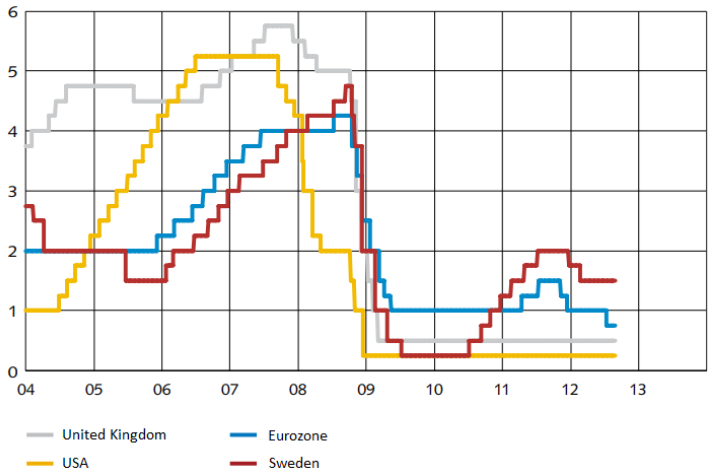

Figure A.2
Comparison of Repo Rates of UK, US, Eurozone and Sweden, 2004-2013
Figure A.2 shows the repo rate for the United Kingdom, USA, the Eurozone, and Sweden, 2004-2013. (Elmér et al., 2012)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Investment/assets		Net equity contr./assets		Net debt iss./assets		Leverage		Interest rate	
PE firm x *Post*	0.059***	0.056***	0.022***	0.021***	0.042***	0.039***	0.013	0.012	−0.003**	−0.003**
	(0.013)	(0.013)	(0.007)	(0.007)	(0.011)	(0.011)	(0.015)	(0.014)	(0.001)	(0.001)
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 controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	12,456	11,910	12,469	12,003	12,903	12,274	13,205	12,553	10,222	9,831
Clusters	1,984	1,878	1,981	1,876	1,982	1.876	1,984	1,878	1,841	1,743
R-squared	0.160	0.161	0.040	0.059	0.090	0.104	0.011	0.029	0.016	0.022

A.3

Excerpt of Regression Table in Bernstein et al.'s (2019) paper

This table depicts similar characteristics as seen in Tables 5,6,8 and 9 in our study. They used a DID regression, with both year fixed effects and firm fixed effects. The main parameter of interest is the PE firm x *Post* variable. The difference between the odd and even column numbers is that the even-numbered columns include firm-level controls. Furthermore, they cluster the standard errors at the firm level. Finally, *** denotes statistical significance at 1%, ** at 5% and * at 10%.

A.4

Excerpts from the Survey Design

For the following questions:
From experience, were PE-investors MORE or LESS likely to engage in any of the following *operational* activities during a crisis?

Assist portfolio companies with operating problems during crisis?

Significantly Less	Less	Same	More	Significantly More
○	○	○	○	○

Provide strategic guidance to portfolio companies during crisis?

Significantly Less	Less	Same	More	Significantly More
○	○	○	○	○

Frequent interactions with management in the portfolio company?

Significantly Less	Less	Same	More	Significantly More
○	○	○	○	○

Replace management (CEO & senior executives) in portfolio companies?

Significantly Less	Less	Same	More	Significantly More
○	○	○	○	○

Added human capital (e.g. expertise individuals or consultants) to improve operational activities?

Significantly Less	Less	Same	More	Significantly More
○	○	○	○	○

→

For the following questions:
From experience, were PE-investors MORE or LESS likely to engage in any of the following *financial* activities during a crisis?

Infusion of equity capital to the portfolio company to alleviate financial constraints during crisis?

Significantly Less	Less	Same	More	Significantly More
○	○	○	○	○

Assist portfolio companies with raising debt financing during crisis?

Significantly Less	Less	Same	More	Significantly More
○	○	○	○	○

Assist portfolio companies with capital structure issues (e.g. debt-to-equity ratio) during crisis?

Significantly Less	Less	Same	More	Significantly More
○	○	○	○	○

Assist with search and evaluation of investment opportunities during crisis?

Significantly Less	Less	Same	More	Significantly More
○	○	○	○	○

→

In your opinion, which of the following is most important for the success of a portfolio company?
Please rank the following alternatives from 1-3 where 1 is most important and 3 is least important. (Do this by dragging the alternatives)

PE-backed firms have access to cheaper debt financing through their PE-investors.

PE-backed firms enjoy access to operational expertise through their PE-investors.

PE-backed firms gain improved access to key partners, such as credit investors.

Based on your experience, do PE-funds enable cheaper debt financing for their portfolio companies?

- ◯ Yes
- ◯ No
- ◯ Don't know / unsure

Private equity firms provide better access to banks for their portfolio companies and can renegotiate better terms?

Definitely Disagree	Disagree	Indifferent	Agree	Definitely Agree
◯	◯	◯	◯	◯

Optimal Question
Is there anything else you would like to add?