

PREVAILING IN THE CRISIS

A STUDY OF SWEDISH PRIVATE EQUITY PORTFOLIO FIRMS
DURING THE FINANCIAL CRISIS

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Prevailing in the Crisis: A Study of Swedish Private Equity Portfolio Firms during the Financial Crisis

Abstract:

Are PE-backed firms more resilient in face of a financial crisis than non PE-backed firms in terms of company performance? This topic is examined through a study of the performance of a sample of 96 Swedish PE-backed firms and 96 non PE-backed peers during the financial crisis of 2008. The empirical findings suggest that PE-backed firms were more successful in maintaining profitability during the crisis years, but were not able to maintain growth any more than peers. The findings indicate that the outperformance in profitability did not come as a results of changes to the labour force in terms of employment growth or labour productivity. Comparing these results with empirical findings on the Swedish market during non-crisis periods, it suggests that the outperformance of PE-backed firms becomes even stronger in times of crisis, suggesting that PE firms' industry expertise may be even more critical during periods of financial turmoil.

Keywords:

Private Equity, Operating performance, Financial crisis

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1 Introduction

1.1 Background

Prior research indicates that Private Equity buyout funds have consistently outperformed public equity markets in terms of returns (see e.g., Harris and Kaplan, 2014; Brown et al., 2015; Kaplan and Sensoy, 2015; Strömberg and Døskeland, 2018). However, from which activities these returns actually stem is a source of conflict. Proponents of Private Equity would argue that PE firms are experts who undertake a combination of financial and operational initiatives that generate true value in their portfolio companies. Contrary to this, critics may assert that the majority of PE firms' ability to generate fund returns is a consequence of exploiting financial tools, leverage and market inefficiencies, rather than their ability to create value in their portfolio firms. Another concern raised in relation to Private Equity is whether the extensive use of leverage in portfolio firms could be associated with an increased risk of financial distress during economic downturns (see e.g., Gregory, 2013; and Giroud and Mueller, 2015). Related to this, empirical studies such as Hotchkiss et al. (2020) seek to examine *if* and *how* shifting economic environments might influence PE firms' choice of debt levels in their portfolio firms. To study Private Equity in relation to shifting economic environments could be interesting for other reasons as well. As previously stated, critics of Private Equity argue that most of PE returns come from engaging in financial activities that do not generate true value in their portfolio firms. It would be reasonable to assume that these financial activities are more restricted during periods of economic crises, which could force PE firms to instead focus on creating operational value to generate fund returns. This reasoning is suggested by e.g., Davis et al. (2019), and is also in line with the findings from a survey with more than 300 PE investors, which showed that PE investors were significantly more likely to assist portfolio companies with operational issues and strategic guidance during the 2008 crisis, compared with non-crisis periods (Bernstein et al., (2019). From the perspective of portfolio firms, the potential benefits of being PE-backed in terms of operational improvements could therefore be more crucial in times of crisis, relative non-crisis periods. It should be noted that the majority of empirical research indicates that PE ownership has a positive impact on the operating performance in portfolio firms during non-crisis periods. (For a comprehensive summary of empirical literature, see Strömberg and Døskeland, 2018.) The main focus of this thesis is thus to investigate if these positive effects also are evident in times of crisis. Specifically, we investigate whether PE-backed firms were more resilient in terms of operating performance

compared to non PE-backed peers during the financial crisis of 2008 and the economic downturn which followed.

Bernstein et al., (2019) have conducted a study similar to this on the U.K. market. To better allow for comparisons between the two studies, our thesis will follow the methodology used in their paper. For instance, all metrics used as proxies for operating performance in this study were also used in theirs. However, this paper also includes an additional analysis of metrics which are not directly related to company performance on a stand-alone basis, but which still contribute to the discussion of how Private Equity influences the operations in portfolio firms. These metrics relate to employment growth and how efficiently labour and capital are managed. In other words, the additional analysis could provide results that give an indication as to which strategies PE firms employ in their portfolio firms in an effort to improve the operating performance.

In this thesis, we have chosen to study the Swedish Private Equity market. There are three main reasons as to why this is a suitable market to study.

Firstly, the Private Equity market in Sweden is well-developed and integrated with the rest of the economy. For instance, Sweden had the world's third highest PE investments as a percentage of GDP in 2007 (Bergström et al., 2007), and Europe's second highest annual average PE investments as a percentage of GDP between 2007-2012 and 2015-2019 (Invest Europe, 2014), (SVCA, 2019). Moreover, between 2007 and 2017, over 1,000 Swedish firms had been funded by Private Equity firms, and PE investments contributed to the Swedish GDP with approximately 5.5 percent over the same period (Næss-Schmidt et al, 2017). As we study changes related to labour, it is also relevant to note that 7.5 percent of the Swedish private employees were employed in Private Equity funded firms between 2007 and 2017. (Næss-Schmidt et al, 2017). Private Equity ownership therefore influences a considerable portion of Swedish private employees.

Secondly, the Swedish economy was influenced differently than many other economies. Specifically, the economic downturn that followed the crisis was in many ways more severe and longer-lasting in, for example, the U.K. than it was in Sweden. In Sweden, GDP decreased by approximately 5 percent in 2009, which constitutes a sharper decrease than both the European average of 4.4 percent and the U.K. decrease of 4.0 percent (Elmér et al., 2012; Piroli, 2015; U.K. Office for National Statistics¹). However, in terms of GDP, the Swedish economy recovered quickly, and so GDP increased by 6.1 percent in 2010 and thus returned to pre-crisis

¹ The GDP decrease U.K. was calculated by the authors using data from U.K. Office for National Statistics.

levels in absolute terms (Elmér et al., 2012). In Europe and the U.K., GDP levels did not return to pre-crisis levels until 2014 and 2012, respectively (Piroli, 2015; U.K. Office for National Statistics²). Financing opportunities for the corporate sector were also influenced differently in Sweden compared to the U.K. For instance, the basis spread³, which is an indication of the cost of capital in an economy, rose more drastically in both the U.K. and in Europe as a whole than it did in Sweden, in response to the financial crisis (Elmér et al., 2012). Monteiro (2013) concludes that the economic and financial crisis severely affected the flow of credit in the U.K., and appears to have been significantly more pronounced in the U.K. than in the rest of the Euro area. Comparing to Sweden, Bäckström (2014) conclude that the downturn in credit growth for the corporate sector was relatively small, considering the severity and scope of the crisis. Not only did the crisis have a more severe effect on financing opportunities in the U.K., but these effects also lasted for a longer period of time. In 2011, 2012, 2013 and 2014 the U.K. received so-called Country-specific Recommendations (CSRs) from the Council of the European Union to “significantly improve the availability of bank and non-bank financing to the private sector and in particular to SMEs” whereas Sweden did not receive this or any other similar recommendation (Council of the European Union (CEU), 2011; CEU 2012; CEU 2013; and CEU 2014). When it comes to the effects on the Private Equity market, investment levels in Sweden were down 42 percent in 2008 and 80 percent in 2009, compared to 2007, but returned to pre-crisis levels in 2010 (SVCA, 2010). However, in the U.K., Private Equity investment levels were down 34 percent in 2008 and 72 percent in 2009, compared to 2007, but had not yet returned to pre-crisis levels in 2016 (Statista, 2017; Statista 2020). The average Private Equity investment level in U.K. between 2010 and 2016 represented approximately 50 percent of the investment level in 2007⁴ (Statista, 2017; Statista 2020). To summarise, on the basis of the economic indicators discussed above, Sweden was considerably affected by the crisis, but to a lesser extent than the U.K. both in terms of effect magnitude and duration. These differences may be sufficiently large that the findings of Bernstein et al., (2019) might not generalise to the Swedish market.

Thirdly, conducting the study on Swedish companies allows us to have access to qualitative company-level data on both private and public companies, in terms of income statements and balance sheets. This gives us a level of flexibility and freedom in our analyses, which we would not have for foreign companies. For instance, it is not mandatory for non-

² The GDP numbers for U.K. was calculated by the authors using data from U.K. Office for National Statistics.

³ Measured as the difference in interbank rates and policy rates.

⁴ Buyout investments levels are calculated by subtracting Venture Capital investments from total Private Equity investments.

public US firms to disclose their accounting reports. Given these arguments, there is significant value in conducting this study in a Swedish setting.

1.2 Purpose and research question

The aim of this paper is to investigate if PE-backed firms were more resilient in terms of operating performance during the economic downturn that followed the financial crisis of 2008, relative to non PE-backed peers. The research question that this paper seeks to investigate is thus:

Are PE-backed firms more resilient in face of a financial crisis than non PE-backed firms in terms of company performance?

Investigating this field of research is relevant for three main reasons. Firstly, as our study is conducted on the Swedish market, it allows for comparisons with the paper “Private Equity and Financial Fragility during the Crisis” by Bernstein et al., (2019), who investigate the operating performance of U.K. PE-backed firms during the years after the crisis. Their findings seem to suggest that PE-backed firms’ superior access to financing during the crisis years influenced their operating performance by allowing them to maintain growth more successfully than non PE-backed peers. As the crisis influenced Sweden differently than the U.K., both generally and in terms of access to financing specifically, it is not unlikely that the crisis also influenced Swedish PE-backed firms differently. Secondly, there are many studies which seek to examine the impact of PE ownership on the operating performance in portfolio firms during non-crisis periods, however there are fewer which study PE ownership and crisis in conjunction. By contributing to the literature on crisis periods, it allows for further comparisons between non-crisis and crisis periods. In this regard, it is particularly relevant to compare any findings we may obtain with Bergström et al. (2007), who conducted a study on the Swedish PE market between 1993 and 2005. This comparison could provide indications regarding the particular effects of a crisis period, as both studies take aim at the same geographical market. Lastly, PE investment levels in Europe were back at an all-time high in 2019, and exceeded the levels experienced in 2007 by more than 20 percent (Invest Europe, 2019). Moreover, PE investment levels as a percentage of GDP were also at the same levels as those experienced in 2007 (approximately 0.55 percent of GDP) (Invest Europe, 2019; Invest Europe, 2014). At the same time, many of the world’s stock market indices are currently at all-time highs, such as the S&P 500, OMX30 and DAX (Yahoo Finance, as of May 5, 2021). Although one cannot be sure *when* there will be another crisis, one can almost certainly be sure that there *will* be one in the future.

To understand how Private Equity influences the operating performance in portfolio firms during crisis periods is thus a topic that is relevant for the future as well.

1.3 Scope of investigation

This study uses a target sample of 96 Swedish PE-backed firms during the financial crisis of 2008. To investigate the effects of PE ownership, a matching sample of 96 non PE-backed firms is constructed to allow for a difference in differences analysis between the two samples. The matching sample is collected based on the nearest neighbour approach in regards to the following metrics: return on assets, total assets, total debt, and revenue. Operating performance is proxied using four accounting metrics, namely: revenue growth, EBITDA margin, return on assets and asset growth. The additional analysis considers the metrics: employment growth, labour productivity (revenue divided by the number of employees) and normalised NWC.

1.4 Contribution

The results of this study contribute to the literature and discussion on how Private Equity influences its portfolio firms regarding their operations in general, with a specific focus on performance. The thesis will specifically add to the literature that covers this topic in relation to times of crisis and economic downturns, which is something that is currently not widely studied. To the best of our knowledge, the operating performance of PE-backed firms during economic downturns has only been studied on the U.K. market. Our main contribution will thus be to conduct a similar study on the Swedish market.

1.5 Terminology

Private Equity and PE are used interchangeably throughout the paper and refer to the buyout segment of Private Equity, i.e. not venture capital. Similarly, PE firms and PE sponsors are used interchangeably and refer to investment companies that acquire firms through a buyout, typically using a significant amount of leverage. Companies owned by a PE firm are referred to as portfolio firms, target firms, or PE-backed firms. Firms which are owned by a PE firm are referred to as non PE-backed. The term peer is used to signify such a company which is regarded as similar to a given PE-backed firm, but which is not PE-backed itself. Note that the terms firm and company are used interchangeably. The crisis in definite form refers to the financial crisis in 2008, whereas the term crisis years denotes the years which are most significantly affected by the crisis, namely 2008 to 2011. The last pre-crisis year is thus 2007 and the first post-crisis year is 2012. Crisis periods refers to such periods that are generally accepted as economic crises,

while all other periods are referred to as non-crisis periods. The term revenue will be used to signify the income a company receives from its normal business activities. If a reference study uses the term sales rather than revenue, sales will be used when discussing that specific paper. In such a discussion, sales and revenue will be regarded as equal.

2 Literature Review

Section 2.1 of the literature review provides a theoretical framework and presents empirical findings on Private Equity and value creation in portfolio firms during non-crisis periods. Note that value creation is not synonymous with operating performance, but rather an umbrella term for the activities that PE firms normally employ to create value in their target firms, where operating performance is one key element. There are two primary reasons to why it is worthwhile to begin by looking at non-crisis periods. Firstly, it should be noted that most research is focused on the effects of Private Equity in non-crisis periods. Secondly, and more importantly, obtaining a thorough understanding of Private Equity in non-crisis periods will create a solid foundation for better understanding which aspects are important to consider when we turn our attention to times of crisis. Section 2.2 aims to provide an understanding of how a financial crisis might influence PE-backed firms, and how the strategies that PE firms normally employ in their portfolio firms might change in response to a crisis. Section 2.3 examines the financial crisis in Sweden in general, and its implications for the Swedish Private Equity market in particular.

2.1 Value creation in portfolio firms during non-crisis periods

A common conceptual framework to categorise the activities that PE firms commonly engage in to generate value in their portfolio companies is the one put forward by Kaplan and Strömberg (2009). They propose that the changes applied by PE firms can be divided into three categories: governance engineering, financial engineering, and operational engineering. *Governance engineering* is closely related to agency theory, which describes the relationship between principals and agents. The core objective of governance engineering is to align the interests of the management (agents) with those of the owners (principals) of a company. Jensen (1989) presents, among other things, the organisational control and incentive systems that PE firms usually implement in their portfolio companies to achieve this alignment. These are e.g. pay-for-performance compensation systems and substantial equity ownership in the firm for managers and directors. The idea is to incentivise the management team to maximise the value

of the firm, which is also the fundamental driver that generates fund returns for the PE firm. Several empirical studies document that the management team in leveraged buyouts (LBOs) receive substantially higher ownership stakes than comparable public companies (Kaplan and Strömberg, 2009). In addition to these measures, PE firms normally employ *financial engineering* as a tool to further ensure that the management team acts in the interest of the owners. Specifically, it is used to resolve the conflict between managers and owners concerning the use of free cash flow (Jensen, 1989). According to Jensen, there is a risk that managers waste a company's free cash flow by engaging in activities that are not value-maximising, such as investing in sub-optimal projects and increasing corporate size, rather than to distribute excess cash to shareholders. By leveraging a company with the use of debt, managers are forced to make interest and principal payments which limits the risk of management wasting free cash flow. Leveraging a company could also be an effort to increase the value of a company through tax deductibility of interest (Kaplan and Strömberg, 2009). *Operational engineering* refers to PE firms using their industry knowledge and expertise within business operations to identify attractive investments, develop value creation plans (VCPs) for those investments, and to implement those VCPs. Examples of such VCPs might include cost-cutting plans, productivity improvements, strategic change or repositioning, company acquisitions, and management changes (Kaplan and Strömberg, 2009).

Systematic evidence of the extent to which PE firms employ the three different kinds of engineering, as well as how different strategies and measures are combined, is largely lacking as this is confidential information. However, Biesinger et al. (2020) obtain this information on emerging markets deals and categorise the VCPs employed in portfolio firm. The study reports the following use of strategies during the years 2007 to 2011: top-line growth (~85% of sample deals), operational improvements (~82%), governance engineering (~58%), financial engineering (~45%) and cash management (~18%). Within the conceptual framework of Kaplan and Strömberg (2009), operational improvements, top-line growth and cash management would most likely be categorised as operational engineering. As Biesinger et al. (2020) study emerging market deals, it is plausible that the numbers could be different from a developed market such as Sweden, considering that target firms in emerging markets might be in greater need of operational engineering, and that the possibility of financial engineering might also be more limited. However, the study provides an overall indication of how PE firms employ different value-creating strategies in their portfolio firms.

There is a wide body of empirical research that documents the effects of PE ownership on the operating performance in portfolio firms. Cumming, Siegel, and Wright (2007) summarise it by concluding that there “is a general consensus across different methodologies, measures, and time periods regarding a key stylized fact: LBOs and especially MBOs enhance performance and have a salient effect on work practices”. This conclusion is in line with the summary made by Strömberg and Døskeland, 2018, who conclude that “[...] the majority of empirical studies support that PE-investments improve the performance of the portfolio companies, and that these improvements do not seem to come at the expense of other stakeholders or long-term value”.

2.2 Effects of a financial crisis on portfolio firms

Section 2.1 gives an account of previous literature concerning the ways in which Private Equity firms *generally* create value in their portfolio firms. However, it is reasonable to assume that a financial crisis would influence this process and give rise to changes and additional effects that should be considered. The purpose of this section is therefore to provide an understanding of how the value creation process in PE-backed firms could be influenced by a financial crisis.

2.2.1 Leverage in portfolio firms

Concerns have been raised about PE firms’ aggressive use of debt financing and the consequences this might have, not only for target firms but also for the stability of financial systems (Gregory, 2013; and Giroud and Mueller, 2015). One concern is that the indebtedness of target firms could make them particularly vulnerable to economic recessions and changing credit conditions. The argument is that having to service a large amount of debt during economic downturns could lead to considerable costs associated with financial distress and even bankruptcy. These concerns should be viewed in light of the empirical findings that indicate that PE firms’ use of leverage tends to vary with the conditions on credit markets. Axelson et al. (2013) find that the one robust predictor of LBO leverage is the prevailing condition of debt markets. The authors also find that LBO activity is pro-cyclical, meaning that LBO leverage peaks during periods of cheap and abundant debt, such as the period leading up to the crisis in 2006 and 2007, and decreases drastically when debt markets deteriorate, such as in 2008 and 2009. The authors also find evidence that deal values tend to increase during these periods of “hot” credit markets and that the subsequent fund returns are thus lower.

The actual impact of leverage on target companies is documented in studies such as Hotchkiss, Smith, and Strömberg (2020). Their results suggest that PE-backed firms default

more frequently than non PE-backed firms. However, when controlling for firm-level indebtedness, this effect disappears. Furthermore, when they compare firms with particularly high levels of debt, they find that PE-backed firms were less likely to default than non PE-backed firms, indicating that PE companies are effective at managing distress risks at high levels of debt. One should note that this study examines the period 1997 to 2010, i.e. not during a crisis period. However, Bernstein et al., (2019) examined this topic during the financial crisis of 2008 on the U.K. market. Their study found that PE-backed firms were not more likely than non PE-backed firms to declare bankruptcy (controlled for firm-level indebtedness), and concluded that their results seem to suggest that PE-backed companies play a stabilising role during uncertain times, rather than posing a risk to the financial system.

2.2.2 Access to capital during the crisis years

Bernstein et al., (2019) conclude that their results indicate that PE-backed companies play a stabilising role during bad times. The results that underpin this suggestion are their findings that PE-backed firms seemed to have had greater access to capital and financing during the crisis years. They find that PE-backed firms decreased investments less, issued more debt and equity, and lowered their cost of debt compared to non PE-backed firms. In aggregate, the authors conclude that their results indicate that PE ownership helps to relax the financial constraints of portfolio companies during crisis periods. These findings could partly be explained by the study by Ivashina and Kovner (2011), who obtain results suggesting that PE-backed firms receive favourable loan terms, both in terms of interest rate and covenant structure (debt to EBITDA covenant), as a result of Private Equity firms' bank relationships. The study suggests that "repeated interactions between PE firms and banks reduce inefficiencies from information asymmetry and allow leveraged buyout sponsored by private equity firms to occur on favourable loan terms". Note that the findings of this study are not specifically in relation to a crisis period, but rather relate to PE ownership in general. However, Bernstein et al., (2019), who do study a crisis period, summarise their findings by concluding that "private equity groups appear to have taken advantage of their fund structures and bank relationships to provide both equity and debt financing to their portfolio companies, with the latter at a lower cost". The empirical findings discussed above thus seem to suggest that PE-backed firms have superior access to financing, both in non-crisis periods and crisis periods. Relating superior access to financing to company performance, Bernstein et al., (2019) obtain results indicating that portfolio firms could maintain higher levels of investments and increase their market share as

a result of superior access to financing during the crisis years. To the best of our knowledge, no empirical studies regarding financing opportunities during a crisis have been conducted on the Swedish PE market specifically. However, considering that Sweden had the world's third highest PE investments as a percentage of GDP in 2007, which was only surpassed by the U.K. and the U.S. (Bergström et al., 2007), it is reasonable to assume that Swedish PE firms enjoyed favourable bank relationships during the time of the crisis.

2.2.3 Operational assistance by PE firms in their portfolio companies

Bernstein et al., (2019) also present findings from a survey with more than 300 PE investors, seeking to investigate if and how PE investors changed their operational and financial activities during the crisis, relative to non-crisis periods. The results of their survey show that, during the crisis, PE investors were significantly more likely to assist portfolio companies with their operational issues, provide strategic guidance, and assist portfolio companies with financial structuring issues. They also find that PE investors were less likely to search for new deals. In accordance with these findings, Bain Capital chose to redeploy all of their 175 investment professionals to focusing on assisting their portfolio firms with operational and financial activities during the crisis, rather than to search for new deals (Bernstein et al., 2019).

2.2.4 Conclusion

Given the observations presented in this section, the following three effects should be considered regarding Private Equity and value creation during times of crisis:

1. PE firms' use of leverage in portfolio companies could lead to costs associated with financial distress and even bankruptcy.
2. PE-backed firms could have greater access to capital and thus be less financially constrained during a crisis. This could have a positive effect on PE-backed firms' operating performance in terms of an ability to maintain investments and increase market share during the crisis period.
3. Private Equity firms could be more likely to assist their portfolio companies with both operational and financial structuring issues, compared to non-crisis periods.

2.3 The financial crisis in Sweden

This section provides an understanding of the financial crisis in Sweden generally, and its implications for the Swedish Private Equity market in particular. To understand how the crisis played out in Sweden is relevant, as it allows for better comparisons with other markets, and

could potentially provide indications of which effects of the financial crisis should have more or less salient influence on Swedish PE-backed firms.

2.3.1 The Swedish economy

The onset of the global financial crisis, marked by the bankruptcy of the American investment bank Lehman Brothers in September 2008, quickly spread to the Swedish market. As Sweden's economy was largely dependent on its export and import industries, which constituted approximately 50 and 40 percent of the economy, respectively, the effects were tangible in 2009 when international trade was abruptly reduced, and the Swedish GDP consequently decreased by more than 5 percent (Elmér et al., 2012). However, as international trade resumed during 2010, the Swedish economy recovered quickly in terms of GDP, which rose by 6.1 percent in 2010 (Elmér et al., 2012). Although GDP levels were back at pre-crisis levels, the real effects on the economy were still tangible in both 2010 and 2011. According to the Swedish National Institute of Economic Research (SNIER), the real economy was still in recession in mid 2011, as a result of the financial crisis (SNIER, 2011). For instance, unemployment levels had risen from 6.1 percent in 2007 and peaked at 8.3 and 8.6 percent in 2009 and 2010, respectively, and thereafter stabilised at approximately 8 percent between the years 2011 and 2014 (SCB, 2021). Turning to the effects on the financial system, Bäckström (2014) concludes that the Swedish banks were, in comparison to banks in other countries, well-prepared for the crisis. Not only were their finances relatively stable, but they had also experienced a crisis during the 1990, which had forced them to undertake cautionary measures. Although the crisis entailed a sharp increase in the basis spread (Elmér et al., 2012), the downturn in credit growth for the corporate sector was in relative terms small, considering the severity and scope of the crisis, according to Bäckström (2014). It should be noted, though, that access to capital was significantly reduced in the beginning of the crisis. According to a survey by the SNIER, 12 percent of Swedish businesses thought it was "considerably more difficult" to receive financing by the end of 2008 compared to the period prior to the crisis, whereas 22 percent of businesses thought it was "more difficult" (SNIER, 2008). Of these businesses, 65 percent stated that the primary reason for the increased difficulty was either higher costs associated with receiving a bank loan, or restricted access to bank loans. The Central Bank of Sweden (CBS) also launched so-called "extraordinary measures" in an attempt to, among other things, provide the economy and the financial system with stability and liquidity. For instance, CBS lowered the policy rate by 4.5 percentage points between October 2008 and July 2009, and offered Swedish banks loans of

MSEK 1,000. As these measures were successful, the CBS could end their package of “extraordinary measures” early, compared to other countries. In mid 2010, only 5 percent of businesses thought it was “considerably more difficult” to receive financing compared to pre-crisis years, although 14 percent still thought it was “more difficult”. 78 percent of business thought it was “as normal” (SNIER, 2010). To summarise, the financial crisis had a substantial negative effect on both the real economy and the financial system in Sweden. However, concerning the financial system, the negative effects were short-lived, while the effects on the real economy still were salient until 2011.

2.3.2 The Swedish Private Equity market

The effects of the crisis on the Swedish PE market were salient in several ways. Firstly, the amount of capital raised by Swedish PE firms was significantly reduced at the height of the crisis years; Fundraising peaked during 2008, totalling MSEK 76,494 (32,792 in 2007) and hit the bottom in 2009 and 2010 with MSEK 1,728 and 7,150, respectively (SVCA 2010). Raised capital returned to pre-crisis levels in 2011 (SVCA, 2019). Secondly, so-called initial investments, i.e. investments in new portfolio companies, were down by 42 and 80 percent in 2008 and 2009, respectively, compared to 2007. During the same time, so-called follow-on investments, in other words investments in already existing portfolio companies, increased with 268 and 147 percent in 2008 and 2009, respectively (SCVA, 2009) (SVCA 2010). However, it should be noted that follow-on investments were increased from particularly low levels. In 2007, follow-on investments constituted 9 percent of total invested capital, whereas they constituted 38 and 54 percent in 2008 and 2009, respectively. In 2010, initial investments were back at pre-crisis levels, and follow-up investments were still up 79 percent compared to 2007.

2.3.3 Conclusion

To summarise, the financial crisis had a substantial negative effect on both the real economy and the financial system in Sweden. However, concerning the financial system, the negative effects were short-lived, while the effects on the real economy prevailed for a longer time period. The effects were clearly reflected in the Private Equity market as well, as both fundraising and initial investments heavily dropped during the height of the crisis, before quickly returning to pre-crisis levels. Follow-on investments increased substantially during the crisis, indicating that the focus on portfolio firms increased during the crisis years.

3 Hypotheses

3.1 Operating Performance

The empirical research on non-crisis periods indicates that PE ownership should have a significantly positive effect on portfolio firms' operating performance. For instance, in the Swedish market, Bergström et al. (2007) obtain results that buyouts had a significantly positive impact on EBITDA margin, with a mean increase of 3.07 percentage points, as well as a significantly positive effect on ROIC, with a median increase 4.01 percentage points. The study does not find differences in sales growth between PE-backed and non PE-backed firms. However, the authors conclude that their results seem to suggest that buyouts have a positive impact on the operating performance of target firms. These results are in line with those obtained on the French market. Boucly et al. (2011) study LBO firms during 1994 to 2004, and find that PE-backed firms outperformed non PE-backed firms in the three years following the buyout by (in percent): EBITDA +18, ROA +4.4, sales +12, and capital expenditures +24. Turning to the empirical findings in periods of crises, only one study could be identified. Bernstein et al., (2019) study the U.K. market during the financial crisis of 2008, and obtain results indicating that PE-backed firms experienced an 8 percent increase in market share and a significantly larger asset growth than non PE-backed peers. They find no evidence suggesting that PE-backed companies performed differently than non PE-backed peers with regards to EBITDA margin or ROA. Their results indicate that the increase in asset growth and market share was a result of superior access to financing during the crisis years for PE-backed firms, relative non PE-backed firms. Note that there are empirical findings indicating that PE-backed firms' superior access to financing is not limited to crisis periods (Ivashina and Kovner, 2011). However, the potential positive effects of having superior access to financing are arguably amplified during periods, when financing opportunities are generally limited, such as during the crisis years. Since financing opportunities were reduced in Sweden during the height of the crisis, it is possible that Swedish PE-backed firms turned to a strategy of investing and increasing their market share. However, it should be noted that financing opportunities were not as severely reduced in Sweden as they were in the U.K., which might make potential effects smaller. Lastly, Bernstein et al., (2019) find that the crisis led to an increased focus from PE firms in the U.K. to assist their portfolio firms in strategic and operating matters. It is likely that such an effect would be mirrored in Sweden, considering the shift in investment focus from initial investment toward follow-on investments among Swedish PE firms.

Weighing all of these factors together, PE-backed firms should have been more resilient in terms of operating performance during the financial crisis, compared to non PE-backed firms. We therefore hypothesise the following:

***Hypothesis 1:** PE-backed firms were less negatively influenced by the crisis in terms of operating performance than non PE-backed peers. In other words, PE firms were more resilient during the crisis in terms of operating performance than their peers.*

3.2 Additional analysis

Our review of literature within the field of Private Equity has given a clear indication that the effects of PE ownership can be observed through a multitude of accounting metrics apart from those which are directly associated with operating performance. Studying such metrics can be valuable, as they can give an indication as to what strategies PE sponsors implement in their portfolio companies in order to achieve higher operating performance. Another reason to extend the analysis is that many of the metrics directly related to operating performance might be slow to respond to changes in strategy, meaning that even if PE-backed firms are more skilled in their choice of strategy during a crisis, the performance gains associated with these choices may be delayed in time and therefore have not adequately developed during the time interval that we study.

Some of the accounting metrics which are commonly discussed in the literature regarding how Private Equity influences the operations in their portfolio companies are employment growth, labour productivity, and net working capital (NWC). We expand on each of these and report on how previous findings influence our hypotheses in Sections 3.2.1, 3.2.2, and 3.2.3, respectively. Additionally, to include changes related to employment growth could also be of particular interest, as it is a commonly held view by labour unions and media that PE ownership is associated with a reduction in the work force as a strategy to reduce costs (Olsson and Tåg, 2012). If this is indeed true, a financial crisis would be a good opportunity to observe this behaviour, in part due to the more urgent need for cost reduction, and also due to the fact that they might receive less public criticism for laying off employees in times of crisis compared to non-crisis periods.

3.2.1 Employment growth

The empirical research on non-crisis periods is conflicting, depending on which geographical market that is considered. One explanation for the origin of these differences, according to

Olsson and Tåg (2012), is that employment protection regulations differ among countries. Concerning this, Sweden had the seventh strongest protection among 30 OECD countries in 2004, which can be compared with the U.S., that scored lowest of all 30 countries (OECD, 2004). For this paper, studies on the Swedish market will first and foremost be relevant. Olsson and Tåg (2012) examine, among other things, the effects of Private Equity on labour growth in Swedish target firms during the period 2002 to 2008. They find that “consistent with the existing evidence of modest net employment effects, we find little evidence of average changes in unemployment incidence after buyouts”. These results are in line with those of Bergström et al. (2007), who find that “employment and wage levels in buyout companies have developed in line with the peer groups”. To the best of our knowledge, no previous empirical studies have been conducted on this topic specifically in relation to a crisis period on the Swedish market. However, Davis et al. (2019), studying the U.S. market, find that “a unit standard deviation rise in the post-buyout GDP growth rate raises employment growth at targets relative to controls by 3.3 percent of base employment [...]. A rise in credit spreads after buyouts brings slower post-buyout employment growth at targets relative to controls [...]”. These results are statistically significant and indicate that the employment growth should be lower for PE-backed firms relative non PE-backed firms in times of economic downturns. However, it should also be noted that the effects of the financial crisis on unemployment levels were substantially more severe in the U.S. compared to Sweden. In the U.S., unemployment levels rose from 5.0 percent in December 2007, and peaked at 10.0 during the height of the crisis (U.S. Bureau of Labor Statistics, 2012), while they rose from 6.1 percent in Sweden and peaked at 8.6 percent (SCB, 2021). This should not, of course, have an effect on the relative difference between PE-backed and non PE-backed firms within the same country, but it still provides an indication that the Swedish and the U.S. labour markets were affected differently. Turning to the potential effects of the financial crisis discussed in Section 2.2.2, superior access to financing could mean that PE-backed firms are, to a less extent, forced to lay off employees as a result of the financial crisis, compared to non PE-backed firms.

Weighing these factors together, we conclude that the literature provides conflicting evidence on how labour growth should develop in periods of crisis. We therefore choose to investigate the following hypothesis:

Hypothesis 2: PE-backed firms were influenced in the same way as non PE-backed peers in terms of employment growth.

3.2.2 Labour productivity

The empirical research on non-crisis periods indicates that PE ownership should have a positive effect on portfolio firms' labour productivity in general. In the U.S. market, Davis et al. (2019) find that labour productivity in PE-backed firms increased by 8 percent in the two years following the buyout, relative to non PE-backed firms. The study defines labour productivity as real revenue per employee. In another study on non-crisis periods, Davis et al. (2014) examine, among other things, how the buyout event influences job reallocation within the target firm. The authors conclude that target firms more aggressively close plants with low total factors productivity (TFP), and they more aggressively open new plants with high TFP. Hence, target firms reallocate their employees within the firm in a way that increases TFP for the firm (+ 2.1 log points increase in TFP compared to peers). Turning to empirical findings on crisis periods, Davis et al (2019) find that labour productivity rises and falls with the credit spread; during periods of high credit spread, such as those experienced during the financial crisis, the relative labour productivity of target firms increased compared to the peer group. To clarify: average labour productivity in PE-backed firms always increased compared to non PE-backed firms, but this outperformance was especially great during times of high credit spreads. The authors state that a possible explanation could be that “[...] when credit is costly and tight, financial engineering is less feasible and PE groups may generate returns through operational improvements that raise productivity in portfolio firms”. When it comes to the effects of the financial crisis, a potential increase in focus from PE companies in assisting their portfolio firms with operational and financial issues could have a positive effect on labour productivity. Furthermore, superior access to financing could expand revenue growth, as suggested by the results of Bernstein et al., (2019). However, this potential effect could also expand the employment growth at PE-backed firms, and the result of this potential effect is thus not clear.

Weighing these factors together, one may expect that PE-backed firms should not have been as strongly influenced in terms of labour productivity as non PE-backed peers during the financial. We therefore hypothesise the following:

***Hypothesis 3:** PE-backed firms were less negatively influenced by the crisis than non PE-backed peers in terms of labour productivity.*

3.2.3 Net Working Capital

The empirical research on non-crisis periods indicates that PE ownership should reduce NWC in portfolio firms. Berg and Gottschlag (2003) assert that one common practice by PE owners

to increase the operational effectiveness in portfolio firms is to reduce capital requirements. The authors refer to several studies that document results indicating that PE portfolio firms significantly reduce working capital following the buyout event. Such studies include Holthausen and Larcker (1996) and Singh (1990). However, Boucly et al. (2011), find that LBO targets and control firms exhibit a similar working capital development following the buyout. No studies have, to the best of our knowledge, been conducted on this topic specifically in relation to a crisis period.

In spite of the findings of Boucly et al. (2011), most literature seems to indicate that PE-backed firms reduce their NWC significantly, and we may therefore expect that PE-backed firms should have reduced their NWC more during the financial crisis, compared to non PE-backed peers. We thus propose the following hypothesis:

***Hypothesis 4:** PE-backed firms decreased their normalised NWC more during the crisis than non PE-backed peers.*

4 Data and Sample

In order to be able to perform an analysis which investigates our hypotheses, we need two samples across which we can compare performance: one which is PE-backed and one which is not PE-backed. It is important to recognise that a group of PE-backed firms is not an accurate representation of a random sample from the population of Swedish firms. On the contrary, private equity firms tend to have high demands on their acquisition targets in terms of historic revenue growth, profitability, and market positioning. Given these common traits among PE-backed firms, it is important that the control group is constructed in such a way that its companies share these traits to the greatest possible extent. Failing to achieve similarity between the PE-backed group and the peer group would make it impossible to distinguish PE ownership as an explanatory variable with regards to company performance during a crisis. In this study, we use data gathered from Serrano. Serrano is a database which contains the financial history of Swedish legal entities from the year 1997 and onwards. Its data is adjusted to account for broken accounting periods, short or long accounting periods, and several other phenomena which could otherwise interfere with statistical analyses on the financial data of groups of companies. The matching procedure is based on the one conducted by Bernstein et al., (2019) and will be described in detail in Section 4.1.

4.1 Construction of target sample

The target sample should consist of Swedish firms which were PE-owned during the financial crisis. The first step was to extract from Capital IQ a list of private equity transactions in Sweden between January 1st 2000 and December 31st 2007. This was done by searching for transactions for which the description of the acquirer contained the terms “Private Equity” or “Leveraged Buyout”. These were then screened individually to make sure that the acquirer fit our requirements. Examples of typical transactions which needed to be excluded in this phase were such transactions in which the acquirer was an investment company that does not fall within our distinction of private equity, such as venture capital firms, pension funds or investment companies with a long-term investment horizon. Additionally, it had to be verified that each acquired company was PE-owned throughout crisis years. Specifically, this meant that all companies which had been sold by a private equity fund to a strategic acquirer or to the public via an IPO were removed. Any company which appeared in the list more than once as an acquisition target, but was sold from a PE firm to another PE firm was kept. This screening resulted in a list of companies, rather than a list of transactions. After this screening, 149 companies remained.

The second step was to associate a Swedish organisation number to each company in the list. This was done by searching for the company name using the service Retriever Business, which is a database for Swedish company information. The organisation number would then be used as the company identifier when extracting the financial data of each firm from Serrano.

Lastly, the data of the companies in question was extracted from Serrano based on the organisation number and it was verified that no data was missing for the years of interest. After this step, the data sample consisted of 96 companies and their respective financial data for the years 2005 to 2012.

4.2 Constructing a matched control group

The procedure of matching followed the same principle used by Bernstein et al., (2019), however with a few adjustments where it was deemed appropriate. The matching proceeded as follows: Firstly, for each PE-backed company, all companies in the Serrano database which had the same first two digits of their SNI code⁵ and for which financial data was available for the entire period of analysis were extracted. Then, the squared distance of these companies to the PE-backed company in question was calculated based on the following equation:

⁵ SNI (Standard för svensk näringsgrensindelning) is a Swedish code standard for industry classification.

$$d_{ij}^2 = \frac{(ROA_i - ROA_j)^2}{\sigma_{ROA}} + \frac{(Assets_i - Assets_j)^2}{\sigma_{Assets}} + \frac{(Debt_i - Debt_j)^2}{\sigma_{Debt}} + \frac{(Rev_i - Rev_j)^2}{\sigma_{Sales}} \quad (1)$$

Where d_{ij}^2 denotes the squared distance between firm i and firm j . Each accounting metric belonging to firm i or firm j is subscripted with i and j , respectively. σ denotes the sample standard deviation with regards to the subscripted accounting metric, with the sample in question being the entire Serrano dataset belonging to the two-digit SNI code of firm i and j . ROA denotes return on assets, calculated as operating profit after financial income divided by total assets, $Assets$ denotes total assets, $Debt$ denotes total debt, and Rev denotes total revenue. By scaling the distance measure in each dimension by the sample standard deviation with regards to that variable, we make sure that variables which are large in absolute value (such as total assets) do not influence the distance measure more than variables which are small in absolute value (such as return on assets). That company which had the smallest squared distance to a specific PE-backed firm was chosen to be its peer. To reduce the effects of outliers, the data of both PE sample and peer sample was winsorised at 1 percent.

4.3 Observed firm characteristics

Table 1 reports the distribution of our PE sample and our matched peer sample across industries. The segmentation of industries follows the broad structure of NACE Rev. 2 defined in Eurostat (2008). By design, the matched sample has the exact same industry distribution as the PE sample. We note that almost all of the companies operate within either Manufacturing, Wholesale and retail trade, or Professional and technical activities.

Table 1

Industry distribution	PE sample		Matched sample	
	N	rel.	N	rel.
Manufacturing	45	47%	45	47%
Construction	3	3%	3	3%
Wholesale and retail trade	28	29%	28	29%
Transportation and storage	1	1%	1	1%
Professional and technical activities	16	17%	16	17%
Education	1	1%	1	1%
Health and social work activities	2	2%	2	2%

This table reports the absolute and relative distributions of the PE sample and the matched sample at the broad industry level, as defined by the firms' NACE section codes.

To study the accuracy of the matching procedure, we present firm characteristics for the PE sample and the matched sample in Table 2. We note that none of the characteristics are statistically significant between the two groups. The matching variables ROA, total assets, debt, and revenue have particularly small and insignificant differences across the two groups. This indicates a successful matching procedure. Additionally, as a result of the matching procedure, the peer sample has the same number of firms as the PE sample, as well as similar standard deviations of the matching variables.

Table 2

	PE sample				Matched sample				Mean diff.	p-value
	N	Mean	Median	SD	N	Mean	Median	SD		
Revenue (kSEK)	96	758 423	224 232	1 527 353	96	794 969	222 906	1 728 103	-36 547	0.8768
Total Assets (kSEK)	96	623 267	129 880	1 575 365	96	590 379	119 029	1 736 959	32 888	0.8908
ROA	96	10.95%	12.66%	17.63%	96	12.69%	11.16%	14.66%	-1.74%	0.4586
Asset growth	96	16.51%	15.72%	22.49%	96	14.11%	10.00%	25.42%	2.40%	0.4892
Debt/assets	96	61.86%	63.27%	20.07%	96	60.49%	63.91%	20.78%	1.37%	0.6424
Employees	96	290	79	805	96	303	83	699	-14	0.9004
Employment growth	96	8.72%	6.67%	21.17%	96	9.05%	4.00%	25.87%	-0.33%	0.9239
Labour productivity (kSEK)	96	3 960	2 555	4 610	96	4 297	2 439	6 444	-337	0.6770

This table reports the summary statistics of PE sample and matched sample firms in the year 2007, which was the basis for the matching procedure. The second to last column reports the mean difference across the groups, and the last reports the corresponding p-value, based on a

4.4 Observed firm trends

Since this analysis will rely on a difference in differences approach, where changes in firm performance before the crisis and during the crisis years will be compared across two groups, we need to make the assumption that the PE group and the matched group have parallel trends in terms of their characteristics. In other words, we make the assumption that the two groups would have developed identically if the crisis had not occurred. Clearly, this assumption cannot be proven, however it can be justified through an examination of the pre-crisis trends of the two groups. In Table 3, the 1-year and 2-year relative mean growth trends of the two groups are presented and compared. The 1-year trend refers to the growth in the period 2006 to 2007 and the 2-year trend refers to the growth in the period 2005 to 2007. We find that the differences across the two groups are small and not statistically significant, indicating that they experienced very similar developments in the years leading up to the crisis. It is therefore reasonable to assume that they would have continued to experience similar development had the crisis not occurred. We therefore consider the condition of parallel trends to be satisfied.

Table 3**Firm's trends in 2007**

	PE sample				Matched sample				Mean diff.	p-value
	N	Mean	Median	SD	N	Mean	Median	SD		
<i>1-year growth</i>										
Revenue	96	11.41%	2.71%	37.88%	96	15.35%	3.47%	49.67%	-3.94%	0.5372
Total Assets	96	15.89%	1.54%	113.03%	96	14.54%	1.47%	77.97%	1.35%	0.9236
ROA	96	11.73%	4.23%	107.61%	96	10.06%	11.79%	101.79%	1.67%	0.9122
Debt/assets	96	2.53%	3.57%	18.96%	96	0.68%	0.63%	14.82%	1.84%	0.4538
Employees	96	-2.43%	1.33%	56.78%	96	-0.53%	0.66%	45.70%	-1.90%	0.7989
Labour productivity	96	9.28%	1.69%	55.40%	96	14.23%	3.20%	100.40%	-4.95%	0.6727
<i>2-year growth</i>										
Revenue	96	24.70%	6.63%	69.89%	96	28.75%	6.53%	82.38%	-4.05%	0.7135
Total Assets	96	22.02%	3.43%	152.85%	96	21.96%	2.97%	112.94%	0.06%	0.9974
ROA	96	-0.15%	8.08%	134.73%	96	-3.50%	3.99%	107.18%	3.35%	0.8490
Debt/assets	96	2.66%	3.66%	28.64%	96	2.68%	1.65%	19.54%	-0.03%	0.9940
Employees	96	13.08%	2.20%	126.22%	96	3.86%	1.83%	56.30%	9.22%	0.5142
Labour productivity	96	14.69%	6.10%	63.08%	96	16.62%	6.05%	102.29%	-1.93%	0.8748

This table reports the 1-year and 2-year mean growth trend for the PE sample and the matched sample. Mean diff. refers to the difference of the PE mean growth and the matched sample mean growth. For each metric, p-values of the mean differences based on a paired t-test are

5 Empirical Strategy

Our analysis is divided into two parts: Operating performance analysis, which is detailed in Section 5.2, and additional analysis, detailed in Section 5.3. The aim of the operating performance analysis is to provide an answer to Hypothesis 1, while the additional analysis aims to answer Hypotheses 2 to 4. In both cases, a regression model is estimated, and based on the results of this regression, conclusions can be drawn regarding the hypotheses. The overall framework of the regression model is detailed in Section 5.1.

5.1 Regression model

Since this study aims to analyse the difference in a set of outcome variables as a result of the crisis for two groups and compare these differences across the groups, the most suitable approach is through a difference in differences analysis. This approach entails running the following regression:

$$y_{it} = \alpha_t + \alpha_i + \beta_1(PE_i * Crisis_t) + \theta^T x_i + \epsilon_{it} \quad (2)$$

Where y_{it} is an outcome variable for firm i at time t , α_t is a year fixed effect, α_i is a firm fixed effect, PE_i is a dummy variable indicating whether firm i is PE-owned, $Crisis_t$ is a dummy variable indicating whether year t is a crisis year and ϵ_{it} are standard errors clustered at firm level. The regression is run over the years 2005 to 2011. The vectors x_i and θ represent our control variables and their regression coefficients, respectively. When performing any regression analysis, it is important to include control variables to separate out confounding

factors, however such control variables should always be theoretically relevant. The control variables that we use are log of revenue, revenue growth, normalised cash flow, ROA, and leverage ratio. These controls are the same as those used by Bernstein et al., (2019). The control variables are calculated in the following way:

$$\text{Log of revenue} = \ln(\text{Revenue}) \quad (3)$$

$$\text{Revenue growth}_t = \frac{\text{Revenue}_t - \text{Revenue}_{t-1}}{\text{Revenue}_{t-1}} \quad (4)$$

$$\text{Normalised cash flow} = \frac{\text{Cash flow}}{\text{Total assets}} \quad (5)$$

$$\text{ROA} = \frac{\text{op. profit after financial income}}{\text{total assets}} \quad (6)$$

$$\text{Leverage ratio} = \frac{\text{Total debt}}{\text{Total assets}} \quad (7)$$

Where the subscript t signifies that the quantity in question belongs to year t . In such cases where the calculation only involves quantities from the same year, such a subscript is omitted. This will be the case throughout this section.

The year fixed effects will capture systematic differences in the output variable for different years. As such, they will capture the effect of the crisis itself, regardless of whether the company in question is PE-owned or not. The firm fixed effects on the other hand will capture systematic differences in the output variable for different firms, regardless of the time period. Having isolated these effects, we can isolate the effect of PE ownership during a crisis by interacting the variables PE_i and $Crisis_t$ through multiplication. The coefficient β_1 in Equation 2 represents the effect that the interaction of PE_i and $Crisis_t$ has on the outcome variable y_{it} . In other words, it indicates how much the outcome variable changes from the fact that it belongs to a firm which is PE-owned and to a year which is a crisis year, which is exactly the effect that we intend to study.

5.2 Operating performance analysis

This analysis aims to answer the question whether PE-backed firms were more resilient in terms of operating performance during the crisis. As there is no single measure or metric that fully captures the operating performance of a firm, it is necessary to include a variety of metrics that,

when studied together, give an indication of a firm's operating performance. The following metrics are used as proxies for operating performance in our study, and each will act as the dependent variable in a regression:

- Revenue growth
- EBITDA margin
- Return on assets (ROA)
- Asset growth

Naturally, if applicable, the dependent variable is omitted from the set of control variables. There are two reasons as to why we have chosen the above accounting metrics as proxies for operating performance. First, all of these metrics are commonly used in the empirical literature that examines the operating performance of firms. For instance, Bergström et al. (2007), Boucly et al. (2011) and Bernstein et al., (2019) all use revenue growth, EBITDA margin and variations of ROA to proxy for operating performance. Bergström et al. (2007) argue that EBITDA margin is the main indicator of operating profitability, and that this metric is particularly relevant within the buyout universe as price and leverage often are quoted in terms of EBITDA multiples. The chosen accounting metrics are therefore supported by the literature as being suitable indicators of operating performance. Secondly, choosing similar metrics as Bergström et al. (2007) and Bernstein et al., (2019) will facilitate the comparison of the results of our study with theirs. As two of the main purposes of this study are to compare our results with earlier findings on the Swedish market in non-crisis periods (Bergström et al., 2007) and with the U.K. market during the same crisis period (Bernstein et al., 2019), it is preferable to use similar metrics as proxies for operating performance.

The formulae for calculating revenue growth and ROA are already presented in Equations 4 and 6. Furthermore, EBITDA margin and asset growth are calculated as:

$$EBITDA\ margin = \frac{Op.\ profit + Depreciation + Amortisation}{Revenue} \quad (8)$$

$$Asset\ growth_t = \frac{Total\ assets_t - Total\ assets_{t-1}}{Total\ assets_{t-1}} \quad (9)$$

5.3 Additional analysis

The additional analysis aims to answer Hypotheses 2 to 4 and thereby provide insight in the effect of some of the strategic changes implemented by PE sponsors on their portfolio companies. In contrast to the operating performance analysis, there is no ambiguity regarding which accounting metrics should be analysed. In this part of the analysis, we study the following metrics as the dependent variables:

- Employment growth
- Labour productivity
- Normalised Net Working Capital (NWC)

In a similar fashion to the operating performance analysis detailed in Section 5.2, each of these will be regressed according to Equation 2. The dependent variables are calculated as:

$$Employment\ growth_t = \frac{Employees_t - Employees_{t-1}}{Employees_{t-1}} \quad (10)$$

$$Labor\ productivity = \frac{Revenue}{Number\ of\ employees} \quad (11)$$

$$Normalised\ NWC = \frac{Tot.\ current\ assets - Tot.\ current\ liabilities}{Total\ assets} \quad (12)$$

5.4 Robustness

Any econometric study should be accompanied by a test of its robustness to changes in the ingoing variables in order to assess its validity. Specifically, any significant results which are obtained should persist if the ingoing variables are changed in a way which is not theoretically relevant to the outcome variable. Conversely, one should expect significant results to vanish if the ingoing variables are changed sufficiently, and in a way which is theoretically relevant. To further augment the robustness that our analysis already obtains from the inclusion of firm fixed effects, year fixed effects, and our selection of control variables, we also perform an analysis in which we change the time period of analysis. In both the operating performance analysis and the additional analysis, the pre-crisis period (2005 to 2007) is compared to the crisis period (2008 to 2011). If any findings that we obtain are truly a result of the crisis, then they should not be expected to persist if we instead compare the pre-crisis period to the year 2012, which we consider the first post-crisis year. We therefore run the same regression specified in Equation 2, but replace the variable $Crisis_t$ with a dummy variable $Year_{2012}$, which takes on the value one for observations belonging to the year 2012, and zero otherwise. We also omit

any observations belonging to the crisis period. By doing this, we change the difference in differences model to only compare the pre-crisis years with the year 2012. Of course, it should be noted that this alteration reduces the number of observations included in the regression, however a comparison of this kind still provides valuable information on the robustness of the analysis.

6 Results

6.1 Results of operating performance analysis

Given our review of previous findings, we expect PE-backed firms to be more resilient in terms of operating performance during a crisis. Specifically, we expect PE-backed firms to experience a lesser decrease in revenue growth, EBITDA margin, ROA, and asset growth than non PE-backed peers. The results of the primary analysis are presented in Table 4. The quantity of interest is the value of the β_1 coefficient from Equation 2, which is represented by the values on the row denoted PExCrisis.

6.1.1 Revenue growth

We start by studying the effect of PE ownership on companies' revenue growth during the crisis. Columns 1 and 2 of Table 4 relate to revenue growth. Even though we expect PE-backed firms to be able to maintain the strong revenue growth which otherwise tends to characterise PE ownership, we find no significant evidence that PE firms aren't influenced by the crisis in the same way as their non PE-backed peers. This fails to provide any evidence in favour of our hypothesis, namely that PE were more resilient in terms of operating performance during the crisis.

6.1.2 EBITDA margin

The results which relate to EBITDA margin are presented in Columns 3 and 4 of Table 4. We find that PE ownership during the crisis is positively related with EBITDA margin at a 5 percent significance level. Controlling for revenue, revenue growth, cash flow, ROA, and leverage ratio, we find that the average effect of PE ownership during the crisis is an increase in EBITDA margin of 2.85 percentage points. This implies that for any given revenue, PE firms were able to keep their operating costs lower than their peers could during the crisis years. This provides evidence in favour of Hypothesis 1.

Table 4**Operating performance analysis**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Revenue growth		EBITDA margin		Return on assets (ROA)		Asset growth	
PExCrisis	0.225 (0.241)	0.119 (0.215)	0.0677*** (0.0207)	0.0285** (0.0137)	0.0644*** (0.0209)	0.0470** (0.0214)	0.0351 (0.0298)	-0.000226 (0.0283)
Log(revenue)		0.414** (0.205)		0.0439 (0.0276)		0.0990*** (0.0221)		0.0336 (0.0214)
Revenue growth				1.11e-05 (0.00142)		0.00358** (0.00178)		0.0255** (0.0109)
Normalised cash flow		0.531 (0.390)		0.0653 (0.0598)		0.146*** (0.0468)		0.532*** (0.0834)
Return on assets (ROA)		0.539 (0.374)		0.566*** (0.0633)				0.236*** (0.0786)
Leverage ratio		0.295* (0.171)		0.00457 (0.0583)		-0.278*** (0.0635)		0.395*** (0.0852)
Constant	0.222*** (0.0561)	-5.037** (2.519)	0.0637*** (0.00700)	-0.526 (0.338)	0.120*** (0.00774)	-0.929*** (0.267)	0.143*** (0.0151)	-0.537** (0.251)
Observations	1,147	1,144	1,337	1,144	1,342	1,144	1,149	1,143
Adjusted R-squared	0.013	0.029	0.422	0.691	0.545	0.626	0.111	0.241
Firm controls	NO	YES	NO	YES	NO	YES	NO	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Firm fixed effects	YES	YES	YES	YES	YES	YES	YES	YES

This table reports the results of the difference in differences model for the performance measures revenue growth, EBITDA-margin, return on assets, and asset growth. Both year and firm fixed effects are included in all specifications. For each outcome variable, the first column excludes firm controls, and the second includes firm controls. Standard errors are clustered on firm level. Robust standard errors are given in parentheses. In columns 1 and 2 the outcome variable is revenue growth, in columns 3 and 4 EBITDA margin, in columns 5 and 6 return on assets, and in columns 7 and 8 asset growth. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

6.1.3 Return on assets

By studying Columns 5 and 6 of Table 4. we find that there is a positive relationship between PE ownership during the crisis and ROA at a significance level of 5 percent. Controlling for revenue, revenue growth, cash flow, and leverage ratio, we find that the average effect of PE ownership during the crisis is an increase in ROA of 4.70 percentage points. In other words, PE firms were able to deliver higher returns to on debt and equity, providing evidence in favour of our hypothesis that PE firms were more resilient in face of the crisis.

6.1.4 Asset growth

Lastly, we explore how PE ownership affected asset growth in the crisis. Columns 7 and 8 of Table 4. show that the regression does not yield significant results for the effect of PE ownership during the crisis when it comes to asset growth. PE firms experienced similar asset growth to their peers during the crisis. The analysis of asset growth thus fails to provide evidence in favour of our hypothesis.

6.2 Results of additional analysis

When it comes to labour and capital efficiency, previous findings provide no conclusive evidence to indicate that PE firms should experience a different effect of the crisis in terms of labour growth. We therefore expect labour growth to be equal across PE firms and non PE-backed firms. Given the lack of effect of PE ownership on revenue growth, which we present in 6.1.1, this should also imply that labour productivity is equal across the two groups. Lastly, we expect PE ownership to have a negative effect on normalised in NWC. The results of the additional analysis are presented in Table 5. Once again, the quantity of interest is the value of the β_1 coefficient from Equation 2, represented by the values on the row denoted PExCrisis.

Table 5

Additional analysis						
	(1)	(2)	(3)	(4)	(5)	(6)
	Employment growth		Labor productivity		Normalised NWC	
PExCrisis	0.00456 (0.0316)	-0.0240 (0.0297)	252.1 (360.3)	-31.56 (362.5)	-0.0461* (0.0271)	-0.0491** (0.0215)
Log(revenue)		0.0697*** (0.0232)		1,628** (700.5)		0.0222 (0.0266)
Revenue growth		0.0475*** (0.0171)		-54.23* (27.83)		-0.000804 (0.00195)
Normalised cash flow		0.0685 (0.115)		67.72 (575.8)		0.108** (0.0434)
Return on assets (ROA)		0.0485 (0.0657)		723.5 (636.2)		0.0480 (0.0493)
Leverage ratio		0.128 (0.0793)		-525.0 (837.5)		-0.731*** (0.0704)
Constant	0.104*** (0.0173)	-0.835*** (0.266)	3,577*** (130.9)	-15,805* (8,280)	0.251*** (0.0118)	0.412 (0.313)
Observations	1,151	1,144	1,341	1,144	1,342	1,144
Adjusted R-squared	0.079	0.169	0.842	0.849	0.682	0.804
Firm controls	NO	YES	NO	YES	NO	YES
Year fixed effects	YES	YES	YES	YES	YES	YES
Firm fixed effects	YES	YES	YES	YES	YES	YES

This table reports the results of the difference in differences model for employment growth, labor productivity, and change in NWC. Both year and firm fixed effects are included in all specifications. For each outcome variable, the first column excludes firm controls, and the second includes firm controls. Standard errors are clustered on firm level. Robust standard errors are given in parentheses. In columns 1 and 2 the outcome variable is 1-year employment growth, in columns 3 and 4 labour productivity, and in columns 5 and 6 normalised NWC. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

6.2.1 Employment growth

As shown by Columns 1 and 2 of Table 5, The regression yields no significant results for the effect of PE ownership during the crisis with regards to employment growth. Employment in PE firms thus followed the same trend as in non PE-backed peers. This gives no indication that PE firms were able to grow their labour force to a greater extent during the crisis than the peer group, nor does it indicate that PE firms were more likely to lay off employees in an effort to reduce costs during the crisis.

6.2.2 Labour productivity

We now investigate the effect of PE ownership on labour productivity. From Columns 3 and 4 of Table 5, we observe that there is no significant effect of PE ownership on labour productivity during the crisis. This fails to provide evidence in support of our hypothesis.

6.2.3 Normalised NWC

Lastly, Normalised NWC is investigated. Columns 5 and 6 of Table 5 show that there is a negative relationship between PE ownership and normalised NWC during the crisis at a 5 percent significance level. On average, PE ownership during the crisis had the effect of decreasing the normalised NWC by 4.91 percentage points. This means that PE firms were able to tie up less capital in current assets and finance their operations using current liabilities to a greater extent than their peers. This provides evidence supporting the hypothesis that PE-firms were able to maintain a lower normalised NWC during the crisis to a greater extent than non PE-backed peers.

6.3 Results of robustness test

The results of the robustness test are presented in Table 6. In this analysis, each of the dependent variables of the operating performance analysis and the additional analysis is analysed for the pre-crisis period and the year 2012. In line with our expectations, we find that the results are insignificant for revenue growth, EBITDA margin, ROA, asset growth, employment growth, and labour productivity. However, we still obtain significant results for normalised NWC. Specifically, PE ownership still had a negative impact of 8.60 percentage points during the year 2012 relative to non PE-backed peers, indicating a lack of robustness of our findings relating to normalised NWC.

Table 6

Robustness test														
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Revenue growth		EBITDA margin		Return on assets (ROA)		Asset growth		Employment growth		Labour productivity		Normalised NWC	
PExYear2012	0.209	0.0726	0.0388	0.0194	0.0546*	0.0352	0.0326	0.00673	0.0121	-0.0310	129.2	-172.6	-0.0804**	-0.0860**
	(0.279)	(0.232)	(0.0241)	(0.0163)	(0.0321)	(0.0350)	(0.0396)	(0.0389)	(0.0444)	(0.0379)	(764.3)	(782.2)	(0.0389)	(0.0353)
Log(revenue)		0.994		-0.0193		0.0636**		0.0142		0.0397		1,761**		0.0401
		(0.854)		(0.0283)		(0.0316)		(0.0272)		(0.0316)		(865.2)		(0.0347)
Revenue growth				0.00411**		-0.000176		0.0191***		0.0446***		-120.2**		-0.00327
				(0.00195)		(0.00251)		(0.00668)		(0.0131)		(60.70)		(0.00635)
Normalised cash flow		1.454		0.0648		0.0723		0.513***		-0.0432		-1,184		0.116
		(0.984)		(0.0868)		(0.121)		(0.173)		(0.239)		(2,263)		(0.105)
Return on assets (ROA)		-0.0342		0.533***				0.299***		0.215*		1,006		0.0144
		(0.503)		(0.0645)				(0.105)		(0.128)		(913.9)		(0.0690)
Leverage ratio		-0.561		-0.0334		-0.158**		0.190*		0.220**		-1,365		-0.681***
		(0.991)		(0.0404)		(0.0774)		(0.113)		(0.105)		(2,112)		(0.111)
Constant	0.221**	-11.50	0.0630***	0.266	0.120***	-0.571	0.143***	-0.182	0.104***	-0.544	3,582***	-16,905*	0.251***	0.168
	(0.0935)	(9.905)	(0.00560)	(0.347)	(0.00704)	(0.372)	(0.0143)	(0.324)	(0.0174)	(0.370)	(128.6)	(10,088)	(0.00949)	(0.423)
Observations	572	572	763	571	766	572	574	572	574	572	765	572	766	572
Adjusted R-squared	0.002	0.049	0.551	0.758	0.505	0.514	0.101	0.204	0.045	0.200	0.768	0.731	0.630	0.724
Firm controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

This table reports the results of the robustness test, which involves a difference in differences model based on the years 2007 and 20012. The outcome variables are revenue growth, EBITDA-margin, return on assets, asset growth, employment growth, labour productivity, and normalised NWC. Both year and firm fixed effects are included in all specifications. For each outcome variable, the first column excludes firm controls, and the second includes firm controls. Standard errors are clustered on firm level. Robust standard errors are given in parentheses. In columns 1 and 2 the outcome variable is revenue growth, in columns 3 and 4 EBITDA margin, in columns 5 and 6 return on assets, in columns 7 and 8 asset growth, in columns 9 and 11 employment growth, in columns 11 and 12 labour productivity, and in columns 13 and 14 normalised NWC *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

7 Discussion

Section 7.1 is devoted to interpreting and discussing the results of the operating performance analysis, while Section 7.2 relates to the additional analysis. Both analyses will be discussed in light of the findings of the robustness test. Lastly, in Section 7.3 we discuss some limitations of this study.

7.1 Discussion of operating performance analysis

The purpose of the operating performance analysis is to provide evidence in support of Hypothesis 1, which states that PE-backed firms were more resilient during the crisis in terms of operating performance, compared to non PE-backed peers. In order to operationalise the concept of operating performance, the accounting metrics revenue growth, EBITDA margin, ROA, and asset growth were analysed. Our results indicate that PE ownership during the crisis positively affected EBITDA margin and ROA, whereas it had no significant effect on revenue growth or asset growth.

It is important to recognise the relationship between EBITDA margin and ROA. Since ROA is proportional to the sum of operating profit and financial income, and EBITDA margin is proportional to the sum of operating profit and depreciation/amortisation, it is clear that ROA and EBITDA margin are positively correlated. The two metrics do however use different bases for normalisation; EBITDA margin involves division by revenue, while ROA involves division by total assets. Given the result that neither revenue growth nor asset growth differed significantly between the PE-backed sample and the peer sample, it should be expected that significance in either one of ROA and EBITDA margin should lead to significance in the other, although this connection is not guaranteed, as it can of course be influenced by depreciation/amortisation, financial income and slight differences in revenue growth and asset growth.

The findings that neither revenue growth nor asset growth were significantly different between PE sample and peer sample indicate that PE firms were not able to maintain growth any more successfully than peers during the crisis. Our results do however indicate that PE firms were more successful in maintaining profitability during the crisis, which could be explained by the increase in attention that PE portfolio companies received from the PE professionals during the crisis.

Our results are similar to those of Bergström et al. (2007), who study the Swedish market between 1993 and 2005. Their results suggest that PE-backed firms outperformed peers in terms of EBITDA margin and return on invested capital (ROIC) by 3.07 and 4.01 percentage points, respectively. It should be noted however, that their study does not investigate the effect of PE ownership during an economic crisis, but instead looks at its general effect during the holding period. One interpretation of our results is therefore that the outperformance of PE-backed firms relative to their peers which Bergström et al. (2007) document becomes *even stronger* during a period of crisis, when the rest of the market is struggling, and PE firms' industry expertise may be even more critical. In addition to the significant results for EBITDA margin and ROA, our findings echo those of Bergström et al. (2007) in that no significant results were obtained for revenue growth.

Comparing our results with the findings on the U.K. market in times of crisis, our study obtains significant results which – to some extent – stand in direct opposition to the findings of Bernstein et al., (2019). Their study indicates that PE-backed firms experienced an 8 percent increase in market share (which can qualitatively be compared to revenue growth) and that PE ownership positively influenced asset growth during the crisis, while they did not find evidence suggesting that PE-backed firms were influenced differently in terms of EBTIDA margin or ROA. There could be several explanations contributing to the differences in results. Firstly, it is worth pointing out that data consisting of companies' financial reporting tends to be quite noisy, which could pose problems if sample sizes are not very large. Limitations in our study are further discussed in Section 7.3. Secondly, Secondly, Bernstein et al., (2019) provide evidence suggesting that U.K. portfolio firms could maintain higher levels of investments and increase their market share as a result of superior access to financing during the crisis years, relative non PE-backed firms. It could be the case the Swedish PE-backed firms did not have, to the same extent as U.K. firms, superior access to financing thanks to PE firms' favourable relationships to banks. However, this is unlikely to have had a significant impact considering that the Swedish PE market is also very well-developed, and Sweden had e.g., the world's third highest PE investments as a percentage of GDP in 2007 (Bergström et al., 2007). Instead, it is more plausible that the effect of having superior access to financing was greater for U.K. portfolio firms because the access to financing was more severely restricted in the U.K., compared to Sweden.

Bernstein et al., (2019) suggest that their findings indicate that PE-backed firms prioritise a strategy of channelling their investment towards increasing their market share during

periods of limited access to capital. The authors also reason that this strategy might be prioritised over increasing short-term profitability, given the economic environment. The results of our study seem to suggest that such a shift in strategy requires that the access to financing is restricted to a certain extent before it is employed. However, it should be noted that PE firms normally employ strategies aimed at increasing both profitability and growth (Biesinger et al., 2020). To which extent one strategy is prioritised over the other is arguably dependent on other factors as well, such as industry-specific outlooks. Relating growth and profitability to operating performance, Bergström et al. (2007) argue that sales growth is a “less clear-cut measure of value creation”, and consider profitability to be more relevant. However, the authors also reason that operating performance is a “complex process that is poorly proxied by a few variables”.

In summary, we find evidence to support Hypothesis 1 in two of our four proxies for operating performance, namely EBITDA margin and ROA. For the other two, revenue growth and asset growth, the result is insignificant, and thus neither positive nor negative. This means that the operating performance analysis does provide support for the hypothesis that PE firms were more resilient during the crisis in terms of operating performance than their peers, however that this resilience does not generalise to all proxies of operating performance.

7.2 Discussion of additional analysis

The purpose of the additional analysis is to provide evidence to support Hypotheses 2 to 4, which relate to employment growth, labour productivity, and normalised NWC. Our results indicate that PE ownership during the crisis had no significant effect on employment growth or labour productivity. On the other hand, we do find that PE ownership had a significant negative effect on normalised NWC during the crisis, however this effect was not found to be unique to the crisis period, but persisted in the year 2012 as well.

When it comes to employment growth and labour productivity, our results echo the results obtained on the Swedish market during non-crisis periods, such as Olsson and Tåg (2012) and Bergström et al. (2007). However, they are different from the results obtained by Davis et al. (2019) on the U.S. market during crisis periods. One possible explanation for this ostensible conflict could be differences in employment protection regulation between the two countries. While Sweden placed on the seventh strongest protection among 30 OECD countries in 2004, the US placed on the 30th place and was thus considered to have the least strong protection of all countries. It could therefore be argued that the differences in employment

protection between Sweden and the U.S. are sufficiently great that a generalisation of the results of Davis et al. (2019) to the Swedish employment market is not valid. In summary, our results provide evidence in support of Hypothesis 2, which states that PE-backed firms were influenced in the same way as non PE-backed peers in terms of employment growth. When it comes to labour productivity, our results provide evidence against Hypothesis 3, which states that PE-backed firms were less negatively influenced by the crisis than non PE-backed peers in terms of labour productivity. It can be noted that this result is consistent with the lack of significant results for both revenue growth and employment growth. The reason for this is that labour productivity is calculated as revenue divided by the number of employees. Since neither numerator nor denominator changed significantly, the resulting quantity is therefore not likely to change significantly either.

One aim of the additional analysis was to provide some insight into how PE firms might increase the operating performance of their portfolio companies. If we relate the findings on employment growth and labour productivity to the operating performance of firms, it seems like the outperformance by PE-backed firms in terms of EBITDA margin and ROA did not come as a result of changes to the labour force, neither in terms of employment growth nor labour productivity. Investigating the measures that give rise to the observed effects on operating performance could thus be subject to further studies.

Our results indicate that PE ownership had a negative effect on normalised NWC during the crisis. However, this result was not found to be robust to changes in time period of analysis. Specifically, PE ownership had a significant negative effect on normalised NWC during 2012 as well. As discussed in Section 3.2.3, several studies have concluded that the reduction of capital requirements is a common measure for PE-backed firms to take in order to increase operating performance. It may be the case that PE firms deployed a strategy of focusing even more on optimising working capital during the crisis, to maintain profitability in an otherwise uncertain period. A reduction of NWC involves faster collection of receivables, extension of payment terms to suppliers, and optimisation of inventory cycles, the first two of which require significant bargaining power to achieve. It not unlikely that PE portfolio firms were able to leverage their strong position in negotiations with both suppliers and customers, who were also experiencing the effects of the crisis, but may have had no financial sponsor to support them. Regarding optimisation of inventory cycles, it can be noted that this is something that Private Equity professionals often have significant experience of. If indeed PE firms were more likely to assist their portfolio companies in operating matters during the crisis, then it is very possible

that inventory optimisation is just such an operating matter. The fact that the effect of PE ownership on NWC is still significant in 2012 could perhaps be the result of a NWC-reducing strategy being implemented during the crisis, and then maintained in the following years as well. In other words, having optimised NWC in their portfolio firms during the crisis, PE firms should have seen no reason to forgo this optimisation only because the crisis had ended. All in all, we find evidence to support the hypothesis that PE-backed firms decreased their normalised NWC more during the crisis than non PE-backed peers, however the causality of the crisis with regards to the decrease in NWC can hardly be established, due to the lack of robustness in terms of time period.

7.3 Limitations of this study

One limitation of this study is the relatively small sample size. After having screened relevant PE transactions, filtered away such firms which do not fit our criteria, and retrieved the financial data from the database Serrano, we were left with a group of 96 PE-backed firms. By comparison, Bernstein et al. (2019) included 434 PE-backed firms in their study. Naturally, this is a consequence of the fact that the U.K. PE market is considerably larger than the Swedish, owing to both a substantially larger GDP as well as a higher value of PE deals relative to GDP. However valid the reason for a small sample size may be, it is still a fact that a small sample size will be detrimental to the robustness of a study, especially if the data is noisy. When it comes to the financial data of private companies, it is fair to say that such data is indeed quite noisy, which makes it important to gather enough data.

Although the robustness test presented in this study is valid in principle, it does not fully test the robustness of our analysis, since it only compares the pre-crisis period to the year 2012, which may result in an exaggerated effect of the year 2012. As previously stated, financial data is rather noisy, so it is not unlikely that one particular year may have somewhat extreme values for some accounting metric, given our sample size. Optimally, one would like to compare the pre-crisis period with a lengthy post-crisis period, however the limited holding period of PE firms means that such an analysis would be less and less relevant as the comparison years stretch further beyond 2012 and more and more firms in the PE sample undergo an exit.

It should also be recognised that the notion of operating performance is difficult to characterise using only a few accounting metrics. It is thus important to remember that the results from the study are only indicators of operating performance.

8 Conclusion

There is a wide body of research indicating that PE-backed firms tend to outperform non PE-backed firms in terms of operating performance. However, few studies have specifically examined this topic in relation to a crisis period. The aim of this paper was therefore to investigate if PE-backed firms were more resilient in face of a financial crisis than non PE-backed firms based on company performance. In addition to looking specifically on metrics directly related to performance, the paper also examined if Private Equity influences labour growth and how efficiently labour and capital is managed within firms.

The study used a sample of 96 Swedish firms which were PE-backed during the financial crisis of 2008. To investigate the effects of PE ownership, a matching sample of 96 non PE-backed firms was gathered to allow for a difference in differences analysis between the two samples. Operating performance was proxied using four accounting metrics, namely: revenue growth, EBITDA margin, return on assets and asset growth.

The results of the study indicate that PE ownership during the crisis positively affected EBITDA margin and ROA, whereas no significant effects on revenue growth or asset growth were identified. The results indicate that PE firms were more successful in maintaining profitability during the crisis, but were not able to maintain growth any more successfully than peers. These findings are consistent with earlier empirical findings on the Swedish market in non-crisis periods (Bergström et al., 2007). However, the results stand – to some extent – in direct opposition to the findings on the U.K. market in times of crisis. Bernstein et al., (2019) obtain results indicating that U.K. portfolio firms could maintain growth more successfully than peers as a result of superior access to financing, whereas the authors do not identify any significant effect on profitability. One possible explanation to the differences in results could be that financing opportunities were more severely restricted in the U.K. than in Sweden during the crisis years, making the effect of having superior financing opportunities larger. Turning to the additional analysis, the results of this study indicate that PE ownership during the crisis had no significant effect on employment growth or labour productivity, but a significant negative effect on normalised NWC during the crisis years. However, this effect was not found to be unique to the crisis period, but persisted in the year 2012 as well. The results from the additional analysis suggest that the outperformance by PE-backed firms in terms of EBITDA margin and ROA did not come as a result of changes to the labour force, neither in terms of employment growth nor labour productivity. Investigating the measures that give rise to the observed effects on operating performance could thus be subject to further studies. Not only would it be helpful

with empirical findings on this topic, but it would also be valuable to conduct qualitative studies that contribute to the understanding of the measures and strategies PE firms normally employ to improve operating performance in their portfolio firms.

In summary, earlier empirical research indicates that PE-backed firms generally tend to outperform non PE-backed firms in terms of operating performance. The results of our study seem to suggest that this outperformance prevails during periods of economic crises. Comparing with empirical findings on the Swedish market during non-crisis periods, our results indicate that the outperformance may become *even stronger* in times of crises, suggesting that PE firms' industry expertise may be even more critical during these periods.

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