Linking human capital responses to performance

An empirical study of the aftermath of the Norwegian financial crisis of 2008-09

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Abstract

The purpose of this thesis has been to address a major gap in the literature by investigating performance implications of human capital responses in the short and long term. By utilizing a combination of survey and registry data, this thesis will examine the relationship between firms' human capital responses and financial performance indicators in the aftermath of the Norwegian financial crisis of 2008-09. Inspecting and analyzing firm performance in the period after the financial crisis reveals that; i) Norwegian firms experienced significant reductions in performance, and that these reductions were not evenly distributed amongst firms; ii) the response related to increased downsizing is negatively associated with long term performance; iii) most human capital investments have limited or no effect on either short or long term performance, and do not lead to conclusive results; iv) a survey with more and detailed operationalizations of human capital decisions is required to create clarity of these events. In sum, the findings provided by this thesis indicate that firms' human capital responses have limited impact on their short and long term performance. Furthermore, the study argues that the lack of findings could be due to poor measures provided by the survey. Based on this, directions for future research are presented to expand this research stream.

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1. Introduction

The trajectory and the outline of the financial crisis of 2008-09 and the following recession is well known, and was the most significant economic downturn since the Great Depression (Crotty, 2008; Reinhart & Rogoff, 2009). Record low short term interest rates drove investors in search of more risky investments which led to the burst of the housing bubble in the US, followed by a rapid decline in the stock market and later developed into a global recession (Lin, 2008). Although the financial crisis and the recession that followed were considerably less severe in Norway compared to other countries, the Norwegian gross domestic product (GDP) was declining, the number of bankruptcies spiked, and the unemployment level were on the rise (IMF, 2010).

The main focus of business cycle literature in economics and finance has been to provide sample evidence of the aggregate effects of recessions, e.g. how GDP, bankruptcy rates, interest rates and employment are affected by a recession (Knudsen, 2014). However, in strategy literature there has been little research into how firms are affected by these. This concern was already identified 25 years ago (Mascarenhas & Aaker, 1989) and the financial crisis of 2008-09 highlighted that not much has changed since then (Agarwal, Barney, Foss, & Klein, 2009; Bromiley, Navarro, & Sottile, 2008). This was the motivation for the preliminary research by Knudsen & Lien (2012), which examined the relationship between competitive behavior during recessions, and how investments in knowledge stocks influence competitive outcomes.

This thesis intend to contribute to the strategy literature by exploring post-recession effects of investments in human capital, rather than previously examined incentives to invest in different types of capital during recessions (Knudsen & Lien, 2014; Knudsen & Lien, 2015a). Our aim is to investigate whether investment in human capital during the financial crisis in Norway can explain performance differences between firms, expressly how investments in human capital affect short and long term performance.

The strategy literature has, as mentioned above, neglected the importance of environmental shocks, and we can only speculate as to why studies on the effects of recessions have been abandoned. However, a possible explanation could be that studies by McGahan & Porter (1997; 1999; 2002) found very small effects in year-to-year variations in profitability (Lien, 2009). Furthermore, strategy literature had its major expansion during the 1990s, an unusually stable period with only mild recessions (Lien, 2009). This has resulted in surprisingly

limited current knowledge about micro-level issues and how financial recessions affect firms and competitive dynamics.

Finance and macroeconomic research has devoted considerable attention to investments during recessions, both in terms of physical capital and in terms of research & development (R&D) investment (e.g. Aghion, Askenazy, Berman, Cette, & Eymard, 2012; Bloom, 2007; Bougheas, Görg, & Strobl, 2003). However, studies of human and organizational capital have received significantly less attention (DeJong & Ingram, 2001; López-García, Montero, & Moral-Benito, 2013).

In strategy, human capital is commonly regarded as a particularly important asset stock in terms of explaining performance heterogeneity (Amit & Belcourt, 1999; Lado & Wilson, 1994; Pfeffer, 1995; Wright, Dunford, & Snell, 2001). Human capital is a key concept throughout this thesis, and we define this concept as the knowledge and skills embedded in firm's employees (Coff, 1997; Crook et al., 2011; Hatch & Dyer, 2004). Furthermore, it is important to emphasize that human capital only comprise of investments in existing knowledge (Knudsen & Lien, 2012). DeJong & Ingram (2001) presents several activities regarding the development of existing knowledge and skills, e.g. continuing education and training programs, on-the-job training, and professional activities pursued outside the workplace. However, few studies have examined how investments in human capital are affected by recessions (Knudsen & Lien, 2014; 2015b). Human capital is particularly interesting to study during recessions, as theory argues that financial crisis and recessions affects factor market efficiency. This implies that human capital can be acquired and accumulated at lower cost during recessions, and in turn lead to superior performance (Barney, 1986; Dierickx & Cool, 1989). In an effort to further develop this research stream, this study will link human capital responses to performance in the short and long term, and will be a continuation of the research conducted by Eirik S. Knudsen and Lasse B. Lien at S T O P (Center of Strategy, Organization and Performance at NHH). In order to establish a relationship between human capital and post-recession performance, this study will analyze accounting variables from Norwegian firms using time-series data provided by NHH and Centre for Applied Research at NHH (SNF), in combination with survey data from SNF's research program "Crisis, restructuring and growth".

The following research question has been constructed to gain knowledge of whether investments in human capital affected the post-recession profits of Norwegian firms:

How did human capital responses during the financial crisis of 2008-09 in Norway affect short and long term performance?

By answering this question, we aim to examine the effects of the effects of human capital responses during the financial crisis, and explore whether such responses affected post-recession performances for Norwegian firms. To present the research question, a research model has been constructed to give a visual presentation of the concepts of this study, and to create an understanding of how the effects interact. The model will be used throughout the thesis to illustrate both findings and results.

Figure 1 Simplified research model.

The research model consists of a set of independent variables (firms' human capital responses), and one set of dependent variables (post-recession performance). A more detailed research model will be presented and discussed in-depth in chapter three.

This thesis' main purpose is to contribute new knowledge on how Norwegian firms responded to the financial crisis of 2008-09 through investments in human capital, and investigate the relationship between these investments and post-recession performance. Whereas the relevance of the study is primarily empirical, it will also have a certain theoretical relevance, as few studies have previously examined these relationships. However, as the Norwegian financial crisis is considered relatively mild compared to other countries (IMF, 2010), it is difficult to obtain significant findings. The main findings reveal that human capital responses related to increased downsizing are negatively associated with long term performance and that most human capital investments have limited or no effect on either short or long term performance. The lack of findings do not necessarily mean that the theory and the presented hypotheses are not supported, but that further operationalization and better data material are needed in order to draw further conclusions. Regardless of limited significant findings, the

results provide new knowledge regarding the appropriateness of using a combination of registry and survey data to measure the short and long term effects of investments in human capital. Moreover, the study will contribute new information to a previously unexplored area of research.

First, the strategy literature has little to reveal when it comes to human capital responses during recessions. Second, to our knowledge there are no studies that have investigated the short and long term effects of such responses. Our expectations are based on theory of how incentives to invest and respond in human capital change during recessions, which ultimately results in changes in performance. Furthermore, our study can serve as a foundation for future research on how investments during financial crises in other types of assets, such as physical capital and research and development (R&D), affect post-recession performance.

The introduction has addressed the research topic and the rest of the thesis will proceed as follows. Chapter two will present and review relevant theory, which is applied in the thesis, and will serve as the foundation for the hypotheses tested in the analysis. Chapter three will provide an in-depth presentation of the methodology, including a discussion of the research design, data collection, sampling strategy, variables and the validity and reliability of the thesis. In chapter four the data will be analyzed by using both descriptive statistics and regression models. The descriptive models are used to illustrate the empirical context and the general economic context in Norway, before interpreting the results from the regressions. Chapter five will discuss findings in relation to relevant literature in addition to providing suggestions for future research, and presents the limitations of the study. Final, chapter six will summarize the findings leading to the conclusion of the thesis.

2. Theoretical background and hypotheses

2.1 Introduction

The purpose of this thesis is to examine the relationship between firms' human capital responses during the financial crisis and post-recession performance. There are several theoretical approaches to explain this depending on discipline. Chapter one illustrated that strategy is not a unified discipline, but rather uses theories from different fields in explaining performance differences. Therefore, the chosen approach is multidisciplinary, combining elements from economics, finance, and strategy literature. However, the theoretical foundation will primarily be based on strategy literature.

This chapter will present and review relevant literature to create a theoretical framework for the hypotheses of this study. First, performance differences between firms will be explained through the resource based view (RBV). Second, as human capital is a fundamentally important resource stock both in terms of firm and to this study, this resource will be presented in-depth. Third, theory considering recessionary shocks and business cycles are presented and described in relation to how they affect investments and stocks of human capital. Fourth and final, responses related to investments in human capital are outlined based on how they are affected by recessions.

2.2 The resource based view

A core issue in the field of strategy is to explain performance differences between firms, as well as how and when such differences can persist (Hoskisson et al., 1999; Rumelt, Schendel, & Teece, 1994). In strategy, there are two dominating theoretical perspectives - the resource based view (RBV) (Barney, 1991) and industrial organization (IO) (Porter, 1979). The IO view puts the determinants of firm performance outside the firm, in the industry structure. In contrast, RBV explicitly search for the internal sources for sustainable competitive advantages (SCAs), and aims to explain why firms in the same industry might differ in performance (Barney, 1986, 1991; Peteraf, 1993; Wernerfelt, 1984). As a consequence, RBV does not replace the IO view, but rather complements the analysis of the external environment (Barney, 2002; Mahoney & Pandian, 1992; Peteraf & Barney, 2003). The external factors in IO are related to a different level of analysis than RBV, and the literature shows that variances in firm performance to a

larger extent are explained through internal rather than external factors (McGahan & Porter, 1997, 1999, 2002).

There are several definitions of resources, e.g. Barney (1991), who defines the concept as; "all assets, capabilities, organizational resources, firm attributes, information, knowledge… controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness". Jakobsen & Lien (2015, p. 90) offer an updated and simplified definition of the concept: "... stocks of input factors that influence a firm's relative ability to implement product market strategies". This definition highlights that firms possess resources that can be used to conceive and implement strategies in the product market, which in turn affects their relative performance.

While most seminal contributions to RBV have appeared during the past 20 years, Edith Penrose's (1959) book *"The Theory of the Growth of the Firm"* is largely recognized as the origin of the RBV. Penrose, challenged the neo-classical economic theory by assuming that firms possess fundamentally different resources. This view was popularized by researchers in the 1980s, and more recent studies (Barney, 1986; 1991; Barney & Clark, 2007; Peteraf, 1993) extended this research stream by focusing on how firms can create a sustainable competitive advantage by exploiting their internal resources. The theory recognizes firms as heterogeneous entities, which try to attain SCA by exploiting their resources and capabilities (Barney, 2007).

Understanding the sources of SCA for firms have been a major area of research in strategy literature (Barney, 1986; Porter, 1979; Rumelt, 1984). In the strategy literature, there are multiple definitions of competitive advantage (CA) (Rumelt, 2003): Barney (2002, p. 9) states that "a firm experiences competitive advantage when its actions in an industry or a market create economic value and when few competing firms are competing and engaging in similar actions". A more recent definition was coined by Peteraf & Barney (2003, p. 314): "…a firm's competitive advantage by when it manages to create more economic value than the marginal competitor in the relevant product market". In sum, a combination of these implies that CA can be defined as above average profit in an industry.

Barney (1991) and Peteraf (1993) argue that the RBV rests on two basic assumptions. The first assumption explains that firms are heterogeneous and control different combinations of resources in their strategies they pursue, which explains performance differences between firms (Barney, 1991). The second assumption explains that resource immobility enables performance differences to persist over time. Further, Barney (1991) describes how resource-heterogeneity and immobility generates sustained competitive advantage through being valuable, rare, non-imitable and non-substitutable (VRIN). These criteria are supported by

empirical research, e.g. a meta-study conducted by Crook et al. (2008), found that the resource-performance link was stronger when resources fulfilled the VRIN-criteria.

Resources are necessary in order to develop product market strategies and can either be acquired or accumulated within a firm (Barney, 1986; Dierickx & Cool, 1989). When an implementation of a strategy require acquisitions of resources, a strategic factor market (SFM) develops. A SFM is defined as "a market where the resources needed to implement a strategy are acquired" (Barney, 1986). The existence of SFMs have two important implications for firm performance in the product market. First, the return on a resource depends on its cost. Second, the cost of acquiring a resource depends on the efficiency in the relevant factor market. In their inception, firms begin with a relatively small amount of strategy relevant resources (Lippman & Rumelt, 1982; Kimberly & Miles, 1981). These resources must be acquired within a firm's environment at some point in their history (Hannan & Freeman, 1977; Pfeffer & Salancik, 1978). Dierickx & Cool (1989) challenges Barney (1986) by putting forward a complementary framework based on the notion of resource accumulation. Firms can acquire several resources in SFM, but some are not simply traded in open markets. According to the article, firms deploy both tradeable and non-tradable resources. Non-tradable resources cannot be realized in factor markets, hence they have to be accumulated within a firm. In order to tap into the profit potential of a non-tradable resource, the firm are constrained to accumulate the resource over time. Dierickx and Cool (1989) emphasize that the complexity of the accumulation process hinders rivals from imitation and thereby non-tradable resources have a higher profit potential than tradable resources. A prerequisite for the accumulation process to be profitable, is that the process has to be less costly than the value of the resource that is developed. Moreover, the process of accumulating resources is inherently more uncertain than acquiring resources in factor markets, which affects the profit potential of these types of resources.

Barney (1986) argues that the profit potential of a resource depends on the efficiency in the relevant factor market, and makes a broad distinction between efficient and inefficient SFMs. In perfectly efficient factor markets, firms have identical expectations of the value of each strategic resource. Following Barney's (1986) terminology, an efficient SFM is defined as "a market where there are no arbitrage opportunities gained by acquiring a combination of resources and selling the combination for a higher price than the cost of the individual resource". In these type of markets, there is no information asymmetry about the value of the resource, and firms will only be able to obtain normal returns from acquiring resources and implementing strategies. Hence, there is no potential for firms to develop SCA.

However, the assumption that firms control the same perfectly accurate information, is not likely to exist in real factor markets (Barney, 1986; Dierickx & Cool, 1989). In such markets, firms are heterogeneous and will consequently have different expectations about the value of strategic resources. The literature emphasizes four elements that explain inefficient SFMs - luck (Barney, 1986), superior information (Barney, 1986), ex ante heterogeneity (Denrell, Fang, & Winter, 2003), and financing constraints (Knudsen & Lien, 2014). The first three elements create expectation differences among firms, which makes it possible to acquire a resource for less than its value. The fourth element creates abnormal price levels that are caused by dysfunctional financial markets, e.g. during a financial crisis.

First, inefficient factor markets involves the concept of luck, which comprises of the two components risk and uncertainty. In the presence of risk, firms are unable to yield expected superior performance, as the possible range of outcomes are known. However, firms might experience luck and gain a superior ex-post performance. For uncertainty, the outcomes and probability distribution are unknown, and thereby it is not possible to quantify expected performance (Knight, 1921). Consequently, luck can generate sustainable performance difference if a resource is acquired or accumulated at below expected value. Second, superior information is a source of SFM imperfections as firms are heterogeneous in regards to the information they possess (Barney, 1986). Some firms may have inside information or more accurate knowledge of the potential application of a resource. This superior information enables firms to exploit information asymmetries either through acquiring undervalued resources, or through avoiding acquiring overvalued resources. According to Barney (1986) the level of SFM-imperfections determine the effect of superior information on firm performance, and the potential to generate competitive advantages from acquired resources. Third, as firms are inherently heterogeneous in the resources they control, each firm has different levels of complementarity for each resource and value resources differently (Denrell, Fang, & Winter, 2003). Consequently, the firm that possess the highest resource complementarity can capture the value equivalent to the marginal difference in complementarity to the second highest bidder. Fourth, financing constraints may appear in abnormal market conditions. Strategy literature assume that financial markets are well-functioning, implying that profitable investments are financed. This assumption can be violated for three reasons; (1) financial markets may vary in terms of efficiency over time (Knudsen & Lien, 2014), (2) characteristics of a resource may affect how difficult it is to finance (Hall & Lerner, 2009), and (3) characteristics of firms may affect the availability of financing (Hall & Lerner, 2009). As a consequence, firms which are

not financially constrained may capitalize on constrained firms and acquire resources at lower prices resulting in superior performance (Shleifer & Vishny, 2011).

In SFMs, each of these imperfections can be present individually or in different combinations, influencing the possibility of achieving superior performance. The overview of the four imperfections focus on how firms can generate superior performance through resource acquisition. However, these are also applicable to intangible resources that are accumulated within the firm (Dierickx & Cool, 1989).

2.3 Human Capital as a Firm Resource

Resources have been categorized in many different ways (Ansoff, 1965; Barney, 1991; Greene & Brown, 1997), e.g. financial, physical, human, organizational and social. Among these, human capital is a resource category of particular importance in several studies (Amit & Belcourt, 1999; Lado & Wilson, 1994; Pfeffer, 1995; Wright, Dunford, & Snell, 2001). Prior to discussing the importance of human capital for SCA, it is important to define the concept of human capital. A classic definition by Becker (1962) of human capital refers to innate or acquired individual attributes that have productive value in workplaces. However, we provide an updated definition of the concept and define human capital as the knowledge, skills and abilities inherent in the employees that constitutes the organization (Coff, 1997; Crook, Tood, Combs, Woehr, & Ketchen Jr., 2011; Hatch & Dyer, 2004).

Investing in human capital involves both acquisition and accumulation (Barney, 1986; Dierickx & Cool, 1989). Employees can be acquired in the labor market, or human capital can be accumulated through investing in existing employees' knowledge, skills and abilities. Human capital is unique in the challenges that firms are facing when appropriating the value of a resource. Moreover, compared to other types of resources, the value can either be lost or captured by competitors when employees decide to leave the firm. The incentives for investing in human capital are influenced by the employees' mobility, and in absence of labor market imperfections, firms would not have any incentives to invest in human capital.

Human capital possess, as previously noted, a unique position compared to other groups of resources. First, human capital is a precursor and a complement for acquiring, developing and deploying all other resources and capabilities (Knudsen & Lien, 2015b). Consequently, firms cannot deploy any resource or capability without complementary human capital (Teece, 1986). This implies that human capital is a crucial strategic resource for firms in any industry. Second, human capital tends to be more mobile than other resources. Unlike other stocks, human capital cannot be possessed by a firm, and may actively be seeking opportunities outside

their own organization. The mobility of human capital implies that firms can choose from a large pool of employees in the labor market with heterogeneous knowledge, skills, and abilities (Knudsen & Lien, 2015b; Wright, McMahan, & McWilliams, 1994). The labor market enables firms to hire employees with the highest complementarity to their own stock of resources, thereby increasing performance (Knudsen & Lien, 2015b; Singh & Agrawal, 2011; Song, Almeida, & Wu, 2003).

Given the ease of how human capital can move between firms, it would seem difficult to protect human resources from expropriation from rivals (Hatch & Dyer, 2004). However, it is not likely to presume that human resources are completely mobile across firms (Abelson & Baysinger, 1984). When a firm acquires human capital from a rival they will likely appropriate some of the rivals' knowledge, but the firm must undergo a period of dynamic adjustments costs while the best uses of human capital is discovered and tailored to the needs of the new environment (Cappelli & Singh, 1992; Mahoney & Pandian, 1992; Mahoney, 1995; Penrose, 1959; Prescott & Visscher, 1980; Teece, Pisano, & Shuen, 1997). Thus, human capital can only generate SCA if isolating mechanisms prevent workers from taking their valuable knowledge and skills to rival firms (Barney, 1991; Rumelt, 1984). Therefore, human resources are most valuable and inimitable when they reside in the environment where they were originally developed (Hitt et al., 2001; Klein, Crawford, & Alchian, 1978; Lepak & Snell, 1999).

An important distinction is the distinction between firm-specific and general human capital, which is essential regarding the value and imitability of the resource (Becker, 1962). General human capital characteristics are useful across a broad range of economic settings, and refer to people's general mental ability and conscientiousness (Molloy & Barney, 2015; Ryan & Ployhart, 2014; Rynes, Giluk, & Brown, 2007). People with valuable, but general human capital can move among the highest bidding firms in the market until their costs roughly equal the value they add (Coff, 1997). Firm-specific human capital is valuable in more limited circumstances (Molloy & Barney, 2015). Individuals can only create this type of human capital on the job, and it is valuable because it helps employees to make decisions that are congruent with a firm's unique strategy, organizational context, and competitive environment (Kor & Mahoney, 2005).

As firm-specific human capital cannot be easily transferred and applied in other firms, it is challenging for employees to demand compensation that is commensurate with their full value to the firm (Becker, 1983). Since firm-specific human capital is hard to apply across firms, employees with such knowledge and skills will experience decreased productivity if they leave the firm (Becker, 1964; 1993). In contrast, employees with general knowledge and skills will

not experience decreased productivity by switching firms. If one assumes that wages are equal to productivity, employees with firm-specific knowledge and skills will suffer a wage penalty if they move. This increases mobility costs for the employee, and possibly helping to sustain a competitive advantage for the firm where the employee is located (Campbell, Coff, and Kryscynski, 2012). If general human capital has a constant value across firms, while firm-specific human capital has higher value at the current firm, a move requires sacrificing both the compensation of firm-specific skills and opportunity costs (Campbell et al., 2012). This makes firms able to retain workers with firm-specific human capital for less than the full use value, which hinders worker mobility (Hashimoto, 1981; Jovanovic, 1979; Parsons, 1972). Therefore, employees could be reluctant to develop firm-specific skills given the alternative to invest in general human capital, where their wage is equal to productivity (Wang & Barney, 2006; Wang, He, and Mahoney, 2009). Firm-specific human capital can function as an isolating mechanism in two ways (Campbell et al., 2012). First, employees with firm-specific human capital are less likely to leave the firm voluntary, and it is therefore less likely that employees take valuable general knowledge and skills to rival firms. Second, if these employees leave voluntarily, the firm-specific knowledge and skills cannot be perfectly deployed and utilized in rival firms. Therefore, relying on firm-specific human capital enhances a firm's ability to sustain competitive advantage, both because employees are less likely to leave, and if they leave employees cannot easily apply their knowledge and skills in rival firms. Following these arguments, human capital is a particular important resource, but impose a challenge in retaining SCA over time.

2.4 The Business Cycle, Recessionary Shocks, and Human Capital

2.4.1 Business cycles
Business cycles affect firms' stocks and flows of resources through changes in demand and access to credit during its different phases. Business cycles are defined as "... a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises..." (Burns and Mitchell, 1946, p. 3). The definition coincides with the Juglarian approach to cycles (Juglar, 1862 cited in Dal-Pont Legrand & Hagemann, 2005). Juglar was the first economist to divide the business cycle into two distinct phases; expansion and recession. Later, Joseph Schumpeter (1939) extended Juglar's work by adding two additional phases, and argued that business cycles were comprised of the four phases; expansion, slowdown, recession and recovery. The following section will outline the three

phases (recovery, expansion, slowdown) of the cycle, while recessions is described in section 2.4.3.

The business cycle enters the recovery phase when a recession reaches its minimum point in the trough, which indicates the lower turning point of the cycle (Boldin, 1994). When a recession reaches the trough, the business cycle enters the recovery phase, which is characterized as the beginning of the upturn where GDP reaches the previous peak level (Sichel, 1994). Once the business cycle has reached the previous peak levels, recovery is said to be complete, and the cycle proceeds with the expansion phase (Eckstein & Sinai, 1986, p. 48).

Periods of economic expansions are typically called prosperity or booms, and is the subsequent phase of recovery. NBER (2010) defines expansion as: "a period where economic activity rises substantially and spreads across the economy…". Moreover, interest rates tend to increase in the expansion phase (Filardo, 1994). This period may be characterized by a period of an unsustainable rapid growth rate in advance of economic activity, but is clearly temporary (Eckstein & Sinai, 1986, p. 50). In this stage, the economy as a whole is usually near its ceiling of potential output. However, the recovery phase can also be followed by a period of slower growth, after normal capacity utilization is approached or surpassed (Schultze, 1964). Subsequently, the rapid growth rate tend to diminish (Sichel, 1994). This pushes the demand for credit beyond the ability of businesses, households, and governments to still expand out of internally generated funds, and at some point supply of credit ceases to keep pace (Eckstein & Sinai, 1986, p. 51). This ends in a peak which is the upper turning point of the cycle (Boldin, 1994).

The business cycle enters a slowdown immediately after reaching the peak preceding a decline in real activity (Boldin, 1994). Every recession since the mid-1950s has been preceded and triggered by a slowdown with a credit crunch (Eckstein and Sinai, 1986, p. 51). During a credit crunch, firms and consumers become aware that their expectations regarding spending plans are falsified, and consequently the cost of financing increases and becomes problematic.. Simultaneously, rapidly increasing interest rates, reduced liquidity in the commercial banking system, and the firms' attempt to liquidate financial assets to raise funds, causes a decline in total level of spending. Businesses adjust their inventories to a lower level and cease to hire new workers. These changes result in production cutbacks, which amplifies the slowdown.

The presentation of the business cycle shows how the competitive dynamics influence firms, their behavior, and responses (e.g. Chevalier & Scharfstein, 1996). Moreover, as firms are inherently heterogeneous in the resources they possess, they are affected differently through the various phases of the cycle. This has implications for their human capital stock. Demand

for labor fluctuates similarly to the demand for firms' products and services, with falling unemployment rates during expansions when demand is high and reduced capacity utilization during recessions (Knudsen & Lien, 2015a). In the following, each of the phases of the business cycle will be presented in relation to human capital.

2.4.2 The business cycle and human capital

During recessions, reduced demand for products and services result in an oversupply of labor. This has two major implications; first, reduced demand and excess capacity reduces the productivity of current employees. Human capital is considerable less flexible than other types of resources when used for development, both in terms of wage rigidity and transaction costs. Second, the oversupply of labor reduces the acquisition cost of high quality human capital. When the recession transforms into the recovery phase, demand for human capital starts to pick up (Ehrenberg & Smith, 2015, p. 181), and the average labor productivity and capacity utilization in firms increases. Moreover, the increased demand enables firms to hire and rehire workers, which increases firm performance. The recovery phase ends when GDP reaches its previous peak level and transitions into the expansion phase. When the demand for products and services exceeds available capacity, firms expand their capacity by hiring new employees to remain competitive. This increases the demand for human capital, resulting in labor scarcity and increasing the cost of employees through rising wages (Knudsen & Lien, 2015b). This causes two main issues for firms' human capital strategies; first, as demand for human capital increases, it becomes increasingly more difficult to appropriate efficiency gains from employees' productivity. Second, scarcity in labor markets results lower mobility costs for each employee. When supply of human capital is scarce, firms are less likely to be able to offer a wage lower than the industry standard. Moreover, this leads to low employee mobility costs, causing employees to be more likely to leave the firm in favor for higher wages (Ehrenberg & Smith, 2015, p. 154-155). The expansion phase ends in a peak in productivity followed by a decline in real activity, which signals the transition to the slowdown phase. When business cycles enters a slowdown, excess capacity gradually increases and the average labor productivity declines. This causes uncertainty regarding future market conditions, and forces firms to liquidate physical assets in order to finance their stock of human capital (Geroski & Gregg, 1997).

2.4.3 Recessionary shocks

A wide body of literature has examined how environmental events is threatening the survival of firms and entire industries (e.g. Martin, 2011; Meyer, 1982, p. 515). Major

recessions can be viewed as system-wide shocks that periodically disrupt the process of economic growth and development. The two main features intensity and duration distinguish recessionary shocks from other types of environmental shocks (Knudsen & Lien, 2014). First, recessionary shocks occur sudden, unanticipated, and have the capacity to alter the trajectory of entire industries (Knudsen & Lien, 2014; Meyer, Brooks, & Goes, 1990). This feature implies that recessions are exogenous to the general population of firms, and hold asset stocks that reflect their strategy before the recession materializes in significant decline in real GDP, employment, and real income (NBER, 2010). In contrast, other environmental changes tend to appear more gradually (Agarwal, Barney, Foss, & Klein, 2009). Second, global recessionary shocks are temporary in duration, last typically 8-18 months and occur every 7-10 years (Reinhart & Rogoff, 2009, 2013). This is in contrast to other economic shocks, which causes more permanent changes in the competitive landscape (Bettis & Hitt, 1995). Moreover, this implies that firms know the recession will pass, which make them less likely to make costly adjustments to their asset stocks (Koberg, 1987).

While each recession differ in their specific causes, intensity, and duration, there are some similarities, in particular reduction in demand and access to credit (Knudsen & Lien, 2014). The effects of demand reductions are twofold; they affect investment opportunities (Bernanke, 1983; Ghemawat, 2009) and internal cash flows available to finance investments (Bhagat & Obreja, 2013; Bond, Harfoff, & Reemem, 2005). First, when demand for products and services is reduced, firms experience excess capacity. This implies reduced incentives to invest in additional capacity and reduction in expected profits. Moreover, demand reductions can affect investments through reduced access to internal funding which entail that external sources are needed to fund a larger portion of its investments (Knudsen & Lien, 2014). Second, recessions reduces the availability of financing, either by reduced access to internal funding and/or access to external funding (Hubbard, 1997). Recessions increases the probability of bankruptcies, which in turn reduces banks' credit line and increases interest rates (Bernanke, Lown & Friedman, 1991; Chava & Purnanandam, 2011). One example is that reduced access to credit during recessions is causing firms that are particularly reliant on external financing to reduce investment, even controlling for investment opportunities (Braun & Larrain, 2005; Campello, 2003).

These factors have several implications, as they may be experienced in different degree and in different combinations (Tong & Wei, 2008). Furthermore, studies find that recessionary shocks have different effects on firm performance throughout the different phases of the

business cycle (e.g. through altering firms' asset stocks) (Alessandri & Bettis, 2003; Gulati et al., 2010; Laitinen, 2000).

2.4.4 Recessionary shocks and human capital

During recessions, demand is reduced and results in some of the human capital being underutilized. When firms are facing a recession and excess capacity increases, the incentives to invest in human capital increases as the opportunity cost of capital is reduced. Firms that are facing such excess capacity are confronted with two options; reducing or retaining (i.e. hoard labor) the number of employees (Knudsen & Lien, 2015a).

First, firms can reduce the number of employees to minimize excess capacity, and thereby cut costs in the short term. If the firm does not expect that it will use the idle capacity soon, it will tend to choose layoffs, rather than to hoard labor. However, if the demand fall is temporary, the firm has to rehire employees to scale back their capacity at the later stages of the business cycle. This implies new costs related to searching, hiring and training of new employees. This indicates that the firm will not engage in laying off employee until they believe the benefits outweigh the costs. Second, firms can hoard labor by using the excess capacity in human capital to invest in training and development programs. Investing in development activities like training becomes more attractive for firms with excess capacity. The reason being that low capacity utilization reduces the opportunity costs of taking employees out of their ordinary tasks. This will increase the costs in the short term, but the firm will avoid costs of searching and hiring when demand rises again (Becker, 1962; Oi, 1962; Rosen, 1966). If the division of labor within the firm require distinct specialized divisions, this will imply that rehiring will be more difficult and expensive, and ultimately lead to that are more inclined to hoard labor. During a recession, uncertainty increases, and there will be considerable uncertainty related to when and if demand will readjust to the pre-crisis level, which will affect a firm's incentives to engage in labor hoarding.

The key question of a recessionary shock is whether firms will utilize the excess capacity in human capital on development activities, or eliminate it through layoffs. Development activities are concerned with using the employee's time for any task beside their daily activities, which might benefit the firm in the future (Knudsen & Lien, 2015a). Such activities may include receiving training, training others, solving bottlenecks, and research- or innovations projects. However, re-assigning employees to development activities will disrupt normal tasks by transferring the employee out of ordinary tasks (Lien, 2010). In periods of low capacity utilization, firms may experience excess capacity within their ordinary operations. The

opportunity cost of human capital investments are reduced, and there are no costs of transferring an employee to human capital development if he or she is completely idle (Hall, 1991). This implies that firms have higher incentives to invest in their human capital stock. Moreover, the opportunity cost of human capital investments is largely associated to the employee's time (Knudsen & Lien, 2015a). This illustrates a countercyclical relationship between demand reductions and investments in human capital (Aghion & Saint-Paul, 1998; Davis & Haltiwanger, 1990; Gali & Hammour, 1993; Hall, 1991; Knudsen & Lien, 2014). This mechanism, which stimulates investment opportunities in human capital during recessions, is the so called pit-stop view of recessions (Aghion & Saint-Paul, 1998; Davis & Haltiwanger, 1990; Gali & Hammour, 1993; Hall, 1991). The pit-stop view claims that the opportunity costs of using idle labor resources in training, solving organizational problems and bottlenecks are considerably lower in periods with low capacity utilization. This argument works in favor of labor hoarding, and thus increases the firm's stock of human capital and future performance (Aghion & Saint-Paul, 1998; Hall, 1991; Knudsen & Lien, 2014b). Moreover, labor economists (e.g. Fay & Medoff, 1985) have empirically documented that labor hoarding occurs during recessions.

According to Knudsen & Lien (2015a) the decision between retaining and reducing the number of employees during a period of increase in human capital, depends on four conditions: First, the adjustment costs of capital related to firing and rehiring an employee. These costs might be related to severance pay associated with layoffs, costs of searching, screening and training of new employees to bring them up to the productivity level of employees you consider laying off. Higher adjustment costs creates greater incentives to hoard labor. Second, the value an employee can generate while reallocated to development. The more value employees can produce in development, the more attractive it will be to hoard labor. This will largely depend on the division of labor within a firm. In some firms, the division of labor will be clearly separated (e.g. production of goods), where sales and production are clearly divided. However, in firms providing services, such as consultancies, these activities are more integrated, which suggests that these types of firms will have stronger incentives to hoard labor than firms with separated departments. Third, the likelihood that the excess capacity will be needed in the future; If a firm believe they do not need the idle capacity soon, the firm will be more likely to make their employees redundant. Fourth, the firm's ability to finance the labor hoarding. Labor hoarding creates short term losses in the hope of creating future gains (Knudsen & Lien, 2015a). A firm facing financing constraints will be forced to make redundancies in order to realize short term savings, even if they believe that hoarding labor is profitable in the long term. The gains

and costs of labor hoarding can be expressed in the following inequality (Knudsen & Lien, 2015a):

$$\alpha + E(T) * \beta \geq E(T) * w + E(T) * \mu * w$$

The left side of the inequality represents the gains, and the right side represents the costs related to labor hoarding. (Alpha) refers to the adjustment costs of hiring and training a replacement of an employee. E(T) is the expected duration of the period with excess slack/capacity. (β) is the value created per time unit when reallocated from production to development. The product E(T)* β is the expected value created when reallocated to development during the period of excessive slack. The right side represents the costs of labor hoarding. W is the wage per time unit, and the product E(T)*w is wage costs of hoarding labor during the period of excess slack. Final, (μ) is a parameter that reflects the opportunity cost of capital. The latter parameter reflects that the capital used for labor hoarding have alternative uses, and will be greater when the firm is more financially constrained. If the firm risks bankruptcy, (μ) could be infinite, which implies that the firm will refuse labor hoarding irrespective of the possible long term gains. If the firm is financially unconstrained, the parameter (μ) will be 0.

In sum, the equation represents the criteria for hoarding a given employee. As every employee and every firm are inherently heterogeneous in the resources they possess, the gains and costs associated with hoarding or lay-offs will depend on pre-recession characteristics of the firm.

2.5 Hypotheses

In this section we will present our hypotheses of how firms respond and how they should respond to recessions according to academic literature. Firms face multiple challenges when choosing strategic responses during recessions, and the following section will outline the essence of relevant theory which supports our hypotheses.

To understand how a firm responds to market pressures, one must know the relevant costs and benefits to the different options available to the firm (Geroski & Gregg, 1993, p. 71). This depends on many factors, such as market conditions and current expectations of market development. Firms do respond to recessionary pressures, and it seems reasonable that this takes effect in changes in how the firm operates and which markets they compete in (Geroski & Gregg, 1993, p. 72). One of these responses is related to downsizing. When demand falls as a result of a recession and capacity utilization is reduced, firms have a short term incentive to

downsize their stock of human capital and eliminate excess capacity. As human capital is a type of resources that is developed and accumulated over time, firms that engage in downsizing and reduce wages will experience a short term increase in profitability due to reduced payroll costs. Moreover, firms engage in downsizing to increase their productivity, measured by total sales divided by the number of employees (Seid, Kendrick & Grossman, 1980). By definition, this results in short term increases in productivity when firms reduce the amount of employees in their organization. Firms downsize because they expect both to yield economic and organizational benefits. In terms of economic benefits, downsizing firms expect to increase value for their shareholders as managers conclude that cutting costs are more predictable than increasing future revenues (Cascio, 1993). Furthermore, downsizing is expected to yield organizational benefits such as lower overhead, reduced bureaucratic costs and faster decision making (Cascio, 1993; DeWitt, 1993). However, the incentive strength of downsizing is largely affected by the likelihood that the excess capacity is needed in the future (Knudsen & Lien, 2015a). As human capital is an accumulated resource, firm which engages in downsizing will reduce their stock of human capital that needs to be re-accumulated when demand picks up in the recovery and expansion phases of the business cycle. This implies direct costs related to searching, hiring and training of new employees. Knudsen & Lien (2015a) argue that this may be caused by high adjustment costs related to hiring and firing employees, combined with low opportunity costs of firm specific labor during periods of excess capacity. Furthermore, firms which have an emphasis on exploration are more inclined to lay off workers during recessions, and also more likely to hire employees during recessions. Knudsen and Lien (2015a) suggest that the first effect is driven by weaker incentives to hoard non-specific labor. The second effect is driven by the lower opportunity cost of using existing employees to train others, combined with labor market conditions that permits hiring and training of talent to a lower cost. If firms have to re-hire to rebuild the competence that was lost during the recession, they will be at a disadvantage to firms which retained and increased their human capital stock during the recessionary years. This could lead to reduced profitability in the post-recession period.

H;1a: Firms which engages in downsizing as a response to the financial crisis increased short term performance.

H;1b: Firms which engages in downsizing as a response to the financial crisis suffered from reduced long term performance.

In order to generate SCA, firms can hire talent in recessions to enhance their human capital stock (Knudsen & Lien, 2014). Hiring during recessions can generate SCA mainly in two ways; first, they can engage in bargain hunting and acquire rare talent that would not be available during expansion. Second, firms may be able to acquire employees under their real value when labor markets are less efficient (Knudsen & Lien, 2014). Both these effects can generate SCA compared to competitors through acquiring rare resources and exploit inefficiencies in factor markets (Barney, 1986; Denrell, Fang & Winter, 2003). While it may seem counter-intuitive to increase capacity during a recession where the firm is already experiencing excess capacity, this might be counter-acted by acquiring rare and scarce talent which are unavailable, or relatively more expensive during other phases of the business cycle. Hiring in recessions involves allocating resources differently than conventional wisdom might seem to dictate. However, making the same resource allocations as one's competitors produces no advantage (Henn, 1985; Ohmae, 1988). Accordingly, a human resource strategy should aim to focus resources on key opportunities (Henn, 1985). This opportunity is more frequent during recessions than at the later stages of the business cycles. When demand picks up and the economy enters the recovery phase, it becomes increasingly more difficult to appropriate efficiency gains from labor productivity. However, if firms are engaging in hiring strategies during recessions, one might expect that this type of human capital investment will yield net negative short term profitability effects, as it involved up-front costs related to searching, hiring and training. When a firm hires new employees, competitive advantage through knowledge can also be obtained through resource accumulation (Dierickx & Cool, 1989) and it takes time for the firm to appropriate the full effect of the investment, while the firm still need to pay the social expenses in full in the short term.

H;2a: Firms which increased hiring as a response to the recession suffered from reduced short term performance.

H;2b: Firms which increased hiring as a response to the recessions increased long term performance.

Education and training are the most important investments in human capital (Becker, 1993, p. 17). Educated people are almost always earning more than people with less educated people, even adjusted for family backgrounds and abilities. When a recession hits, the nature of a firm's competitive environment and strategy is changed, which suggests that the effects of

hiring and training should differ from pre-recession periods (Kim & Ployhart, 2014). Most prior research which focus on individual level data, have not found that benefits of training differ across business cycles (Colquitt, Lepine & Noe, 2000; Schmidt & Hunter, 1998). However, theory regarding firm-specific human capital and the RBV suggests the opposite; that the value generated from firms' responses through hiring and training should be affected by changes in firms' strategies and competitive environment (Delery & Doty, 1996; Jackson & Schuler, 1995; Youndt et al., 1996). Moreover, mild recessions are actually stimulating human capital investments, as the opportunity cost of making such investments decline. However, more severe recessions may lead to decreases in such investments (Knudsen & Lien, 2014).

Knowledge can be classified as either articulable or tacit (Lane & Lubatkin, 1998; Polanyi, 1967). While articulate knowledge can be codified and thereby easily transferred, tacit knowledge can not (Teece, Pisano & Shuen, 1997). Tacit knowledge are commonly embedded in a firm's routines and in a firm's social context as it is partially embedded in individual skills and working relationships within the firm (Nelson & Winter, 1982; Szulanski, 1996). Professionals gain knowledge both through formal education (articulable) and on the job training (tacit). While the articulable knowledge has alternative use (e.g. for other firms), the tacit, firm-specific knowledge will create long term advantages for firms. Furthermore, as human capital is a type of resource that needs to be accumulated over time, increasing investments during the recession may lead to negative short term effects during the initial phase of the accumulation, while over time it may lead to a superior post-recession competitive advantage compared to firms that do not engage in such investments. Investing in training is more attractive for firms that experience excess capacity and low capacity utilization, as the opportunity costs of taking employees out of their ordinary tasks are greatly reduced (Greer, 1984). The reduction in opportunity costs implies that incentives to invest in training are increases when demand falls. When demand picks up in the recovery and expansion phase of the business cycle, the opportunity cost of training increases, which in turn makes it more difficult to reap SCA from these initiatives. However, even though the opportunity cost of investing in training is greatly reduced during recessions, firms that engage in increased training might suffer from a short term profitability disadvantage compared to downsizing firms. The reason is that human capital investments will increase payroll costs, as well as the out of pocket cost of training compared to firms which reduce their payroll costs through downsizing (Knudsen & Lien, 2014).

H;3a: Firms which increased training of employees increased long term performance.

H;3b: Firms which increased management training as a responses to financial crisis increased long term performance.

H;3c: Firms which engaged in increased training suffered a short term profitability disadvantage.

The previous three hypotheses have highlighted that competitive advantages through human capital responses be generated through resource acquisition (training) and accumulation (training), and that firms have to balance the short term incentives to reduce excess capacity by downsizing with potential long term benefits of investing in their human capital stock. In broader terms do investments in organizational development encompass both hiring, training and other human capital investments. Combining the insights from the previous hypotheses, one should expect that in general human capital investments are associated with negative short term performance due to up-front costs and labor hoarding, but when knowledge is accumulated and developed over time it may create a source of competitive advantage.

H;4a: Firms which increased human capital investments as a response to the recession suffered from negative short term profitability.

H;4b: Firms which increased human capital investments as a response to the recession yielded superior long term performance

Summary. This summary provides a retrospect overview of the key points of this chapter. First, the two dominating theoretical perspectives of the strategy field was outlined. Second, the resource based view was used to explain competitive advantage and performance differences between firms. Third, human capital was highlighted as a particular important resource in explaining performance differences. Fourth, economic and financial literature is used to explain the different phases of the business cycle and recessionary shocks, and how human capital is considered in conjunction with recessionary shocks. Fifth, presents more specific theory regarding human capital responses in recessions, and outlines the hypotheses of how firms should respond to recessions through different human capital actions. This summary shows how a theoretical framework created for the hypotheses to be tested. These hypotheses and the theoretical fundament will be a cornerstone for the rest of this thesis.

3. Research methodology

3.1 Introduction

This section will outline the selection of methodological choices in the thesis. First, the research design of the thesis will be presented. Second, the sampling strategy will be described and justified. Third, the potential validity and reliability threats are discussed. Fourth, the dependent and independent variables in the research model will be presented. Fifth, the full model of analysis is described in detail. Sixth and final, the prerequisites for the regression analysis are presented in relation to this thesis.

3.2 Research design

The research question is the basis for which methods that are appropriate, and how analysis of data should be conducted. According to Saunders, Lewis, & Thornhill (2009, p. 595) methods could be defined as the *"techniques and procedures used to obtain and analyze research data…"*. The aim of this thesis is to examine how investments in human capital during recessions affects post-recession performance, and this influences the choice of research design. The research design provides the framework in which the study will be conducted; it reveals the research priorities and purpose (Ghauri & Grønhaug, 2005, p. 56). According to Saunders, Lewis, & Thornhill (2009, p. 139), the most commonly used classification method of research purpose is the threefold. This method distinguishes between exploratory-, descriptive- and explanatory research, and research might follow one of these methods or a combination of these. An exploratory study attempts to discover and gain insights about a topic through open questions (Saunders, Lewis, & Thornhill, 2012, p. 171). Studies that establish causal relationships between variables are often termed as explanatory (Saunders, Lewis, & Thornhill, 2012, p. 172). The object of a descriptive study is to portray an accurate profile of persons, events or situations (Saunders, Lewis, & Thornhill, 2009, p. 140). The purpose of this study is to examine the relationship between human capital responses in recessions and post-recession performance. A number of studies have laid the groundwork for this thesis, using a descripto-explanatory research design (e.g. Aghion et al, 2012; Knudsen & Lien, 2014; 2015b). As this thesis aims to contribute to this research stream, a descripto-explanatory design is chosen. The purpose of the descriptive research is to accurately describe how human capital responses

influence post-recession performance. As this relationship is empirically documented, the thesis aims to add insight through explanatory information.

Studies can be conducted either by use of a deductive or by an inductive research approach (Saunders, Lewis, & Thornhill, 2009, p. 124). Studies with an inductive approach normally start by collecting data and develop a theory as a result of the analysis, while deductive studies will start by developing a theory, and then in turn design a research strategy to test hypotheses. This study will thus have a deductive approach, as it develops a conceptual framework of hypotheses to be tested based on existing literature of investments during recessions. Furthermore, the research question considers causal relationships between variables, and three requirements has to be fulfilled in order to claim that there is a causal relationship between two variables (Kenny, 1979): First, a causal relationship requires a reliable covariation between the two variables. Second, the cause (X) must precede the effect (Y) in time to establish the direction of relationship. Third, a causal relationship requires that there are no plausible alternative explanation for the observed relationship.

The purpose of the thesis and the research question have determined the design choices. Based on this, a combination of registry data and survey data is chosen to fulfill the purpose and to answer the research question. The strength of registry data is that it is well suited to analyze large amounts secondary financial data with objective measures, which makes it possible to generate both valid and reliable findings through objective measures. A weakness of using registry data is that the researcher has a selective approach focusing on one part of the reality simplifying complex problems into abstract indicators. The strength of a survey design is that it is well suited to analyze the large amounts of secondary financial data, as well as the analysis of a questionnaire, making it possible to generate both valid and reliable findings. The advantage of using a combination strategy is that accounting data is only reported yearly, and a recession may hit firms and industries at different points in time. However, this makes it difficult to measure and separate the cause and effect in time. By supplementing the registry data with survey data, it is possible to more accurately measure the recessionary shock, firms' responses to it, and when firms enter the recovery phase through objective attributes.

3.3 Data collection

This thesis utilizes data from two sources to analyze how the financial crisis of 2008-09 affected human capital investments and post-recession performance. The first source is registry data provided by SNF and NHHs database. The dataset was delivered to SNF by Bisnode D&B Norway AS (D&B) in cooperation with Menon Business Economics AS (Berner, Mjøs, &

Olving, 2014). The database consists of yearly accounting information of Norwegian firms from 1992-2012, and contains the whole population of 264,271 Norwegian firms registered in Brønnøysund Register Centre (Brønnøysundregistrene) in 2013. The database also consists of information such as industry classification codes (NACE), geographical location and ownership structure. This enables the exclusion of irrelevant industries, e.g. governmental organizations. Berner, Mjøs and Olving (2014) have presented a detailed review of the database with descriptions of all the variables and overview of the number of observations per variable.

The second source is a survey involving 1248 CEOs, and how they responded to the effects of the financial crisis of 2008-09 on Norwegian firms. The survey created as a part of SNF's research program "Crisis, restructuring and growth", and was used by Eirik S. Knudsen in his doctoral thesis. The survey was divided into four parts and 39 questions, covering an extensive range of different firm characteristics and responses. The survey was distributed per mail to the CEOs of 5000 firms in November, 2010. A cover letter stating the purpose of the survey and instructions for answering it was also attached. The CEOs could choose to either answer the survey using the attached paper version, or by answering it online by entering a web address in the cover letter.

3.4 Empirical setting and sampling strategy

As the purpose of this thesis is to accurately describe and analyze how firms recuperated from the recession, it is important that the data set represents the empirical setting. Due to the lack of data material available for this topic, we have the same criteria in order to make the sample representative for Norwegian firms (presented below). By using a sample strategy, there is trade-off between internal and external validity of the sample. Given the purpose of this thesis is to fill a gap in the academic literature of how human capital responses affect performance, external validity seem more important than internal. The external validity will be relatively high, as the same theoretical concepts should apply to most firms internationally, and there is limited conditions which are based on Norwegian context. In terms of internal validity some of the constructs discussed in this thesis is not perfectly operationalized due to that the fact that the survey was not collected with the topic of our thesis mind; this could in turn be a threat to internal validity.

The sample size of the study is 1248 firms, randomly drawn from a selection of representative firms which were operational in 2007. When deciding which sampling strategy to choose, there was a trade-off between choosing the highest number of firms possible and excluding firms that might distort data, causing our inferences to be inaccurate. Due to the sheer

size of the sample, it would be too time consuming to decide on an individual basis, which companies to include or exclude. Firms for the study were therefore selected through judgment sampling. The criteria are formed to give a representative sample of the Norwegian business environment, and concerns type of business entity, revenues, labor costs, governmental organizations, type of industry and year. In order to achieve a representative sample of the population, the selection of firms was based on the same criteria as in Knudsen (2012):

Sample criterion 1: Exclude firms with missing accounting information.

To be able to link accounting data with firm and industry data, two different files were matched to create a complete dataset corresponding to each year. Even though most of the data is complete, there is some missing data in some of the observations in the merged files. Firms with available accounting information, but missing company and industry information were kept to do aggregate analyses. Firms that lacked accounting information, despite being in possession of firm and industry information, were excluded.

Sample criterion 2: Selection of years 2007-2012.

The entire dataset from D&B consists of accounting data for all Norwegian firms from 1992-2014. However, changes in Norwegian accounting practices were implemented on January 1st, 1999. For the purpose of our analysis, we have chosen a base year of 2007 to capture firms' resources prior to the financial crisis, and compared the responses they performed in 2008-09 to their performance in a limited period after the end of the financial crisis was over (2010-2012).

Sample criterion 3: Include firms with the following business entities; AS, ASA and ANS.

The dataset provides information of the different business entities of Norwegian firms, which is 42 in total. As one try to investigate the impact of human capital investment on post-recession performance, not all of these entities are relevant. A reasonable cut-off seems to be justified by including four types of firms; "joint-stock companies" (AS), "publicly traded companies" (ASA) and "responsible corporations" (ANS). Despite keeping only three of the 42 legal business entities in Norway, the sample rate is still high and constitute 90 percent of all firms.

Sample criterion 4: Exclude firms owned by the government.

Firms owned by the government is excluded from the sample. This criterion is grounded in that some of the companies might serve other purposes than to be profit-maximizing, as well as they might be shielded from competition. Governmentally owned companies constitute of approximately 1.2 percent across of the datasets, which reduces the average number of firms from each sample year by 590.

Sample criterion 5: Exclude firms with sales income less than or equal to NOK 10 million.

Another sample decision that was made, was to exclude a sales revenue of less than NOK 10 million in the base year of 2007. The reason behind choosing a sample criterion based on sales revenue was to avoid firms set up as tax shelters, holding companies and firms with no real operations. Moreover, the selection criterion has been adjusted by using Statistics Norway's inflation index. The base year for all inflation corrections is 2007, and a table of the inflation rate index is presented in table 6 in the Appendix.

-- Insert table 6 about here --

Sample criterion 6: Exclude firms with labor costs and social expenses greater than or equal NOK 3 million.

The criterion based on labor costs is set for the same reasons as sales income. Firms with low labor costs are often holding firms or tax shelters. To have a correct estimate of how many holding firms and property firms we had in our sample, it would be preferable to use a criterion based on the number of employees. However, the dataset is incomplete in regards to reporting the number of employees, as firms are only required to report their number of employees in their first registration year. Moreover, we want to have a criterion which ensures that the firms in the sample actually have employees. To avoid these problems our criterion is based on the level of labor costs and social expenses. By choosing these criteria we exclude firms that might lead to biases in our sample.

Sample criterion 7: Remove selected industries from the population.

Table 1 Excluded industries

2-digit NACE	Industry description
1	Agriculture, hunting and related service activities
2	Forestry, logging and related service activities
40	Electricity, gas, steam and hot water supply
41	Collection, purification and distribution of water
65	Financial intermediation, except insurance and pension funds
66	Insurance and pension funds, except compulsory social security
67	Activities auxiliary to financial intermediation
75	Public administration and defense; compulsory social security
80	Education
85	Health and social work
90	Sewage and refuse disposal, sanitation and similar activities
91	Activities of membership organizations n.e.c.
92	Recreational, cultural and sporting activities
99	Extra-territorial organizations and bodies
0	Missing values

Sports and other interest groups were excluded due to the fact that they might not be profit maximizing. Other industries such as agriculture and forestry were excluded as most of their operations are heavily subsidized by, and have close relations to the Norwegian government, which results in a misrepresentative sample of Norwegian firms. Moreover, firms within the financial industry were excluded because of their capital structure and debt levels which causes distortion in the sample. Banks and insurance firms for instance, typically operate with debt levels between 90-95 % (Gropp & Heider, 2009). Firms within the healthcare industry were excluded because due to the differences within the industry, as some firms are private (and profit-maximizing whilst others are public. For similar reasons, the sanitation industry, e.g. water cleansing and garbage disposal services have been removed from the sample as most of these firms are not profit-maximizing.

Sample summary. By using the seven sample criteria on the D&B dataset, the following samples for each of the years 2000-2012 were constructed:

Table 2 Sample summary

Criteria	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
None	140243	149969	140949	153640	156628	170775	201259	221623	233960	237645	240496	248874	263930
Sales	23725	24297	23639	22723	24153	26282	27725	30488	30692	29315	29391	30738	31871
Salary	15188	15895	15534	15115	15962	17585	18744	21097	21834	21065	21185	22311	23279
Legal form	14669	15084	15358	14559	15377	17703	17832	20115	20664	19889	20008	21086	21996
Industry	14397	14791	15238	14479	15282	16668	17725	19993	19480	19767	19401	20895	21791
Ownership	14045	14431	14662	14036	14794	16026	17170	19370	18879	19301	18760	20239	21140

The table shows that the most drastic reductions in sample size occur when the sales and salary criteria are implemented. The implementation of legal form and industry criteria only exclude a low proportion of firms. From the table there is a growing trend of the number of firms in each year series.

3.5 Research model

The research model is based on the research design outlined in the previous chapter. While the research design section outlined the structure of analysis, this section will explain the technical approach. This chapter will describe the general approach of how the research question will be analyzed and solved.

A research model contains the characteristics of an empirical phenomenon, and provides a logical representation of how different factors influence the scrutinized problem (Frankfort-Nachmias & Nachmias, 1996). The full model presented here is an extension of the simplified model illustrated in the introduction (Fig x). The purpose of the extended model is to provide a better overview of how other factors influence the research question. These factors are included in the analysis as they may have considerable effect on the relationship between human capital responses and post-recession performance, and they will therefore be used as control variables in testing the hypotheses.
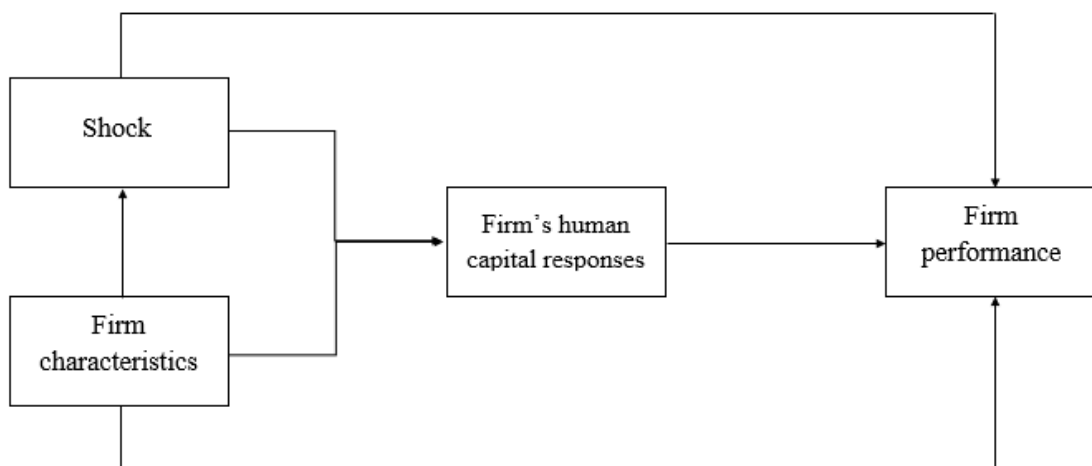
Figure 2 Extended research model.

A more detailed explanation is necessary to get an understanding of the relationship between the factors. First, firm characteristics influence whether and to what extent a firm is affected by the shock. Second, both firm characteristics and the shock will influence which human capital responses a firm can initiate. Third, is the relationship between the firms' human capital responses and post-recession performance, where human capital responses initiated may have considerable impact on firm performance. Fourth and final, the shock and the pre-recession characteristics may also influence the post-recession performance. This model is therefore the foundation for computing the variables of interest for testing the hypothesis in the forthcoming analysis.

3.6 Variables

This subsection will outline the dependent and independent variables of the thesis, and discuss how and why firm- and industry variables are computed and selected. As described in the latter subchapter, the research model will focus on the independent variables' effect on the dependent variable.

3.6.1 Dependent variables

This thesis aims to analyze how investment in human capital affect performance differences between firms, thereby implying a measure of performance. Performance can be referred to either as profitability, growth, market share, product quality and allocative efficiency (Lipczynsky, Wilson, and Goddard, 2005). In our research model, performance consists of the profitability measures EBITDA and ROA.

Profitability. There are two approaches to measure firm profitability: accounting and economic profit. The starting point for both approaches are sales revenue, but they differ in which costs that are used to estimate profits. Accounting profit is based on accounting costs retrieved from the firm's financial statements, while economic profit are based on economic costs, that also include opportunity cost of capital. It is challenging to collect information about opportunity cost of pragmatic reasons. Therefore, most researchers use financial statements, because of availability and access to firms' accounting statements. This also applies to this thesis, and accounting profit margin defined as earnings before interest, depreciation and amortization margin (EBITDA margin) as well as return on assets (ROA), will be used to measure firm profitability. Initial testing of the dependent variables showed that EBITDA margin had better model fit than ROA (i.e. higher adjusted R-square), and as a result will be the main variable of interest in the analysis.

$$EBITDA\ margin = \frac{EBITDA}{Total\ revenues}$$

$$ROA = \frac{Net\ income}{Total\ assets}$$

3.6.2 Independent variables

As a result of Knudsen's (2014) paper on how demand for different types of investments changes during recessions, we have chosen independent variables that we hypothesize have an effect on post-recession performance. The variables are collected as both ordinal and ratio from the survey.

Hiring. The survey contained two sections where the respondents were asked about the number of employees affiliated to the firm, both before and after the crisis. The three questions distinguished between the number of permanent employees, temporary employees, and contracted employees. It was decided that the questions regarding permanent employees were best suited to measure hiring, as there was not included a question directly addressing in hiring in the survey. The variable did therefore only partly provide information about the firms' hiring in the period, and the measure is considered to be a type of ratio data. The equation presented here describes how the variable is calculated:

$$Hiring = \frac{Employees_{i,t} - Employees_{i,t-1}}{Employees_{i,t-1}}$$

Due to the lack of a proper construct to measure hiring, we had to use the same definition as employee growth. However, deficient and flawed data made it impossible to analyze this variable in registry data, and gave us no other option than to use the survey to indicate the number of employees before and after the crisis as a measure of hiring. Reporting the number of employees is only mandatory when the firm registers in the Entity Registry, which results in inadequate data. A Pearson correlation was conducted between employee- and salary growth, which intuitively should be highly correlated. The correlation coefficient showed an average of approximately 0.4 ($p<0.01$), that is considerably lower than expected for these variables.

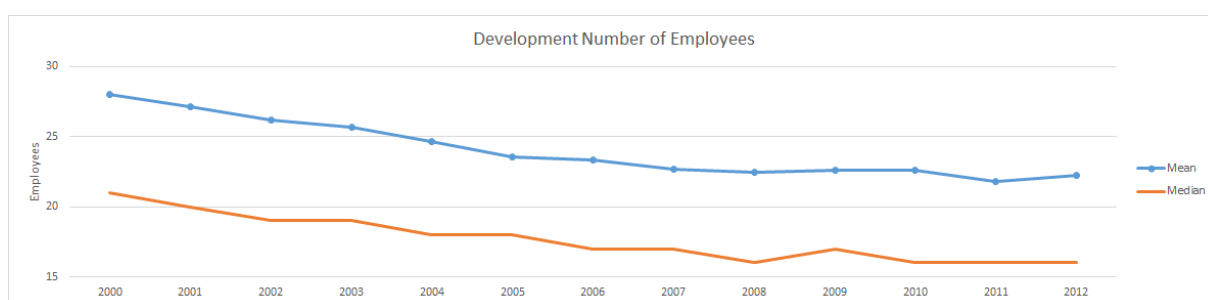*Figure 3* Development in number of employees, 2000-2012.

Moreover, the mean reported number of employees fell from 28 employees in 2000 to 22 employees in 2012, while the average growth of wages and social expenses increased by 70% in the same period. This contributes to explain why the correlation coefficient for these variables are lower than expected.

Figure 4 Growth in wages and social expenses, 2000-2012.

In sum, as registry data does not require a firm to update the number of their employees, this causes us to use an inadequate measure of hiring, defined as the net difference of employees from 2007-2010 stated in the survey.

Downsizing. To measure downsizing it was possible to use the same measure as for the previous variable. This is somewhat problematic as several other spurious effects (e.g. retirement) may occur, and have negative impact on the results. Fortunately, in comparison to hiring there is a question that directly addresses downsizing. The respondents were asked to what degree downsizing was used as a measure of cost control in response to the financial crisis. Respondents answered on an ordinal Likert scale with eight points (0 = not performed, 1 = not important, 7 = very important).

Training and development of employees. The respondents were asked if training and development of employees were reduced or increased in the firm, and the extent of importance this response had for the firm. The question about increased training of employees was included as a variable in the analysis. The nature of the variable is quite broad, and encompasses both intensive and longer training programs. Moreover, it is not possible to say anything about the quality of the training program. Respondents answered on an ordinal Likert scale with eight points, indicating the importance of the response (0 = not performed, 1 = not important, 7 = very important).

Training and development of managers. The respondents were asked if training and development of managers were reduced or increased in the firm, and the extent of importance this response had for the firm. The question about increased training of managers was included as a variable in the analysis. The same arguments as for the latter variable could be applied here. Respondents answered on an ordinal Likert scale with eight points (0 = not performed, 1 = not important, 7 = very important), indicating the importance of the response.

Human capital investments. Respondents were asked whether they changed their investments in human capital or not. The variable involving investments in human capital is particular broad through the term organizational development, encompassing a broad range of both human- and organizational investments. The reason why the variable of increased investments in training was not included in the regression models, as there was a high and significant correlation between that particular variable and the variables related to training. To prevent multicollinearity, it was therefore decided to exclude this variable from the regression, to separate the various human capital responses. Respondents answered on an ordinal Likert scale with seven points (-3 = greatly reduced, 3 = greatly increased), indicating the extent of change.

3.6.3 Control variables

Control variables are important for increasing the robustness of the multiple regressions when controlling for variation in corporate performance that cannot be explained by explanatory variables. To increase the robustness of the regressions, relevant control variables has been included.

Age. Firm age is a common variable in firm performance models. Geroski (1995) found that younger firms were more vulnerable to bankruptcies than older firms. Younger firms have typically less financial reserves than their older counterparts, and arguably less reputable products and relations to both customers and suppliers (Knudsen & Lien, 2014). Therefore, in recessions several age-effects can be present affecting firm performance. According to Lien (2010) these effects may exacerbate the marginal customer mechanism, presuming weak customer relations. Moreover, young firms might be more severely affected by credit constraints if lenders restrain from extending credit. Based these arguments, age seems like an appropriate control variable.

Age should have an intuitively diminishing effect on firm performance, since as a firm matures the less significant is age on firm performance. To linearize the relationship between age and performance a log-linear variable has been generated.

$$Age = \ln((year\ of\ analysis - (founding\ year + 1))$$

Size. Size is another interesting measurement of how severe a firm is affected by a recession. There is lack of consensus amongst researchers regarding the relationship between firm size and how severe the firm is impacted by recessions: A study by Dunne, Roberts, and Samuelson (1989) argues that the likelihood of survival in recession is higher for both older and larger firms compared to younger and smaller firms. This view is supported by Geroski and Gregg (1996, 1997) which found that smaller firms are more severely hit than their larger counterparts, and they suggested that a possible reason for this result is that larger firms have economies of scale and/or access to external finance. The latter statement has empirical support by Gertler and Gilchrist (1994), and Lang and Nakamura (1995) which found that smaller and riskier firms were disproportionately harder affected than larger firms in periods with limited access to finance. Furthermore, Bernanke (1983) argues that creditors prefer firms with strong balance sheets, easily liquidated assets and low information asymmetry problems, something that tends to favor larger firms. This thesis has tested two different variables to measure size;

(1) the logarithm of total income and (2) the logarithm of total assets. The variables were log-transformed to linearize the relationship between size and the dependent variables:

$$Size\ 1 = \ln(Total\ revenues)$$

$$Size\ 2 = \ln(Total\ assets)$$

Testing the variables both separately and together on the models indicated that *Size 2* was the one of particular interest, as it provided the most significant findings across the models. The reason for not including both measures was the extremely high and significant correlation of .838 (p<.01) in the base year 2007.

Financial leverage. Researchers have found that financial leverage could explain differences in how firms are affected by recessions. A study by Geroski and Gregg (1993) found that firms with higher pre-recession debt levels were more severely hit by the 1991-1992 recession than their less leveraged counterparts. Maksimovic (1995) argues that firms with high debt reduces profits, increases the costs and reduces their ability to fulfill their obligations. This reduces a firm's ability to enter into contracts, as they become more likely to default their obligations and to act opportunistically. An empirical study by Opler and Titman (1994) confirms this effect, and in the 1991-1992 recession firms with high pre-recession debt were most affected. Knudsen (2011) did also observe the same effect by studying the recession of 2008-2009 in Norway. Based on this, it makes sense to include financial leverage as a control variable in the base year, and the variable is calculated as:

$$Financial\ leverage = \frac{Total\ debt}{Total\ assets}$$

Liquidity. In accounting, the concept of liquidity refers to a firm's ability to cover its payment obligations. A study by Campello, Graham, and Campbell (2010) argues that credit constrained firms are struggling to cover its obligations in recessions. Therefore, low liquidity are likely to exacerbate in several of the credit constrained difficulties firms face in recessions. Based on this, liquidity is considered as an important control variable.

There are several liquidity measures, and this thesis will use liquidity 1 (L1) and liquidity 2 (L2). The reasoning behind using both measures is to increase the robustness by

having a greater basis of comparison. L1 captures a firm's ability to cover its short term obligations to creditors, and is calculated as:

$$L1 = \frac{Current\ assets}{Current\ liabilities}$$

L2 measures the relationship as L1, but the least liquid current asset inventory is deducted from the calculation:

$$L2 = \frac{Current\ assets - Inventory}{Current\ liabilities}$$

Testing the variables both separately and together on the models indicated that *L2* was the one of particular interest, as it provided the most significant findings across the models. Moreover, it enables to control for inventory. The reason for not including both measures was the extremely high and significant correlation of 1.00 ($p<.01$) in the base year 2007.

Fixed assets. In recessions, firms with high ratio of fixed assets are less likely to experience credit constraint effects (Campello et al., 2010; Campello & Fluck, 2006), and such firms have more collateral to offer banks and creditors (Bernanke, Gertler, & Gilchrist, 1993). The variable is based on registry data and is formally calculated as:

$$Fixed\ assets\ ratio = \frac{Fixed\ assets}{Total\ assets}$$

Durability. The durability of product offered by the firm could also influence firms' vulnerability to recessions. Knudsen and Lien (2012) argue that the more durable goods firms have in their portfolio, the more likely they are to be negatively affected by recessions. This argument is in line with Petersen and Strongin (1996), which found that durable goods are three times more cyclical than nondurable goods. They also found that durability is the most important factor in explaining the cyclicality of an industry. As a durable investment involves some irreversibility, the value of postponing the investment increases during recessions, which leads to a negative drop in demand. This is therefore an interesting control variable, and the variable is based on question 3.1 in the survey. The responding firms were asked how large the proportion of their production, which stemmed from durable goods. The measure is an interval scale with a natural minimum of zero.

Export. The financial crisis in Norway in 2008-09 was relatively mild compared to the US and the EU (IMF, 2010; OECD, 2015). Norwegian firms with a high proportion of export revenue would consequently be hit harder by the recession, than firms that relied on domestic sales. To distinguish between export-oriented and domestic-oriented firms and capture this effect, controlling for export seems appropriate. The variable is based on question 2 of the survey, were the responding firms were asked how large proportion of their income that stemmed from export.

Pre-recession profitability. A study by Mueller (1977) suggested that profitability provide firms with resources that help firms to maintain subsequent profitability. This is related to the classical selection argument about the survivor principle, which states that the most efficient firms survive, while the least productive leaves the market (Alchian, 1950; Friedman, 1953). Knudsen (2011) supports this argument by concluding that pre-recession profit is a negative indicator of how severely firms are affected by recessions. The number of studies which support this argument is extensive (e.g. Aw, Chen, & Roberts, 2001; Baily, Hulten, Campbell, Bresnahan, & Caves, 1992; Bellone, Musso, Nesta, & Quéré, 2008; Carreira and Teixeira, 2011; Foster, Haltiwanger, & Krizan, 2001; Griliches & Regev, 1995; Haltiwanger, 1997), which makes it reasonable to control for pre-recession profitability. The variable is based on the EBITDA margin in 2007 is computed the same way as the dependent variable:

$$EBITDA\ margin = \frac{EBITDA}{Total\ revenues}$$

Pre-recession growth. Knudsen (2011) found that firms with high pre-recession growth were more vulnerable during recessions. In a study of the 1991-1992 recession in the UK, Geroski and Gregg (1996, 1997) found that firms with a relatively higher pre-recession growth rates were more severely hit by recessions. This may imply that firms which experience high growth in the end of boom are more vulnerable to recessions. The firms that were most severely hit had a 22 percent higher growth over the years 1985-89 compared with the whole sample. In comparison, the firms that were not affected by the recession were found to have 50 percent lower growth in the same period. It is therefore important to control for previous growth in the regression models. There are several growth measures, e.g. output, assets, market or sales. A study by Delmar, Davidsson and Garner (2003) found a high correlation between various types of growth, still research results may differ. There are two common approaches of growth in the financial statements; assets and sales (Davidsson & Delmar, 1997). Moreover, several studies

(e.g. Blixt, 1997; Storey, 1996) argue that these growth measures are appropriate to capture the growth of firms. Sales growth is considered to be the most conventional growth measure, and is frequently used in studies as a univariate growth measure (Davidsson & Fitzsimmons, 2005). Based on this, sales growth will be used as the control variable to measure the pre-recession growth of 2006-2007. According to Coad & Holzl (2012) there are two approaches to define corporate growth: absolute and proportional measures. Absolute measures are usually biased towards large firms, while proportional measures tend to put more emphasis on small firms (Birch, 1987). The sampling criteria in this thesis has removed a large proportion of small firms and it is difficult to compare absolute growth across different sized firms. Based on this, proportional growth will be used as a measure, where growth of firm *i* in year *t* is:

$$Growth = \frac{Sales\ Income_{i,t} - Sales\ Income_{i,t-1}}{Sales\ Income_{i,t-1}}$$

Severity of crisis. Firms are as noted inherently different in the resources they possess, which in turn makes recessions affect firms differently. During recessions, some firms will be severely hit while others are not affected. This causes performance differences, where some firms prosper while others performs badly due to the recession. It is therefore important to account for the severity of the crisis in the regression models. The variable is based on question 16, which is based on an ordinal five-point scale (1 = considerably negatively affected, 5 = positively affected).

Demand reductions. Knudsen & Lien (2014) argue that human capital investments in recessions are stimulated by mild demand reductions, while decreasing for strong demand reductions. Demand reductions increase the level of excess capacity in human capital, which gives firms stronger incentives to invest in human capital, through training or solving organizational problems. Therefore, it seems appropriate to control for demand reductions in the regression models. The variable is based on question 18.1 in the survey, which had a seven-point ordinal scale (-3 = reduced, 3 = increased).

Credit reductions. Reductions in demand reduces a firm's cash flow, and thereby the access to internal funding (Knudsen & Lien, 2014). A credit constrained firm might be unable to finance the labor hoarding and initiatives it would initially undertake. The firm is therefore forced to reduce the labor hoarding, and probably downsize their workforce. Credit reductions is based on question 18.6 where the respondents rated how their access to credit was affected

by the crisis. The variable was based on a seven-point ordinal scale (-3 = reduced, 3 = increased).

Outlook. The firms' outlook of how they will cope with the post-recession is captured through the control variables encompassing market shares, profitability and growth. This is interesting as it enables to investigate the relationship between the firms' future forecasts about the post-recession and their actual performance. The three control variables are based on the three sub-questions in question 37. Each of the questions are based on a seven-point ordinal scale ranging from 1 (weakened) to 7 (strengthened).

Defining the start and end of the recession. Firms are inherently different in the resources they possess, which in turn makes recessions affect firms differently. During recessions, this will lead to heterogeneous performance differences; some firms prosper while others perform badly. A major problem of using secondary financial data in defining the start and the end of a recession, is that it is difficult to separate the effects caused by the shock from the effects of firm responses. This approach also assume that all firms are affected by a recessionary shock at the same time, while some firms may not have been affected by the recession at all. Knudsen (2014) controlled in their survey for the timing of the recession. Table 3 shows that the start of the recession varies considerably between firms, and is based on the question 17 and 36 of the survey.

Table 3 Start of the recession.

	Frequency	Percent
Spring 2008	99	7,9
Fall 2008	343	27,5
Spring 2009	282	22,6
Fall 2009	161	12,9
Spring 2010	103	8,3
Fall 2010	32	2,6
Not affected	216	17,3
Missing values	12	1,0
Total	1248	100

Table 4 End of the recession.

	Frequency	Percent
Spring 2008	86	6.9
Fall 2008	16	1.3
Spring 2009	56	4.5
Fall 2009	146	11.7
Spring 2010	183	14.7
Fall 2010	153	12.3
Not over yet	530	42.5
Missing values	78	6.3
Total	1248	100

The data from the tables were transformed into dichotomous variables in the regression models. These variables enable the isolation of how firms were impacted to how firms responded to the recession. This was formally performed by making dichotomous variables for each of the alternatives in the table except for *Not affected* and *Not over yet*.

Defining the short term and long term period of the post-recession. While we have defined the start and the end of the recession as the period from 2008-09, it is important for our study to define what is the short term and long term as this is time-frame we present our analysis and findings. In finance and macroeconomics, the short term is usually defined as the time-frame of the next 12 months, while the long term is defined as the time-frame longer than this period. For the purpose of this analysis, the short term period after the recession is defined as the year 2010, and the long term is defined as the years 2011 and 2012. In theory, the long term period of the recession could be defined further than 2012, but it is questionable that responses undertaken in 2008-09 would have effects lasting longer than 3-4 years. Furthermore, our regression models lost much of their significance when stretching the period to 2013 and 2014, hence 2012 was defined as the end year of the analysis.

The means and standard deviation of the independent and control variables are presented in table 5 below:

Table 5 Correlation matrix for independent and control variables.

	Mean	Std. Dev.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1.	2.72	2.55	1																			
2.	-1.14	22.09	-.210**	1																		
3.	3.37	2.34	.142**	-.011	1																	
4.	2.65	2.14	.139**	.011	.622**	1																
5.	4.03	1.25	-.063*	-.002	.258**	.274**	1															
6.	2.34	.888	.020	-.016	-.057	-.046	-.009	1														
7.	.198	.318	.032	.002	.042	.030	.040	-.116**	1													
8.	.094	.0833	-.069*	.080**	-.010	-.017	-.031	-.016	.032	1												
9.	.238	.212	.032	-.026	-.052	-.002	-.076*	.042	-.085**	.187**	1											
10.	26.10	39.80	.084**	-.024	.006	-.006	-.054	.049	.013	.082**	-.024	1										
11.	1.16	.714	-.105**	.065*	-.051	-.060*	.005	.059	-.015	.152**	-.095**	-.011	1									
12.	.79	.2321	.022	.033	.048	.010	.082**	-.049	.085**	-.051	-.600**	-.045	-.189**	1								
13.	7.48	20.03	.016	-.077**	-.052	-.027	.013	-.001	.008	-.079**	.088**	.103**	.102**	-.101**	1							
14.	2.89	.8765	-.406**	.135**	-.134**	-.054	.074*	-.018	-.056	.009	.038	-.106**	.045	-.040	-.120**	1						
15.	9.78	1.20	.073*	-.130**	.036	.074*	.047	.185**	.096**	.098**	.189**	.123**	.044	-.171**	.318**	-.135**	1					
16.	3.14	1.85	-.302**	.076*	-.117**	-.039	.060*	-.015	-.097**	.008	.068*	-.121**	.001	-.040	-.076*	.619**	-.170**	1				
17.	4.40	1.92	-.112**	.022	-.056	-.054	-.024	.082**	-.006	.065*	-.058	-.058	.098**	.068*	-.038	.200**	-.107**	.316**	1			
18.	4.55	1.52	-.120**	.055	.081**	.095**	.078*	-.039	.029	-.068*	-.040	-.028	-.068*	.036	.000	.216**	.003	.188**	-.002	1		
19.	4.54	1.45	-.072*	.032	.081**	.101**	.076*	-.020	.003	-.034	.006	.000	-.033	.022	-.012	.220**	-.018	.153**	.041	.713**	1	
20.	4.71	1.41	-.024	.025	.144**	.132**	.078**	-.029	.038	-.061*	-.028	.008	-.007	.019	.011	.139**	-.008	.089**	-.004	.741**	.748**	1

[a] ***, **, and * represent statistical significance (2-tailed), at 1, 5, and 10 percent levels respectively.

[b] Mean and standard deviation calculated with taking the natural logarithm of the variables.

1. Downsizing **5.** Human capital inv. **9.** Fixed Assets **13.** Export **17.** Affected – Credit
2. Hiring **6.** Age [b] **10.** Durability **14.** Severity of crisis **18.** Outlook - Market share
3. Training employees **7.** Sales growth 2007 **11.** Liquidity 2 **15.** Size 2 [b] **19.** Outlook – Profitability
4. Training managers **8.** EBITDAmarg 2007 **12.** Financial leverage **16.** Affected – Demand **20.** Outlook - Growth

Firm vs. industry variables. An important consideration when computing variables is to separate between idiosyncratic firm effects from industry effects, and there are three reasons why this is crucial. First, it is important to distinguish between these two effects, as firm performance could only partly be attributed to industry affiliation (McGahan & Porter, 2002). Second, refraining from controlling for industry effects may lead to skewed results, which might violate the validity of the study. Third, research has shown that some industries a more severely affected by recessions (e.g. Peterson & Strongin, 1996), which makes industry effects more important.

Industry effects have been implemented in the dataset by including creating dichotomous variables by dividing firms into different two-digit NACE-codes. However, these codes are broad definitions of industries. These broad industry definitions represent a major disadvantage as they are imprecise. The imprecision does that a two-digit NACE-code could encompass a wide range of different operations, e.g. industry 74 that includes all sort of services. Firms within this particular industry will most likely have quite dissimilar characteristics, and thereby be affected and respond differently to recessions. Using more detailed NACE-codes is a possibility, but there are also problems associated to this approach, as this leads to single-firm industries. Hence, it is not possible to perfectly account for industry effects except of taking them into account in the data analysis.

3.7 Regression Analysis

Regression analysis is used to analyze the data in this thesis. This method is considered as an appropriate tool in analyzing large quantities of numerical observations. The data in this thesis are either survey questions that are converted into numerical alternatives, or registry data based on firms' financial statements. This makes the statistical techniques of regressions analysis well-suited to test the relationship between the various variables presented in this thesis. These statistical techniques is suited to assess the relationship between several independent variables and the dependent variable (Tabachnick & Fidell, 2007, p. 117). The assessed relationship generates a regression model that quantifies the strength of the relationship and can be used for prediction. Furthermore, the linear regression can be performed as either simple or multiple, depending on the amount of independent variables in the regression equation. The data in linear regression is modeled using linear predictor functions and unobservable variables are estimated from the data.

A simple bivariate linear regression model of one independent variable (X) and one dependent variable (Y), can be used to explain how X affects Y. A typical estimated linear regression function can be represented as:

$$Y = \beta_0 + \beta_1 x + \varepsilon$$

The equation of the simple ordinary least square (OLS) model consists of a constant (β_0), the coefficient of X (β_1), and the error term (ε). The error term denotes the amount the equation may differ in the empirical analysis indicating an incomplete relationship (Wooldridge, 2010). The equation above approximates the true relationship, which is the difference between the estimated and the error term (ε). The coefficient is estimated by fitting the equation to the data that is analyzed. The OLS method produces a straight line through the points so that the sum of squared deviations between the points and the line minimizes the residuals (Keller, 2009, p. 129; Tabachnick & Fidell, 2007, p. 117). Residuals are defined as the deviation between the data points and the fitted OLS line (Keller, 2009, p. 621). In theory, the error term should have an expected value of zero to obtain an unbiased estimate of the relationship between X and Y. The error term must also be uncorrelated with the independent variable X to avoid biased estimations of the OLS line, and this assumption is formally represented as:

$$E(\varepsilon|x) = 0$$

The general purpose of linear multiple regression is to examine the relationship several independent variables and the dependent variable. While bivariate regression only includes one independent variable and leave other potential variables unobserved, multiple linear regression can include infinite independent variables related to the dependent variable (Keller, 2009, p. 672). The multiple regression model is expressed as;

$$Y = \beta_0 + \beta_1 x_1 + \beta_1 x_2 + \ldots + \beta_p x_p + \varepsilon$$

The beta coefficient for an independent variable in multiple regression will be its effect on the dependent variable, keeping the other independent variables constant (Wooldridge, 2010). Multiple regression is often preferable to bivariate regression, as multiple regression can

account for the relationship between an infinite number of independent variables. Multiple regression is also suited to control for confounding variables, and thereby get better estimates of relevant variables (Cooper & Schindler, 2006). Moreover, the inclusion of several independent variables enables testing of non-linear relationships between the dependent and the independent variables. The prior shows that multiple regression have several applications which is relevant for the data analysis in this thesis.

Among researchers it is often a fear that omitted relevant variables will bias the results (Clarke, 2005). Multiple regression enables researchers to include several independent variables to prevent omitted-variable bias (OMB). OMB occurs if one or more independent variables are left out, causing the model to over- or undercompensate the effect of one or several other independent variables. Moreover, unobserved factors captured by the error term (e) might be correlated to one or more independent variables.

3.7.1 Prerequisites for regression analysis

There are prerequisites for the regression analysis to generate unbiased estimates of OLS models. Biased estimations can occur if one fail to meet the prerequisite criteria of preventing causal inferences. The following subsection will present these prerequisites and their implications for this thesis.

First, is the criterion that states that the error term should be equal to zero. Second, is the criterion, which states that the variance of the error term is required to be constant for all values of the independent variable (Bollerslev, 1986; Keller, 2009, p. 655). When this criterion is violated, the condition is called heteroscedasticity. The occurrence of heteroscedasticity can also reduce the efficiency of the regression model by underestimating the variance (Johnson, 1997). This is particularly a large problem when regression models are nonlinear (such as logit or probit models), which causes the estimators to be biased and inconsistent in an unknown direction. Heteroscedasticity has larger implications when investigating smaller samples, than those used in this study. In contrast, Johnson (1997) argues that the presence of heteroscedasticity may still generate unbiased estimates. Third, is the criterion that states that the error term of two different periods should not be correlated. Fourth and last, is the non-endogeneity of the independent error term regardless of the values of the independent variables.

Multicollinearity (also called collinearity and inter-correlation) is a condition that occurs when the independent variables are correlated with one another (Keller, 2009, p. 692). There are two implications of multicollinearity. First, as the variability of the coefficients is large, the sample coefficient might be far from the actual population parameter. Second, when the

coefficients are tested, the t-statistics will be small, this leads to an inference where there is no linear relationship between the affected independent variables. There is an extensive literature of detecting and coping with multicollinearity (e.g. Belsley, Kuh, and Welsh, 1980; Farrar & Glauber, 1967; Green, Carroll, and DeSarbo, 1978; Krishnamurthi & Rangaswamy, 1987). There are therefore several methods to test for multicollinearity, and the probably most widely used method is examining the correlation matrix of the predictor (Mason & Perrault, 1991). Another robust method is to run VIF-tests and control for tolerance on individual predictors (Wooldridge, 2010). This thesis will utilize VIF-tests and tolerance levels to test multicollinearity. A rule of thumb in this matter is that tolerance levels below .1 and VIF-value above 10 indicates multicollinearity.

Furthermore, it is important to inspect whether the regression models fulfills the criteria of normality and linearity (Tabachnick & Fidell, 2013). The normality criterion concerns how residuals should be normally distributed about the dependent variable(s) score(s). The criterion of linearity concerns how the residuals should have a straight line relationship with the predicted dependent variable(s) score(s). These two criteria can be checked by inspecting the Normal P-P Plot of the regression models. This inspection should show a reasonably straight diagonal line from the bottom right to top right, which indicates linearity and normality of the data analyzed. If there are major deviations it could be useful to check the Scatterplot for outlying observations, and investigate whether Cook's distance, leverage trimming and interquartile range are able to identify these influential observations. Multiple regression models are sensitive to outliers, and this procedure is an important procedure in the initial data screening process (Tabachnick & Fidell, 2013). As highlighted earlier, the procedures of removing outliers in this thesis are implemented carefully to get representative and valid findings.

3.7.2 Outlying observations

In the conduction of a regression analysis, it is important to control particular influential observations, namely outliers. Grubbs (1969) defines an outlying observation, or outlier, as an observation that is distant from other observations. These observations have substantial impact on regression results (Chatterjee & Hadi, 1986; Wooldridge, 2010). According to Wooldridge (2010) outliers may have influential impact on OLS results, and can also result in violation of the normality criteria that are common in some statistical tests (Keller, 2009). Regressions are therefore prone to outliers, as residuals with large absolute values are allocated disproportionate weight in the OLS method. Outliers may occur for two reasons, either due to variability in the measurement or by experimental error. The extreme observations in the D&B dataset are due

to variability in measurement, and it is difficult to assert them as erroneous. The literature is unambiguous regarding retaining or excluding outliers. Thereby, researchers are facing a difficult dilemma. These extreme observations may provide important information by increasing the variation in the independent variable (Wooldridge, 2010), or as noted have influential impact on OLS results. This thesis stresses to generate a representative sample of the empirical setting, and removing outliers is considered an optimal route to attain this. Ideally, the analysis of this thesis should have presented results with and without outliers. However, to retain as many observations as possible, only the dependent variables are trimmed in the regression analysis, i.e. EBITDA margin and ROA.

As noted, the approach of excluding variables in this thesis consists of two phases. First, extreme observations are identified by using Cook's distance and leverage. The decision whether retaining or excluding the outliers is based on a robustness test, which examines their omission in the models of this thesis. Second, interquartile range is used to identify extreme observations performing a similar robustness test. The intention of this approach is to identify and exclude extreme observations, which may have substantial influence on the confidence intervals and corresponding percentiles of the trimming in the second phase. Other master theses within this field of research has used standard deviation to remove outliers instead of using the interquartile range. The reason why this thesis has used interquartile range is that it is better suited to identify outliers, and reduces the risk of removing observations on erroneous basis. Thereby, the application of interquartile range results in a more representative sample of the empirical setting than any standard deviation rule.

Implementing Cook's Distance and leverage trimming

The first phase of identifying and excluding extreme outliers was as noted performed through Cook's distance and leverage trimming. Cook's distance indicates whether an observation has disproportional impact on the regression model (Chatterjee & Hadi, 1986; Cook, 1977; 1979). The value of Cook's distance is a measure to estimate a data point's impact on the regression if it was excluded from the regression analysis (Field, 2013). The literature is not coherent regarding the threshold of Cook's distance. For instance, Cook and Weiseberg (1982) argues that data points above 1 should be investigated, while Hamilton (1992) argues that data points with a value above 4/N are influential. This thesis will follow Cook and Weiseberg's (1982) procedure, and the decision is based on assumption that this will ensure a representative sample by only excluding extreme outliers.

Leverage observations are those extreme outliers of the independent variables without any neighboring values that influence the fitted regression model (Everitt, 2002). Similar to Cook's distance there is not a consensus in the literature regarding the threshold of leverage. Huber (1981) argues that data points above 0.5 should be excluded from the analysis. In contrast, Hamilton (1992) argues that leverage values above 0.2 should be avoided and excluded. The selection of threshold is again based on generating a representative sample, and by Huber's (1981) threshold corresponds to this strategy.

The execution of the procedures was generated in SPSS by running the regression model with variable generation for Cook's distance and leverage trimming. Although, these procedures did not identify many outlying data points, the observations excluded had significant effect in measurements as R2, significance level, correlation matrix and residuals.

Implementing interquartile range trimming

The second phase of identifying and removing outliers based on interquartile range. This procedure involves excluding observations below *Q1 - 2.2IQR* and above *Q3+ 2.2IQR*. There has been a debate between scholars regarding the size of the multiplier. Originally, Tukey (1977) suggested that the multiplier of the latter equation should be 1.5. However, an article by Hoaglin & Iglewicz (1987) demonstrated that the 1.5 multiplier was inaccurate approximately 50 percent of the time, and suggested that 2.2 is probably more valid. Both multipliers have been tested in this study, and it seems like 2.2 is more accurate for correctly identifying and excluding outlying observations.

The implementation of interquartile range trimming was performed in SPSS by implementing the values in the filtering function. To examine the effects of the trimming in the second phase, a starting point is skewness and kurtosis. Skewness is a measure of the asymmetry to the distribution of different variables, and a value of 0 indicates perfect symmetry around the mean. A unimodal distribution may indicate that there are extreme data points in one of the tails that displaces the mean. In a similar way as skewness, kurtosis is a descriptor of the distribution's shape. The kurtosis value of a normally distributed variable is 0. According to Tabachnick & Fidell (2007) negative values indicate a flat distribution, which indicates that the sample consists of disproportionately many observations in one or both of the tails.

3.8 Interaction effects

In certain cases, the effect of an independent variable on a dependent variable may depend on the value of other independent variables, called moderator variables (Cox, 1984;

Jaccard & Turrisi, 2003, p. 3). The interpretation of the coefficients in the regression changes by introducing interaction effects. An interaction effect exists when the effect of the independent variable on the dependent variable differs depending on the value of a third variable (Jaccard & Turrisi, 2003, p. 9). For instance, sales growth might vary depending on the age of the company in the dataset, as young firms typically grow faster than older firms. This makes age the moderating variable as growth is "moderated" by firm age (Evans, 1987).

3.9 Data limitations

The D&B dataset has undergone quality assurance by Berner, Mjøs and Olving (2014), but there are still some issues concerning the quality of the data. First, the dataset has been standardized across the years to improve the usability. However, no attempts have been made to correct the effects associated with changes in accounting law, accounting practices or other reformations that affect the content of accounting posts (Berner, Mjøs, & Olving, 2014). This leads to inconsistency in the dataset across years, and the results from the analysis should therefore be interpreted carefully. Second, some variables contain incomplete or even missing data. These variables are primarily related to accounting information where reporting is voluntary, e.g. number of employees.

The survey dataset seems to be of high quality (Knudsen, 2014), as it has been revised a number of and pre-tested on CEOs in twelve firms before the final survey was dispatched. However, there are always potential concerns related to the use of surveys. First, the survey data is collected for another purpose than this thesis. This results in some data limitations regarding the purpose of the thesis, but these concerns do not exceed normal limitations of secondary data. Second, some variables contain incomplete or even missing data. This could be a result of respondents refraining to answer a particular question. Third, respondent biases might be a concern in surveys. Knudsen (2014) has checked for respondent biases using registry data, and did not find any significant difference in respect to firm characteristics.

3.10 Reliability and validity concerns

Reliability and validity are central concepts in evaluating the quality of research. To reduce the probability of drawing wrong conclusions, it is crucial to scrutinize the validity and reliability of the research design (Saunders, Lewis, & Thornhill, 2009, p. 156-157).

Reliability refers to the extent in which the selected data collection techniques or analysis will yield consistent findings (Saunders, Lewis, & Thornhill, 2009, p. 156). As presented, the analysis will utilize both registry data and survey data; in terms of the use of

secondary financial data, the concerns regarding reliability are minimal. The risk of non-replicable findings are also considered minimal. This is due to the transparency and the collection of the material. However, there are a number of potential biases, which are present when using survey data. First, the data is retrospective, which leads to potential concerns about the memory of the respondents. The fact that the survey was distributed to the respondents relatively close to the recession may have reduced the problem, but this cannot be tested. Second, as there is only one respondent of each firm, the data is vulnerable to common method biases. This is in particular problematic if the CEOs' responses are subject to systematic biases. An example of this could be that poor management performance is blamed on the recession.

Validity is a term for how well we manage to measure what we intend to measure or examine in our research, and it is common to distinguish between construct, internal and external validity (Ghauri & Grønhaug, 2010, p.78). Construct validity is to what extent the constructs are operationalized to measure what it claims to measure (Zaltman et al., 1977, p. 44, cited in Ghauri & Grønhaug, 2010, p. 81; Saunders, Lewis, & Thornhill, 2012, p. 193). A statistical study is said to have internal validity if the statistical inferences about causal effects are valid for the population being studied (Stock & Watson, 2012, p. 355). Furthermore, the analysis is said to have external validity, if its conclusions can be generalized from the population studied to other populations and settings. The following will evaluate each of these issues separately.

Construct validity. Construct validity is related to how well constructs are operationalized (Saunders, Lewis, & Thornhill, 2012, p. 193). Construct validity is a relevant issue in this thesis, as it is difficult to approximate certain constructs from the D&B database and the survey in the analysis. For instance, it is difficult to operationalize downsizing and hiring. This thesis has compared the measures of absolute growth from the D&B dataset and the survey. First, the variable of employee growth is an imprecise and inexpedient measure, as it do not measure what it intends to measure. The reason for this is that it is only mandatory to report the number of employees when firms register in the Entity Registry, which results in inadequate data. Second, the variable of employee growth in survey is far from perfect. The variable is based on two questions regarding the number of employees, and thereby encompassing a wide range of effects that cannot be entirely attributed to downsizing or hiring, e.g. retirement. The same argument applies to measuring the amount and quality of training through the survey. Moreover, controlling for ownership structure could inadvertently comprise a broad range of effects beyond the actual ownership effects. The construct validity of these and other proxies could be debated, though the key variables included in the models of this

thesis are arguably adequately operationalized based on the data available. Therefore, it is considered that the thesis ensures construct validity sufficiently.

Internal validity. The data collected from the D&B-database can be considered to be of strong validity for a number of reasons. First, as the study rests on descriptive research of financial secondary data, the internal validity of the data is presumed to be high. Second, the data is collected from an independent research facility in Norway, which eliminates the possibility that the data is influenced by our research. Third, due to the changes enacted by the accounting act of 1998, validity will be strengthened by the selection of data in the period after 1998 to avoid causality claims as a result of changes in accounting standards.

The internal validity of the survey used in this thesis may have some concerns. Despite having a large number of respondents, and selected randomly amongst 17,312 firms, the survey was not conducted as a part of our own survey, and thereby lack human capital operationalizations. Further, survivor bias could be a potential concern as the survey was only distributed to surviving firms. In turn this might lead to that firms which were most adversely hit are underrepresented in the survey data, which suggests caution regarding causal claims of potential findings.

External validity. The external validity of this study is considered strong. Even though the financial crisis affected countries differently, the theoretical and practical concepts presented in this thesis relevant to firms in all countries (e.g. hiring, firing and human capital development). Furthermore, despite that the focus of the analysis concerns Norwegian firms, there are few context-specific elements which are not generalizable to other populations. The impact of the financial crisis of 2008-09 and the following recession varies between countries. As there is a lack of these type of studies internationally, this thesis hope to serve as groundwork for similar studies in other countries. This means that the external validity is given utmost importance for further studies.

Summary. This chapter has highlighted the main principles of how methods will be used to solve the hypothesis of this thesis. First, the descripto-explanatory research design was presented, and which implications this have for the study. Second, the sampling criteria and strategy for the thesis was presented. Moreover, it was discussed how the sampling procedure was implemented to get a representative sample. Third, the potential validity and reliability threats were discussed, and this showed that internal validity was of particular importance. Fourth, the dependent variables EBITDA margin and ROA was presented, and that the independent and control variables was based on both registry and survey data. This was then

related to the model of analysis. Fifth and final, the prerequisites for the regression analysis were presented, and this part focused on the keys of multiple regression.

4. Analysis

This chapter will present and examine the results of the analysis. First, a presentation of the empirical context of the overall economic condition in Norway from 1999-2012, to provide a better understanding of the analysis. Second, descriptive statistics of the key variables will be presented. Third, the findings from the regression models will be highlighted and discussed. Fourth and final, the interaction term will be discussed.

4.1 Empirical context

This subsection will present and discuss the empirical context of the overall economic condition in Norway in the period of 1999-2012, to provide a better overall understanding of the analysis. A critical assumption in the research model is that the financial crisis had such an unexpected and considerable impact on the Norwegian economy that it can be treated as a natural experiment. This creates a sharp treatment effect (firms responded quickly to the recession), but creates potential biases as it is not random which firms are most severely hit (e.g. unobservable variables such as level of education and contract-length can affect the outcome of the analysis).

Business cycles are of particular importance in this thesis, and start by presenting macroeconomic data to show the impact on the overall Norwegian economy in the period of 2000-2012 describing the real GDP growth.
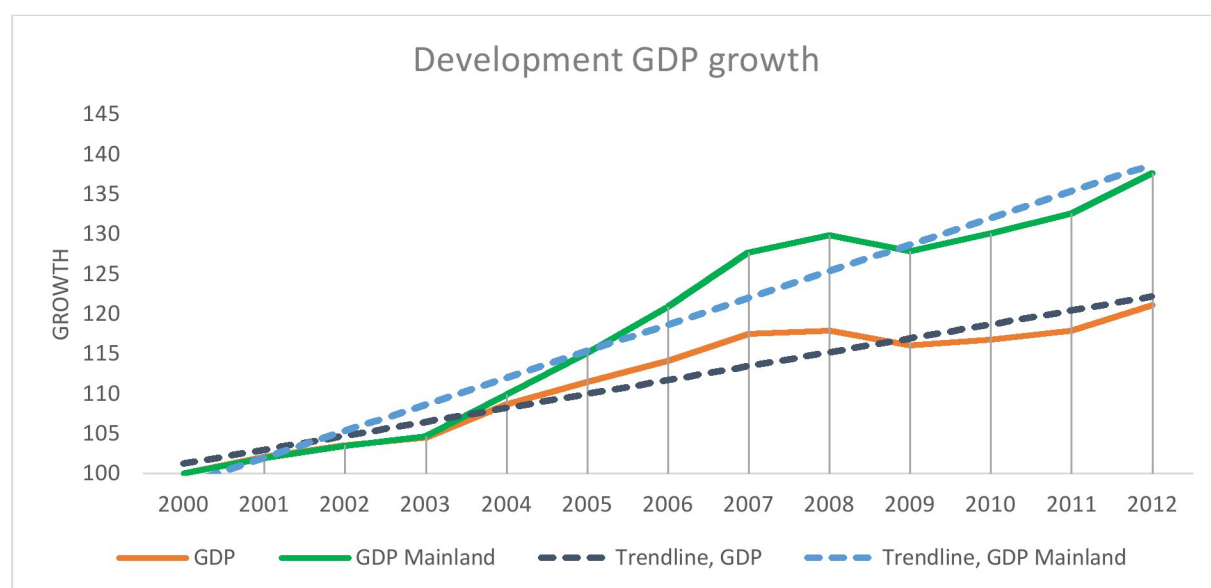

Figure 5 Development GDP 2000-2012 (Fixed price 2000 = 100).

The diagram is based on the theoretical presentation of the four phases in the business cycle. From the diagram, real GDP fluctuates around the GDP trend line. The real GDP in 2000 is above the trend line, but is declining to relative to the long term trend line. In 2001, the GDP drops below the trend line, indicating the beginning of a slowdown phase, which continues in 2002 and 2003. The turning point of the business cycle late 2004, where the business cycle enters the recovery phase. The real GDP intersects the trend line, and from this point the real GDP grows faster than the trend line. From this point, the business cycle enters the expansion phase, where GDP surpasses the trend line and continues until halfway of 2008. From here, the GDP growth diminishes towards the trend line, and the economy enters the slowdown phase indicating the beginning of the financial crisis. In the last quarter of 2008, GDP intersects the trend line indicating the beginning of the recession. The impact of the crisis seemed severe for mainland GDP growth was reduced from 5.7 % in 2007 to -1.6 % in 2009. After reaching the trough, the business cycle enters the recovery phase, and the GDP is ascending towards the trend line in 2010-2011. Furthermore, the recovery phase changed growth rates to 1.6 % in 2010 and 2011 respectively and moving towards the trend line in 2012. An interesting finding is that mainland GDP seemed to be more severely hit than the country as a whole. An explanation could be that oil and gas related industries did not experience large declines in oil prices before late 2008.

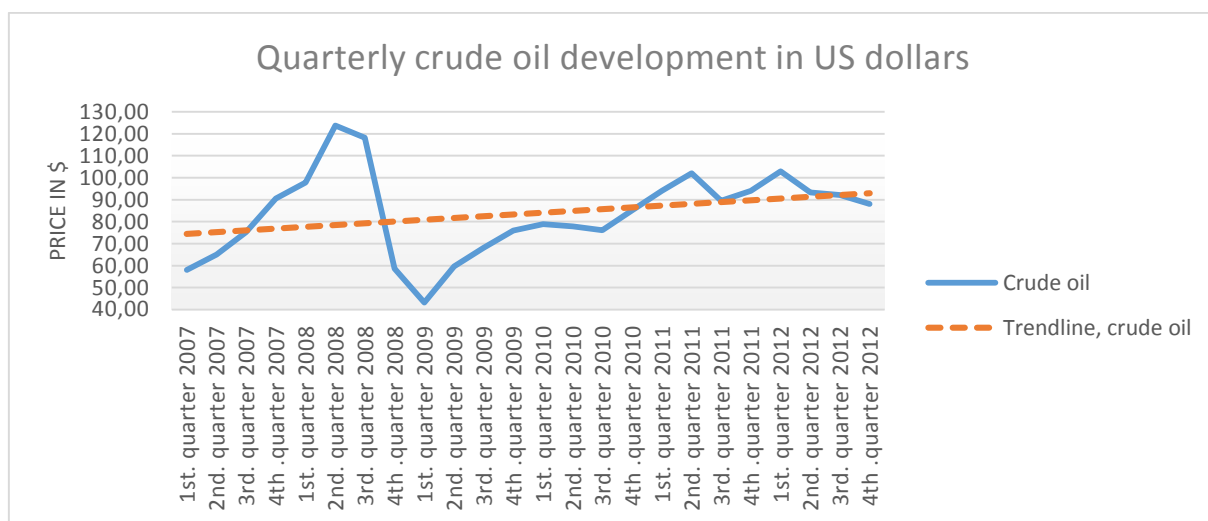*Figure 6* Quarterly crude oil development in USD ($), 2007-2012.

Moreover, unemployment changes throughout the business cycle, and is thereby related to the level of economic activity in the economy, with low unemployment rates during expansions and increasing unemployment rates during recessions. Comparing the unemployment rate to changes in GDP in the year before and year after the financial crisis,

unemployment rate was reduced from 4.6 to 2.5 % during expansion and was increasing to 3.2 % during the recession. One interesting finding is that the unemployment rate peaked in 2010 when the financial crisis was considered by most firms to be over (Table 5). Further, unemployment is considered as a lagged economic indicator (Sørensen & Whitta-Jacobsen, 2005). One explanation for the lagged effect observed in the data could be that the late drop in oil price, which caused reduced unemployment.

4.2 Descriptive statistics

In order to create an enhanced overview of the Norwegian context, descriptive statistics of some of the main variables are presented in prior to presenting the regressions in the next sub-chapter. The presented variables are illustrated by using mean and median values to provide an overview of the development in the period of analysis. Mean values could be sensitive to extreme observations, and data cleansing has been performed to remove such observations. Furthermore, standard deviation is presented separately to provide an overview of the development of variance and dispersion in the presented variables. The descriptive have not been adjusted for industry affiliation, as the purpose of this section is to describe the aggregate developments in the economy.

Profitability. The figure illustrates how the mean and median of profitability develops over the period for EBITDA margin and ROA. From the figure the mean and the median follows the same pattern throughout the period. The figure illustrated how the business cycle moves from a slowdown/recovery caused by the dot-com bubble in 2000-2003, into an expansion phase with increasing growth until the financial crisis hits in 2008. From this point, both the mean and median is diminishing, but in 2010 there is a turning-point where the EBITDA-margin starts to grow at a low pace. This indicates that firms enter the recovery phase of the business cycle, bringing the EBITDA-margin above the pre-expansion level. However, both the mean and median are still significantly lower than the expansion level in 2004-2007. This indicates the measure is clearly following the development of the business cycle.
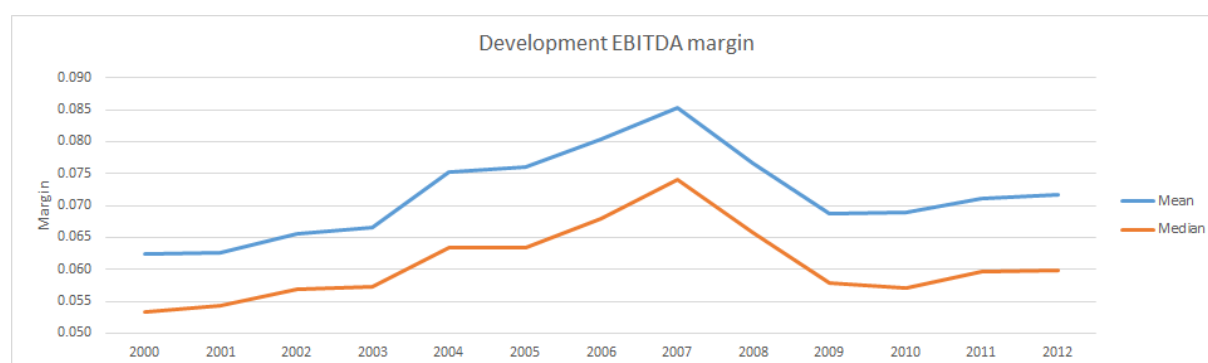
Figure 7 Development mean and median EBITDA margin, 2000-2012.

The standard deviation for EBITDA margins portrays a pattern where the recession and slowdowns is consistent with the expectations of divergent performance. The standard deviation in the expansion phase is increasing, while the financial crisis causes further spikes in the standard deviation. Moreover, the standard deviation in the recovery phase is relatively stable. Figure 8 illustrates the differences in EBITDA-margin increased during the expansion and the recession, and indicates that some firms performed poorly during the expansion. The difference between the top and worst performers increased further during the recession. The pattern in recessions could also be explained by the fact that some firms were severely harmed by the recession, while others were not affected. This result is consistent with the findings of Knudsen & Lien (2012).
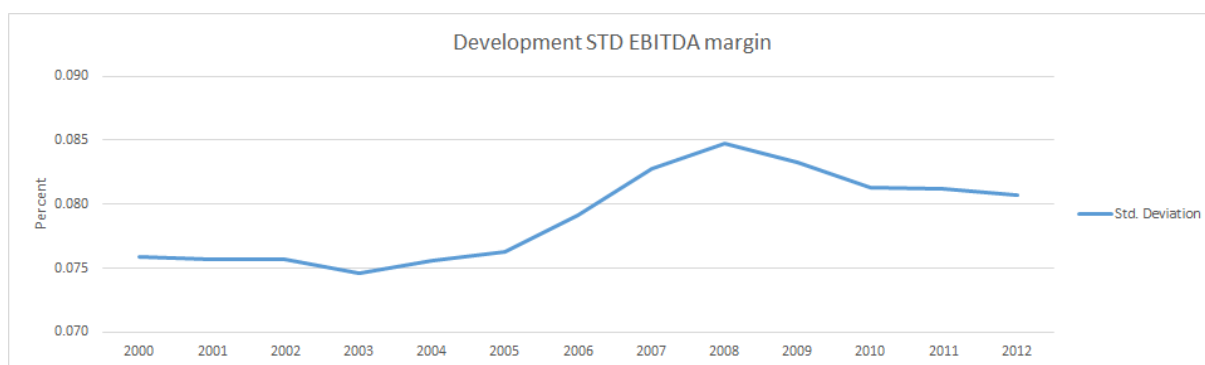
Figure 8 Development standard deviation EBITDA margin, 2000-2012.

Return on assets (ROA) is the second measure of profitability, and the graph depicts that the ROA is low during the dot-com bubble before increasing in 2003. The ROA continues to grow at a steady pace during the expansion between 2004-2007, reaching its peak in 2007. The financial crisis hits in 2008 causing a considerable decline in ROA, which continues in 2009 before reaching the turning point in 2010. The ROA level in 2010 is higher than the pre-expansion levels. The two measures, mean and median, are highly correlated and follow each other closely in the diagram.
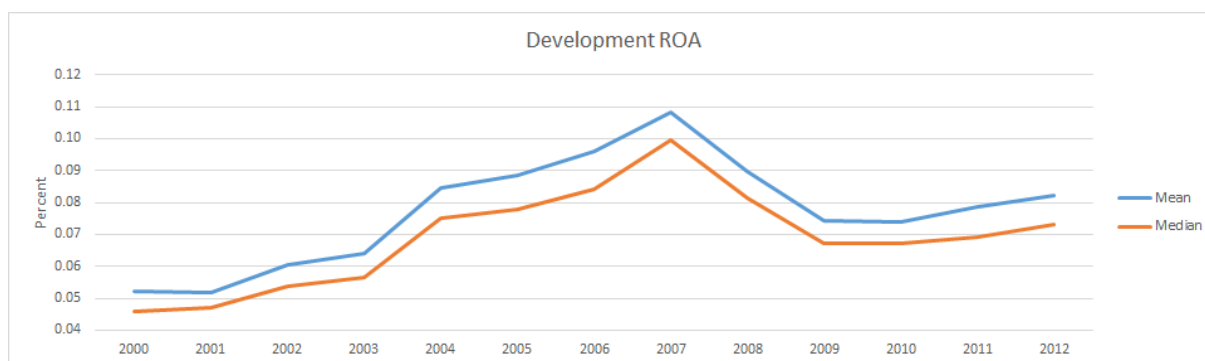
Figure 9 Development mean and median ROA, 2000-2012.

The standard deviation of ROA follows almost the same pattern as for the EBITDA margin. Moreover, it is a bit more challenging to interpret as the business cycle is less prominent compared to the standard deviation of EBITDA margin. However, the standard deviation is low during the recovery and early expansion (2000-06), before it increases rapidly during the later end of the expansion into the slowdown and the recession (2007-09). The turning point in 2010 indicates the start of the recovery phase.
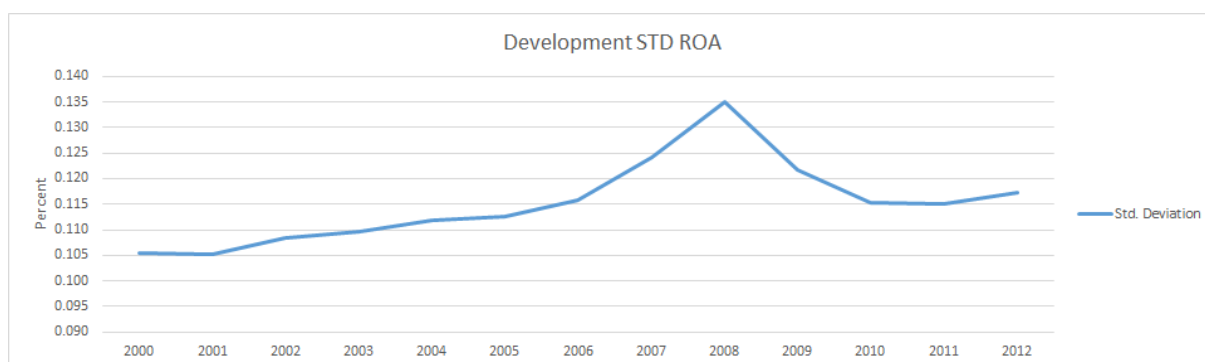
Figure 10 Development standard deviation ROA, 2000-2012.

While the descriptive analysis of EBITDA and ROA indicated that profitability decreases considerably during a financial crisis, the standard deviation increased. This is interesting as it gives an indication that firms were affected differently by the financial shock. Figure 11 shows that there are significantly differences between how severely firms were hit and that this in turn can affect which responses they are able to perform.
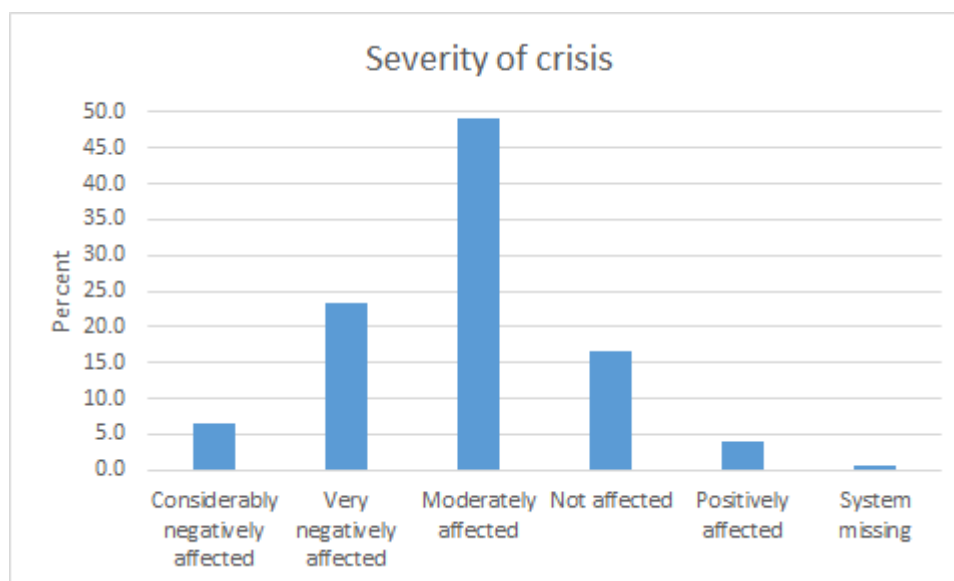
Figure 11 Severity of the financial crisis.

4.3 Hypotheses analysis

To investigate the relationships between firm and industry characteristics related to performance, OLS-regressions has been conducted for the years 2010-2012. The regression outputs from the regression models are presented in Table 7-15 in the Appendix.

-- Insert table 7-15 about here --

The basic regression model is illustrated in Equation x where Y_{1-2} is representing the dependent variables:

$$
\begin{aligned}
Y_{1-2} = \alpha & + \beta_1 Downsizing + \beta_2 Hiring + \beta_3 Training\ Employees \\
& + \beta_4 Training\ Managers + \beta_5 Human\ Capital\ Investments + \beta_6 Age \\
& + \beta_7 Sales\ Growth\ 2007 + \beta_8 EBITDAmarg\ 2007 + \beta_9 Fixed\ Assets \\
& + \beta_{10} Durability + \beta_{11} Liquidity\ 2 + \beta_{12} Financial\ Leverage \\
& + \beta_{13} Export + \beta_{14} Severity\ of\ crisis + \beta_{15} Size \\
& + \beta_{16} Affected\ (Demand) + \beta_{17} Affected\ (Credit) \\
& + \beta_{18}\ Outlook\ (Market\ Share) + \beta_{19} Outlook\ (Growth) \\
& + \beta_{20}\ Outlook\ (Profitability) + [Industry\ dummies] \\
& + [Crisis\ dummies] + \varepsilon
\end{aligned}
$$

Seven models were run for each of the two dependent variables – EBITDA margin (registry) (Models A1-A7) and ROA (registry) (Models B1-B7) for the years 2010-2012. Models A1 and B1 comprise the control variables, industry dummies, crisis dummies and a constant. Models A2-A6 and B2-B6 comprises the latter variables and an independent variable (Downsizing, Hiring, Training Employees, Training Managers, Human Capital Investments). Models A7 and B7 includes the full specification.

Due to lack of significant findings in Models A1-A7 and B1-B7, it was decided to exclude some control variables to check if this could lead to significant findings. Seven regression models were run on the dependent variable - EBITDA margin (Models C1-C7). Each model follows the same approach as described in the previous. In the process of selecting which control variables to exclude from the final regression models, several setups were tested. This process led to three final setups that were tested on the years 2010-2012. The first model tested the effect of running a regression without controlling for industry effects. The second model tested the effect of running regressions without both the industry variables and firms' expectations about growth, profitability, and market share. The third and last model tested the same as the latter, but also removed the controls for when the crisis hit. Running each of these models revealed that the second model provided the most interesting results for the years scrutinized. Instead of presenting the results from all of the models, it seems reasonable to only present the results from the second regression model. All the models presented in the following are all significant at 0.01 level. The following will primarily be linked to Models A1-A7, which is considered as the main model. The results presented will also be supplemented with findings from Model B1-B7 and Model C1-C7.

In the following section, the hypotheses presented earlier in this theses is linked to the regression analyses:

Downsizing. The hypotheses tested here concerns of how downsizing affects firm performance in the short and long term.

H;1a: Firms which engages in downsizing as a response to the financial crisis increased short term performance.

H;1b: Firms which engages in downsizing as a response to the financial crisis suffered from reduced long term performance.

These hypotheses were tested through regression Model A2, and the results are presented in Table 7-9. The theoretical predictions of downsizing states that firms that engaged in downsizing as a response to the crisis reaped positive returns in the short term, but suffered from reduced post-recession in the long term. The table for 2010 shows that Downsizing has a negative effect on EBITDA margin (registry), but this relationship is not significant. The findings suggest that downsizing was not associated with positive performance in short term. For 2011, there is a strong negative relationship between Downsizing and EBITDA margin, but this relationship is not significant. The results for 2012, reveals a weak negative effect of Downsizing on EBITDA margin. Moreover, the findings are somewhat ambiguous regarding the statistical significance. The results for 2011 are not significant, while the results for 2012 are significant ($p<0.05$). The negative and significant coefficient of downsizing in 2012, indicates partial support for second theoretical prediction of reduced firm performance in the long term. Model C2 with the omitted variables reveals similar results to Model A2, and there is no change in the significance across the years. Thereby, omitting the variables had no effect in increasing the significance level of the results. In Model B2 where ROA is the dependent variable reveals that Downsizing has a negative and significant effect ($p<0.01$) on ROA in 2010, opposite of the theoretical argument of the hypothesis. For 2011 and 2012 there are a negative and significant ($p<0.10$) relationships between Downsizing and ROA. This is in line with the theoretical arguments and hypothesis regarding long term effects on performance.

Models A7, B7, C7 includes all the independent variables in one model with the same predictions. The following will first look into the short term effects, and then the long term effects on firm performance for each of the models. Starting with Model A7, Downsizing has a slightly negative and significant ($p<0.10$). The findings regarding the long term effects on performance reveals the same pattern for Downsizing as in the short term. The results confirm the ambiguous pattern from model A2, where Downsizing is significant ($p<0.05$) only in 2012. The overall conclusion for Model A7 is that there is limited support for the hypothesis, and that there is only partial support for the hypotheses considering the effect of Downsizing on performance. The results from Model C7 with the omitted variables on EBITDA margin reveals a non-significant and slightly negative relationship in the short run. The long term results replicate the results from Model A7, where only the results from 2012 is significant ($p<0.05$). Model B7 reveals that Downsizing has a negative and significant ($p<0.01$) effect in the short term. This negative effect is present in the long term but is less significant ($p<0.10$). The findings from the ROA-model provides partial support for the hypotheses and theoretical

arguments. In sum, there are some support for the theoretical arguments and the hypotheses, but the results are ambiguous across the various models.

Hiring. The hypotheses tested here concerns how hiring influence firm performance in the short and long term.

H;2a: Firms which increases hiring as a response to the recession will have reduced short term profitability.

H;2b: Firms which increases hiring as a response to the recession will have increased long term profitability.

Model A3 tested the hypotheses, where hiring was included as an independent variable. The theory section outlined how recessions might increase the incentives of hiring. The logic behind this reasoning is that the price of talent declines in recession, leading to increased costs in the short term. The first prediction assumes that hiring is associated to negative performance in the short term. From the analysis, table 7 reveals that hiring is equal to zero and non-significant on EBITDA margin. The second theoretical prediction assumes that hiring is associated with positive performance in the long term. The logic behind this argument is that firms which are able to hire employees in recessions, will yield performance gains in the later stages of the business cycle. The results from 2011 and 2012, reveals a weak positive and non-significant effect on EBITDA margin. The results from Model A3 does not support the theoretical arguments and hypotheses. Therefore, the overall conclusion is that there is no evidence of hiring being associated with negative performance in the short term, or positive performance in the long term. Model C3 with the omitted variables reveals similar results to Model A3, and there is no change in the significance levels of the independent variables across the years. Thereby, omitting the variables had no effect in giving evidence for the hypotheses. The output from Model B3 reveals that the independent variable is far from significant across the years 2010-2012.

Model A7 testing the various independent variables in one model identifies non-significant effects for hiring in the short- and long run. Model C7 reveals that Hiring in the short term becomes significant ($p<0.10$) and has a slightly negative effect on EBITDA. However, there are not any significant results for Hiring in the long term. The full specification ROA-model (B7) fails to identify any significant results both in the short and long term. In sum, none of the tested models provides evidence for any of the hypotheses.

Training of employees. The hypotheses tested here concerns how training of employees influence a firm's performance in the short and long term.

H;3a: Firms which increased training of their employees as a response to the financial crises increased long term performance.

H;3b: Firms which engages in increased training will suffer from a short term profitability disadvantage.

Model A4 was used to investigate the hypotheses of how Training of Employees influence performance. The theoretical argument outlined earlier states that the opportunity cost of training declines in recession, incurring costs in the short term. This leads to the first prediction, which presumes that increased training of employees is associated with reduced performance in the short term. The analysis shows that Training of Employees is weakly negative and non-significant on EBITDA margin. The second theoretical prediction presumes that training of employees is linked to positive post-recession performance. The reasoning behind this argument is that training leads to higher quality on human capital, causing higher profits in the later phases of the business cycle. However, the findings shows the same pattern as in the short term. The findings from Model A4 suggest that there is no evidence to support the hypotheses. The overall conclusion of Model A4 is that Training of Employees is not associated with negative performance in the short term, or positive performance in the long term. The findings from Model C4 omitting the control variables suggest that there is no evidence to support this hypothesis. Consequently, Model C4 reveals similar results to Model A4. Model B3 outlines a clearer picture by revealing a positive and significant (p<0.10) effect of training employees on ROA in 2010. Thereby giving some support to the hypothesis. The long term effects are the opposite of the short term results revealing that Training of Employees is both negative and non-significant on ROA. The full specification models (A7, B7, C7) replicate the same findings as presented in Models A4, B4, and C4. In sum, there is limited overall support for the theoretical arguments and the hypotheses.

Training of Managers. The hypotheses tested here concerns how training of managers influence a firm's performance in the short and long term.

H;3c: Firms which increased management training as a response to the financial crisis, increased long term performance.

H;3d: Firms engaging in increased training will suffer from a short term profitability disadvantage.

Model A5 was used to investigate the hypotheses of how Training of Managers influence performance. The theoretical arguments follow the same principles as training of employees. The first prediction is that training of managers is linked to reduced firm performance in the short term. The findings suggest that Training of Managers is equal to zero and non-significant on EBITDA margin. The second prediction is that training of managers is linked to positive post-recession firm performance. The findings for the second prediction shows a weak negative and non-significant effect on EBITDA margin. The findings from Model A5 suggest that there is no evidence to support the hypotheses. The overall conclusion is that Training of Managers is not associated with negative performance in the short term, or positive performance in the long term. The findings from Model C5 (Table 13-15) reveals similar findings from Model A5. Moving on to Model B5 with ROA as the dependent variable, shows no significant results across the years analyzed. In the short term the effects are positive, whilst they in the long term are negative. The full specification models (A7, B7 & C7) replicate the same findings as presented in Models A5, B5, and C5. Overall, there is limited support for the theoretical arguments and hypotheses.

Human capital investments. The hypotheses tested here concerns how human capital investments influence firm performance in the short and long term.

H;4a: Firms which increased human capital investments as a response to the recession suffered from negative short term profitability.

H;4b: Firms which increased human capital investments as a response to the recession yielded superior long term profitability.

Model A6 was used to investigate the hypotheses of the effect of Human Capital Investments on performance. The first prediction is that human capital investments is linked to reduced firm performance in short term. The second prediction is that human capital investment is linked to positive long term performance for the firm. The theoretical arguments applied here follows the same logic as the previous hypotheses. The results indicates a weak positive relationship for each of the years, but these relationships are non-significant. The findings from

Model A6 suggest that there is no support for the hypotheses. The overall conclusion for Model A6 is that Human Capital Investments is not associated with negative performance in the short term, or positive performance in the long term. Model C6 reveals similar findings to A6 leading to the same overall conclusion. Scrutinizing the results of Model B6 reveals that Human Capital Investments cause weak negative effects on ROA for all years in the analysis. However, these findings are not significant and provide no support for the theoretical predictions and hypotheses. The full specification models (A7, B7 & C7) replicate the same findings as presented in Models A6, B6, and C6. In sum, the various models tested here provide no support for the hypotheses.

Summary. This summary provides an overview of the key points of the analysis of the models (A1-A7, B1-B7, C1-C7) with the two dependent variables - EBITDA margin and ROA. First, the findings regarding Downsizing revealed partial support for the hypotheses, which stated that downsizing were associated with negative long term performance (A2/7, B2/7, C2/7). Second, the results for Hiring, Training of Employees/Managers, and Human Capital Investments did not support the theoretical arguments of the hypotheses (A3-A6, C3-C6). While model B3 revealed a positive and significant relationship in the short term. Third, the findings regarding the full model including all the specifications were corresponding to the findings for the models (Model A2 and A3-A6 (A7), Model B2 and B3-B6 (B7), and Model C2 and C3-C6 (C7)). The overall conclusion is that there is limited support for the tested hypotheses.

4.4 Interaction terms

The previous section revealed limited support for the tested hypotheses. Furthermore, exploratory tests regarding interaction terms were implemented to examine whether such effects existed between the scrutinized variables. The following will first test if there are interaction effects between the independent variables on performance (Models D1-D2), and second examine whether there are any interaction effects between independent and control variables on performance (Models E1-E2). The regression outputs from the models including the interaction effect are presented in Table 16-21 in the Appendix.

-- Insert Table 16-21 about here --

The equation for the regression models is illustrated in Equation y where Y_1 is representing the dependent variable.

$$Y_{1-2} = \alpha + \beta_1 Downsizing + \beta_2 Hiring + \beta_3 Training\ Employees$$
$$+\ \beta_4 Training\ Managers + \beta_5 Human\ Capital\ Investments$$
$$+\ \beta_6 Downsizing * Human\ Capital\ Investments$$
$$+\ \beta_7\ Independent\ variables * Control\ variables$$
$$+\ [Firm\ control\ variables] + [Industry\ dummies] + [Crisis\ dummies]$$
$$+\ \varepsilon$$

Two models were run on the dependent variable EBITDA margin (registry) for the years 2010-2012 (Models D1-D2). Several different interaction setups were tested in Model D1 and D2, but the results presented here do only encompass the interaction effect between Downsizing and Human Capital Investments. Model D1 comprises the control variables, industry dummies, crisis dummies, independent variables (Downsizing and Human Capital Investments), and a constant. Model D2 encompasses the previous, but also includes the interaction term between the two variables Downsizing and Human Capital Investments. Interaction variables were created between the most significant independent and control variables in the previous statistical models. The next step was to test several different setups between independent and control variables. The setup that provided the most interesting initial results were the interaction effect between Liquidity 2 and the various control variables. Models E1 and E2 follows the same approach as Models D1-D2. Moreover, all models tested were significant at 0.01. The following will present the results from the models.

Downsizing and Human Capital Investments. The interaction term tested here concerns how downsizing/hiring and human capital investments influence firm performance in the short and long term. Table 16 for 2010 shows that the interaction effect of downsizing and human capital investments has a positive and non-significant effect on EBITDA margin. The findings suggest that the interaction effect was not associated with positive performance in short term. For 2011, there is also a positive and non-significant relationship between the interaction term and EBITDA margin. The results for 2012, reveals a weak negative and non-significant effect of on EBITDA margin. Similar to the findings of downsizing there are non-significant findings regarding hiring across the years. Hiring is therefore not presented in separate tables as it does not contribute with new knowledge or findings. In sum, there are some support for the theoretical arguments and the hypotheses, and thereby not possible to support findings from earlier studies.

Liquidity 2 and independent variables. The relationship tested here concerns whether there exist an interaction effect between Liquidity 2 and one of the independent variables, and

if such relationship influence firm performance in the short and long term. The presented interaction effect encompasses Liquidity 2 and Hiring. This interaction term was tested through regression Models E1-E2, and the results are presented in Table 19-21. The table for 2010 shows that the interaction effect of Hiring and Liquidity 2 has a negative and significant ($p<0.05$) effect on EBITDA margin. The findings suggest that the interaction effect was not associated with positive performance in short term. For 2011, there are a negative and non-significant effect of the interaction effect on EBITDA margin. In 2012, there is a positive and non-significant effect for the interaction effect on EBITDA margin. The results of the interaction effect provides some ambiguously findings, and there is not much support for an existing interaction effect between the scrutinized variables. For the other independent variables, there are no significant findings by combining them with Liquidity 2 across the years 2010-2012.

5. Discussion

5.1 Introduction

The purpose of this thesis was to investigate performance implications of human capital responses in the aftermath of the Norwegian financial crisis. While previous studies have examined the aggregate effects on performance, and incentives to invest in human capital during recessions, the main goal of this paper was to look at implication on firms' performance in the short and long term.

The previous chapter presented and interpreted the analysis from the output of the regression models, and showed the short and long term outcome of firms' responses to the financial crisis. In this chapter, a discussion will provide an in-depth presentation of the implications of these regression models. The structure of this chapter will be as follows: First, the overall implications of firm characteristics for decisions will be presented. Second, the decisions of firms as depicted in the regression models will be discussed. Final the implications of these decisions on short term and long term profitability will be analyzed and explained in detail.

5.2 Implication of descriptive statistics

The implication of changes in key firm characteristics during the Norwegian financial crisis is important to present. They illustrate how changes in the competitive environment affect the ability to use different measures to respond, and thereby counteract some of the effects of the financial crisis. In terms of the development of EBITDA, it is evident that both the mean and median was reduced during the recessionary years of 2008-09. More interesting, is the trend of the increase of the EBITDA standard deviation. An increase in this statistic shows that the performance difference between firms diverges (i.e. the difference between top and bottom performers increases). This can be explained by that the most profitable strategy is not necessarily available for all firms, in contrast to theory, which suggests that all positive net present value (NPV) projects are financed in efficient markets (Fama, 1980). In relation to the topic of this thesis, positive human capital projects and strategies might not be pursued, as the availability to finance uncertain projects with human capital resource accumulation is not evenly distributed between firms, and this scenario occurs more frequently during recessions. This leads to increased performance differences.

In sum, the key descriptive statistics which are analyzed on an overall level (EBITDA, ROA and the severity of the crisis), suggest that firm characteristics have an impact on which

responses that are eligible for firms to pursue when responding to a financial crisis. In the following chapter, an in-depth discussion will be conducted of to show the implication of these responses.

5.3 Discussion of main findings:

Main finding 1: *Increased downsizing is negatively associated with long term performance.* The regression models which regressed increased downsizing on firm performance revealed that there was both a negative relationship between downsizing as a response to the Norwegian financial crisis, and performance in 2012. The long term effects of downsizing are largely supported by theory and our hypothesis, which states that human capital is a resource that needs to be accumulated over time. Moreover, firms that engages in downsizing are reducing their stock of human capital, and will need to re-accumulate human capital when demand picks up again at the later stages in the business cycle. This implies direct costs related to searching, hiring and training of new employees, which is related to negative long term performance (Knudsen & Lien, 2014b). Moreover, firms that downsized may lose important employees which could be potentially problematic in the long term. If one compares a firm which downsized to one which retained their human capital stock, the downsized firm could according to the RBV, be at a long term disadvantage (Barney, 1986; Peteraf, 1993). If a competing firm, retains and thereby accumulates their human capital over time during the recessionary years, this could lead to potential competitive advantages unavailable to the downsizing firm. Later, when the demand for labor picks up again in the recovery phase of the business cycle it becomes more difficult to appropriate efficiency gains from human capital (Ehrenberg & Smith, 2015, p. 154-155).

In terms of the short term effects of downsizing, our hypothesis and theory expected that downsizing would be associated with short term performance increase, while the analysis revealed a non-significant relationship. The reason behind the hypothesized positive relationship was that firms engage in downsizing to increase their productivity, and because they expect to yield both economic and organizational benefits. In terms of economic benefits, downsizing firms expect to increase value for their shareholders as managers conclude that cutting costs are more predictable than increasing future revenues (Cascio, 1993). It is difficult to assess why downsizing would lead to non-significant relationship, but one reason could be that even though the regression models have controlled for various factors, such as how hard the firm were struck by the crisis, industry effects and pre-recession profitability, there might still be omitted variables which are not included in the survey or registry data that affected the

results (e.g. moral effect on downsizing). Furthermore, as effect of downsizing could have been caused by the loss of morale and increased uncertainty among the remaining employees. In turn, this might reduce the productivity of the remaining employees in the short term after the firm has engaged in downsizing.

There is also a possibility that despite the importance of human capital in strategy literature, investments in human capital do not affect performance significantly as a response to recessions and that this is the reason why this thesis revealed no significant relationships. This is again explained by that when firms face a recession, they tend to use a mix of different combinations of complex responses which make the effect of each individual response difficult to isolate, and in turn lead to inconclusive results. When removing the industry and outcome-related control variables, the omitted variables did not dramatically alter the results of our short term hypothesis. This could be explained by the fact that downsizing is to a larger extent dependent on firm variables (i.e. the resources the firms possess), rather than industry characteristics (Barney, 1986).

Main effect 2: *Firms which increased their emphasis on hiring as a response to the financial crisis did not cause reduced short term profitability, or positive long term performance.* The regression models which regressed hiring on profitability, did not show any significant results on either the short or long term. This is in contrast to the hypothesized relationship of reduced short term performance and increased long term performance. The theoretical foundation for the hypothesis was that increased hiring during recessions can generate SCA through engaging in bargain hunting and acquire rare talent that would not be available during expansion, or through acquiring employees at a "discount" (Knudsen & Lien, 2014), and in turn create an advantage in the long term. Both these effects can generate SCA compared to competitors through acquiring rare resources and exploit inefficiencies in factor markets (Barney, 1986; Denrell, Fang & Winter, 2003). In the recession phase of the business cycle, the labor market efficiency is at its weakest, which makes firm which puts an emphasis on hiring at a favorable position to acquire appropriate human capital gains through hiring. Later, when the business cycle enters the recovery phase, the labor market efficiency increases (i.e. wages increase) and potential competitive advantages through hiring may be lost (Denrell, Fang & Winter, 2003; Ehrenberg & Smith, 2015, p. 181). While it may seem counter-intuitive to increase capacity during a recession where the firm is already experiencing excess capacity, this might be counter-acted by acquiring rare and scarce talent which are unavailable, or relatively more expensive during other phases of the business cycle. In terms of reduced short

term performance, theory suggests that hiring incurs cost which may disadvantage the firm's overall position.

However, the regression models showed no evidence of the relationships supported in theory or in our hypotheses. One of the reasons could be biases related to how the hiring variable is operationalized. As the variable is defined as the net difference in permanent employees from 2007-2010, it fails to incorporate relevant effects such as layoffs and retirement which could lead to biases in the prediction of performance. Furthermore, there seems to be a correlation between firms' outlook and whether they retained and hired employees, which gives hiring reduced significance in the model with no omitted variables. With the omission of the outlook variables (growth, market share and profitability) the relationship was investigated. It seems likely that firms which have a positive outlook on their performance in the post-recession are more likely to increase their rate of hiring, and thereby have reduced profitability in the short term (through incurring costs in terms of hiring, searching and training). This is evidenced in the model where these variables were omitted and the hiring variable became significant on the .10 level in 2010 (Table 13). Even though the strength of this relationship is not strong, it serves as an indication of the direction of the relationship between hiring and short term performance. Turning to the observation of the long term, no findings were indicated in the models with omitted variables, which supports that there are no significant relationship between hiring and long term performance.

Another explanation could be that even though there are large costs associated with hiring during recessions, and positive profits to be reaped in the long term these are not on average associated with reduced performance in the short term or increased performance in the long term. Many factors are present during the recessions and the hiring is only one of many complex responses a firm might undertake which makes the performance outcome of each outcome difficult to isolate. It seems likely that hiring is only one out of many responses firms undertake in combination to respond to the changes in the environment.

Main effect 3: *Firms which increased training for employees and managers did not experience reduced short term profitability or increased long term profitability compared to firms that did not increase training as a response to the recession.* When the variables increased training of employees and increased training of employees where regressed on short term and long term performance, no significant results were found. The theory behind the hypothesized short term negative and the long term positive relationship was that education and training is perceived as one of the most important investments in human capital (Becker, 1993, p. 17). Moreover, mild recessions stimulate human capital investments, as the opportunity cost of

making such investments decline (Knudsen & Lien, 2014). Two main effects impact the short term and long term profitability of training. (1) First, firms with excess capacity in their human capital (and thereby reduced opportunity cost of training) have a short term disadvantage in terms of higher labor costs compared to firms which reduced their excess capacity through downsizing (Knudsen & Lien 2015a). Moreover, the out of pocket costs of training will also place these firm at a short term disadvantage, although this effect is minor. (2) Second, human capital is a type of resource that needs to be accumulated over time in order to provide superior performance (Dierickx & Cool, 1989). To summarize, this means that one would expect firms that increase human capital training as a response to the financial crisis to yield negative short term performance and positive long term performance.

However, as mentioned, the analysis presented did not reveal any significant findings and there might be numerous explanations to this. One of the problems is related to the operationalization of the variable. The variable does not make a distinction if training is formalized in terms of training programs which could increase firm-specific knowledge, and in turn increase long term performance (Nelson & Winter, 1982; Szulanski, 1996), or if it is more of a general nature. Furthermore, it does not take account of the average value of the training programs. Even though the variable provides an indication on whether human capital training was prioritized, there is no indication of the size of the training programs, and thereby creating potential biases in the dataset.

More controversial is the possibility that increased focus on training initiatives during the financial crisis are so small, that they are not associated with either negative (short term) or positive (long term) performance. As mentioned previously in this section, firms undertake a range of responses, both related and unrelated to human capital to cope with the changing environments during a recession. This makes it difficult to isolate the effect of training on performance, more importantly to express that it is just one of many responses firms undertake separately or in combination with other initiatives.

Main effect 4: *Increased human capital investments as a response to the recession did not yield negative profits in the short term or superior profits in the long term.* The analysis of general human capital and organizational investments revealed that there were no significant negative or positive relationship to performance in the short and long term. The theoretical arguments that competitive advantages through human capital responses be generated through resource acquisition (hiring) and accumulation (training), and that firms have to balance the short term incentives to reduce excess capacity by downsizing with potential long term benefits of investing in their human capital stock (Dierickx & Cool, 1989; Knudsen & Lien, 2014;

Peteraf, 1993). In broader terms do investments in human capital encompass both hiring, training and other human capital investments, and act a general term that can be seen as a combination of these.

One reason why the hypothesized relationship did not prove significant could be due to the operationalization of the variable. As the term investment in human capital and organizational development is rather vague, this could lead to biases in how the term was perceived. Moreover, as the term encompass a range of different activities, it is difficult to know which activities that are associated with positive or negative performance. According to the RBV (Barney, 1986; 1991; Peteraf, 1993), firms are inherently heterogeneous in terms of the resources they possess, and they will consequently perform a range of different activities as responses to the financial crisis that would be defined under the "human capital investment-umbrella". In turn these activities yield different returns on their investment, and could lead to biases in the data and be a reason for the inconclusive results.

Furthermore, if the market knows that human capital investments are profitable in the long term, abnormal profits from these initiatives might be competed away. It is possible that due to low information asymmetry, it is known that firms yield superior performance from these initiatives, and that this competition results in limited findings.

There is also a possibility that despite the importance of human capital in strategy literature, investments in human capital do not affect performance significantly in response to recessions and that this is the reason why the thesis revealed no significant relationships. This is again explained by that when firms face a recession, they tend to use mix of different combination of complex responses which make the effect of each individual response difficult to isolate, and in turn lead to inconclusive results. When removing the industry and outcome-related control variables did not dramatically alter the results of our hypotheses, it may seem that there were limited specific changes, but rather depended on firm resources (Barney, 1986).

Main effect 5: *Firms which combined human capital responses did not yield superior performance to firms which did one or neither of the human capital measures.* The results from the analysis demonstrated that there was little evidence of the presence of interaction effects between the independent variables (hiring, downsizing, training of employees/managers, and investments in human capital). There were some interaction effects between the independent variable hiring and Liquidity 2, but this interaction effect is only present in 2010 and not persistent in 2011 and 2012. There was not identified any interaction effects between the most significant controls and independent variables.

Structural changes in industries are among other things caused by mismatches between a firm's structure and the resources and demands from the competitive environment (Geroski & Gregg, 1994). Additionally, DeWitt (1993) argues that organizations use downsizing as a measure to increase focus on core competencies (as a mean of restructuring) and remove ineffective layers in the organization and to boost productivity. A practical example is when a company engages in downsizing in order to increase organizational effectiveness and increase the overall quality of their human capital, one would expect that the firm would yield superior performance in their training initiatives, as the return of training is superior among competent employees (Cascio, 1993; DeWitt, 1993, Henn, 1985). These arguments support that firms which used a combination of responses (e.g. increased hiring and downsized, or increased human capital investments in combination with downsizing) yielded superior profits than firms that did either of these responses.

Interaction variables were created between downsizing/hiring, and human capital investments, as these had the most significant results in the statistical models. However, after examining the statistical models with the inclusion of these variables, neither of the interaction terms proved statistically significant.

The most natural explanation for not finding interaction effects between the variables is that they do not exist in the data sets. However, as described there are several theoretical and empirical studies that have argued and demonstrated the existence of them. Several possible explanations have been explored in an effort to show why it was not possible to demonstrate these interaction effects. The main explanation for this might be that it was not possible to operationalize the scrutinized variables perfectly. The methods chapter elucidated that there were potential problems with the survey data regarding measuring and operationalizing certain variables. First, hiring was not measured directly in the data set leading to a suboptimal measure. The reason for this was there was not a question that directly encompassed hiring. This meant that one had to use two variables measuring the number of employees in 2007 and 2010 in the various firms to create a growth variable to capture the concept of hiring. However, this hiring variable does only examine the employee growth, and does not account particularly for firm responses initiated by the crisis. The potential downside of this is that it is not possible to capture any interaction effects between hiring and investments in human capital. Second, in comparison to hiring, downsizing is measured directly through a question in the survey. This provides higher accuracy in the measure, which makes it possible to exclude potential undesirable spurious effects in the model. The latter suggest that this variable is operationalized sufficiently to capture potential interaction terms with other variables. Third, the variable

encompassing human capital investments shares some similarities with downsizing, due to the variable's broad nature. This variable does not specify any responses, making it impossible to distinguish between the different types. This makes the variable imprecise and inaccurate in measuring human capital investments. The discussion reveals that impreciseness of the variables and the challenge of operationalize them, could potentially make it difficult to isolate the desired from spurious effects.

A second explanation for the lack of interaction effects between the relevant variables, is that firms initiate the various responses at different phases during a recession affecting profit differently over time. An example is that firms that downsize might not increase their human capital investments at the same time. This might result in undermining the possibilities of an interaction effect between the various responses scrutinized. Knudsen & Lien (2014) argues that both investors' and customers' preferences change during recession. However, the sequence of these changes are somewhat ambiguous, but as presented in this thesis, recessions are triggered by a slowdown with a credit crunch (Eckstein & Sinai, 1986, p. 51). It is therefore natural to assume that investors and creditors change their preferences before consumers. Moreover, uncertainty increases during a recession, increasing the value of postponing an investment, which leads to a negative drop in demand (Bernanke, 1983). Based on the previous arguments some firms might be forced to downsize when the preferences of both of the actors change due to the recession. The sequence chain and the uncertainty associated with it could have implications for firms' investments as well. For instance, changed preferences of creditors and investors combined with increased uncertainty could make firms reluctant about initiating both hiring and human capital investments. Such firms might be reluctant in implementing human capital investments until they observe how the recession change consumers' preferences. Furthermore, firms that downsize as a response to the recession might be credit constrained immediately when the recession commences, and thereby have to abstain from other human capital investments for a period. However, some of these firms might increase their liquidity during the crisis, and potentially initiate human capital investments. The latter is not accounted for in the survey, which makes it impossible to investigate whether this has an effect on the interaction effects. Additionally, the different initiatives and responses do also influence performance differently over time. While downsizing might lead to immediate cost reductions, hiring and human capital leads to increased costs. According to the RBV both hiring and human capital investments need to be accumulated (Dierickx & Cool, 1989). This has implications for when firms can reap the benefits of their investments. The discussion reveals that firms might develop different initiatives and responses at different phases of the recession,

causing dissimilar effects over time. The implications of the arguments presented here is that the time frame investigated in the regression models are possibly too short to capture some of the effects. In turn, this can influence the likelihood of demonstrating an interaction effect between the variables.

5.4 Limitations

This sub-chapter summarizes the limitations of the thesis. A major drawback is that the survey data are collected for another purpose than for this paper. This is not in itself problematic, but what is challenging is the lack of human capital measures in the survey. An example is the variables concerning the number of employees in firms are unspecific, as they only look into absolute measures in 2007 and 2010. Preferably, such variable should have had consecutive sub-questions to control for factors, e.g. retirement, to provide an understanding of underlying conditions causing a negative net value. The efforts regarding operationalizing in the thesis are consider to be optimal on the basis of the data available.

Second, a potential problem both in the survey and registry data is the so-called survivor bias. The survey data is vulnerable to survivor bias, as the survey was only distributed to surviving firms. This indicates that the firms, which were most adversely hit, are underrepresented in the survey data. Therefore, caution is required when expressing causal claims about this under-sampled part in the findings. Similarly, the registry data is exposed to the same problem. The regression models uses data across different years, which makes it impossible to account for the reasons why firms go bankrupt. A potential drawback of this is the effects of debt and liquidity during recessions.

Third, the survey provided questions regarding when firms were hit by the recession, and at what point firms recuperated from it. It might be problematic to only to rely on the responses from these questions of several reasons. First, is the single respondent method bias, where firm responses might lead to systematic biases. Such self-serving bias, might cause poor financial results which are blamed on the recession, and not on managerial performance. Second, firms might be influenced by local or industry shocks, which they might blame on the recession. To overcome this potential bias in the regression models, 2008-09 were defined recessionary years. Corresponding to this it is difficult to determine when the recession is over. Therefore, the years after 2011 are defined as post-recession period.

Fourth, as the data collected is with a lagged dependent variable it is problematic to draw conclusion too far into the future. This is due to potential spurious effects, which it is not possible to account for. Therefore, one is obliged to set a threshold for how far forward the

effects of firm responses should be measured. It was decided that a natural threshold based on when the data was collected and responses conducted as the year 2012.

Fifth, the industry NACE-codes represents a limitation in this study. The methods chapter revealed that the NACE-codes were of moderate quality, as they are broad and imprecise representing a potential major disadvantage. The imprecision that a two-digit NACE-code could encompass a wide range of different operations, e.g. industry 74 that includes all different types of services. Firms within this industry will most likely have quite dissimilar characteristics, and thereby be affected and respond differently to recessions. Using more detailed NACE-codes was possible, but there are also problems associated regarding that approach, as this leads to single-firm industries. Since all the regression models in the thesis are adjusted by various industry means based on two-digit NACE-codes, this could potentially substantially influence the results.

5.5 Future research

The background for this study was that the strategy literature was particular scarce regarding firms' investments in human capital in recessions, and the subsequent post-recession performance. The aim was to examine these relationships by combining survey and registry data in an effort to test various effects of different human capital responses and performance to provide insight and to contribute to the existing literature. However, this thesis were unable to produce significant results to support most theoretical predictions and the corresponding hypotheses. Despite the lack of significant findings, this research identified several important precautions regarding further studies, as there are still large gaps in the available literature.

The most significant point for future research following the same approach as this thesis, is understanding the principles of human capital theory in designing a survey. Primarily, it is important to include a wider body of questions in relation to human capital responses to avoid the problems with operationalizing as described throughout this thesis. This is considered as an essential step in capturing and separating a larger extent of the underlying effects of various human capital initiatives as a response to recessions. A particular important distinction within the RBV is between firm-specific and generic human capital, which was not accounted for in this study. Implementing this and other more comprehensive distinctions with more relevant and accurate measures could potentially have led to enabling significant and conclusive results for the independent variables scrutinized in this study.

This study was based on a lagged dependent variable analysis, but future research could benefit by using panel data, and there are several reasons for this. Using a lagged dependent

variable makes it impossible to separate cause and effect in time. Panel data makes it possible to examine cause and effects over the business cycle could provide more insight of how human capital responses influence performance in greater detail than this study. For instance, this can provide knowledge about how firms themselves evaluate how their responses influenced by post-recession performance. This can make future research more interesting and convincing by providing increased internal validity. This will enable isolation of some of the spurious effects through implementation of additional control variables.

The tested interaction terms of this thesis revealed little empirical support for the theoretical predictions. Future studies could benefit through testing the same interaction terms by following the previous recommendations regarding operationalizing of independent variables. Another possibility is to investigate the relationship between different control variables and the independent variables in greater detail, than presented in this study.

The authors of this study believe that the incitements for future research offered here, suggest that the benefits are from further operationalization of the key constructs. There is obviously major gaps regarding testing theoretical predictions on how human capital responses affect firm performance over the business cycle. The recession of 2008-2009 and the current empirical setting in Norway, combined with the increased interest in human capital should indicate a growth of opportunities for this topic. The authors hope that the suggestions presented here could help bringing the field forward.

This chapter discussed the findings from the analysis, and this summary will provide some key takeaways. First, the implications of the descriptive statistics were discussed. Second, the main findings of the thesis were discussed in detail highlighting potential reasons for the results. Third, the limitations of this study were presented and discussed with a particular emphasis of potential drawbacks of using the data. Fourth and final, the direction for future research was outlined focusing on how this study could be used as a fundament.

6. Conclusion

The purpose of this thesis was to examine how human capital responses during the Norwegian financial crisis were influencing performance in the short and long term, and to study the advantages and limitations of using registry and survey data for this purpose. While there were previous studies that had examined the how macro-level factors affected countries and firms, there had been limited research on micro-level decisions such as investments in human capital. However, the resulting research for the majority been focused on how incentives to investments in human capital is altered by a recessionary shock (Knudsen & Lien, 2014), rather than focusing on the performance outcomes of such responses. The sample used in the regression analysis was based on assembling the survey with the registry data comprising about 1000 firms in the period 2010-2012. The main findings and implications of this thesis are summarized in the following.

First, the financial crisis had an undeniable effect on the Norwegian economy, while the unemployment level and GDP remained higher than their closest trading partners. Norway experienced a GDP decline, an increase in the unemployment rate, and a spike in the number of bankruptcies. Additionally, descriptive statistics of profitability - EBITDA margin and ROA, revealed that profitability declined during the recession. The standard deviation also increased considerably during the recession, indicating that the difference between the best and worst performers became larger during the recession.

Second, downsizing as a response to the financial crisis resulted in long term negative performance. This serves as an important managerial implication for firms which are hit by a severe shock: Downsizing should be one of the last resorts in order to respond to financial crises; as it can be severely detrimental to their long term performance and competitiveness.

Third, increasing hiring as a response to the financial crisis did not cause reduced short term profitability, or positive long term performance. Regarding the findings it is especially important to take strong precautions from the results, as the data available made it difficult to operationalize the construct satisfactorily. This suggest that a more appropriate operationalization of the variable could possibly change the conclusion. Moreover, the findings could suggest that even though there are large costs associated with hiring during recessions, and positive profits to be gained in the long term these are not on average associated with reduced performance in the short term or increased performance in the long term.

Fourth, firms that increased training for employees and managers did not have reduced short term profitability or increased long term profitability compared to firms that did not

increase training as a response to the recession. The discussion highlighted that there was a potential problem with the operationalizing of the variables, as there is no distinction between firm-specific and generic human capital. This and other characteristics of the variables could make it difficult to isolate the effect of training on performance.

Fifth, the effects of investments in human capital did not reveal conclusive results, and cannot be seen as a measure to affect firm performance in the short or long term. The discussion revealed that there was a potential problem with the operationalizing of the variable, as it in nature encompassed a broad range of different human capital initiatives. This suggests that the performance relationships between these types of investments should be analyzed in greater detail, in order to find conclusive results.

Sixth, the interaction terms between the independent variables hiring and human capital on performance did not reveal any conclusive results. The various interaction effects cannot be seen as measures influencing the short and long term performance. Scrutinizing possible interaction effects between the independent variables and the various control variables revealed the same findings. These findings suggest that the interaction terms between the various variables should be scrutinized in detail to provide conclusive results. Further studies with more extensive operationalizing of the scrutinized variables are necessary to provide a unanimous conclusion.

Seventh, the combination of survey and registry data that was utilized was one step in the right direction to investigate these relationships, but we expect that due to the fact that the survey was not purely focused on developments in human capital, the questions were inadequate with regards to the topics covered. In the future, we propose that a more detailed survey with focus on human capital operationalization and performance measures should be conducted in order to provide more fruitful results.

In conclusion, the financial crisis of 2008-09 and the following recession had considerable negative effects on the Norwegian economy, and that downsizing as a human capital response to the financial crisis yielded negative results in the long term. Revelations from the hypotheses and its results contained here provided inconclusive results. This proved that a future detailed survey for 'human capital' research is necessary to further comprehend and investigate this area.

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Appendices

Table 6 Inflation rate 2000-2012.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Inflation rate	88.89	91.56	92.75	95.07	95.45	96.98	99.21	100.00	103.80	105.98	108.63	109.93	110.81.

Table 7 Regression models A1-A7 EBITDA margin 2010

Dependent variable	EBITDAmarg 2010													
Model name	A1		A2		A3		A4		A5		A6		A7	
	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.
Firm variables														
Downsizing			-.001 (.001)	-.043									-.002* (.001)	-.051*
Hiring					.000 (.000)	-.038							.000 (.000)	-.045
Training employees							.000 (.001)	.011					.001 (.001)	.015
Training managers									.000 (.001)	.000			.000 (.000)	-.004
Human capital inv.											.001 (.002)	.014	.001 (.002)	.008
Firm control variables														
Age	.000 (.003)	.005	.000 (.003)	.005	.001 (.003)	.006	.001 (.003)	.006	.000 (.003)	.005	.000 (.003)	.005	.001 (.003)	.007
Sales growth 2007	.000 (.007)	-.001	.000 (.007)	-.001	.000 (0.007)	.000	.000 (.007)	-.001	.000 (.007)	-.001	.000 (.007)	-.001	.000 (.007)	.000
EBITDAmarg 2007	.450*** (.028)	.464***	.446*** (.029)	.460***	.452*** (.029)	.467***	.450*** (.028)	.464***	.450*** (.028)	.464***	.450*** (.028)	.465***	.449*** (.028)	.463***
Fixed Assets	.040*** (.015)	.106***	.041*** (.015)	.108***	.004*** (.015)	.106***	.040*** (.015)	.106***	.040*** (.015)	.106***	.041*** (.015)	.107***	.042*** (.015)	.109***
Durability	.000 (.000)	-.012	-.000 (.000)	-.011	.000 (.000)	.001	.000 (.000)	-.011	.000 (.000)	-.012	.000 (.000)	-.011	.000 (.000)	-.008
L2	.010*** .003	.086***	.009*** (.003)	.083***	.010*** (.003)	.008***	.010*** .003	.086***	.010*** .003	.086***	.010*** .003	.086***	.010*** .003	.085***
Financial leverage	-.004 (.013)	-.012	-.004 (.013)	-.012	-.004 (.013)	-.012	-.004 (.013)	-.012	-.004 (.013)	-.012	-.004 (.013)	-.013	-.004 (.013)	-.010
Export	.000 (.000)	-.026	-.001 (.000)	-.029	.000 (.000)	-.026	.000 (.000)	-.025	.000 (.000)	-.025	.000 (.000)	-.026	.000 (.000)	-.029
Severity of crisis	.017*** (.004)	.181***	.015*** (.004)	.169***	.017*** (.004)	.186***	.017*** (.004)	.182***	.017*** (.004)	.181***	.017*** (.004)	.180***	.016*** (.004)	.171***
Size	.004* (.002)	.062*	.004** (.002)	.064**	.004* (.002)	.058*	.004* (.002)	.061*	.004* (.002)	.062*	.004* (.002)	.061*	.004* (.002)	.058*
Affected - Demand	.002 (.002)	.046	.002 (.002)	.043	.002 (.002)	.045	.002 (.002)	.046	.002 (.002)	.046	.002 (.002)	.045	.002 (.002)	.042
Affected - Credit	-.002 (.002)	-.052	-.002* (.001)	-.052*	-.002* (.001)	-.053*	-.002 (.002)	-.052	-.002 (.002)	-.052	-.002 (.002)	-.051	-.002 (.002)	-.053
Outlook - Market share	-.003 (.002)	-.055	-.003 (.002)	-.061	-.003 (.002)	-.052	-.003 (.002)	-.054	-.003 (.002)	-.055	-.003 (.002)	-.055	-.003 (.002)	-.059
Outlook - Profitability	.006*** (.002)	.109***	.006** (.002)	.111**	.004** (.002)	.109**	.006*** (.002)	.109***	.006*** (.002)	.109***	.006*** (.002)	.109***	.006*** (.002)	.110***
Outlook - Growth	-.004* (.003)	-.073*	-.004 (.003)	-0.068	-.006* (.003)	-.074*	-.004* (.003)	-.075*	-.004* (.003)	-.073*	-.004* (.003)	-.073*	-.004* (.003)	-.071*
Industry dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Crisis dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Constant	-.051 (.078)		-0.04 (.078)		-.051 (.078)		-.051 (.078)		-.051 (.078)		-.053 (.078)		-.045 (.078)	
N	848		842		828		844		840		844		825	
F-value	10.512		2.041		1.967		.173		.000		.257		1.025	
R²	.439		.664		.664		.439		.439		.439		.442	
Adjusted R²	.397		.398		.398		.397		.396		.397		.397	

Table 8 Regression models A1-A7 EBITDA margin 2011

Dependent variable	EBITDAmarg 2011													
Model name	A1		A2		A3		A4		A5		A6		A7	
	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.
Firm variables														
Downsizing			-.002 (.001)	-.504									-.001 (.001)	-.047
Hiring					.000 (.000)	.017							.000 (.000)	-.012
Training employees							-.001 (.001)	-.018					.000 (.001)	-.001
Training managers									-.001 (.001)	-.031			-.001 (.001)	-.031
Human capital inv.											.001 (.002)	.010	.001 (.002)	.017
Firm control variables														
Age	-.007** (.003)	-.073**	-.007** (.003)	-.073**	.007*** (.027)	-.073***	-.007** (.003)	-.074**	-.007** (.003)	-.074**	-.007** (.003)	-.073**	-.007** (.003)	-.074**
Sales growth 2007	-.016** (.008)	-.064**	-.016** (.008)	-.064**	-.016** (.008)	-.064**	-.016** (.008)	-.064**	-.016** (.008)	-.064**	-.016** (.008)	-.064**	-.016** (.008)	-.064**
EBITDAmarg 2007	.314*** (.027)	.384***	.311*** (.027)	.381***	.313*** (.027)	.384***	.314*** (.027)	.384***	.314*** (.027)	.384***	.314*** (.027)	.385***	.311*** (.027)	.381***
Fixed Assets	.058*** (.016)	.155***	.059*** (.016)	.157***	.058*** (.016)	.155***	.057*** (.016)	.154***	.057*** (.016)	.154***	.058*** (.016)	.156***	.058*** (.016)	.157***
Durability	.000 (.000)	-.011	.000 (.000)	-.011	.000 (.000)	-.011	.000 (.000)	-.011	.000 (.000)	-.011	.000 (.000)	-.010	.000 (.000)	-.009
L2	.011*** (.004)	.103***	.010*** (.004)	.101***	.011*** (.004)	.102***	.011*** (.004)	.102***	.010*** (.004)	.101***	.011*** (.004)	.103***	.010*** (.004)	.098***
Financial leverage	-.006 (.014)	-.017	-.005 (.014)	-.014	-.006 (.014)	-.017	-.006 (.014)	-.018	-.006 (.014)	-.018	-.006 (.014)	-.018	-.005 (.014)	-.016
Export	.000 (.000)	-.002	.000 (.000)	-.006	.000 (.000)	-.002	.000 (.000)	-.003	.000 (.000)	-.003	.000 (.000)	-.002	.000 (.000)	-.007
Severity of crisis	.004 (.004)	.047	.003 (.004)	.030	.004 (.004)	.044	.004 (.004)	.046	.004 (.004)	.046	.004 (.004)	.045	.002 (.004)	.028
Size	.002 (.001)	.038	.003 (.002)	.042	.003 (.002)	.040	.003 (.002)	.040	.003 (.002)	.042	.002 (.002)	.037	.003 (.002)	.045
Affected - Demand	.001 (.002)	.017	.001 (.002)	.014	.001 (.002)	.017	.001 (.002)	.017	.001 (.002)	.018	.001 (.002)	.016	.001 (.002)	.015
Affected - Credit	-.001 (.002)	-.016	-.001 (.001)	-.016	-.001 (.002)	-.016	-.001 (.002)	-.016	-.001 (.002)	-.017	-.001 (.001)	-.016	-.001 (.001)	-.015
Outlook - Market share	.001 (.003)	.017	.001 (.003)	.012	.001 (.003)	.016	.001 (.003)	.017	.001 (.003)	.016	.001 (.003)	.017	.000 (.003)	.010
Outlook - Profitability	.005* (.003)	.087*	.005* (.003)	.088*	.005* (.003)	.087*	.005* (.003)	.087*	.005* (.003)	.089*	.005* (.003)	.086*	.005* (.003)	.090*
Outlook - Growth	-.005*	-.091*	-.005*	-.087*	-.005*	-.091*	-.005*	-.088*	-.005*	-.088*	-.005*	-.091*	-.005	-.084

Table 9 Regression models A1-A7 EBITDA margin 2012

Dependent variable	EBITDAmarg 2012													
Model name	A1		A2		A3		A4		A5		A6		A7	
	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.
Firm variables														
Downsizing			-.002** (.001)	-.074**									-.002** (.001)	-.073**
Hiring					.001 (.000)	.069							.000 (.000)	-.011
Training employees							.000 (.001)	-.009					.000 (.001)	-.008
Training managers									.000 (.001)	-.012			.000 (.001)	-.010
Human capital inv.											.002 (.002)	.038	.002 (.002)	.039
Firm control variables														
Age	-.005* (.003)	-.062*	-.005* (.003)	-.063	.025** (.013)	.067**	-.005* (.003)	-.063*	-.005* (.003)	-.063*	-.005* (.003)	-.063*	-.006** (.003)	-.064**
Sales growth 2007	-.021*** (.008)	-.087***	-.021*** (.008)	-.087***	.024 (.035)	0.23	-.021*** (.008)	-.088***	-.021*** (.008)	-.087***	-.021*** (.008)	-.088***	-.021*** (.008)	-.088***
EBITDAmarg 2007	.336*** (.028)	.413***	.331*** (.028)	.407***	.409*** (.093)	.154***	.335*** (.028)	.413***	.335*** (.028)	.413***	.337*** (.028)	.415***	.332*** (.028)	.409***
Fixed Assets	.046*** (.016)	.128***	.047*** (.016)	.131***	.037 (.035)	.025	.046*** (.016)	.128***	.046*** (.016)	.128***	.047*** (.016)	.130***	.047*** (.016)	.132***
Durability	.000 (.000)	.029	.000 (.000)	.031	.000 (.000)	.015	.000 (.000)	.029	.000 (.000)	.029	.000 (.000)	.031	.000 (.000)	.033
L2	.008** (.004)	.079***	.008** (.004)	.075**	-.045*** (.016)	-.105***	.008** (.004)	.078**	.008** (.004)	.079**	.008** (.004)	.078**	.008** (.004)	.074**
Financial leverage	.010 (.014)	.032	.010 (.014)	.036	-.030 (.063)	-.022	.010 (.014)	.032	.010 (.014)	.032	.010 (.014)	.030	.011 (.014)	.034
Export	.000 (.000)	-.042	.000 (.000)	-.049	-.001 (0.01)	-.059	.000 (.000)	-.043	.000 (.000)	-.043	.000 (.000)	-.043	.000 (.000)	-.050
Severity of crisis	.009** (.004)	.106**	.007* (.004)	.082*	.062*** (.018)	.168***	.009** (.004)	.106**	.009** (.004)	.106**	.009** (.004)	.100**	.007 (.004)	.078
Size	.002 (.002)	.039	.003 (.002)	.045	-.006 (.013)	-.023	.003 (.002)	.040	.002 (.002)	.039	.002 (.002)	.036	.003 (.002)	.042
Affected - Demand	.000 (.002)	.002	.000 (.002)	-.002	-.015* (.008)	-.083*	.000 (.001)	.001	.000 (.002)	.002	.000 (.002)	-.001	.000 (.002)	-.004
Affected - Credit	-.002 (.001)	-.045	-.002 (.001)	-.045	-.004 (.006)	-.022	-.002 (.001)	-.045	-.002 (.001)	-.045	-.002 (.001)	-.043	-.002 (.001)	-.043
Outlook - Market share	.001 (.003)	.026	.001 (.003)	.020	-.022* (.011)	-.104*	.001 (.003)	.026	.001 (.003)	.026	.001 (.003)	.025	.001 (.003)	.019
Outlook - Profitability	.004 (.003)	.078	.004 (.003)	.078	-.026** (.012)	-.115**	.004 (.003)	.078	.004 (.003)	.079	.004 (.003)	.076	.004 (.003)	.077
Outlook - Growth	-.006** (.003)	-.114**	-.006** (.003)	-.107**	.038*** (.012)	.164***	-.006** (.003)	-.112**	-.006** (.003)	-.113**	-.006** (.003)	-.115**	-.006** (.003)	-.105**
Industry dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Crisis dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Constant	-.005 (.032)		.004 (.032)		-.006 (.294)		-.005 (.032)		-.005 (.032)		-.009 (.032)		-.001 (.033)	
N	806		797		794		799		795		799		780	
F-value	5.307		4.57		.002		.072		.132		1.489		1.235	
R²	.292		.300		.296		.296		.296		.298		.302	
Adjusted R²	.237		.245		.240		.241		.241		.242		.243	

Table 10 Regression models B1-B7 ROA 2010

Dependent variable	ROA 2010													
Model name	B1		B2		B3		B4		B5		B6		B7	
	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.
Firm variables														
Downsizing			-.005*** (.001)	-.119***									-.006*** (.001)	-.134**
Hiring					-.032 (.000)	.069							.000 (.000)	-.051
Training employees							.002* (.001)	.053*					.002 (.002)	.046
Training managers									.002 (.002)	.041			.002 (.002)	.031
Human capital inv.											.001 (.003)	.012	-.001 (.002)	-.013
Firm control variables														
Age	.003 (.003)	.027	-.003 (.004)	-.025	-.003 (.004)	-.027	.003 (.003)	.029	.003 (.003)	.028	-.003 (.004)	-.027	.003 (.003)	.028
Sales growth 2007	-.008 (.011)	-.025	-.009 (.011)	-.026	-.008 (.011)	-.025	-.008 (.008)	-.025	-.008 (.008)	-.026	-.009 (.011)	-.026	-.007 (.011)	-.022
EBITDAmarg 2007	.195*** (.031)	.205***	.186*** (.027)	.195***	.201*** (.031)	.212***	.194*** (.031)	.204***	.196*** (.031)	.206***	.195*** (.031)	.205***	.195*** (.031)	.204***
Fixed Assets	-.011 (.022)	-.022	.071*** (.022)	.162***	-.012 (.022)	-.025	-.009 (.022)	-.019	-.010 (.022)	-.021	-.010 (.022)	-.022	-.008 (.022)	-.016
Durability	.000 (.000)	.007	.000 (.000)	.010	.000 (.000)	.007	.000 (.000)	.029	.000 (.000)	.006	.000 (.000)	.007	.000 (.000)	.011
L2	.004 (.005)	.031	.004 (.005)	.025	.005 (.005)	.033	.008** (.004)	.078**	.005 (.005)	.033	.008** (.004)	.078**	.004 (.005)	.032
Financial leverage	.069*** (.019)	.157***	.071*** (.012)	.013	.069*** (.019)	.157***	.010 (.014)	.032	.069*** (.019)	.157***	.004 (.014)	.031	.073*** (.019)	.166***
Export	.000 (.000)	-.022	.000 (.000)	-.029	.000 (.000)	-.023	.000 (.000)	-.018	.000 (.000)	-.020	.000 (.000)	-.022	.000 (.000)	-.028
Severity of crisis	.026*** (.005)	.215***	.021*** (.006)	.179***	.026*** (.005)	.220***	.026*** (.005)	.218***	.026*** (.005)	.217***	.026*** (.005)	.214***	.022*** (.006)	.186***
Size	-.002 (.002)	-.025	-.001 (.003)	-.017	-.002 (.002)	-.030	-.002 (.002)	-.029	-.003 (.003)	-.030	-.002 (.002)	-.026	-.003 (.003)	-.031
Affected - Demand	-.001 (.002)	-.012	-.001 (.002)	-.016	-.001 (.002)	-.012	-.001 (.002)	-.011	-.001 (.002)	-.013	-.001 (.002)	-.013	-.001 (.002)	-.016
Affected - Credit	-.001 (.002)	-.011	-.001 (.002)	-.013	-.001 (.002)	-.011	-.001 (.002)	-.010	-.001 (.002)	-.009	-.001 (.003)	-.017	-.001 (.002)	-.014
Outlook - Market share	-.001 (.003)	-.017	-.002 (.003)	-.029	-.001 (.003)	-.015	-.001 (.003)	-.015	-.001 (.003)	-.017	.001 (.003)	.025	-.002 (.003)	-.026
Outlook - Profitability	.007* (.004)	.092*	.007** (.004)	.098**	.007* (.004)	.091*	.007* (.004)	.092*	.007* (.004)	.089*	.007* (.004)	.091*	.007* (.004)	.095*
Outlook - Growth	-.005 (.004)	-.066	-.004 (.004)	-.058	-.005 (.004)	-.066	-.006 (.003)	-.076	-.005 (.004)	-.070	-.005 (.004)	-.067	-.005 (.004)	-.067
Industry dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Crisis dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Constant	-.059 (.118)		-.036 (.118)		-.057 (.118)		-.059 (.118)		-.054 (.118)		-.063 (.119)		-.059 (.118)	
N	859		853		850		855		851		855		836	
F-value	4.354		12.137		.949		2.789		1.723		.152		3.774	
R²	.243		.253		.243		.245		.244		.243		.259	
Adjusted R²	.187		.197		.187		.189		.188		.186		.200	

Table 11 Regression models B1-B7 ROA 2011

Dependent variable	ROA 2011													
Model name	B1		B2		B3		B4		B5		B6		B7	
	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.
Firm variables														
Downsizing			-.007 (.005)	-.047									-.003* (.001)	-.065*
Hiring					.000 (.000)	-.007							.000 (.000)	-.016
Training employees							-.002 (.002)	-.036					-.002 (.002)	-.038
Training managers									-.001 (.002)	-.018			.001 (.002)	.017
Human capital inv.											-.001 (.003)	-.017	-.001 (.002)	-.015
Firm control variables														
Age	-.004 (.004)	-.036	-.019 (.014)	-.046	-.004 (.004)	-.036	-.004 (.004)	-.037	-.004 (.004)	-.036	-.004 (.004)	-.036	-.004 (.004)	-.037
Sales growth 2007	-.011 (.011)	-.033	-.038 (.039)	-.033	-.011 (.011)	-.032	-.011 (.011)	-.033	-.011 (.011)	-.033	-.011 (.011)	-.032	-.010 (.011)	-.031
EBITDAmarg 2007	.156*** (.031)	.172***	.412*** (.102)	.141***	.157*** (.031)	.173***	.156*** (.031)	.172***	.155*** (.031)	.172***	.156*** (.031)	.172***	.156*** (.031)	.172***
Fixed Assets	.028 (.022)	.056	.020 (.081)	.013	.027 (.024)	.056	.026 (.024)	.054	.027 (.024)	.056	.027 (.024)	.056	.027 (.024)	.055
Durability	.000 (.000)	.001	.000 (.000)	.037	.000 (.000)	.001	.000 (.000)	.001	.000 (.000)	.006	.000 (.000)	.001	.000 (.000)	.002
L2	.008 (.005)	.055	.014 (.018)	.031	.008 (.005)	.055	.008 (.005)	.053	.005 (.005)	.033	.008 (.005)	.055	.008 (.005)	.052
Financial leverage	.059*** (.021)	.132***	.054 (.070)	.036	.059*** (.021)	.132***	.058*** (.021)	.131***	.069*** (.019)	.157***	.059*** (.021)	.133***	.060*** (.021)	.135***
Export	.000 (.000)	-.039	-.001 (.001)	-.031	.000 (.000)	-.039	.000 (.000)	-.041	.000 (.000)	-.040	.000 (.000)	-.039	.000 (.000)	-.046
Severity of crisis	.007 (.005)	.057	.022 (.020)	.054	.007 (.005)	.058	.007 (.005)	.056	.007 (.005)	.057	.007 (.005)	.060	.005 (.006)	.040
Size	-.002 (.002)	-.023	.000 (.012)	.000	-.002 (.003)	-.024	-.002 (.002)	-.021	-.002 (.002)	-.021	-.002 (.002)	-.022	-.002 (.003)	-.019
Affected - Demand	.001 (.002)	.018	.006 (.009)	.032	.001 (.003)	.017	.001 (.003)	.017	.001 (.002)	.018	.001 (.002)	.019	-.001 (.002)	-.016
Affected - Credit	.000 (.002)	.005	-.005 (.007)	-.028	.000 (.002)	.005	.000 (.002)	.005	.000 (.002)	.004	.000 (.002)	.004	.001 (.003)	.014
Outlook - Market share	.000 (.004)	.003	.009 (.013)	.038	.000 (.004)	.004	.000 (.004)	.002	.000 (.004)	.003	.000 (.004)	.004	.000 (.004)	.002
Outlook - Profitability	.011*** (.004)	.0154***	-.009 (.013)	-.038	.011*** (.004)	.154***	.011*** (.004)	.155***	.011*** (.004)	.155***	.011*** (.004)	.155***	.011*** (.004)	.155***
Outlook - Growth	-.009** (.004)	-.115**	.014 (.014)	.057	-.009** (.004)	-.115**	-.008** (.004)	-.109**	-.009** (.004)	-.113**	-.009** (.004)	-.114**	-.008** (.004)	-.104**
Industry dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Crisis dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Constant	-.142 (.126)		-.256 (.330)		-.142 (.127)		-.137 (.127)		-.144 (.127)		-.138 (.127)		-.117 (.127)	
N	848		842		839		844		840		843		824	
F-value	2.387		1.566		.036		1.116		.276		.257		.845	
R²	.151		.057		.151		.152		.151		.151		.155	
Adjusted R²	.088		-.010		.087		.088		.087		.087		.087	

Table 12 Regression models B1-B7 ROA 2012

Dependent variable	ROA 2012													
Model name	B1		B2		B3		B4		B5		B6		B7	
	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.
Firm variables														
Downsizing			-.003* (.002)	-.063*									-.003* (.002)	-.072*
Hiring					.000 (.000)	-.024							.000 (.000)	-.035
Training employees							.001 (.002)	.018					.001 (.002)	.014
Training managers									.001 (.002)	.015			.001 (.002)	.018
Human capital inv.											.000 (.003)	.001	-.001 (.003)	-.008
Firm control variables														
Age	-.035 (.194)	-.046	-.005 (.004)	-.043	-.005 (.004)	-.043	-.005 (.004)	-.042	-.005 (.004)	-.042	.015 (.006)	.125	-.005 (.004)	-.042
Sales growth 2007	-.045 (.075)	-.021	-.016 (.012)	-.047	-.015 (.012)	-.044	.015 (.006)	.126	-.015 (.012)	-.045	-.015 (.012)	-.045	-.015 (.012)	-.043
EBITDAmarg 2007	.249 (.194)	.046	.173*** (.030)	.199***	.180*** (.031)	.206***	.176*** (.030)	.201***	.176*** (.030)	.202***	.176*** (.030)	.201***	.179*** (.031)	.205***
Fixed Assets	.022 (.154)	.001	.007 (.024)	(.015)	.005 (.024)	.011	.007 (.024)	.014	.006 (.024)	.013	.006 (.024)	.013	.007 (.024)	.014
Durability	-.001 (.001)	-.003	.000 (.000)	.030	.000 (.000)	.027	.000 (.000)	.027	.000 (.000)	.027	.000 (.000)	.027	.000 (.000)	.030
L2	.029 (.033)	.033	.005 (.005)	.038	.006 (.005)	.042	.006 (.005)	.042	.006 (.005)	.013	.005 (.005)	.041	.006 (.005)	.042
Financial leverage	.061 (.133)	.022	.084*** (.021)	.192***	.083*** (.021)	.189***	.083*** (.021)	.189***	.083*** (.021)	.189***	.083*** (.021)	.189***	.085*** (.021)	.193***
Export	.000 (.001)	-.014	.000 (.000)	-.062	.000 (.000)	-.057	.000 (.000)	.027	.000 (.000)	-.056	.000 (.000)	-.057	.000 (.000)	-.062
Severity of crisis	.033 (.038)	.043	.013** (.006)	.104**	.015*** (.006)	.129***	.015** (.006)	.126**	.015** (.006)	.126**	.015** (.006)	.125**	.013** (.006)	.108**
Size	-.004 (.022)	-.007	.001 (.003)	.013	.000 (.003)	.005	.001 (.003)	.007	.001 (.003)	.007	.001 (.003)	.009	.000 (.004)	.005
Affected - Demand	-.006 (.017)	-.017	.000 (.003)	.001	.000 (.003)	.003	.000 (.003)	.004	.000 (.003)	.003	.000 (.003)	.004	.000 (.003)	.001
Affected - Credit	.001 (.013)	.002	-.001 (.002)	-.013	-.001 .002	-.012	-.001 (.002)	(-.012)	-.001 .002	-.011	-.001 (.002)	-.012	-.001 (.002)	-.013
Outlook - Market share	-.002 (.024)	-.004	.003 (.004)	.038	.003 (.004)	.044	.003 (.004)	.044	.003 (.004)	.043	.003 (.004)	.043	.003 (.004)	.040
Outlook - Profitability	.007 (.026)	.014	.002 (.004)	.022	.001 (.004)	.019	.001 (.004)	-.055	.001 (.004)	.019	.001 (.004)	.020	.001 (.004)	.020
Outlook - Growth	.006 (.027)	.012	-.003 (.004)	-.046	-.004 (.004)	-.051	-.004 (.004)	-.055	-.004 (.004)	-.053	-.004 (.004)	-.051	-.004 (.004)	-.050
Industry dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Crisis dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Constant	.078 (.626)		-.021 (.048)		-.006 (.294)		-.031 (.048)		-.030 (.048)		-.009 (.032)		-.001 (.033)	
N	817		811		809		813		809		813		795	
F-value	2.59		2.84		.462		.285		.201		.001		.874	
R²	.165		.165		.165		.165		.165		.165		.169	
Adjusted R²	.101		.103		.101		.100		.100		.100		.100	

Table 13 Regression models C1-C7 EBITDA margin 2010

Dependent variable	EBITDAmarg 2010													
	C1		C2		C3		C4		C5		C6		C7	
	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.
Firm variables														
Downsizing			-.001 (.001)	-.043									.000 (.001)	-.006
Hiring					.000 (.000)	-.036							.000* (.000)	-.054*
Training employees							.002 (.003)	.017					.000 (.001)	-.012
Training managers									-.001 (.001)	-.018			-.001 (.001)	-.036
Human capital inv.											.001 (.002)	.012	.000 (.002)	.009
Firm control variables														
Age	-.001 (.002)	-.009	-.001 (.002)	-.009	-.001 (.002)	-.007	-.003 (.007)	-.011	-.001 (.002)	-.010	-.001 (.002)	-.009	-.002 (.002)	-.023
Sales growth 2007	-.002 (.007)	-.009	-.002 (.007)	-.009	-.002 (.007)	-.009	.026 (.021)	.037	-.002 (.007)	-.008	-.002 (.007)	-.009	.000 (.007)	.001
EBITDAmarg 2007	.461*** (.027)	.477***	.458*** (.027)	.473***	.465*** (.027)	.480***	.815*** (.054)	.442***	.461*** (.027)	.476***	.461*** (.027)	.477***	.436*** (.025)	.520***
Fixed Assets	.051*** (.014)	.135***	.052*** (.014)	.138***	.051*** (.014)	.135***	.009 (.040)	.009	.051*** (.014)	.134***	.051*** (.014)	.135***	.047*** (.012)	.146***
Durability	.000 (.000)	.005	.000 (.000)	.007	.000 (.000)	.003	.000 (.000)	-.001	.000 (.000)	.004	.000 (.000)	.005	.000 (.000)	.007
L2	.011*** (.003)	.096***	.011*** (.003)	.094***	.011*** (.003)	.100***	-.034*** (.009)	-.115***	.011*** (.003)	.095***	.011*** (.003)	.096***	.010*** (.003)	.105***
Financial leverage	.004 (.012)	.012	.005 (.012)	.013	.004 (.012)	.012	-.057 (.036)	-.060	.004 (.012)	.012	.004 (.012)	.011	.008 (.011)	.026
Export	.000 (.000)	.045	.000 (.000)	.043	.000 (.000)	.046	.000 (.000)	-.018	.000 (.000)	.044	.000 (.000)	.045	.000** (.000)	.063**
Severity of crisis	.018*** (.004)	.191***	.016*** (.004)	.178***	.018*** (.004)	.194***	.050*** (.011)	.197***	.018*** (.004)	.191***	.017*** (.004)	.190***	.010*** (.003)	.119***
Size	.005** (.002)	.074**	.005** (.002)	.075**	.005** (.002)	.073***	-.002 (.006)	-.013	.005** (.002)	.076**	.005** (.002)	.073**	-.002 (.002)	-.023
Affected - Demand	.001 (.002)	.034	.001 (.002)	.030	.001 (.002)	.034	-.009* (.005)	-.070*	.001 (.002)	.034	.001 (.002)	.033	.001 (.001)	.030
Affected - Credit	-.001 (.001)	-.035	-.001 (.001)	-.035	-.002 (.001)	-.037	-.002 (.004)	-.017	-.001 (.001)	-.035	-.001 (.001)	-.034	-.001 (.001)	-.031
Crisis dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Industry dummies	No		No		No		No		No		No		No	
Constant	-.115*** (.027)		-.107*** (.027)		-.117*** (.027)		-.029 (.080)		-.114*** (.027)		-.117*** (.027)		-.061** (.025)	
N	878		870		865		916		868		872		775	
F-value	23.934		2.170		1.735		.352		.449		.216		1.248	
R²	.395		.396		.397		.253		.395		.395		.410	
Adjusted R²	.378		.379		.379		.233		.378		.378		.388	

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Table 14 Regression models C1-C7 EBITDA margin 2011

Dependent variable	EBITDAmarg 2011													
	C1		C2		C3		C4		C5		C6		C7	
	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.
Firm variables														
Downsizing			-.002 (.001)	-.051									-.001 (.001)	-.044
Hiring					.000 (.000)	.023							.000 (.000)	.016
Training employees							-.001 (.001)	-.023					.000 (.001)	-.013
Training managers									-.002 (.001)	-.046			-.001 (.001)	-.017
Human capital inv.											.001 (.002)	.008	.001 (.002)	.014
Firm control variables														
Age	-.008*** (.003)	-.089***	-.008*** (.003)	-.089***	-.008*** (.003)	-.089***	-.008*** (.003)	-.090***	-.006** (.002)	-.073**	-.008*** (.003)	-.089***	-.008*** (.003)	-.091***
Sales growth 2007	-.014* (.008)	-.055*	-.014* (.008)	-.055*	-.014* (.008)	-.056*	-.014* (.008)	-.055*	-.007 (.007)	-.029	-.014* (.008)	-.056*	-.014* (.008)	-.055*
EBITDAmarg 2007	.302*** (.025)	.370***	.300*** (.025)	.367***	.301*** (.025)	.369***	.302*** (.025)	.370***	.276*** (.022)	.385***	.302*** (.025)	.370***	.299*** (.025)	.366***
Fixed Assets	.070*** (.014)	.188***	.071*** (.014)	.191***	.070*** (.015)	.187***	.069*** (.015)	.186***	.065*** (.013)	.200***	.070*** (.015)	.188***	.071*** (.014)	.190***
Durability	.000 (.000)	.011	.000 (.000)	.014	.000 (.000)	.012	.000 (.000)	.011	.000 (.000)	.045	.000 (.000)	.012	.000 (.000)	.014
L2	.013*** (.003)	.126***	.013*** (.003)	.124***	.013*** (.003)	.125***	.013*** (.003)	.125***	.014*** (.003)	.161***	.013*** (.003)	.126***	.013*** (.003)	.122***
Financial leverage	.003 (.013)	.010	.004 (.013)	.012	.003 (.013)	.009	.003 (.013)	.009	.008 (.012)	.027	.003 (.013)	.009	.003 (.013)	.010
Export	.000 (.000)	.024	.000 (.000)	.022	.000 (.000)	.024	.000 (.000)	.023	.000 (.000)	.037	.000 (.000)	.024	.000 (.000)	.020
Severity of crisis	.005 (.004)	.061	.004 (.004)	.045	.005 (.004)	.057	.005 (.004)	.060	.004 (.003)	.048	.005 (.004)	.060	.004 (.004)	.042
Size	.003 (.002)	.045	.003 (.002)	.047	.003 (.002)	.047	.003 (.002)	.046	.002 (.002)	.040	.003 (.002)	.044	.003 (.002)	.049
Affected - Demand	.001 (.002)	.012	.000 (.002)	.009	.001 (.002)	.012	.001 (.002)	.012	.001 (.002)	.030	.000 (.002)	.012	.000 (.002)	.009
Affected - Credit	.000 (.001)	-.008	.000 (.001)	-.007	.000 (.001)	-.008	.000 (.001)	-.008	.000 (.001)	-.009	.000 (.001)	-.008	.000 (.001)	-.007
Crisis dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Industry dummies	No		No		No		No		No		No		No	
Constant	-.011 (.029)		-.004 (.029)		-.011 (.029)		-.009 (.029)		.003 (.026)		-.012 (.029)		-.005 (.030)	
N	864		856		852		857		787		858		837	
F-value	12.577		2.463		.569		.564		2.370		.073		.691	
R²	.258		.261		.259		.259		.300		.259		.261	
Adjusted R²	.238		.239		.238		.238		.278		.237		.237	

Table 15 Regression models C1-C7 EBITDA margin 2012

Dependent variable	EBITDAmarg 2012													
	C1		C2		C3		C4		C5		C6		C7	
	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.	Unstd coef.	Std coef.
Firm variables														
Downsizing			-.002** (.001)	-.076**									-.002** (.001)	-.075**
Hiring					.000 (.000)	.002							.000 (.000)	-.009
Training employees							.000 (.001)	-.005					.000 (.000)	-.005
Training managers									.000 (.001)	-.007			.000 (.000)	-.006
Human capital inv.											.002 (.002)	.036	.002 (.002)	.036
Firm control variables														
Age	-.006** (.003)	-.066**	-.006** (.003)	-.067**	-.006** (.003)	-.066**	-.006** (.003)	-.067**	-.006** (.003)	-.067**	-.006** (.003)	-.067**	-.006** (.003)	-.068**
Sales growth 2007	-.019 (.008)	-.078**	-.019 (.008)	-.078**	-.019 (.008)	-.078**	-.019 (.008)	-.078**	-.019 (.008)	-.078**	-.019 (.008)	-.079**	-.019 (.008)	-.078**
EBITDAmarg 2007	.319*** (.025)	.393***	.314*** (.025)	.387***	.319*** (.025)	.393***	.319*** (.025)	.393***	.319*** (.025)	.393***	.320*** (.025)	.394***	.315*** (.025)	.388***
Fixed Assets	.050*** (.014)	.140***	.052*** (.014)	.146***	.050*** (.014)	.140***	.050*** (.014)	.140***	.050*** (.014)	.140***	.051*** (.014)	.142***	.053*** (.014)	.148***
Durability	.000 (.000)	.048	.000 (.000)	.052	.000 (.000)	.048	.000 (.000)	.048	.000 (.000)	.048	.000 (.000)	.050	.000* (.000)	.055*
L2	.011*** (.003)	.102***	.010*** (.003)	.099***	.011*** (.003)	.102***	.011*** (.003)	.102***	.011*** (.003)	.102***	.011*** (.003)	.102***	.010*** (.003)	.099***
Financial leverage	.020 (.013)	.062	.021 (.013)	.066	.020 (.013)	.062	.020 (.013)	.062	.020 (.013)	.062	.019 (.013)	.059	.021 (.013)	.064
Export	.000 (.000)	-.036	.000 (.000)	-.041	.000 (.000)	-.036	.000 (.000)	-.037	.000 (.000)	-.037	.000 (.000)	-.037	.000 (.000)	-.042
Severity of crisis	.009** (.004)	.105**	.007* (.004)	.080*	.009** (.004)	.105**	.009** (.004)	.105**	.009** (.004)	.105**	.009** (.004)	.100**	.007* (.004)	.076*
Size	.003 (.002)	.048	.003 (.000)	.052	.003 (.002)	.048	.003 (.002)	.048	.003 (.002)	.049	.003 (.002)	.045	.003 (.002)	.049
Affected - Demand	.000 (.002)	.006	.000 (.002)	.001	.000 (.002)	.006	.000 (.002)	.006	.000 (.002)	.006	.000 (.002)	.004	.000 (.002)	.000
Affected - Credit	-.001 (.001)	-.037	-.001 (.001)	-.036	-.001 (.001)	-.037	-.001 (.001)	-.037	-.001 (.001)	-.037	-.001 (.001)	-.035	-.001 (.001)	-.035
Crisis dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Industry dummies	No		No		No		No		No		No		No	
Constant	-.033		-.022		-.033		-.032		-.032		-.038		-.027	
	(.029)		(.029)		(.029)		(.029)		(.029)		(.029)		(.029)	
N	832		824		820		825		822		826		805	
F-value	11.681		5.044		.006		.026		.055		1.409		1.284	
R²	.252		.257		.252		.252		.252		.254		.258	
Adjusted R²	.231		.234		.230		.230		.230		.231		.232	

Table 16 Regression models D1-D2 EBITDA margin 2010

Dependent variable	EBITDAmarg 2010			
	D1		D2	
	Unstd coef.	*Std coef.*	*Unstd coef.*	*Std coef.*
Independent variables				
Downsizing	-.001	-.043	-.002	-.068
	(.001)			
Human capital investments	.001	.011	.000	.000
	(.002)		(.003)	
Downsizing * HC investments			.000	.029
			(.001)	
Firm control variables				
Age	-.001	-.009	-.001	-.009
	(.002)		(.002)	
Sales growth 2007	-.002	-.009	-.002	-.008
	(.007)		(.007)	
EBITDAmarg 2007	.458***	.473***	.458***	.474***
	(.027)		(.027)	
Fixed Assets	.053***	.139***	.053***	.139***
	(.014)		(.014)	
Durability	.000	.007	.000	.006
	(.000)		(.000)	
L2	.011***	.093***	.011***	.093***
	(.003)		(.003)	
Financial leverage	.004	.012	.004	.013
	(.012)		(.012)	
Export	.000	.043	.000	.043
	(.000)		(.000)	
Severity of crisis	.016***	.177***	.016***	.177***
	(.004)		(.004)	
Size	.005**	.074**	.005**	.074**
	(.002)		(.002)	
Affected – Demand	.001	.030	.001	.030
	(.001)		(.001)	
Affected – Credit	-.001	-.034	-.001	-.034
	(.001)		(.001)	
Crisis dummies	Yes		Yes	
Industry dummies	No		No	
Constant	-.109		-.106	
	(.028)		(.029)	
N	868		868	
F-value	1.167		.817	
R²	.396		.396	
Adjusted R²	.378		.378	

Table 17 Regression models D1-D2 EBITDA margin 2011

Dependent variable	EBITDAmarg 2011			
	D1		D2	
	Unstd coef.	*Std coef.*	*Unstd coef.*	*Std coef.*
Independent variables				
Downsizing	-.002	-.051	-.003	-.095
	(.001)		(.003)	
Human capital investments	.000	.006	-.001	-.014
	(.002)		(.003)	
Downsizing * HC investments			.000	.049
			(.001)	
Firm control variables				
Age	-.008***	-.089***	-.008***	-.090***
	(.003)		(.003)	
Sales growth 2007	-.014*	-.055*	-.014*	-.055*
	(.008)		(.008)	
EBITDAmarg 2007	.300***	.367***	.300***	.367***
	(.025)		(.025)	
Fixed Assets	.071***	.191***	.072***	.192***
	(.014)		(.015)	
Durability	.000	.014	.000	.013
	(.000)		(.000)	
L2	.013***	.124***	.013***	.124***
	(.003)		(.003)	
Financial leverage	.004	.012	.004	.112
	(.013)		(.013)	
Export	.000	.014	.000	.022
	(.000)		(.000)	
Severity of crisis	.004	.044	.004	.045
	(.004)		(.004)	
Size	.003	.046	.003	.046
	(.002)		(.002)	
Affected – Demand	.000	.009	.000	.009
	(.002)		(.002)	
Affected – Credit	.000	-.007	.000	-.007
	(.001)		(.001)	
Crisis dummies	Yes		Yes	
Industry dummies	No		No	
Constant	-.005		.000	
	(.030)		(.031)	
N	854		854	
F-value	1.248		.927	
R²	.261		.261	
Adjusted R²	.238		.238	

Table 18 Regression models D1-D2 EBITDA margin 2012

Dependent variable	EBITDAmarg 2012			
	D1		D2	
	Unstd coef.	*Std coef.*	*Unstd coef.*	*Std coef.*
Independent variables				
Downsizing	-.002**	-.074**	-.001	-.017
	(.001)		(.003)	
Human capital investments	-.002	-.074	.004	.059
	(.001)		(.003)	
Downsizing * HC investments			.000	-.064
			(.001)	
Firm control variables				
Age	-.006**	-.067**	-.006**	-.066**
	(.003)		(.003)	
Sales growth 2007	-.019	-.078**	-.019	-.078**
	(.008)		(.008)	
EBITDAmarg 2007	.315***	.388***	.315***	.388***
	(.025)		(.025)	
Fixed Assets	.053***	.147***	.052***	.147***
	(.014)		(.014)	
Durability	.000*	.055*	.000*	.056*
	(.000)		(.000)	
L2	.010***	.099***	.010***	.098***
	(.003)		(.003)	
Financial leverage	.021	.064	.020	.063
	(.013)		(.013)	
Export	.000	-.042	.000	-.042
	(.000)		(.000)	
Severity of crisis	.006*	.075*	-.001	-.035
	(.004)		(.001)	
Size	.003	.049	.003	.050
	(.002)		(.002)	
Affected – Demand	.000	.000	.000	.000
	(.002)		(.002)	
Affected – Credit	-.001	-.035	-.001	-.035
	(.001)		(.001)	
Crisis dummies	Yes		Yes	
Industry dummies	No		No	
Constant	-.027		-.033	
	(.029)		(.031)	
N	822		822	
F-value	3.124		2.235	
R²	.258		.258	
Adjusted R²	.235		.234	

Table 19 Regression models E1-E2 EBITDA margin 2010

Dependent variable	EBITDAmarg 2010			
	E1		E2	
	Unstd coef.	*Std coef.*	*Unstd coef.*	*Std coef.*
Independent variables				
L2	.011***	.100***	.012***	.103***
	(.003)		(.003)	
Hiring	.000	-.036	.000	.138
	(.000)		(.000)	
Hiring * L2			.000**	-.134**
			(.000)	
Firm control variables				
Age	-.001	-.007	-.001	-.008
	(.002)		(.002)	
Sales growth 2007	-.002	-.009	-.002	-.009
	(.007)		(.007)	
EBITDAmarg 2007	.465***	.480***	.468***	.484**
	(.027)		(.027)	
Fixed Assets	.051***	.135***	.053***	.139***
	(.014)		(.014)	
Durability	.000	.003	.000	.003
	(.000)		(.000)	
Financial leverage	.004	.012	.006	.018
	(.012)		(.012)	
Export	.000	.046	.000	.042
	(.000)		(.000)	
Severity of crisis	.018***	.194***	.017***	.191***
	(.004)		(.004)	
Size	.005**	.073***	.006***	.083***
	(.002)		(.002)	
Affected - Demand	.001	.034	.001	.032
	(.002)		(.002)	
Affected - Credit	-.002	-.037	-.002	-.036
	(.001)		(.001)	
Crisis dummies	Yes		Yes	
Industry dummies	No		No	
Constant	-.117		-.123	
	(.027)		(.027)	
N	865		865	
F-value	1.735		22.23	
R²	.397		.397	
Adjusted R²	.379		.379	

Table 20 Regression models E1-E2 EBITDA margin 2011

Dependent variable	EBITDAmarg 2011			
	E1		E2	
	Unstd coef.	*Std coef.*	*Unstd coef.*	*Std coef.*
Independent variables				
L2	.010***	.099***	-.001	-.017
	(.003)		(.003)	
Hiring	.000	.002	.000	.075
	(.000)		(.000)	
L2 * Hiring			.000	-.061
			(.000)	
Firm control variables				
Age	-.006**	-.066**	-.008***	-.089***
	(.003)		(.003)	
Sales growth 2007	-.019	-.078**	-.014	-.056**
	(.008)		(.008)	
EBITDAmarg 2007	.319***	.393***	.305***	.373***
	(.025)		(.025)	
Fixed Assets	.050***	.140***	.070***	.189***
	(.014)		(.014)	
Durability	.000	.048	.000	.012
	(.000)		(.000)	
Financial leverage	.021	.066	.004	.011
	(.013)		(.013)	
Export	.000	-.041	.000	.022
	(.000)		(.000)	
Severity of crisis	.007*	.080*	.005	.057
	(.004)		(.001)	
Size	.003	.052	.003	.051
	(.000)		(.002)	
Affected - Demand	.000	.001	.000	.011
	(.002)		(.002)	
Affected - Credit	-.001	-.036	.000	-.009
	(.001)		(.001)	
Crisis dummies	Yes		Yes	
Industry dummies	No		No	
Constant	-.027		-.013	
	(.029)		(.029)	
N	865		852	
F-value	1.735		.800	
R²	.397		.260	
Adjusted R²	.379		.238	

Table 21 Regression models E1-E2 EBITDA margin 2012

Dependent variable	EBITDAmarg 2012			
	E1		E2	
	Unstd coef.	*Std coef.*	*Unstd coef.*	*Std coef.*
Independent variables				
L2	.011***	.102***	.011***	.101***
	(.003)		(.003)	
Hiring	.000	-.036	.000	-.014
	(.000)		(.000)	
L2 * Hiring			.000	.019
			(.000)	
Firm control variables				
Age	-.006**	-.066**	-.006**	-.066**
	(.003)		(.003)	
Sales growth 2007	-.019**	-.078**	-.019**	-.078**
	(.008)		(.008)	
EBITDAmarg 2007	.319***	.393***	.318***	.392***
	(.025)		(.025)	
Fixed Assets	.050***	.140***	.050***	.140***
	(.014)		(.014)	
Durability	.000	.048	.000	.048
	(.000)		(.000)	
Financial leverage	.020	.062	.020	.061
	(.013)		(.013)	
Export	.000	-.036	.000	.022
	(.000)		(.000)	
Severity of crisis	.009**	.105**	.009**	.105**
	(.004)		(.004)	
Size	.003	.048	.003	.047
	(.002)		(.002)	
Affected - Demand	.000	.006	.000	.006
	(.002)		(.002)	
Affected - Credit	-.001	-.037	-.001	-.036
	(.001)		(.001)	
Crisis dummies	Yes		Yes	
Industry dummies	No		No	
Constant	-.033		-.013	
	(.029)		(.029)	
N	820		820	
F-value	.006		.046	
R²	.252		.252	
Adjusted R²	.230		.229	