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Recessions and the short-term stability of the relative economic performance between firms

A study of how the short-term stability of firms' competitive advantages and disadvantages is affected by recessions, and how specific firm characteristics may influence the effect

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Abstract

The purpose of this study is to analyze how recessions affect the relative economic performance between firms by measuring the short-term stability of Norwegian firms' competitive advantages and disadvantages during the financial crisis of 2008. Further, analyses will be conducted to determine whether specific firm characteristics affect the changes in their short-term stability. Financial data on Norwegian firms for the period 1999-2010 was analyzed in order to investigate these issues. Our results show that i) the financial crisis of 2008 had considerable negative impact on the aggregate firm performance of Norwegian firms, and the effect was more severe for poorly performing firms than for well performing firms, ii) firms' competitive advantages were less stable in crisis, and more stable in booms, and iii) different firm characteristics like size, leverage and growth affected the effect of the crisis on the short-term stability of firms' competitive advantages. Finally, we give some directions for future studies.

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1. Introduction

1.1 Introduction to the study

The global economy is characterized by business cycles, i.e. booms and recessions which occur regularly and influence the national economies of many countries. When it comes to economic crises, firms will react in different ways to deal with the new and more challenging rules of the game. It is known that the average performance of firms declines in recessions (Geroski & Gregg, 1997), but we do not know what happens to the relative performance. How do recessions influence the short-term stability of firms' competitive advantages or disadvantages? Firm characteristics like size, leverage and sales growth may contribute to the outcome. The most recent economic crisis is the financial crisis of 2008, the biggest one since the 1930's Great Depression, and it affected the worldwide economy considerably, including Norway. Previous studies have investigated the crisis' impact on Norwegian firms, but there are still many unanswered questions related to the stability of firms' competitive advantages and disadvantages during crisis.

1.2 Positioning of the study

The term «sustained competitive advantage» has been subject of considerable debate, particularly with regard to the fact that competitive advantages, or disadvantages, have become more short-term and unstable (D'Aveni et al., 2010). A related, but little explored issue is how business cycles affect the short-term stability and duration of competitive advantages and disadvantages. There has not been conducted much research in the strategic management field on how firms and industries are affected by recessions, and most of the literature that touches upon these topics is a byproduct from research of product market implications in the financial field or from macroeconomic theory. It would therefore be interesting to present new research in another framework different from the existing one.

When it comes to conducting economic research on the topic, it should be possible to do it with empiricism and real life settings, as long as the so-called "natural experiment" allows "the study of the effects of exogenous variation in an explanatory variable that is in other

situations endogenously related to the outcome of interest" (Meyer, 1995). In other words, we can investigate the idea of short-term stability of competitive advantages or disadvantages in recessions as long as there is a considerable fall in the key financial ratios that we use to compute the competitive advantage variable.

1.3 Structure and clarification of the study

Our study will be highly structured, and it has nine different chapters, including references and appendices. In the first chapter, we introduce the topic, our research question and implications of the study. The second chapter will present the theoretical background of the topic, which we will complement with existing literature in chapter three. The main connection between these two chapters is that the theoretical background will present main theories and concepts which the research in the literature review builds on. The research we present in the literature review is specific to the thesis topic, and gives an account of what accredited scholars and researchers have already published. The literature that we choose to include gives grounds for our hypotheses, and at the same time it helps us explain some of our findings from the analyses.

The fourth chapter presents the research design, methodological choices and validity concerns of our study. We give a thorough review of our data, our samples and our analyses, including descriptions of the variables and measures. This part is supposed to make the study as transparent and airtight as possible, and clarify the research process. The hypotheses that we want to test are based on the literature review, and are presented in chapter five. Chapter six contains the analyses of the dataset and the presentation of the results, while we continue with our in-depth discussion of the findings in chapter seven. This chapter will also contain recommendations and directions for future studies, together with limitations of our study.

We want to clarify some important terms and parts of the study, in order to avoid possible misinterpretations by the reader and to get a clearer understanding of the arguments and purpose of this thesis. Before we obtained our data and formulated our research question, we were interested in the duration and sustainability of firms' competitive advantages and

disadvantages during recessions, since there is little existing research or empirical evidence on the matter. In order to investigate this area, one needs data from several years, although the exact number of years which defines a sustainable competitive advantage is more uncertain. The existing theory about sustainability will be dealt with in the theoretical background of this study. In spite of ambiguous theory regarding the number of years needed to define sustainability, we saw the necessity to put down a limit based on relevant information from which we could draw conclusions. Most importantly, we consider sustainability to hang together with the expression long-term. Long-term can be a subjective denomination that depends on the setting in which it can convey meaning. For instance, a day trader might consider long-term much differently than a buy-and-hold investor, who would consider anything less than several years to be short-term trading. In our case, we knew that we were going to work with firm accounts and financial crises, and we therefore think of long-term as a period of several years. The implication of this definition on our thesis is that the financial crisis of 2008 is too close in time for us to investigate the sustainability of competitive advantages and disadvantages. The proximity to the recent financial crisis makes it difficult to say anything about the long-term evolution of firms' competitive advantages. Thus, what we will do is to conduct analyses consisting of 1- and 2-year correlations, and focus on the short-term stability of competitive advantages and disadvantages instead of the sustainability. With the term stability, we think of the development of competitive advantages and disadvantages from year to year, i.e. if firms which have competitive advantage/disadvantage one year will maintain it in the following one or two years. Our focus is not deep case-specific details of the shock, but rather the broader patterns. Since there has been conducted little research on the topic and this study is one of the first contributions to the field, it seems natural to begin with investigating the short-term effects of the crisis before looking at the long-term effects. When short-term effects have been investigated, one can more easily justify that prospective continuations of this study can focus on long-term effects.

The next thing we want to clarify is how we are going to denominate competitive advantages and disadvantages throughout the study. We consider it to be cumbersome and inconvenient to use the entire phrase and we will therefore limit ourselves to write only "competitive advantage," when we in reality are talking about *both* advantages and disadvantages. Disadvantages can thus be understood as negative advantages.

1.4 Research question

In order to embark on the existing research gaps, we have developed the following research question:

> *How do business cycles affect the short-term stability of the relative economic performance between firms, and how might specific firm characteristics influence the crisis' effect on the short-term stability of firms' competitive advantages and disadvantages?*

When answering this research question, we subsequently want to illuminate which performance variables that are most affected by economic fluctuations, how firm size, capital structure and sales growth influence the results, and what the explanations might be for the patterns we observe. Thus, we hope to broaden knowledge in the strategic management field, as well as developing guidelines and suggestions for future research on the short-term stability of competitive advantages during business cycles.

1.5 Implications of the study

The main purpose of this study is to provide new knowledge on how firms' relative performance is affected by recessions. We will investigate this by measuring the short-term stability of Norwegian firms' competitive advantages during the financial crisis of 2008, and we hope to be able to generalize our findings to other recessions. The study is part of the NHH research project Crisis, Restructuring and Growth, and the results of the study will provide directions for future studies within the project, but also for outside researchers investigating the same issues. As there are considerable gaps in the strategic management literature on how recessions affect the relative performance of firms, this study is expected to contribute to the field.

2. Theoretical background

2.1 Introduction

In this section, the theoretical foundations of this thesis will be presented. The main focus is on competitive advantage, but some theory of corporate finance and recessions will also be presented. The theory on competitive advantage has its origin from the strategic management field, and is the background for our study. Financial characteristics are necessary to include because they make it possible to quantify the competitive advantage variables, while recessionary pressures affect the dynamics of these variables. Together, this will be the basis for understanding how and why the short-term stability of competitive advantages may change during recessions. The theoretical background presented in this section will lay the foundations for the literature review in chapter 3.

2.2 Strategic management foundations

2.2.1 Competitive advantage

Barney (2007) describes competitive advantage as a firm being able to create more economic value than rival firms. In other words, a company has a competitive advantage when it has better returns than the industry mean. Economic value is the difference between the perceived benefits obtained by a consumer who buys a firm's products or services, and the full economic cost of these products or services. This improved profitability comes from a firm being better at creating value in some way or another, which may be done by having lower costs, offering a better product, or by a combination of the two (Barney, 2007). There are several possible sources of competitive advantages; being able to get the most output from a minimum of input enables a low-cost strategy, and focusing on innovation and customer orientation may provide better products or lower costs that make the firm achieve a higher perceived quality from the customer.

2.2.2 The Resource Based View of the firm and competitive advantage

Some firms are able to develop and implement strategies that generate high profit levels even in competitively difficult environments and industries, while other firms operate in favorable

industries, but still choose to implement poor strategies that do not generate profit (Barney, 2007). By conducting an industry analysis, the opportunities and threats in a specific industry are identified. However, this is not enough to determine whether a firm is going to be able to have competitive advantages in that industry. There exists a complementary view which concentrates on the identification of each firm's strengths and weaknesses by looking at their resources.

Resources may be defined as stocks of inputs that affect the company's relative ability to implement product market strategies (Jakobsen & Lien, 2001). Penrose (1959) divides firm resources into two main groups: physical resources and human resources. Physical resources consist of land, natural resources, factories, raw materials, byproducts and finished goods, while human resources are labor and managerial staff. Barney (2007) extends Penrose's take on it by adding two more categories: financial capital, which are the different money resources, and organizational capital, which is a firm's structure, systems, culture and reputation, as well as more informal relationships. The resources are not the actual inputs in a production process, but rather a bundle of different potential services that can be combined in many different ways and quantities, depending on the environment. Besanko et al. (2010) explain that resources both directly and indirectly can have an impact on a firm's profitability; they can directly affect the firm's ability to create more value than other firms, and they can indirectly affect value-creation because they serve as the basis of the firm's capabilities. Recessions influence firm resources in an important way. Part of what characterizes a crisis is that the resource value is either lost or altered. This is because the demand is twisted in such a way that what a firm is good at is now being judged differently. Market demand and competition both change, which contributes to the changing of the value of a firm's resources.

The idea of resource-based theory is that firms differ with respect to the resources they possess. This implies that firms vary in terms of what activities they can perform exceptionally well. To look at the firm as a collection of productive resources administered by the firm's decision makers, instead of just simple production functions stems from the work of Penrose (1959), and the term "the resource-based view of the firm" was first coined by Birger Wernerfelt (1984). The main features of the resource-based view is resource heterogeneity

and resource immobility; that firms compete with different sets of resources and that these resources only partially can be moved or copied (Barney, 2007). These two assumptions must be fulfilled in order to make the firm able to create economic value. Competitive advantage is thus created by exploiting those valuable, distinctive resources that cannot easily be copied.

2.2.3 The sustainability of competitive advantages

The fundamental basis of above average performance in the long run is sustainable competitive advantage (Porter, 1985). For a competitive advantage to be sustainable, it must be underpinned by resources that are scarce and imperfectly mobile, which means that well-functioning markets for resources and capabilities cannot exist (Besanko et al., 2010). This brings us to the VRIO framework of analysis, developed by Barney (1991). For firm resources to be a source of sustained competitive advantage, they need to be valuable, rare, imperfectly imitable, and there cannot be strategically equivalent substitutes for these resources. This theory thus says that a firm has a sustained competitive advantage when the uniqueness of product-market strategies can be sustained in equilibrium. Barney (1991) does not refer to a calendar period when talking about the sustainability of a competitive advantage, but claims that it depends on the possibility of competitive duplication, and that the competitive advantage is sustained only if it continues to exist after efforts to duplicate that advantage have ended.

Peteraf (1993) extends Barney's framework of sustained competitive advantage, while drawing on Ricardo's (1817) focus on the economics of rent, also called price theory. She claims that resources yield sustained competitive advantages when four conditions are met: resource heterogeneity, ex post limits to competition, imperfect mobility and ex ante limits to competition. Thus, a firm bases a sustained competitive advantage on differential rents in excess of opportunity costs in equilibrium (Foss, 2005). As an inspiration for Peteraf's (2009) work on the resource-based view, Ricardo (1817) looked at the economic consequences of the "original, unaugmentable, and indestructible gifts of Nature," i.e. that some firms possess resources which are scarce and limited in supply. These resources give these firms lower average costs than other firms. Because of the inelastic supply curves they cannot expand output rapidly, regardless of how high the price may be. Considering this, it is possible for

those who have high quality factors of production with inelastic supply to earn an economic rent, where economic rent is defined as a payment to an owner of a factor of production above the minimum required to bring the factor into employment (Ricardo, 1817).

Agarwal et al. (2009) question the fact that macroeconomic models of industries and economies typically start with "representative firms," implying that all firms in an industry are identical, and contrast this with the idea of heterogeneity as one of the critical determinants of a competitive advantage. This highlights some of the incompatibility of macroeconomic theory versus strategic management theory, and tells us that for the competitive advantage to be a reality, we cannot presuppose macroeconomic implications when we work out our hypotheses.

2.3 Corporate finance foundations

There are several measures to corporate profitability; operating profit margin and return on assets (ROA) are two of the most common. These two will be used to create the competitive advantage variable later in this study. Operating profit margin is the after-tax operating income as a percentage of sales (Brealey et al., 2012), in other words it measures the proportion of sales that finds its way into profits. Return on assets (ROA) is net income as a percentage of total assets. One can break ROA down into the product of asset turnover and operating profit margin, and this is often called the *Du Pont formula.* You would naturally prefer both high operating profit margin and high turnover, but a high-price and a high-margin strategy would typically result in lower sales per dollar of assets. Firms must therefore make trade-offs between the two, and the Du Pont formula can help identify what strategy the firms are pursuing. What we can see is that grocery stores which tend to have high average turnover ratios have lower average profit margins, and that electric and water utilities have high margins and low turnovers (Brealey et al., 2012).

In finance theory, capital structure is defined as the mix of long-term debt and equity financing (Brealey et al., 2012). Miller & Modigliani's (1958) well-known proposition 1, the debt-irrelevance proposition, claims that "when there are no taxes and capital markets

function well, the market value of a company does not depend on its capital structure. In other words, financial managers cannot increase value by changing the mix of securities used to finance the company." Only changes in the company's real assets will affect company value. Even though more debt financing increases earnings per share for shareholders, it is offset by the fact that shareholders now hold more financial risk and therefore require a higher return on their shares. The share price will be exactly the same as before restructuring. However, many critics of this proposition state that since the real world scenario involves taxes, financial distress, bankruptcy costs and conflict of interest among shareholders, the proposition does not hold.

The pecking order theory suggests that firms prefer internal finance, but if that is not enough and external finance is required, firms issue debt first and equity only as a last resort. This is because an issue of debt is less likely to be interpreted by investors as a bad omen, because there is less scope for debt to be misvalued. The explanation for why the most profitable firms borrow less is that they do not need outside money, while less profitable firms borrow more because they do not have enough internal funds to invest with, which makes debt first in the pecking order for finance (Brealey et al., 2012). The pecking order says something about how much leverage a firm has, and the implications this will have for firms during recessions will be discussed in the literature review.

2.4 Industries defined

An industry is defined as "a collection of firms that sell the same or closely related products" (Pindyck & Rubinfeld, 2005). In our study, the definition presented here will not be used directly. Instead, we will use 2-digit NACE codes to classify our industries. These are the European Union's classification system, and also the basis for coding of industries on firms and businesses in the Central Coordinating Register in the Brønnøysund Register Centre, and in Statistics Norway's firm- and business register. The industry codes will be used to find an industry profitability mean needed to compute the competitive advantage variable. Some of these codes may not be perfectly consistent with the definition above, but due to the scope of this thesis, we consider it adequate to use the 2-digit NACE-codes to classify industries.

2.5 Recessions

The business cycle is "recurring fluctuations of income relative to potential income. A boom describes rising income (relative to potential income) which culminates in a peak. A recession describes declining income (relative to potential income) which bottoms out at a trough" (Gärtner, 2009). We will treat the economic crisis of 2008 as an exogenous shock on the Norwegian economy. This is because the crisis did not have its origin in Norway, but started in the U.S. and later spread worldwide. More explicitly, the crisis sprung out of the easy-money policies that were pursued by the U.S. Federal Reserve and other central banks. The widespread availability of mortgage finance increased house prices up until 2006 when they started to decline quickly, and people had to default on their mortgages. The financial system in the U.S. started to melt down during the autumn of 2008. The supply of credit to industry suffered, unemployment rose, and business bankruptcies tripled (Brealey et al., 2012). The crisis spread to the rest of the world, where many foreign banks had made huge investments in U.S. subprime mortgages. It hit Norway as an exogenous demand shock through reductions in aggregate demand for the economy as a whole.

3. Literature review

3.1 Introduction and empirical challenges

In this section, literature relevant for this study will be reviewed. The literature presented here will be used to formulate the hypotheses that will be tested. While there are numerous studies analyzing how firms are affected by recessions, the large majority is related to finance and macroeconomics. Lien (2010) claims that most findings relevant for the strategic management field are byproducts from work originally studying effects related to finance, macroeconomics or IO-economics. At the same time, there is a large amount of literature on competitive advantages and the sustainability of these, but very few have discussed this in relation to recessions. Thus, the effect a crisis has on firms' competitive advantages is unknown as of today. We will first present some facts about the financial crisis of 2008, before we use literature of general firm performance during recessions, as well as some literature on competitive advantages becoming more unstable and less sustainable, to formulate some hypotheses of what might happen to the competitive advantages of firms during recessions. Literature on how different firm characteristics might affect firm performance will also be

presented as this gives an indication of what effect the same firm characteristics might have on competitive advantages.

3.2 The impact of the financial crisis of 2008

The first clear signs of a financial crisis became current in 2007, but it was in September 2008 that the crisis hit the economy hard. The financial crisis of 2008 affected large parts of the real economy. Demand from both households and businesses were reduced and foreign trade declined, causing production to fall. The demand for labor declined and the unemployment rate in most countries increased significantly (Statistics Norway, 2009; Brealey et al., 2012). At the same time, corporate profitability was severely weakened and the number of bankruptcies increased (Brealey et al., 2012). This intensified the problems that had occurred in the financial markets. When businesses and individuals went bankrupt, it led to large losses in the financial sector. There was an increasing distrust between banks and other financial institutions, which led to more tightened lending policies. This again led to reduced corporate investments, household purchases and general consumption. In other words, the weak real economy and the crisis in the financial markets reinforced each other (Statistics Norway, 2009).

The origin of the financial crisis of 2008 was the United States of America, but it quickly spread worldwide. Especially European countries were severely affected by the crisis, and it hit Norway as an exogenous demand shock through reductions in aggregate demand for large parts of the economy. However, the Norwegian economy fared relatively well through the financial crisis of 2008 compared to other countries (Statistics Norway, 2010). Norway had active fiscal, monetary and credit policies which gave significant contributions to the limitation of the economic downturn that most countries experienced during the crisis, and in addition, the Norwegian government took fast and comprehensive action in order to stabilize the Norwegian markets and to improve access to new loans to Norwegian financial institutions (Norwegian Ministry of Finance, 2009). Norway also has a relatively large public sector which grew during the crisis, and this also contributed to the GDP decline in Norway being smaller than in most European countries (Statistics Norway, 2010). Even though the Norwegian economy was hit less severely than its European counterparts, the crisis was by no

means negligible in Norway. Several industries experienced declines in sales revenue and profitability. The Norwegian economy was also indirectly hit because so many of the country's foreign trade partners were severely hit by the crisis.

3.3 Sustainable competitive advantage

Due to the proximity to the financial crisis of 2008, this study does not examine the sustainability of competitive advantages, but rather the short-term stability. Nevertheless, we consider it necessary to illuminate the concept of sustainability because it is the motive of this thesis. In addition, it can contribute to the understanding that long-lasting stability can be defined as sustainability. The term "sustainable competitive advantage" has been subject of considerable debate. The discussion is especially concerned with whether competitive advantages have become more short-term and unstable. D'Aveni et al. (2010) is an important contributor to this discussion, pointing out recent studies suggesting that sustainable competitive advantages are rare and declining in duration. Thomas and D'Aveni (2009) found that the volatility of financial performance has increased over time. This suggests that the relative importance of the temporary component of competitive advantage is rising, compared to the long run component of sustainable competitive advantage. Wiggins & Ruefli (2002) have studied the incidence and persistence of superior economic performance by analyzing a sample of 6,772 firms in 40 industries over 25 years, and they found interesting results. While some firms exhibit superior economic performance, only a very small minority does so, and the phenomenon rarely persists through long time frames. They found two types of firms that are more likely to achieve persistent superior economic performance; smaller firms with large market shares in relatively small (and possibly young) industries, and larger firms with lower levels of diversification. The key finding of this research is that the demonstrated rarity of achieving sustained superior economic performance proves that it is very difficult to attain. This in turn implies that superior economic performance can only be achieved by skillfully implemented and adapted strategies over long periods of time.

3.4 Competitive advantage during recessions

3.4.1 Firm performance during recessions

Preconditions for using recessions as exogenous shocks to an economy are that they have a considerable effect on firm performance, and that they are largely unanticipated. Because the literature on competitive advantage during crisis is so limited, it is useful to include literature about firm performance during recessions. How firms perform during crisis can give us some indications of what will happen to the firms' competitive advantages.

Geroski and Gregg (1996, 1997) studied the effects of recessions on firm performance by analyzing the distribution of profit margins for about 2,300 large UK companies during the period of 1971-93. The findings were interesting. Firstly, they found that the average profit margins varied procyclically, even though there was no clear trend. Secondly, they found that there was a significant rise in the standard deviation of profit margins during recessions, and that the dispersion did not return to pre-recession levels after the recession was over. Finally, they found that the spread of margins across firms was greater than the variation in median and mean margins over time, and that margins for firms within the lower quartile of the sample fell further than the margins of the firms in the top quartile. Geroski and Gregg explained these findings with a relatively small percentage of firms had profits falling relatively heavily. These arguments are also supported by their findings that the bottom quartile of firms also had the largest reductions in sale.

Geroski and Gregg (1997) found no statistically significant relationship between pre-recession profits and how severely firms were affected by the recession. Knudsen (2011) has studied the effect of different pre-recession characteristics on the severity of recession impact on Norwegian firms. He complemented secondary financial data with primary data from an extensive questionnaire about the effects of the financial crisis of 2008 distributed to 5000 Norwegian companies in late 2010, and found out why some firms are more severely affected by recessions than others, and how different firm and industry characteristics affect firms' vulnerability to shocks. His first finding is that firms with high operating profits prior to the recession are less vulnerable to the recession than firms with low pre-recession operating

profits. This coincides with earlier empirical findings of the survival of more profitable firms, while the least profitable firms are forced out of business during recessions (Aw et al., 2001; Baily et al., 1992; Bellone et al., 2008; Carreira & Teixeira, 2011; Griliches & Regev, 1995), and the classical selection argument stating that the least productive firms leave the market while the most productive ones survive (Alchian, 1950; Friedman, 1953). The findings are however in conflict with the findings of Nishimura et al. (2005), who found that efficient firms exited the market while the inefficient ones survived. The poorly functioning Japanese banking system is suggested as the reason for these findings.

3.4.2 Effects of firm characteristics: Firm size

An interesting feature is the link between competitive advantage and firm size. Because large firms have easier access to resources and are more able to achieve economies of scale, one assumes that larger firms are more competitive than small firms. Moen (1999) argues that this is the case because small companies have less purchasing power and produce lower quantities than large companies, making it difficult to get input factors at a low price and to obtain economies of scale. However, small companies are able to develop competitive advantages - usually by having unique products or technology (Moen, 1999). There is an ongoing discussion concerning the causal direction of the relationship between firm size and efficiency. It can be difficult to determine whether the firm is efficient because it is large, or if a firm is large because it is efficient. In support of the first direction is the fact that large firms achieve economies of scale and have easier access to resources and finance, while the other direction could be explained by efficient companies buying less efficient companies and thereby expand. The most important implication of the latter direction is that the efficient firms capture market shares and input factors from the less efficient firms through the market for corporate control.

There have been done some studies of the effect of firm size on profitability during recessions. Geroski and Gregg (1997) find that smaller firms are more affected by recessions than larger firms, and these findings are supported by several other studies (Gertler & Gilchrist, 1994; Lang & Nakamura, 1995). This is explained by the economies of scale and easier access to external finance and other resources that larger firms enjoy. Knudsen (2011)

on the other hand, finds that firm size is in fact positively related to the probability of a firm being severely affected by a recession. He found that the largest firms was more severely hit by the financial crisis of 2008 than small firms, and explains this with smaller firms being more flexible than larger firms. When demand is dropping rapidly, it is an advantage to be able to adjust business accordingly. Large firms tend to be more rigid and less flexible than smaller firms, and this indicates that larger firms are more severely affected by recessions. Another factor that coincides with the prediction of larger firms being more severely hit than smaller firms, is the nature of the product the firms sell. Firms that are producing durable goods are likely to experience a steeper decline in demand, because consumers are more cautious with respect to buying such products during times of recession. Durable goods are often produced by manufacturing firms that are large in size, and this contributes to the assumption that larger firms are hit harder by recessions than small firms.

Level of exports is yet another decisive factor regarding firm size and recessions. If a recession hits several countries in different parts of the world, firms that depend on international trade will suffer. Large firms tend to have a larger share of exports, which can be decisive as to how the firm manages throughout the recession. During a worldwide crisis like the financial crisis of 2008, it is reasonable to assume that larger firms are more severely hit than small firms when we look at the level of exports. However, it is important to notice that the type of effect depends on the nature of the crisis. While the financial crisis of 2008 had an international impact which affected export intensive firms negatively, this does not apply to all recessions. For example, during the Norwegian banking crisis of the late 1980's, it was the firms that mainly traded domestically which suffered the most. Between the large share of durable goods and high levels of export, large firms risk meeting a double negative effect on demand during recessions.

3.4.3 Effects of firm characteristics: Financial leverage

Capital structure is another feature that can explain differences in how firms are affected by recessions. The relationship between capital structure and performance during recessions has been examined by several studies, and most of them find evidence of capital structure affecting the performance of firms during recessions. This is in contrast to Miller and

Modigliani's (1958) first proposition, which states that the value of a firm is unaffected by its choice of capital structure.

In their study of 2,300 large UK firms during the period of 1971-93, Geroski and Gregg (1996) found that highly leveraged firms were more severely affected by the 1991-92 recession than firms with lower debt ratios. Opler and Titman (1994) studied the income statement and balance sheet items of 46,799 publicly traded firms in the period of 1972-91, and found that highly leveraged firms were more severely affected by recessions than less leveraged firms. More specifically, they found that the sales of firms in the top leverage decile declined by 26 percent more than for the firms in the bottom leverage decile. This is explained by financial distress being costly, and particularly the indirect costs were found to be significant. Because financial distress is so costly, it is reasonable to assume that the highly leveraged firms will experience more difficulties during recessions than less leveraged firms. The findings of Campello and Fluck (2006) were similar. Using detailed firm- and industry-level data from 57 U.S. manufacturing companies over the 1990-91 recession, they found that firms with high debt levels lost more market shares, and experienced higher drops in operating profits during economic downturns than less leveraged firms. Knudsen (2011) complemented secondary financial data with primary data from an extensive questionnaire about the effects of the financial crisis of 2008, distributed to 5000 Norwegian companies in late 2010. This study also found that firms with high pre-recession debt-ratio were more vulnerable to recessions than their counterparts with lower debt levels. To sum it up, the literature is clear and unambiguous regarding the fact that firms with high leverage will be more severely hit by a crisis than firms with low debt ratios.

3.4.4 Effects of firm characteristics: Growth rate

Pre-recession growth rate is another interesting feature that may have an impact on firm performance during recession. Geroski and Gregg (1996) found that firms which experienced unusually high growth rates prior to the recession often proved to be particularly vulnerable to recessionary pressure. Lien (2010) came to the same conclusion – he explains that companies experiencing high growth late in a boom have a large share of marginal customers. These are people or firms which will begin to demand the firm's products only in the peak of the boom.

More customers than usual feel that they can afford certain products when times are good, but they will instantly restrict consumption when a crisis hits. Firms with a large share of this type of customers will experience a sudden drop in demand when crisis hits, which is higher than the decline in demand for firms that did not experience the same high growth prior to the recession. Knudsen's (2011) findings coincide with this; he found that high pre-recession growth increased the probability that a firm would be severely affected by the recession. In another study of Geroski and Gregg (1997), they found that firms that grew rapidly during early stages of the recession proved less vulnerable to the recession than others. Higson et al. (2004) found similar results. They studied 43,612 UK companies over the period of 1967-97, and found that the effects of aggregate shocks are more pronounced for firms in the middle range of growth. Rapidly growing and rapidly declining firms were found to be less sensitive to aggregate shocks than firms in the interior of the growth range. They explain that the fastest growers in a recovery are less responsive to macroeconomic conditions than firms with lower growth rates, because rapid growers are overstretched and have enough slack to meet the higher demand that recovery brings. The study stresses the fact that some firms can experience a rapid growth even in recessions, while other firms will decline even in recoveries. This highlights that firms' profitability and growth during recessions is an extensive and complex subject. Because growth rates are non-linear and complex variables, it would be valuable to examine the effects on firm performance during crisis from different angles. However, it is important to note that the five studies presented here investigate growth rates in different stages of the business cycle. This means that these studies are not directly comparable, but we believe that they can implicate what effect growth rates have on firms' competitive advantages and give grounds for hypotheses.

3.5 Summary

Based on the studies reviewed above, one can conclude that there are several gaps to fill in the strategic management field on how recessions affect firms' competitive advantages. A large majority of related findings are byproducts of research related to finance and macroeconomics. What we have considered relevant, and thus included in our literature review, is research on the financial crisis of 2008, the sustainability of competitive advantages, firm performance during recessions and different effects of firm characteristics like size, leverage and growth. The research presented will be the basis for our hypotheses in

chapter five, and we believe that our analyses will add valuable insights and fill some of the gaps in the literature.

4. Research design, methodological choices and validity concerns

4.1 Research design

Saunders et al. (2009) describe research design as the overall plan and structure for how to answer the research question, i.e. the chosen framework used to collect, analyze and interpret the data. To develop a research design first involves determining whether the study has an exploratory, descriptive or explanatory design. Exploratory studies have the purpose to assess phenomena in a new light, to ask questions and to seek new insights into the phenomena. Descriptive studies aim to produce an accurate representation of persons, events or situations, but in order to go further and draw conclusions from the data one is describing, there is a need to evaluate data and synthesize ideas. Explanatory studies, which focus on studying a situation or a problem in order to explain the relationship between variables, do just that. In addition, one could often go ahead and subject the data to statistical tests such as a correlation analysis. Our study utilizes both description and explanation, where description functions as a forerunner to the latter. Therefore we say that we have a descripto-explanatory study.

The literature that will provide the foundation on which the research is built can be approached in two different ways; with either an inductive or a deductive approach (Saunders et al., 2009). An inductive approach involves developing theory as a result of observing empirical data, and later relating it to existing literature. A deductive approach involves using literature to identify theories and hypotheses that will be tested using data, and the objective is to be able to generalize the results. In addition, the researcher should be independent of what is observed. This study has a deductive approach as we develop a theoretical framework, after which we subsequently test several hypotheses using data. The concept of competitive advantage will be operationalized in a way that enables it to be measured quantitatively. Further, we will compare our results to the existing literature, and finally draw conclusions which will answer the research question. The study is thus highly structured.

Saunders et al. (2009) further present the classical experimental design, the case design and the survey design as the three most usual research designs. The experimental design uses one experimental group and one control group, leaving the experimenter in control of all variables in the research model, while the case design investigates a particular contemporary phenomenon within its real-life context. The survey design contains analysis and comparisons of large amounts of data collected from a sizable population. This design is perhaps the most common research design in business and management research, and is well suited for exploratory- and descriptive studies. The survey design is chosen for this thesis because of the purpose and goal of the study, and because the large amounts of data used in this type of study make it possible to generate representative findings. Further, a study can be based on primary data and/or secondary data. Primary data is data collected specifically for the research project being undertaken, while secondary data is data that was originally collected for some other purpose. In this study, secondary financial data is used, and hence a quantitative method is chosen.

4.2 Data collection

Data will be collected from SNF (Institute for Research in Economics and Business Administration) and NHH's database for accounting- and firm information for Norwegian companies. The latter database consists of accounting information for all Norwegian firms for the years of 1992-2010, and is delivered to SNF from the Brønnøysund Register Centre via Dun & Bradstreet Norway AS in cooperation with Menon Business Economics AS (Mjøs & Øksnes, 2009). The Brønnøysund Register Centre is a government administrative agency responsible for a number of national regulatory and registration schemes for business and industry. The database also consists of other information like industry classification codes (NACE), industry groups, company forms and other useful information. Mjøs and Øksnes (2009) present an extensive review of the database with detailed descriptions of the included variables, as well as overviews of the number of observations per variable.

4.3 Reliability and validity concerns

In order to judge the quality of the study, the validity and reliability of the study must be assessed. Validity is the extent to which the data collection method accurately measures what it was intended to measure, and the extent to which research findings are really about what they profess to be about (Saunders et al., 2009). There are two types of validity that are important to consider; internal and external validity. Internal validity focuses on whether findings and conclusions are tenable and correct. Accordingly, it refers to whether the conclusions one has drawn coincide with reality or not. In order for this to be redeemed, it is important to have a representative sample. Generally, the validity of quantitative studies is relatively good. This applies to our study through the fact that our secondary financial data provide us with the information that we need to answer our research question. To illustrate, our dataset contains operating profit margins as well as revenues and assets, which we need to further investigate profitability and competitive advantages. On the other hand, the validity is decreased by account of two different issues. First, we have the fact that firms may have reported manipulated or inaccurate data in their accountancy, and we do not have the opportunity or the time to examine this and eventually correct it. Second, similar inaccuracies may arise due to us excluding some firms ahead of the analysis. These matters can be a potential source of bias that we have to take into consideration when we draw our conclusions.

External validity indicates to which degree we can generalize the results, i.e. to which degree the results can be transferred to other samples and situations. Since we analyze a large number of firms, we should have very few problems generalizing our findings. However, one problem could be related to the fact that Norwegian firms may tend to act in other ways than foreign firms when facing an economic crisis, in addition to economic crises being different in both nature and impact. Also, due to our sampling criteria, a large number of companies are removed from the sample. This may lead to sample biases which can influence the results negatively. These factors must be considered when generalizing the results in order to use them in other situations and samples.

Reliability assesses the degree to which the data collection methods and -analyses will be trustworthy and yield consistent findings. To address this issue one can ask three questions: 1) Will the measures yield the same results on other occasions? 2) Will similar observations be reached by other observers? and 3) Is there transparency in how sense was made from the raw data? (Easterby-Smith et al., 2008). Further, Robson (2002) suggests four different threats to reliability. These are concern biases and errors related to the participant or the subject, and errors and biases related to the observer. The problems are relevant mostly in qualitative studies where there can be several observers who conduct the research while not asking the questions in the same way, and who later interpret the research differently. They may be asking different participants at different points in time and these participants might interpret the questions differently, or not answer them honestly. However, since our study is quantitative, transparent and well structured, reliability should not be subject to biases or errors.

4.4 Sampling strategy

4.4.1 Empirical setting

The aim of this study is to give an as accurate as possible picture of the stability of competitive advantages of Norwegian firms during the financial crisis of 2008, and to draw conclusions from it. In order to achieve this, as many firms as possible should be included in the chosen empirical setting. This will increase the external validity of the findings. However, in order to make the sample as representative as possible for Norwegian firms, we have found it necessary to exclude some firms from the sample. By excluding firms that may cause inaccuracies, the internal validity of the findings increases. Even after excluding those firms, the sample is still very large, and since it is cross-sectional, the external validity will still be satisfying.

4.4.2 Sample size

The chosen sample frame of this study is the whole population of Norwegian firms. In 2010, the whole sample frame consisted of 240,758 different firms. Due to the very large size of the sample frame, it is impossible to sort out individual cases that may cause inaccuracies in the

findings. To decide which firms that should be included in the sample and which firms that should be excluded, we have generated cut-off limits for some of the variables in the sample. In this section, we will explain and justify the choices we have made with regards to the sampling for analyzing the secondary financial data we have collected.

Sample criteria 1: Remove firms with missing information

To create a complete dataset, containing both the accounting information and the industry- and company information that we needed for the analysis, we had to merge together two different datasets for each year. The two datasets are mostly consistent, but the number of observations is somewhat different in some of the years. Possible explanations for the lack of information are that new firms start up, or that existing firms go bankrupt. During a crisis, more firms than usual go out of business, which indicates that the sample will contain more firms with missing information these years. There is a risk that the analyses suffer from survivorship bias, i.e. that the results would be skewed because only the companies that are successful enough to survive until the end are included. However, we believe that this will not affect the analyses negatively. In fact, the sample becomes more conservative, which reduces the chance of observing exaggerated effects. As the firms with missing accounting values would be excluded from the dataset because of our other sample criteria, we chose not to exclude any firms with missing accounting values at this stage. Firms with missing company- and industry information, but containing accounting information, would be possible to include in the analyses, so we chose not to exclude these firms either.

Sample criteria 2: Years 1999-2010

The dataset originally consists of financial data for all Norwegian firms in the period 1992-2010. To make the study as comprehensive and consistent as possible, it would be preferable to include all the years available in the dataset. However, changed accounting practices in Norway from 01.01.1999 make this difficult. To ensure that the dataset is as consistent as possible, only information from the years 1999-2010 will be included in the sample. We believe this eleven-year period is sufficient to explore the impact of the financial crisis on the short-term stability of firms' competitive advantages.

Sample criteria 3: Include only AS, ASA, ANS and DA firms

Detailed information about the legal form of the firms is included in the dataset. In all, there are 42 different legal forms included in the dataset, many of which are not relevant for this study. We have therefore chosen to include only four different types of firms in our sample. The legal forms we are including are "joint-stock companies" (AS), "publicly traded companies" (ASA), "responsible corporations" (ANS) and "companies with apportioned liability" (DA). It was also considered to include Norwegian companies registered abroad (NUF), but due to the large amount of small companies using this legal form to save taxes, and as a cheap substitute for establishing an AS, we decided to exclude these. In addition, the dataset is rather incomplete with regards to such firms. Foundation (STI) is a legal form which includes a relatively large number of companies. However, these are excluded from the sample because they often are established for non-commercial purposes.

By excluding all legal forms other than AS, ASA, ANS and DA, many unwanted company forms are removed from the sample. At the same time the sample rate remains very high, because these four legal forms constitute a very large part of all firms in Norway. More specifically, in 2010, the sample consists of 205,379 firms after excluding all other legal forms than AS, ASA, ANS and DA. This represents 85.3 percent of all companies in the dataset.

Sample criteria 4: Exclude government owned firms

The firms in the dataset are divided into ten different ownership structures. Government owned companies will be excluded from the sample because such firms are not necessarily profit maximizing. When these companies are removed, the sample in 2010 consists of 202,644 firms. This is equivalent to 84.2 percent of the total dataset. The dataset is however somewhat incomplete with regards to the information about ownership structure. For the years of 2000-2002, the dataset does not include any information about the ownership structure of the firms. This makes it impossible to exclude the government owned companies from the dataset for these years. As the main focus of this study is to analyze the financial crisis of

2008, the variable is included as a sample criterion even though there are missing observations in the years 2000-2002.

Sample criteria 5: Sales income >= 10.0 MNOK

In order to exclude very small companies, as well as holding companies and other firms with very little or no income, firms with sales income lower than 10.0 MNOK is excluded. There is a large number of very small companies in Norway, and including all of these in the analysis would affect the results. Since we are adjusting the industry on a regular mean, the sample would be dominated by the very small companies. Equally important is the fact that our study is part of a larger research program, and will be used to complement other research projects at NHH. Thus, our analysis must be done within the same criteria as the other projects in the research program. We are using 2007 as a basis year for the 10.0 MNOK and adjust the cut-off limit according to inflation by using the consumer price index (CPI) for all the other years (appendix A). In the same way as for sample criteria 1, removing firms with sales income lower than 10.0 MNOK can cause survivorship bias. Firms that end up just below the limit will be removed from the sample, and this can lead to skewed results. However, we believe that this will contribute to more conservative results, which reduce the chance of observing exaggerated effects.

Sample criteria 6: Labor costs and social expenses >= 3.0 MNOK

In order to exclude holding companies and property companies, a cut-off on labor costs and social expenses will be set. The most preferable would be to set the cut-off based on the number of employees, but this is not possible due to incomplete reports of this variable in the dataset. Labor costs and social expenses are indirect measures of the number of employees, as companies with few employees will have low labor costs and social expenses. Companies with such costs lower than 3.0 MNOK are excluded from the sample. This sum is chosen in order for the sample to have the same criteria as other complimentary research projects at NHH. The 3.0 MNOK is in 2007-kroner, and is adjusted according to CPI for the other years to ensure that the samples are comparable (appendix A).

Sample criteria 7: Remove agricultural industries, finance and insurance, health industries and cultural industries.

There are some industries which would be suitable to exclude from the sample. We argue that it is desirable for the companies in the sample to be as "ordinary" as possible, in the way that they are competitive and profit maximizing, and that they have income statements and balance sheets that are easy to compare. Therefore, industries characterized by subsidies or tariff barriers, industries in close relation to the government and industries with special accounting standards will be excluded from the sample. These are mainly agriculture, finance and insurance, health and culture. There are different reasons for why these industries do not have a normal market mechanism. Norwegian agriculture is in large parts funded by subsidies; health industries are mainly run or controlled by the government; culture industries are somewhat connected to the state and financed by a combination of subsidies and volunteer work; and finance and insurance industries operate with different accounting treatment of revenues and profits than most other industries, and would thus be difficult to compare to the rest of the sample. Another note with regards to removing the industries of finance and insurance is that we wish to examine what effect the financial crisis had on non-financial industries. By including these industries, they would in large parts overshadow other interesting results. The financial aspect of the crisis will however indirectly be included, because leverage will be a focus area in the analysis. The industries with two-digit NACE-codes of 1, 2, 40, 65, 66, 67, 75, 80, 85, 90, 91, 92 and 99 (appendix B) will be removed from the dataset. This is also in accordance with the other research projects in the research program to which our thesis contributes.

Sample criteria 8: Exclude extreme observations based on standard deviations

After the first seven sample criteria are conducted, we will do some analyses without changing the sample any further. We will conduct descriptive analyses of profitability mean, median and standard deviation each year. This will be done for operating profit margin, ROA and sales growth (hypothesis 1, 2 and 3). When these analyses are taken one step further by exploring the top and bottom decile for operating profit margin and ROA, this sample criterion is conducted. Throughout the rest of the study, we will use mean to compute the competitive advantage variables. Mean can be a more vulnerable measure than median

because it is affected by a few very large or very small values which will be reflected in a skewed mean. Nevertheless, we choose to use mean instead of median because competitive advantage is defined by better returns than the industry mean.

The dataset includes firms that in different years have extreme observations. This may be due to various reasons; it may be random situations or special circumstances for specific companies. When using mean, these observations can interfere with the analysis, and thus affect the results. Extreme values will therefore be excluded from the sample for later analyses. This is done by only including companies with measurement variables within the range of +/- two standard deviations from the mean. The exclusion will be done for the variables operating profit margin and ROA. This operation is not done for growth rates, because this variable will not be used further in the analysis. We will then compute the competitive advantage variables and use them in the rest of the analyses. The sample size before and after the removal of outliers, is shown in a table in the summary paragraph below.

Summary

By using the eight sample criteria outlined above, the samples in the table on the next page were constructed for the years of 1999-2010. The rows N_{drmarg}, N_{ROA} and N_{growth} show the number of firms in the sample after criteria 1 through 7 have been conducted, i.e. sample with outliers. The rows N_{drmarg}* and N_{ROA}* show the number of firms in the sample after criteria 1 through 8 have been conducted, i.e. sample without outliers. As mentioned, this is not done for the growth variable because this variable is not used further in the analysis.

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
N_{drmarg}	13350	13770	14130	14382	13731	14479	15678	16762	18908	18131	17616	16719
N_{ROA}	13347	13769	14130	14382	13730	14477	15676	16762	18908	18131	16719	16719
$N_{growth*}$	**	11486	11768	12146	11975	12962	12962	14083	15963	15593	15210	15210
N_{drmarg}*	13188	13722	13964	14132	13576	14146	15442	16139	18735	18109	17356	16299
N_{ROA}*	13323	13572	13969	14237	13727	14471	15480	16481	18564	18129	16701	16701

***Since the data from 1998 is not used in this analysis, there is no sales growth rate in 1999.*

Despite the fact that a large proportion of the dataset is excluded from the sample, the sample sizes are still large. This is important for the analysis to generate results that can be generalized to the population, as well as securing that the analysis is as robust as possible (Saunders et al., 2009). We would like to stress that these selection criteria are set based on two factors; our own judgment of what will be the most suitable for us to answer our research question, as well as guidelines given to us by the research project that this study is a part of.

4.5 Data analysis

The SNF data files are large, and we will use the statistical software program SPSS to carry out our analyses. Our descripto-explanatory analysis will consist of various correlation analyses where the motive is to test our hypotheses and possibly reveal the stability of firms' competitive advantages. Correlation results will tell us something about how stable the competitive advantages are during crisis and which firm- and industry characteristics that can affect this stability. The way in which we are going to interpret the correlation results will be explained later on. The variables we choose are either already in the SNF files or easily computed prior to the analysis. Our results will be handled and presented in Windows Office Excel.

A preliminary step will be to determine which type of correlation analysis is the most appropriate. In the case where the data is normally distributed, the most instinctive type of choice will be the Pearson's correlation analysis, while a non-normal distribution of the data indicates the use of Spearman's rho as the suitable analysis. Our preparatory normality test showed that in the majority of the data sets the data was not normally distributed, and the proper test would therefore be Spearman's rho (appendix C). This test describes a non-linear relationship, and the correlation coefficient in a Spearman analysis can be between -1 and 1, i.e. positive or negative. We will not be able to conclude in cases where the results are not statistically significant.

Statistical significance means that it is unlikely that the result occurred by chance. The concept of significance in statistical correlation does not necessarily denote that something is important, as it may do in other contexts. It only signifies that something is probably not accidental. Statistical significance is a central concept in hypothesis testing. We operate our study with 99- and 95 percent confidence interval, but have chosen not to specifically distinguish between them in the presentation of the analysis. As long as the significance stays within a 95 percent confidence interval or higher, we will include the correlation coefficient in our results. Significance within a 99- and 95 percent confidence interval means that the probability of true value is 0.99 and 0.95, respectively. In other words, high significance indicates reliable results.

The final step of our analysis will be to interpret and explain the results. In order to do this, it will be decisive to understand the meaning of the correlation coefficient, and how it can help us draw conclusions. Generally explained, a Spearman correlation coefficient different from zero tells us how well the relationship between two variables can be described. The sign of the Spearman correlation coefficient tells us the direction of the relationship between *X* (the independent variable) and *Y* (the dependent variable). If *Y* increases when *X* increases, the Spearman correlation coefficient is positive. If *Y* declines when *X* increases, the Spearman correlation coefficient is negative. The Spearman correlation coefficient increases in magnitude as *X* and *Y* become closer to being perfect functions of each other.

In our study, the meaning of the Spearman correlation coefficient will be interpreted as follows: A positive correlation coefficient means that the firms which perform poorly one year perform poorly the next year, or that those which perform well one year perform well the next year; hence, more stable competitive advantages. A positive but lower correlation coefficient from one year to another indicates a lower probability of performing accordingly; hence, less stable competitive advantages. A negative correlation coefficient means that the firms which perform well/poorly one year perform, poorly/well the next year, respectively.

4.5.1 Variables

In order to answer our research question, we need to identify variables which can describe firm performance, or more exact, a firm's competitive advantage. The competitive advantage variable is defined by two different profitability measures, and we will describe them in the following.

Profitability measures and measures of competitive advantage

There are two types of profits that can be used to describe the profitability of a firm: accounting profits and economic profits. What distinguishes the one from the other is the presence of opportunity costs in the economic profits. It is difficult to collect information about opportunity costs in real life settings, and most researchers use accounting profits because of the availability and easy access to firms' accounting statements. This also applies to our situation, and all of our numbers will therefore be accountancy based. To support our choice, Lipczynski et al. (2005) found that accounting rates of return can be a useful indicator, even if it is not the absolute perfect one.

As mentioned earlier, we define competitive advantage as profitability above the industry mean. We will use operating profit margin (drmarg) and return on assets (ROA) as measures of profitability for each company, because the use of both will give us a complete overall picture. ROA takes into account the firm's assets, while operating profit margin focuses on the operation of the firm independent of the balance sheet. The use of the two will therefore

make us able to conclude on a broader scale, which will result in our findings being more robust. Finally, we will compute the variables into two competitive advantage variables (CA) by subtracting the industry mean (by 2-digit NACE code, 2002 revision. Appendix B). We present the formula for the calculation of the competitive advantage variable:

$$Competitive\ Advantage = Firm\ Profitability - Average\ Industry\ Profitability$$

It is important to remember that this variable implies both competitive advantages and disadvantages, i.e. that it may be both positive and negative. In accordance with the definition of competitive advantage, a firm has a competitive disadvantage if it has lower profitability than the industry mean. As we pointed out in chapter 1.3, this thesis investigates the stability of both competitive advantages and disadvantages, but we will refer to both of these as competitive advantage.

While the operating profit margin variable can be found directly in the SNF files, we will compute ROA by dividing net income by total assets:

$$ROA = \frac{Net\ Income}{Total\ Assets}$$

4.5.2 Splits

The two main variables, competitive advantage based on operating profit margin and competitive advantage based on ROA, will constitute the basis for the correlation analysis. We will investigate the competitive advantage variables with both 1-year and 2-year correlation analyses in SPSS, and we will perform the analyses for the entire samle in addition to various splits. The reason for the splits is to investigate if firm characteristics affect the performance of the firms during crisis. We will split the files on firm size, leverage and growth.

Size

When we perform the splits on firm size we use total sales revenue.

Leverage

Firm debt ratio is the last variable we have to compute, and we do this by subtracting the firms' equity ratio from 1:

$$Debt\ Ratio = 1 - Equity\ Ratio$$

The equity ratio is computed in the SNF data files as:

$$Equity\ ratio = \frac{Equity}{(Equity + Debt)}$$

Growth

In order to split the results on growth, we compute the following variable:

$$\frac{Salgsinn_t - Salgsinn_{t-1}}{Salgsinn_{t-1}}$$

'*Salgsinn'* stands for total sales revenue, and *t* denotes the specific year. This growth calculation gives us the growth from the previous year to the current; i.e that the growth rate in 2007 means the growth that took place from 2006 to 2007.

The splits will be divided into ten percentiles each for size, leverage and growth. We will correlate the competitive advantage variable of firms over 1- and 2-years within the same percentile.

5. Hypotheses

5.1 Introduction

In this section we will present some hypotheses that can enlighten our main research question; how a crisis will affect the short-term stability of the relative performance between firms during crisis. First, there will be a few hypotheses regarding the impact of the financial crisis of 2008 on firm performance, before several hypotheses regarding the short-term stability of competitive advantages during recessions are presented. These will also shed light on the effect of different firm characteristics.

5.2 Firm performance during the financial crisis of 2008

The financial crisis of 2008 affected large parts of the economy. Demand from both households and businesses were reduced and foreign trade declined, causing production to decrease; the demand for labor declined and the unemployment rate in most countries increased significantly (Statistics Norway, 2009; Brealey et al., 2012). In order to explore how firm performance was affected by the crisis, we will analyze the performance measures throughout the period of 1999-2010. We will analyze profitability by exploring the mean and median of the two profitability measures operating profit margin and return on assets, and the volatility will be analyzed by exploring the standard deviation of the same variables. Geroski and Gregg (1996, 1997) found that average profit margins varied procyclically, and that the standard deviation of profit margins increased during recessions. This indicates that the corporate profitability declines and that volatility rises during times of recession, and this is the basis for our first two hypotheses:

Hypothesis 1: Operating profit margins and return on assets (ROA) declined during the financial crisis of 2008

Hypothesis 2: The standard deviation of operating profit margins and ROA increased during the financial crisis of 2008.

A reduction in demand was one of the main effects of the financial crisis of 2008. It is interesting to explore what happened to this variable for Norwegian firms, and an analysis of this will give further insight to the impact of the financial crisis on firm performance. Sales growth is a measure that can serve as an indicator of reduction in demand. This variable will be analyzed in a similar way as operating profit margins and return on assets. The literature review pointed out that demand declines during recessions, which is the basis of our next hypothesis:

Hypothesis 3: Average sales growth declined during the financial crisis of 2008.

It would be interesting to explore what effects the crisis had on firms in different performance percentiles of the sample. There exists some literature regarding this. One of Knudsen's (2011) findings is that firms with high operating profits prior to the 2008 financial crisis are less vulnerable to the recession than firms with low pre-recession operating profits. This coincides with earlier empirical findings of the survival of more profitable firms, while the least profitable firms are forced out of business during recessions (Aw et al., 2001; Baily et al., 1992; Bellone et al., 2008; Carreira & Teixeira, 2011; Griliches & Regev, 1995), and the classical selection argument stating that the least productive firms leave the market, while the most productive ones survive (Alchian, 1950; Friedman, 1953). Geroski and Gregg (1996, 1997) studied the differences between the highest and lowest quartile based on profitability, and found that margins fell further for firms within the lower quartile than for firms within the top quartile. This indicates that it is the less profitable firms that are the most severely affected during recessions, and it is reasonable to assume that this group of firms also experienced a larger increase in volatility during the crisis. This gives grounds for the next hypotheses:

Hypothesis 4: The average performance of the lowest performing firms falls more during crisis than the average performance of the highest performing firms

Hypothesis 5: The standard deviation of operating profit margins and ROA during crisis is higher for the lowest performing firms than for the highest performing firms.

5.3 Competitive advantage during the financial crisis of 2008

The main purpose of this thesis is to explore how business cycles, and recessions specifically, affect the short-term stability of firms' competitive advantages. It is known that average performance declines and the volatility increases during recessions (Geroski & Gregg, 1997), but there is no literature about what happens to the relative performance of firms. What happens to the competitive advantages during crises? As this is a subject that has not been studied, our hypotheses are based on literature on general performance and profitability during recessions, as well as what researchers find interesting to examine. Since firm profitability decreases and market volatility increases, it is reasonable to assume that it becomes more difficult for companies to maintain their competitive advantages during recessions. Thus, our hypothesis is that competitive advantages become more unstable during times of crisis:

Hypothesis 6: During crisis, firms' competitive advantages become less stable.

5.4 Effects of firm characteristics on competitive advantage: Firm size

Moen (1999) explains that there is an expected link between firm size and competitive advantage. Knudsen (2011) finds that larger firms are more severely affected by the financial crisis of 2008 because they are rigid and less flexible than smaller firms. In addition, since large firms are more export intensive and more often produce durable goods, it is reasonable to assume that large firms are negatively affected by the financial crisis of 2008. However, the results of several other studies contradict Knudsen (Geroski & Gregg, 1997; Gertler & Gilchrist, 1994 and Lang & Nakamura, 1995). These studies show that small firms are more affected by recessions than larger firms. Due to easier access to resources and external finance and better abilities to achieve economies of scale, larger firms are assumed to be more competitive than small firms, and thus better equipped to handle a crisis. Other factors such as

the nature of the crisis, level of exports, the nature of the product and the composition of industries may affect the results. We formulate our next hypothesis:

Hypothesis 7: During crisis, small firms' competitive advantages become less stable than for large firms.

5.5 Effects of firm characteristics on competitive advantage: Financial leverage

In contrast to Miller and Modigliani's (1958) theorem stating that the value of a firm is unaffected by its choice of capital structure, most studies of the relationship between capital structure and performance finds evidence of capital structure affecting the performance of firms during recessions. Geroski and Gregg (1993) found that highly leveraged firms were more severely affected by the 1991-92 recession than firms with lower debt ratios, while Opler and Titman (1994) and Campello and Fluck (2006) found that firms with high debt levels lost more market shares, and experienced higher drops in operating profits during economic downturns than less leveraged firms. Knudsen (2011) also found that firms with high pre-recession debt-ratio were more vulnerable to recessions than their counterparts with lower debt levels. The literature is unambiguous in the findings of high-leveraged firms being more severely hit by crisis, and this gives ground for the next hypothesis:

Hypothesis 8: During crisis, high-leveraged firms' competitive advantages become less stable than for low-leveraged firms.

5.6 Effects of firm characteristics on competitive advantage: Growth rates

Growth rates are complex and non-linear variables. This makes it interesting to explore the effect on firms' competitive advantages from different angles. First, the differences between firms with high and firms with low growth rates will be analyzed. Next, differences between the firms in the interior of the growth range will be examined up against those with high and

low growth rates respectively. This will give a comprehensive insight to the impact of different growth rates on firms' competitive advantages during recessions.

Geroski and Gregg (1996) found that firms which experienced unusually high growth rates prior to the recession often proved to be particularly vulnerable to recessionary pressure. Lien (2010) found the same – he explains that companies experiencing high growth late in a boom will experience a large drop in demand when a crisis hits. This is due to a large share of marginal customers. Knudsen's (2011) findings coincide with this; he found that high pre-recession growth increased the probability of a firm being severely affected by the recession. Nevertheless, firms' profitability and growth during recessions is an extensive and complex subject. Higson et al. (2004) looked at differences between high growth and medium growth firms, and found that the effects of aggregate shocks are more pronounced for firms in the middle range of growth. Rapidly growing and rapidly declining firms were found to be less sensitive to aggregate shocks than firms in the interior of the growth range. However, from literature of firm performance during recessions, it is reasonable to assume that firms with low growth rates are more severely hit by a crisis than those in the interior range of growth. This is because firms with low profitability often have negative growth rates, and that this effect probably gets worse when crisis hits (Aw et al., 2001; Baily et al., 1992; Bellone et al., 2008; Carreira & Teixeira, 2011; Griliches & Regev, 1995). To sum up, most of the literature finds that high-growth firms are experiencing the largest fall in demand for their products during early stages of a crisis, while the firms with low growth are severely affected because of their poor initial performance. This means that the high-growth firms are more severely affected than the medium- and low-growth firms, and that the low growth firms are more severely affected than the medium growth firms. This is the basis of our three hypotheses regarding growth rates:

Hypothesis 9: During crisis, the competitive advantages of firms with high sales growth become less stable than for firms with low sales growth.

Hypothesis 10: During crisis, the competitive advantages of firms with high sales growth become less stable than for firms with medium sales growth.

Hypothesis 11: During crisis, the competitive advantages of firms with low sales growth become less stable than for firms with medium sales growth.

6. Analysis

6.1 Introduction

This section holds all the analyses of our study. We will focus mainly on presenting the results, while the next section (chapter 7) will contain our discussion and implications of the findings. First, we will present analyses of how the financial crisis of 2008 affected the profitability of Norwegian firms. Next, analyses of the financial crisis' effect on the stability of the firms' competitive advantages will be presented. We will describe the correlations with a solidus to illustrate which years have been correlated with each other; e.g. the 1-year correlation between the competitive advantage in 2006 and the competitive advantage in 2007 will be written as 06/07. Finally, we will present analyses on how different firm characteristics can contribute to how the competitive advantages and their stability are affected during crisis.

6.2 Analyses and hypotheses testing

6.2.1 Firm performance during the financial crisis of 2008

Our first hypotheses concern the impact of the financial crisis of 2008 on corporate profitability, and will provide insight into how the crisis affected the profitability of Norwegian companies. Existing literature (Geroski & Gregg, 1997) predicts that profit margins will decline during recessions, and this is the basis for our first hypothesis:

Hypothesis 1: Operating profit margins (drmarg) and return on assets (ROA) declined during the financial crisis of 2008

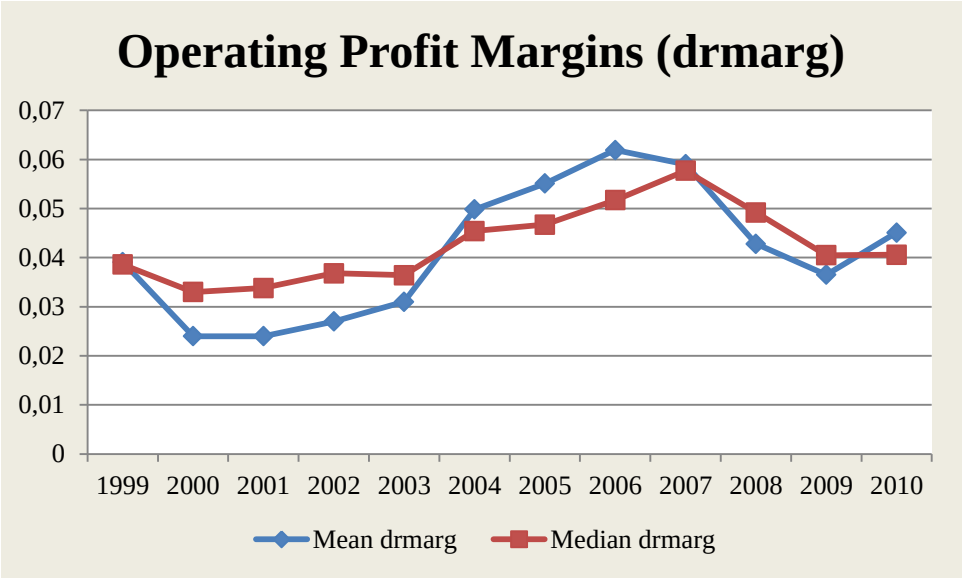

FIGURE 1: OPERATING PROFIT MARGINS (DRMARG) FROM 1999 - 2010 (MEAN AND MEDIAN)

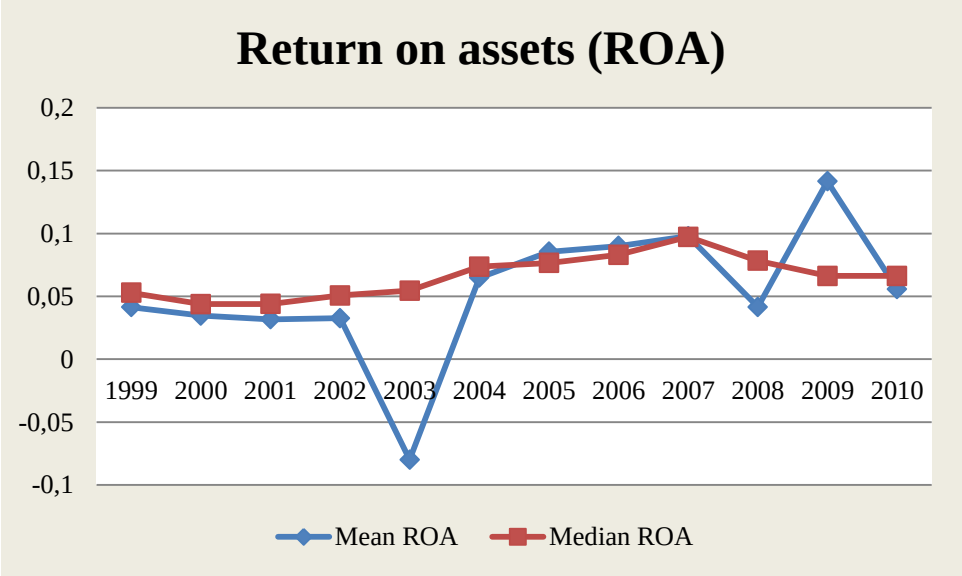

FIGURE 2: RETURN ON ASSETS (ROA) FROM 1999 - 2010 (MEAN AND MEDIAN)

The graphs have quite different courses. As for the effect of the financial crisis of 2008, both graphs show a decline in profitability during this period. The effect is quite severe for both operating profit margin and ROA. Operating profit margins experience a significant decline

from 2006-2009. The average operating profit margin falls by over 40 percent; from 0.0619 in 2006 to 0.0365 in 2009. The median follows a year after with a fall from 0.0577 in 2007 to 0.0406 in 2010; a fall by almost 30 percent. This provides evidence of the financial crisis' negative effect on corporate profitability. The course of the mean and median for operating profit margins resemble each other, but the graph shows that the mean has consistently larger fluctuations than the median. We see that the curves intersect in 2003 and that the mean is larger than the median during the boom, but that the curves intersect again in 2007 when the financial crisis first appears, making the mean lower than the median. This is because the mean is more vulnerable than the median, and is more affected by those firms that experience either very low profitability in recessions or very high profitability in booms than the median.

Return on assets also experiences a decline during the financial crisis of 2008, but the graph shows that the effect strikes a year later than for operating profit margins. The mean shows a steep, short term effect from 2007-2008; from 0.0979 to 0.0415, which is equivalent to almost a 60 percent fall. The median shows a more conservative decline that goes from 0.0973 in 2007 to 0.0663 in 2009 and 2010. This equals a 32 percent decline. The effect is thus more severe for return on assets than for operating profit margins. Both graphs support the hypothesis that profitability, based on operating profit margins and return on assets, declined during the financial crisis of 2008.

It is interesting to take a closer look at the differences between the mean and the median for return on assets. While the median shows quite an even course with a stable growth until 2007, and then a stable decline from 2007 onwards, the mean shows a rather unstable course with significant downturns and peaks. In 2003, the average ROA experiences an extreme fall, down to -0.08. This is peculiar because 2003 is a year without any well-known market fluctuations. In 2009, there is a large peak in the average ROA which also seems strange, since it is so close to the financial crisis of 2008. The fact that the average firm is doing better in 2009 than in the boom years of 2005 and 2006 seems peculiar. In order to ensure that it is not typing errors or other analytical errors that cause these results, this analysis has been conducted twice at different times. The results are the same, which implies that there must be other reasons for these results. There might be errors in the dataset, but the most likely explanation is that there are some firms that have extraordinary results these years which

affect the results. This demonstrates the weakness of using mean as a measure; extreme observations will affect the results so that they do not convey an accurate picture of the situation for most observations. However, mean is still used to create our main variable (CA) throughout the rest of the analyses in this thesis. This is in accordance with the definition of competitive advantage, which is based on industry average returns. In order to reduce the possibility that the vulnerability of the mean will affect our analyses, observations that are more than +/- two standard deviations from the mean are removed as explained in chapter 4.4.2. This operation seems to be sufficient. Appendix D consists of graphs that confirm this. The graphs show that the mean is no longer affected by extreme observations after outliers +/- two standard deviations from the mean are removed. The mean and the median now have quite similar courses. This justifies our choice of using mean as the basis for our main variable, CA.

During recessions, markets become less secure and predictable. It becomes more difficult for firms to maintain their profitability, and because some companies are more severely hit than others, there are larger differences in profitability. This will cause an increase in the standard deviation of profit margins, which is the basis for our second hypothesis:

> *Hypothesis 2: The standard deviation of operating profit margins and ROA increased during the financial crisis of 2008.*

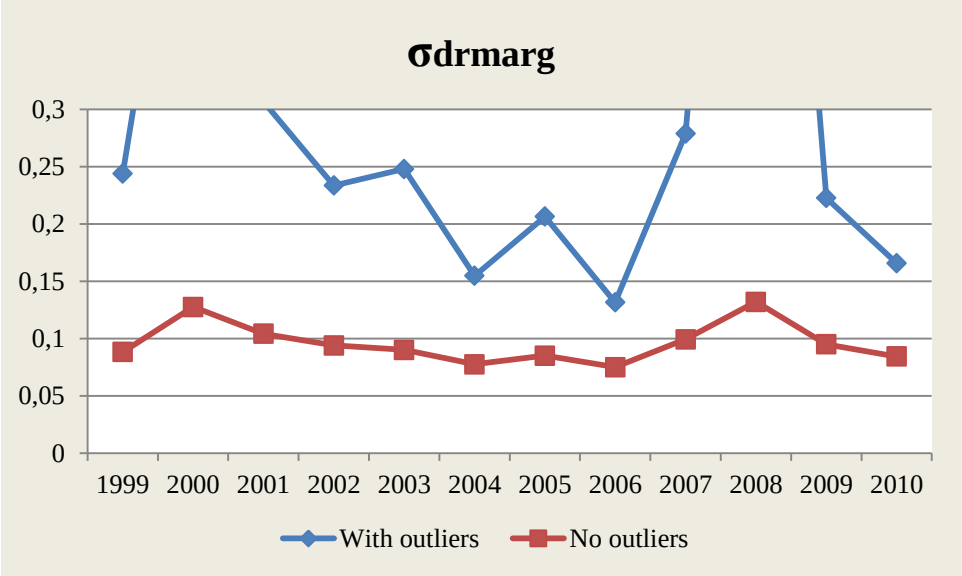

FIGURE 3: STANDARD DEVIAION OF OPERATING PROFIT MARGINS (DRMARG) 1999 – 2010

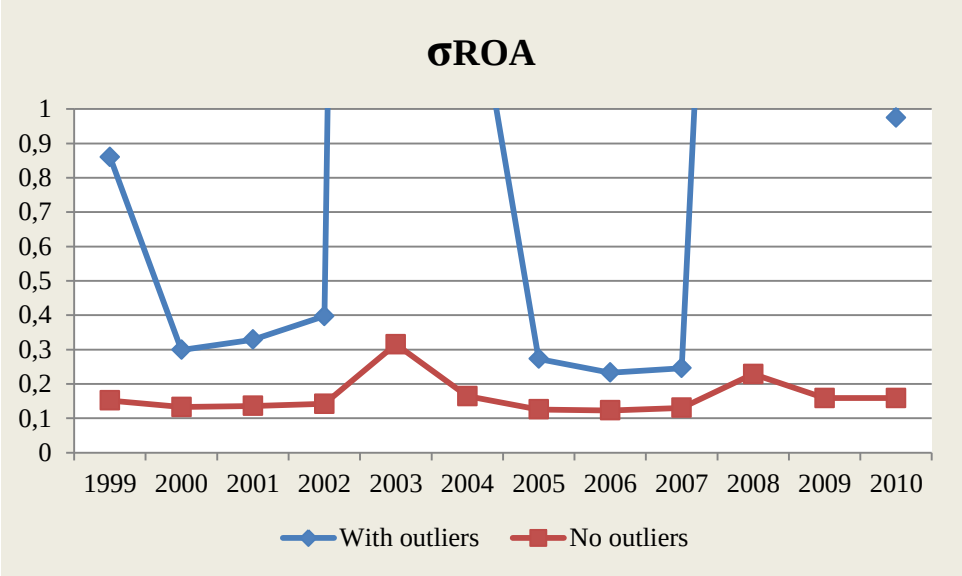

FIGURE 4: STANDARD DEVIATION OF RETURN ON ASSETS (ROA) 1999 - 2010

The graphs show the standard deviation of operating profit margins and return on assets both before (blue line) and after (red line) outliers have been removed according to sample criteria 8. The blue line thus shows the effects for the sample only after sample criteria 1-7 have been conducted, while the red line illustrates the effect for the sample used for the further analyses in this thesis. We have decided to set the maximum limit of the y-axes to 0.3 for operating profit margin and 1.0 for ROA, to emphasize the effects of the crisis when outliers have been removed. If we were to show the entire range of the blue curve, the red curve would look

completely flat. We thus observe that the two curves have very different courses, and this is due to the extreme observations that affect the analysis before outliers have been removed as described above. Before the removal of outliers, the standard deviation of operating profit margins experiences an increase in two periods of time; first during the dot-com crisis of 2000-2001 and again during the financial crisis of 2008. The latter increase is steeper and somewhat longer lasting than the first. During the financial crisis of 2008, the standard deviation increases from 2006-2008. The increase is rather large, from 0.1316 to 0.9835. This is equivalent to a seven-fold increase, and provides clear evidence of markets becoming more unpredictable during recessions. Nevertheless, this peak is affected by a few extreme observations. After these outliers have been removed, the standard deviation of operating profit margins experiences a rather even course without any prominent peaks or downturns. However, like our analysis before removal of outliers, this analysis shows an increase in standard deviation during the financial crisis; from 0.075 in 2006 to 0.132 in 2008. This is equivalent to a 76 percent increase. In other words, we see that the Norwegian market became more volatile during the crisis, also when the extreme observations have been removed.

The standard deviation of return on assets has a similar progress as the one for operating profit margins. Before outliers are removed, two periods of time show a large increase in standard deviation. This is from 2002-2003 and from 2007-2009. Return on assets thus seems to be affected by recessions one year later than operating profit margins are affected. During the financial crisis of 2008, the graph shows a steep and significant increase in the standard deviation of return on assets, from 0.2475 in 2007 to 10.6648 in 2009; a 43-fold increase. However, this effect is caused by a few extreme observations. After these have been removed, it becomes clearer what effects the crisis had on the ordinary Norwegian company. The numbers show that there is an increase in standard deviation also without outliers; from 0.123 in 2006 to 0.229 in 2009. This is equivalent to an increase of 86 percent, and it confirms that the Norwegian market became more volatile during the financial crisis of 2008. Both graphs support our hypothesis of increasing standard deviations of profitability during the financial crisis of 2008.

An investigation of average sales growth will give a further insight into the effects of the financial crisis of 2008. During recessions, demands decline and this will lead to a decline in sales growth. This is the basis for our third hypothesis:

Hypothesis 3: Average sales growth declined during the financial crisis of 2008.

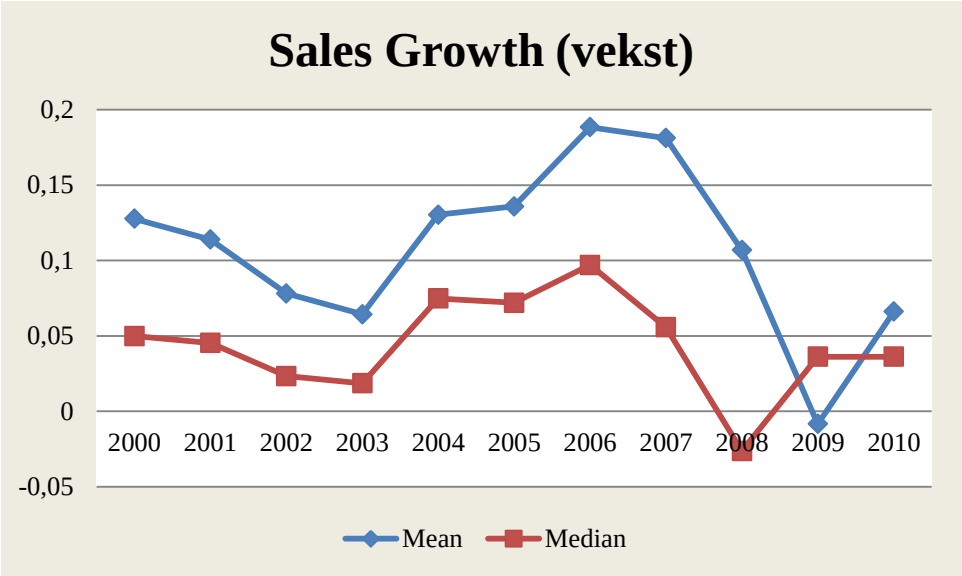

FIGURE 5: SALES GROWTH (VEKST) 1999 - 2010 (MEAN AND MEDIAN)

The graph shows a steady and significant increase in average sales growth from 2003 to 2006. This is what we would expect in a boom. From 2006 to 2009, the graph shows a steep and significant drop in the average sales growth. From 0.1883 in 2006, it falls down to -0.0083 in 2009. The median also experiences a steep decline, from 0.097 in 2006 to -0.0263 in 2008. This illustrates the effect of the financial crisis on demand, and emphasizes the crisis' effect on corporate performance and profitability. The graph supports the hypothesis of average sales growth declining during the financial crisis of 2008.

We want to take a closer look on how different firms are affected by recessions, and more specifically if there is a difference in the impact of the 2008 crisis on the 10 percent of the firms with the highest average performance, versus the 10 percent with the lowest average

performance. The literature review showed that firms with high operating profits prior to the recession are less vulnerable to the recession than firms with low pre-recession operating profits (Knudsen, 2011; Geroski & Gregg, 1996, 1997). It is reasonable to assume that the firms that are more vulnerable to a recession also experience the largest increase in volatility. This gave grounds for the next hypotheses:

Hypothesis 4: The average performance of the lowest performing firms falls more during crisis than the average performance of the highest performing firms

Hypothesis 5: The standard deviation of operating profit margins and ROA during crisis is higher for the lowest performing firms than for the highest performing firms.

The following analyses are conducted after outliers have been removed in accordance with sample criteria 8. The graphs in appendix D show that when outliers have been removed, there is little difference between the mean and the median, which affirms that extreme observations no longer affect the mean. This justifies our use of mean throughout the rest of the study. First, we explore the average operating profit margin:

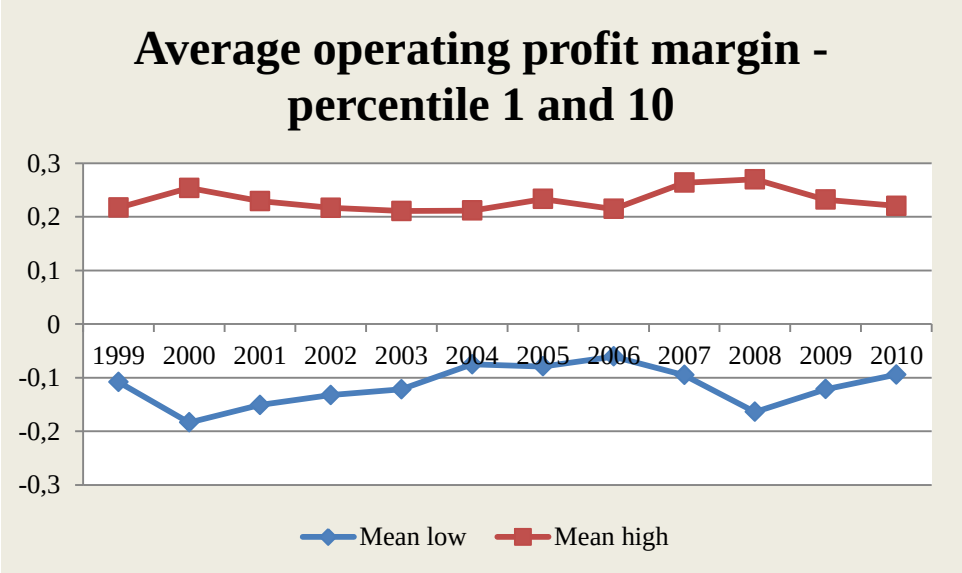

FIGURE 6: AVERAGE OPERATING PROFIT MARGIN - PERCENTILE 1 AND 10

We observe that the average operating profit margin of the highest percentile increases prior to recessions; both before the dot com crisis of 2000 and the financial crisis of 2008. In contrast, the average operating profit margin of the lowest percentile decreases just before and during the same two crises. During normal economy levels, the average operating profit margin of the high performers stays on a relatively stable level around 0.21. The low-performing firms fluctuate more, and it seems to be a trend that their average operating profit margin increases when it decreases for the high-performers. It also increases steadily in normal economy years. As for the financial crisis of 2008, the graph shows that the firms in the bottom decile experience a decline from -0.0952 in 2006 to -0.1639 in 2008; a fall of 72 percent. The firms in the top decile experienced a decline from 0.2699 in 2008 to 0.2202 in 2010. This is equivalent to 18 percent, and shows that the low-performers experience a more severe fall in profitability than the high-performers, which supports our hypothesis.

Next, we analyze the average ROA:

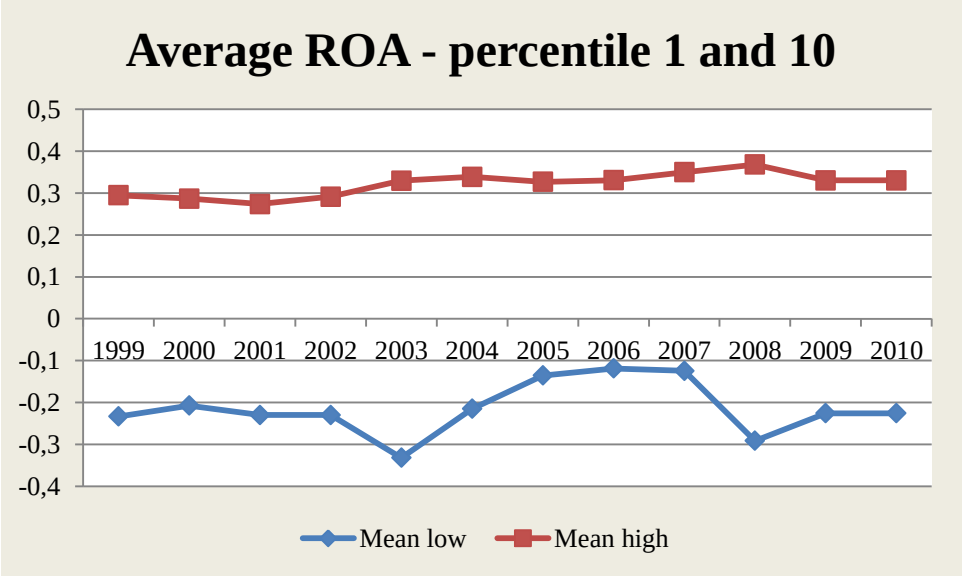

FIGURE 7: AVERAGE ROA - PERCENTILE 1 AND 10

The average ROA for the 10 percent highest performers stays around a 0.3-0.4 level, while it fluctuates more for the 10 percent lowest performers. We observe a decrease before and during crisis years for the bottom decile; from -0.1185 in 2006 to -0.2914 in 2008. This is equivalent to a fall of 145 percent. The top decile experiences a shorter and much less severe decline; from 0.3682 in 2008 to 0.3302 in 2009. This is equivalent to 10.3 percent. In addition, the mean for the low performers experience a larger fall in 2002-2003, before it increases until the financial crisis of 2008. It is clear that the 10 percent firms with the lowest profitability are more severely affected by the crisis than the 10 percent firms with the highest profitability. This is in accordance with our hypothesis.

Next, we compare the standard deviation of the two key financial ratios for the two percentiles. First, we present the standard deviation of the operating profit margin in the graph below:

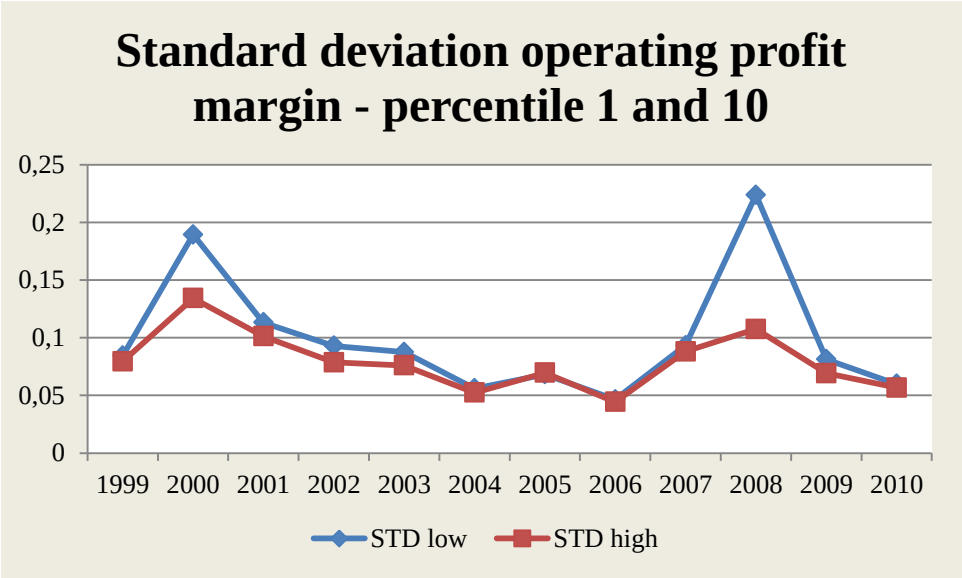

FIGURE 8: STANDARD DEVIATION OF OPERATING PROFIT MARGIN - PERCENTILE 1 AND 10

The standard deviations are almost identical for the two percentiles, except for in the crisis years of 2000 and 2008. During both crises, the standard deviation for the 10 percent lowest firms in terms of operating profit margin peaks. The gap is 0.055 in 2000 and 0.116 in 2008.

The graph clearly shows that the standard deviation increases more during crisis for the bottom decile in terms of profitability than for the top decile. In other words, those which perform poorly experience a greater volatility during recessions than those which perform in the top of the sample. This is in accordance with our hypothesis.

For the standard deviation of ROA we present the graph below:

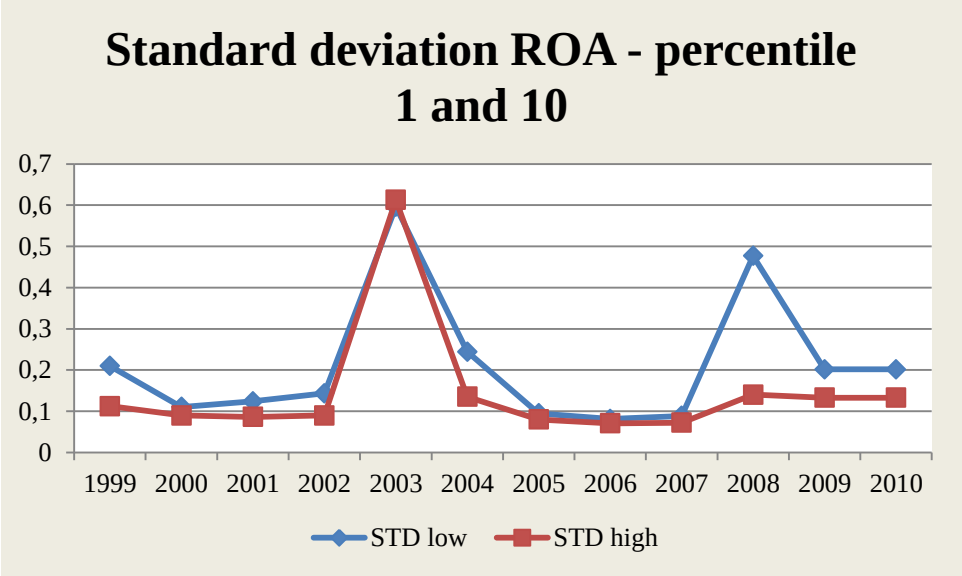

FIGURE 9: STANDARD DEVIATION OF ROA - PERCENTILE 1 AND 10

The curves overlap during the entire research period, except for in the crisis year of 2008. This year, the standard deviation of the low performers is 0.34 higher than the standard deviation of the high performers. This shows that poorly performing firms experience a larger increase in volatility during recessions than firms that perform well, and this supports our hypothesis. Because of our sampling criteria, it is reasonable to assume that these findings are conservative and that the effects are somewhat larger due to the survivorship bias.

6.2.2 Competitive advantage during the financial crisis of 2008

The purpose of this thesis is to take a closer look on what effects a financial crisis has on the short-term stability of firms' competitive advantages. As this is a subject that has not been studied before, our hypotheses are formulated from literature about general performance and profitability during recessions, as well as from what we as researchers find interesting to examine.

First, we will analyze the sample as a whole. This will give us an indication of how the crisis affected the competitive advantages of Norwegian firms in general. The basis for our first hypothesis regarding competitive advantage is that during recessions, markets become more volatile and it becomes more difficult for companies to maintain their competitive advantages. This is because recessions affect the value of resources and change the rules of the game. This implies that the competitive advantages of some firms might lose its value, while other firms experience a reduction of their competitive disadvantage.

Hypothesis 6: During crisis, firms' competitive advantages become less stable.

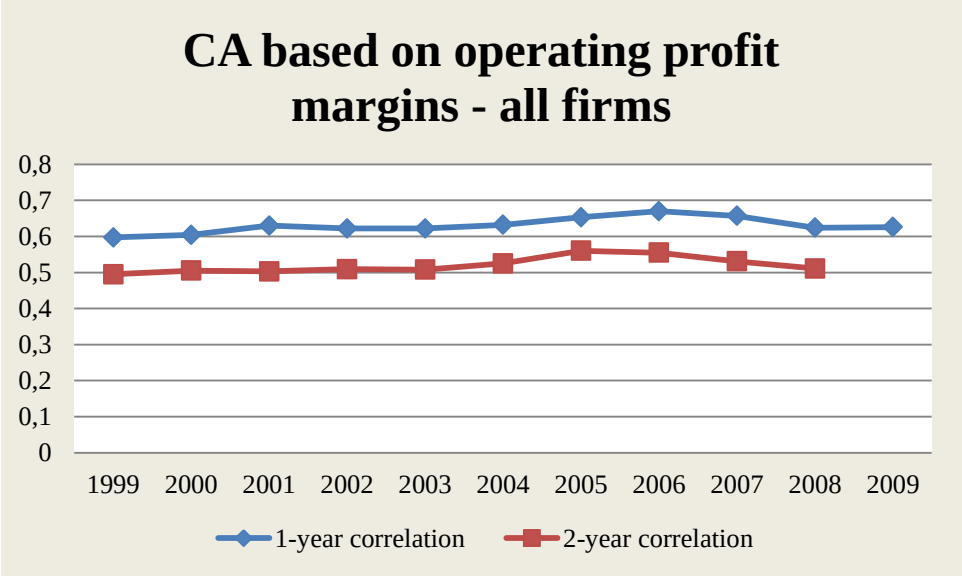

FIGURE 10: CORRELATION OF COMPETITIVE ADVANTAGE – ALL FIRMS (BY OPERATING PROFIT MARGIN)

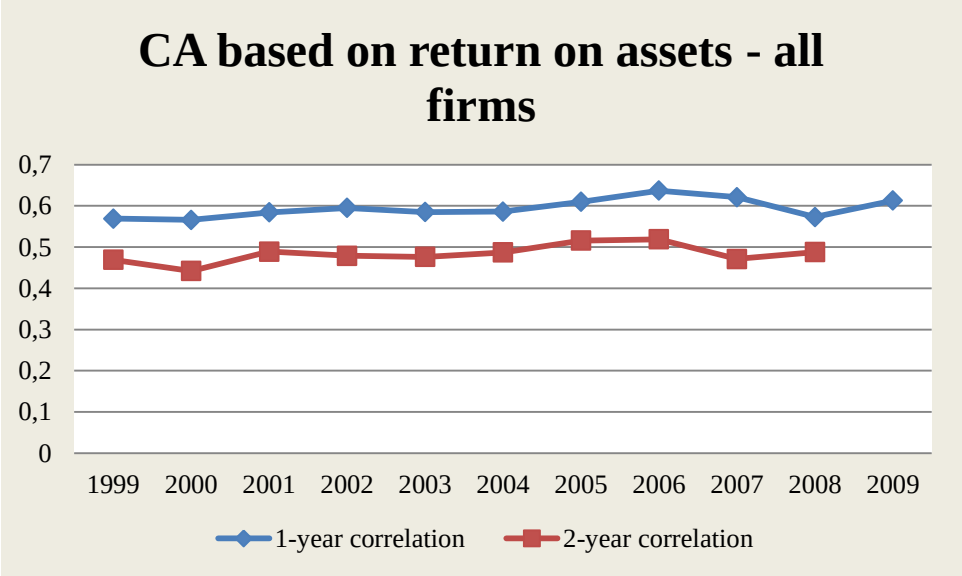

FIGURE 11: CORRELATION OF COMPETITIVE ADVANTAGE – ALL FIRMS (BY ROA)

The graph illustrating correlations of competitive advantages based on operating profit margins shows a quite stable progress over the entire time period of 1999-2009. However, the graph shows a slight increase in 1-year correlation from 04/05 to 06/07 and in 2-year correlation from 04/06 to 05/07. These periods are both economic booms. When crisis hits, the graph shows a small decline in both 1- and 2-year correlations of competitive advantage, from 0.67 in the 06/07 correlation to 0.624 in the 08/09 correlation, and from 0.56 in the 05/07 correlation to 0.531 in the 07/09 correlation. This is equivalent to a 6.8 percent and 5.2 percent decline respectively, which indicates that the competitive advantages become slightly less stable during the financial crisis. The effect is rather small, but we consider the graph to support our hypothesis, as there is an increase during the boom and a decrease during the crisis.

The graph illustrating correlation of competitive advantage based on return on assets shows a similar progress as the operating profit margin-based one, with few peaks or downturns. Also, this graph shows a small increase before the graph decreases during the crisis. The effect seems to happen one year later for return on assets than for operating profit margins when we look at the 2-year correlation; the decline for ROA takes place between 06/08 and 07/09, while it starts to decline from the 05/07 correlation for the operating profit margin-based. The fall in correlation is slightly larger for ROA than for operating profit margins; the 1-year

correlation falls from 0.637 in 06/07 to 0.573 (9.5 percent) in 08/09, and the 2-year correlation falls from 0.519 in 06/08 to 0.488 (6 percent) in 08/10. Even though the effect for ROA is small, we consider the results to support our hypothesis because there is a fall during crisis. The graph of ROA also shows a drop for 2-year correlation during the dot-com crisis in 2000, which again indicates that the competitive advantages become less stable during crises.

We will now take the analysis one step further by splitting the results by different firm characteristics. This will give us an insight into which firm characteristics that affect how stable firms' competitive advantages are during crisis. The characteristics analyzed in this thesis are firm size, leverage and growth rate.

6.2.3 Effects of firm characteristics on competitive advantage: Firm size

The literature on how firm size affects the competitive advantages is somewhat bifurcated. We base our hypothesis on the literature which states that small firms are more affected during recessions than large firms (Geroski & Gregg, 1997; Gertler & Gilchrist, 1994 and Lang & Nakamura, 1995). In other words, we should expect to see a larger decline in correlation for small firms, and this gives grounds for the hypothesis:

> *Hypothesis 7: During crisis, small firms' competitive advantages become less stable than for large firms.*

The graphs compare the correlation of the competitive advantage variable for the smallest and the largest firms in the sample. The sample is divided into deciles; the blue line represents the 10 percent smallest firms measured by sales revenue, and the red line represents the 10 percent largest firms measured by sales revenue.

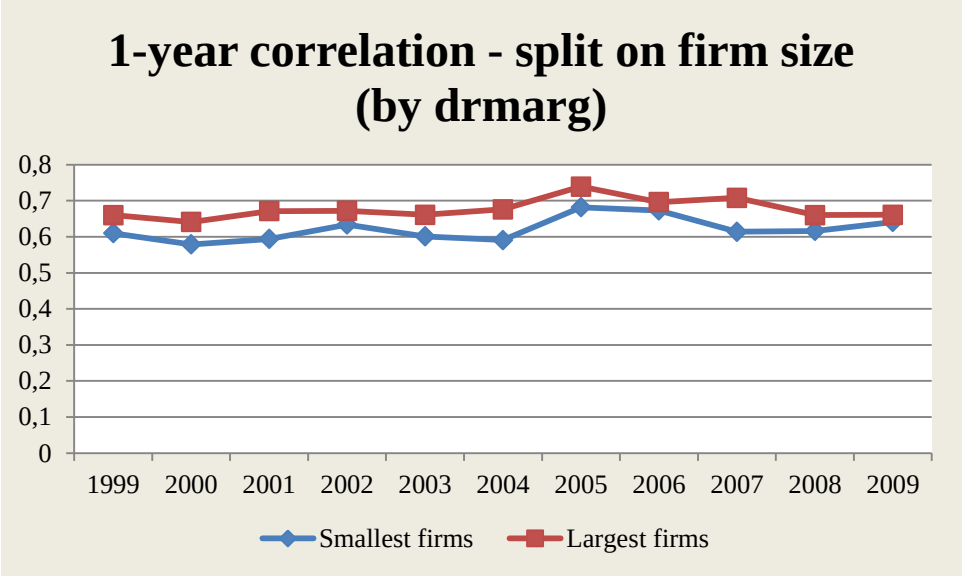

FIGURE 12: 1-YEAR CORRELATION: SPLIT ON FIRM SIZE (BY DRMARG)

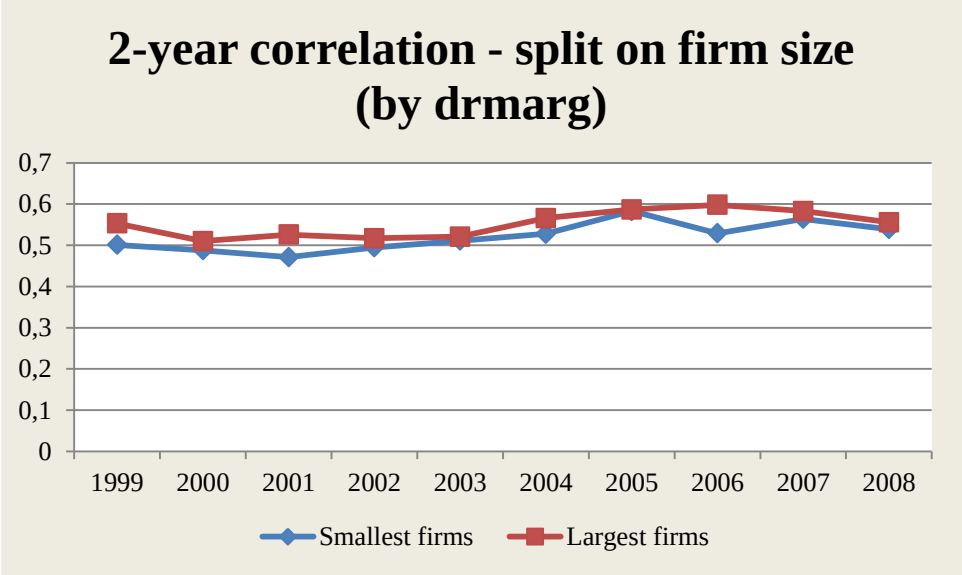

FIGURE 13: 2-YEAR CORRELATION: SPLIT ON FIRM SIZE (BY DRMARG)

First, we will present the results for operating profit margins (drmarg). For the 1-year correlation of the competitive advantage variable, there is a decline from the 06/07 correlation to the 07/08 one, but a small increase from the 07/08 correlation to the 08/09 one for the smallest firms. The correlation for the largest firms behaves in a reversed proportional manner: it increases slightly from the 06/07 correlation to the 07/08 one, but declines from the 07/08 correlation to the 08/09 one. This indicates that the effect of the crisis hit large firms

one year after it hit small firms. The size of each decline is -0.059 for the smallest firms and -0.048 for the largest firms. This is equivalent to an 8.8 and 6.8 percent decline for small and large firms respectively. The results support our hypothesis of competitive advantages being less stable for small firms than for large firms during recessions.

The graph of the 2-year correlation shows that correlation declines from 0.583 in 05/07 to 0.529 in 06/08 for small firms. This is equivalent to a fall of 9.3 percent. The graph shows that the correlation for large firms increases in this period, but it then declines from 0.598 in 06/08 to 0.556 in 08/10; a fall of 7 percent. It is the correlation of 06/08 that illustrates the effect of the crisis the best, and with regards to the hypothesis, it is expected that the correlation for small firms declines more than the correlation for large firms. Focusing on this specific period, the graph shows that while the 2-year correlation for small firms decreases, the one for large firms increases. This supports our hypothesis. However, it seems that the effect comes one year later for the large firms. Taking this into account, small firms still experience a larger fall (9.3 percent) than large firms (7 percent). This also supports our hypothesis.

Next, we have the results for the correlation of the competitive advantage variable computed from return on assets (ROA). The results are the following:

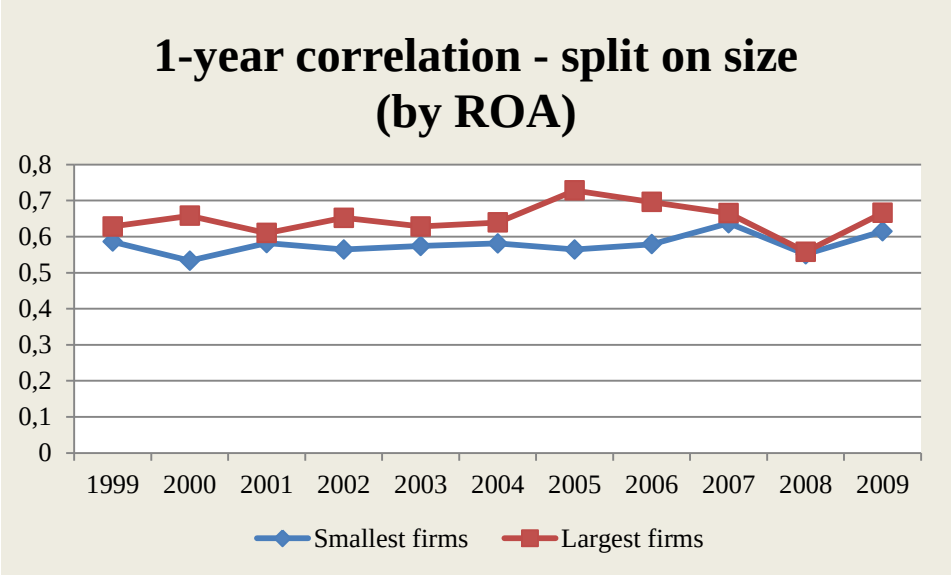

FIGURE 14: 1-YEAR CORRELATION: SPLIT ON FIRM SIZE (BY ROA)

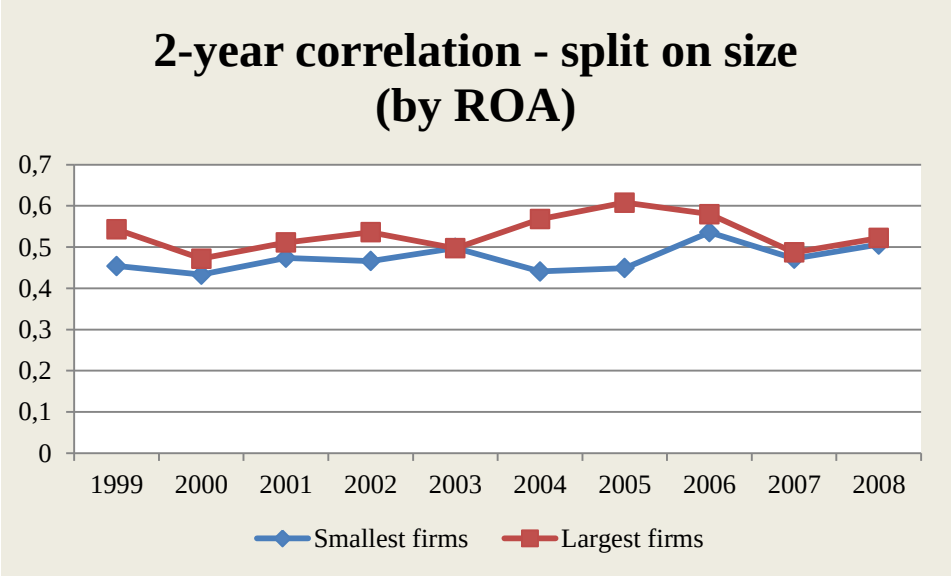

FIGURE 15: 2-YEAR CORRELATION: SPLIT ON FIRM SIZE (BY ROA)

The graph shows that the 1-year correlation for the largest firms declines from 0.728 in 05/06 to 0.558 in 08/09. The decline is steepest from 07/08 to 08/09; a fall of 16 percent. This is one year after the financial crisis hit. For the smallest firms, the correlation increases between the years of 05/06 and 07/08, and declines from 0.637 in the 07/08 correlation to 0.551 in the 08/09 one. This is a fall of 13 percent. For ROA, it thus seems that the large firms experience the largest fall in 1-year correlations. This indicates that it is the large firms that experience the most unstable competitive advantages during crisis, which contradicts our hypothesis. The 2-year correlation moves in the exact same way. While the large firms experience a decrease in correlations from 0.608 in 05/07 to 0.487 in 07/09, a fall of almost 20 percent, the small firms only experience a decrease in correlations from 0.536 in 06/08 to 0.472 in 07/09, a fall of almost 12 percent. Also this result contradicts our hypothesis. All in all, the results for return on assets do not support our hypothesis.

6.2.4 Effects of firm characteristics on competitive advantage: Financial leverage

Most of the recent studies of the relationship between capital structure and performance find evidence of capital structure affecting the performance of firms during recessions. The literature is unambiguous about that high leveraged firms are more severely affected during recessions than firms with low debt ratios. This tells us that we should expect to see a larger

drop in correlation of the competitive advantage variable for firms with high leverage. The general findings let us constitute the following hypothesis:

> *Hypothesis 8*: *During crisis, high-leveraged firms' competitive advantages become less stable than for low-leveraged firms.*

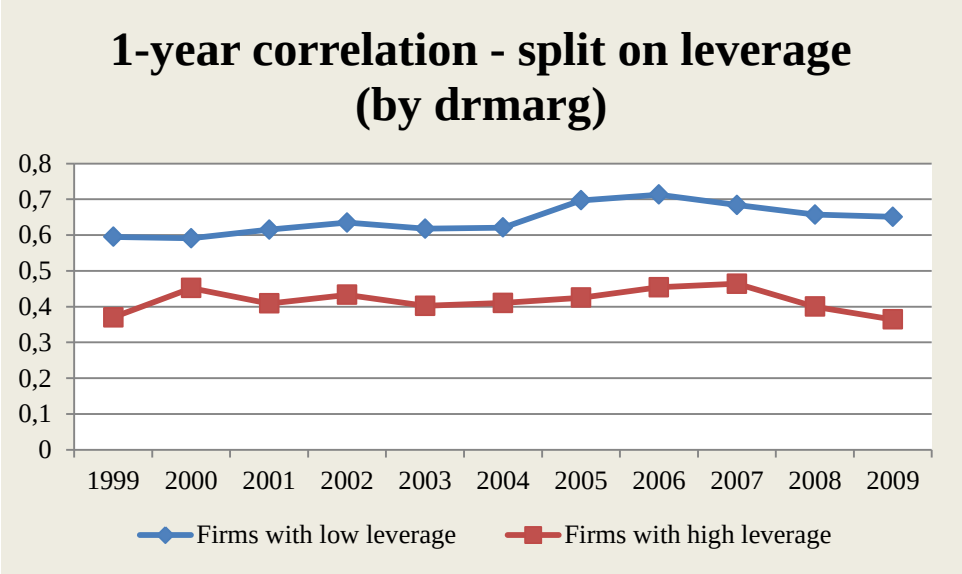

FIGURE 16: 1-YEAR CORRELATION: SPLIT ON LEVERAGE (BY DRMARG)

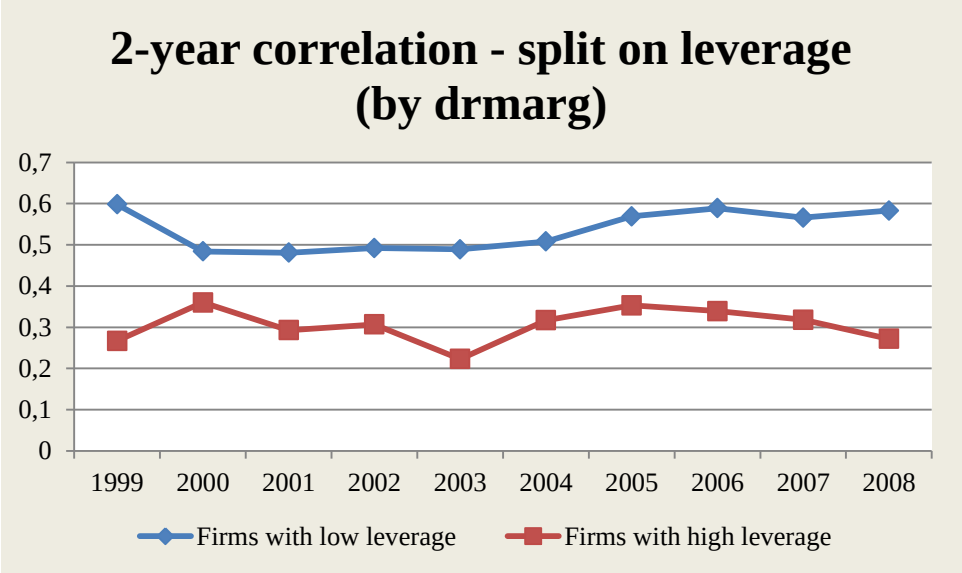

FIGURE 17: 2-YEAR CORRELATION: SPLIT ON LEVERAGE (BY DRMARG)

The blue line represents the lowest 10 percent of the firms measured by leverage, and the red line represents the highest 10 percent of the firms measured by leverage. The fall in 1-year correlation from 0.464 in 07/08 to 0.364 in 09/10 for firms with high leverage is equivalent to almost 22 percent, and is steeper than for those with low leverage. Low-leveraged firms experience a decline from 0.713 in 06/07 to 0.651 in 09/10, a fall of almost 9 percent. However, the correlation for low-leveraged firms starts to decline one year before the high-leveraged one (from the 06/07 correlation to the 07/08 one). The graph of 2-year correlations shows a larger difference. Low-leveraged firms experience a small decrease from 06/08 to 07/09 before the correlation increases from 07/09 to 08/10. High-leveraged firms however, experience quite a long-lasting decline, from 05/07 and out. Both of the above graphs support the hypothesis that during a crisis, firms with high leverage have less stable competitive advantages than firms with low leverage.

Next, we have the results for the correlation of the competitive advantage variable computed from return on assets (ROA) for all firms. The results are the following:

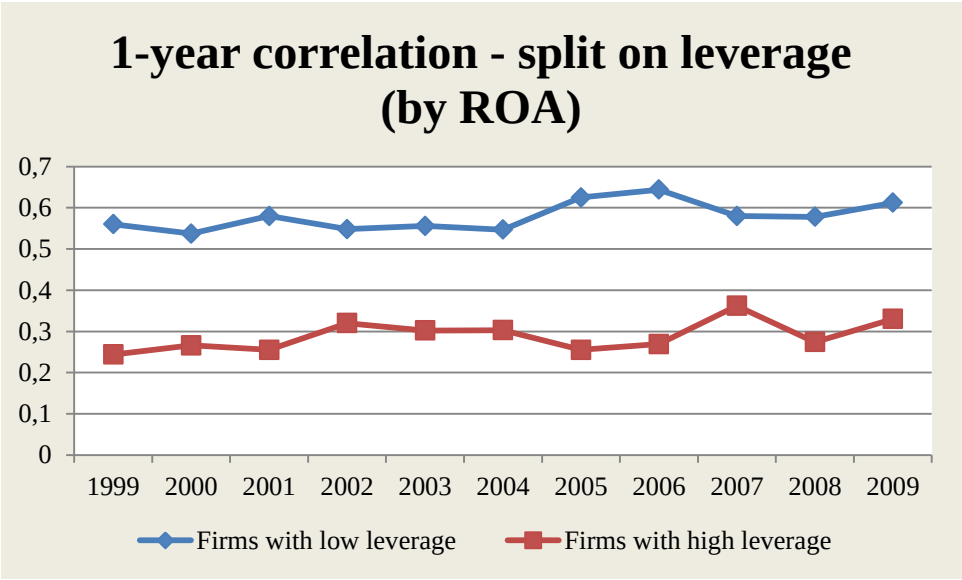

FIGURE 18: 1-YEAR CORRELATION: SPLIT ON LEVERAGE (BY ROA)

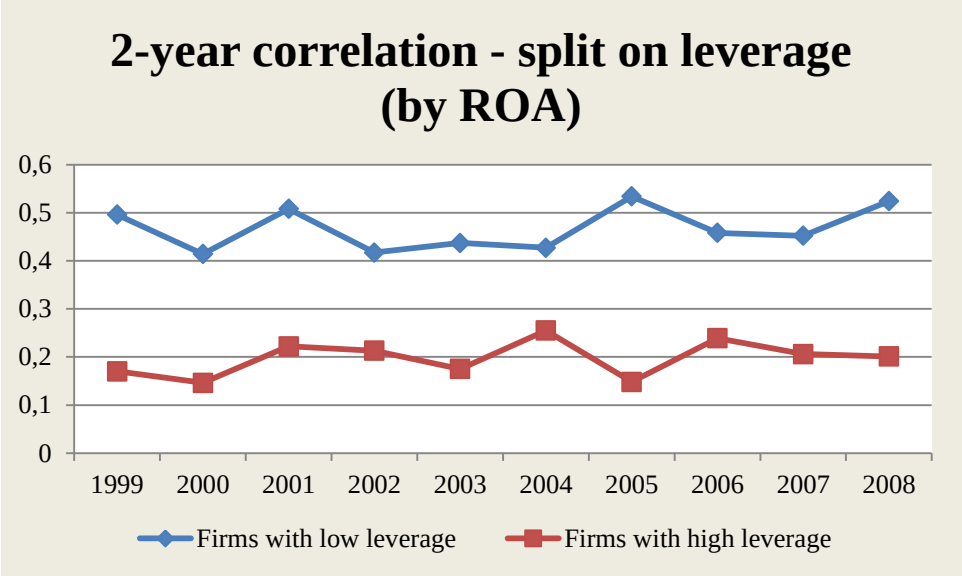

FIGURE 19: 2-YEAR CORRELATION: SPLIT ON LEVERAGE (BY ROA)

The first graph shows that the 1-year correlation for firms with high leverage has a steep decline from 0.362 in 07/08 to 0.274 in 08/09. This is equivalent to a 24.3 percent decline. The low-leveraged firms experience a decline from 0.644 in 06/07 to 0.58 in 07/08, a fall of almost 10 percent. From 2007 onwards, the curve shows an even and moderate growth. This analysis shows that competitive advantages become less stable for high-leveraged firms than for firms with low leverage, which is in accordance with our hypothesis.

The curves for 2-year correlation present a more complex result. The 06/08-correlation is in many ways the most interesting one, because this number shows the correlation between the competitive advantages in 2006, which is a boom year, and 2008, which is the main year of the financial crisis. The two deciles in terms of leverage show different results; while low-leveraged firms experience a decline in this correlation, the high-leveraged firms experience an increase. The high-leveraged firms then experience a steady decline until the 08/10-correlation. This might indicate that the effect comes one year later for the high-leveraged firms. As for the size of the decline, the low-leveraged firms experience a fall from 0.534 to 0.452 while the high-leveraged firms experience a fall from 0.239 to 0.201. This is equivalent to 15.3 percent and 15.9 percent respectively, and implies that the high-leveraged firms experience a slightly larger fall than the low-leveraged firms. The curve for the low-leveraged

firms then increases when the one for high-leveraged declines from 07/09 to 08/10. These results only barely support our hypothesis.

6.2.5 Effects of firm characteristics on competitive advantage: Growth rates

The analysis of pre-recession growth rates is three-parted. It is valuable to analyze the impact growth rate has on firms' competitive advantages from different angles because growth is a complex and non-linear variable. First, high-growth versus low-growth firms will be analyzed, and then the firms in the interior range will be analyzed up against each of these.

High versus low growth

A considerable amount of literature finds that firms which experience unusually high growth rates prior to a recession often prove to be particularly vulnerable to recessionary pressure. This means that we should expect to see a larger decline in correlation of the competitive advantage variable for firms with higher growth rates. We state the hypothesis:

> *Hypothesis 9: During crisis, the competitive advantages of firms with high sales growth become less stable than for firms with low sales growth.*

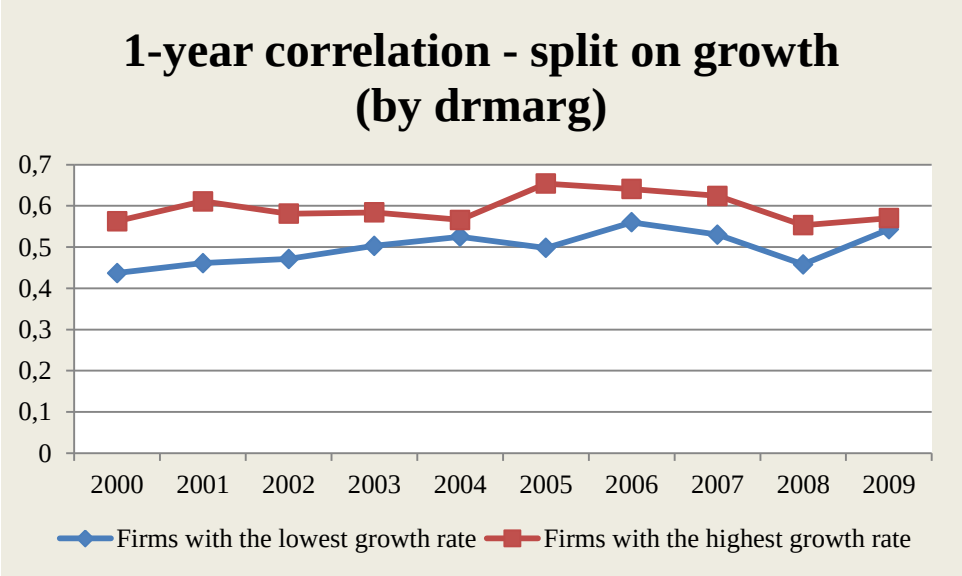

FIGURE 20: 1-YEAR CORRELATION: SPLIT ON HIGH/LOW GROWTH (BY DRMARG)

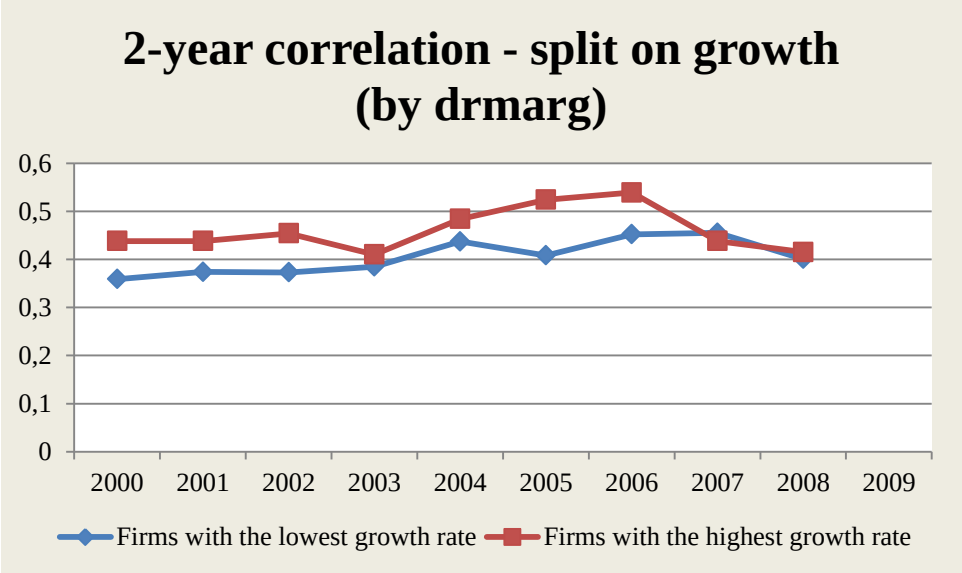

FIGURE 21: 2-YEAR CORRELATION: SPLIT ON HIGH/LOW GROWTH (BY DRMARG)

First, we will describe the competitive advantage variable based on operating profit margin. The blue line represents the lowest 10 percent of the firms measured by growth in sales revenue, and the red line represents the highest 10 percent of the firms measured by growth in sales revenue. Between 06/07 and 08/09 both the 1-year correlation of the competitive variable for both high growth firms and low growth firms declines. Firms with low growth experience a decline of 18.2 percent, from 0.56 in 06/07 to 0.458 in 08/09, while firms with

high growth experience a decline of 13.7 percent, from 0.641 in 06/07 to 0.553 in 08/09. This implies that competitive advantages of low-growth firms become less stable during recessions than those of high-growth firm, and this result does not support our hypothesis.

The graph of 2-year correlation shows a different result. This graph shows that firms with the highest growth rate experience a significant and steep fall in correlations, from 0.539 in 06/08 to 0.415 in 08/10. This is a fall of 23 percent. The low-growth firms have quite a stable course, with a decrease in correlations from 0.455 in 07/09 to 0.401 in 08/10, a fall of 11.8 percent. This result thus shows that the competitive advantages of firms with high growth become less stable during recessions than those of firms with low growth. This result supports our hypothesis.

Next, we have the results for the correlation of the competitive advantage variable computed from return on assets (ROA) for all firms. These are the following:

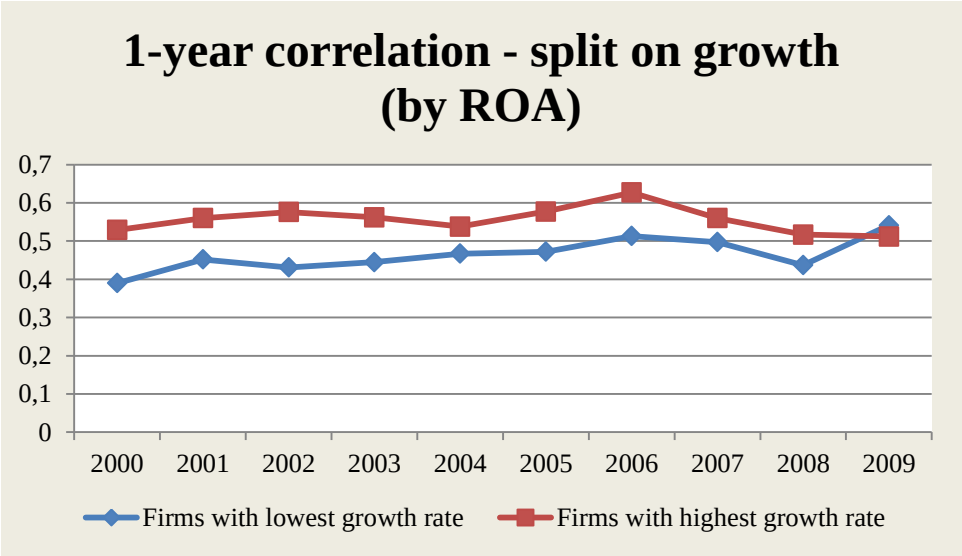

FIGURE 22: 1-YEAR CORRELATION: SPLIT ON HIGH/LOW GROWTH (BY ROA)

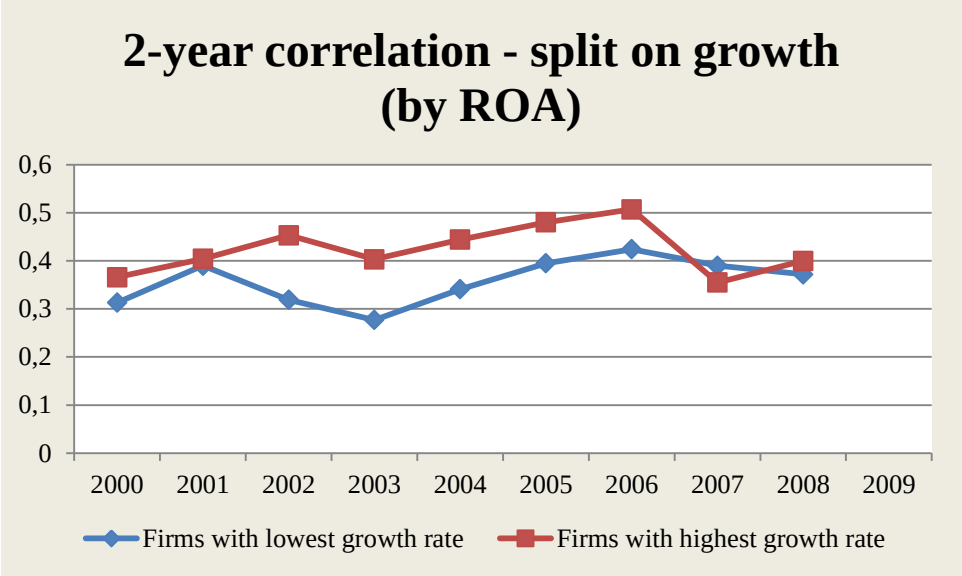

FIGURE 23: 2-YEAR CORRELATION: SPLIT ON HIGH/LOW GROWTH (BY ROA)

The 1-year correlation for firms with high growth declines from 0.627 in 06/07 to 0.517 in 07/08. This corresponds to a 17.5 percent fall. Low-growth firms experience a fall of 14.8 percent during the same period, from 0.513 in 06/07 to 0.437 in 08/09. This is in accordance with our hypothesis. The 2-year correlation shows a different course. The firms with high growth experience a significant fall from 06/08 to 07/09. This is the same pattern as for operating profit margins. The correlation falls from 0.507 in 06/08 to 0.355 in 07/09, a fall of almost 30 percent. For low growth firms the course is different, there is a modest decline from 0.424 in 06/08 to 0.372 in 08/10, a fall of 12.2 percent. Both the 1-year and 2-year correlation show that competitive advantages of firms with high growth become less stable than those of low growth firms during recession, which supports our hypothesis.

High versus medium growth

Because growth is a non-linear variable, it is interesting to analyze this variable from several angles. We will now present the analyses where those firms in the middle of the sample in terms of growth are compared to those with the highest and lowest growth. Existing literature finds that rapidly growing and rapidly declining firms were found to be more sensitive to aggregate shocks, than firms in the interior of the growth range. This means that we should

expect to see a larger decline in correlation of the competitive advantage variable for firms with high growth rates. We state the hypothesis:

Hypothesis 10: During crisis, the competitive advantages of firms with high sales growth become less stable than for firms with medium sales growth.

Here we compared the middle decile (5) to the highest decile (10) of growth. Our results for the operating profit margin-based variable are as follows:

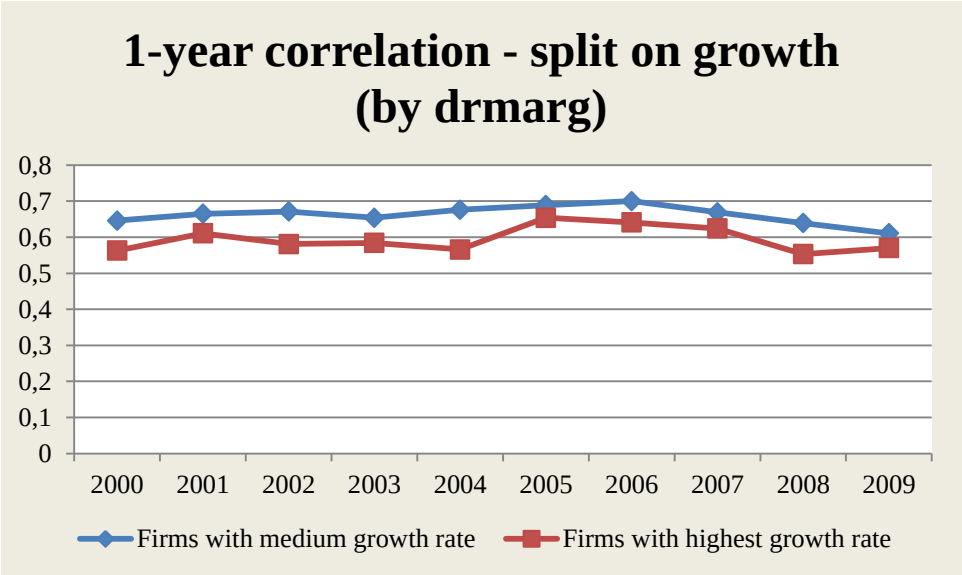

FIGURE 24: 1-YEAR CORRELATION: SPLIT ON HIGH/MEDIUM GROWTH (BY DRMARG)

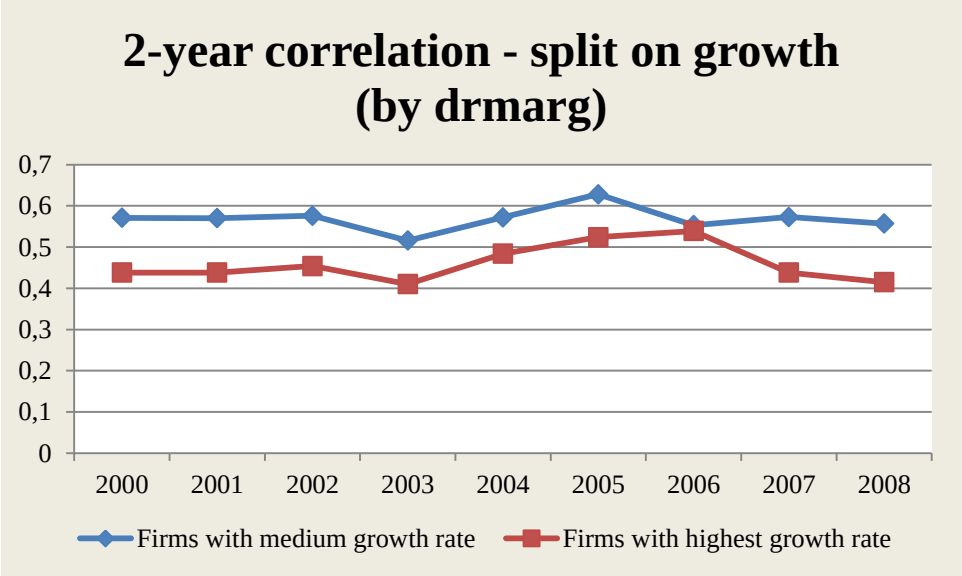

FIGURE 25: 2-YEAR CORRELATION: SPLIT ON HIGH/MEDIUM GROWTH (BY DRMARG)

For the competitive advantage variable based on operating profit margin, firms with medium growth rate generally has a higher 1-year correlation coefficient than firms with high growth. The high-growth firms' correlation increases more prior to the crisis than what it does for the medium-growth firms, but the high-growth correlation starts to decline one year ahead of the medium-growth one. The high-growth firms experience a decline from 0.641 in 06/07 to 0.553 in 08/09, a fall of 13.7 percent. This decline is steeper than that of medium-growth firms. These experience a decline of 8.7 percent, from 0.7 in 06/07 to 0.639 in 08/09. This implies that the competitive advantages of high-growth firms become less stable during crisis than those of medium-growth firms. This supports our hypothesis.

The 2-year correlation looks somewhat different; the correlation for high-growth firms steadily increases from 2003 through 2007, when it all of a sudden falls by 18.7 percent from 0.539 in the 06/08 correlation to 0.438 in the 07/09 correlation. The correlation for medium-growth firms also increases in a steady manner from 2003, but starts to decline from 0.628 in the 05/07 correlation to 0.553 in the 06/08 correlation, i.e. one year ahead of the high growth one. This decrease is equivalent to 15 percent. From there it increases between 06/08 and 07/09, before it declines slightly between the latter and the 08/10 correlation. The decrease in correlation is steeper for the firms with high growth, which implies that these firms

experience more unstable competitive advantages during recessions than firms with medium growth. The results support the hypothesis.

Next, we look at the results from the correlation of the competitive advantage variable based on ROA:

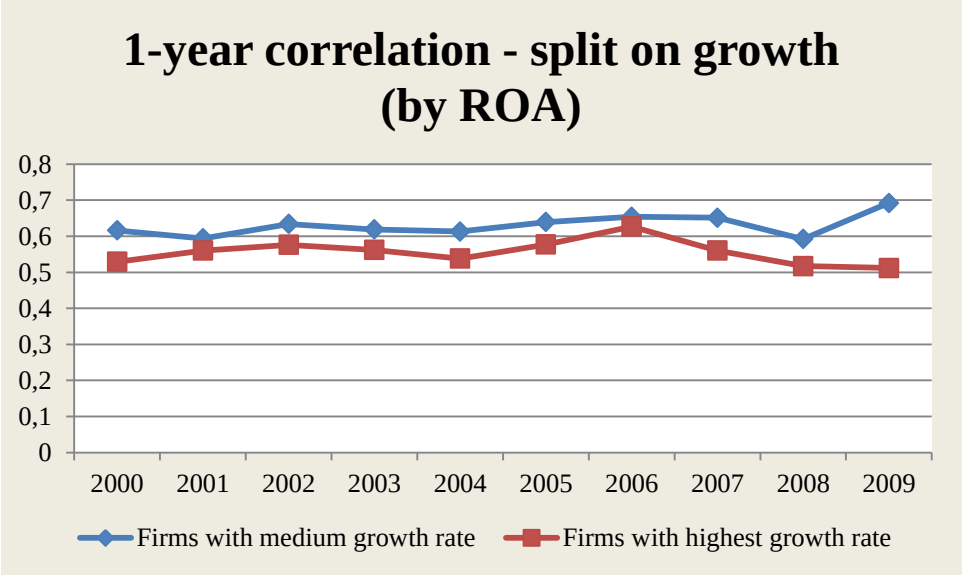

FIGURE 26: 1-YEAR CORRELATION: SPLIT ON HIGH/MEDIUM GROWTH (BY ROA)

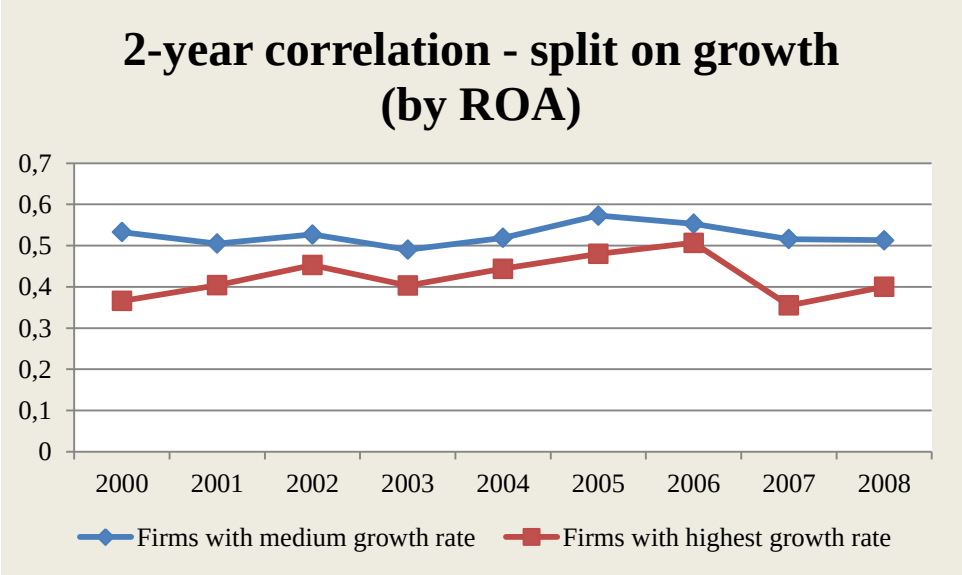

FIGURE 27: 2-YEAR CORRELATION: SPLIT ON HIGH/MEDIUM GROWTH (BY ROA)

We observe the same trends for the ROA-based competitive advantage variable as for the operating margin-based. The 1-year correlation of the medium-growth firms generally has a higher coefficient than the one for high-growth firms. Also here, the high-growth correlation starts to decline one year ahead of the medium-growth one, namely from 06/07 onwards. The high-growth firms experience a fall of 17.5 percent; from 0.627 in 06/07 to 0.517 in 08/09. The only decline that the medium-growth firms have is from 0.651 in the 07/08 correlation to 0.592 in the 08/09 correlation, after which we observe an abrupt increase. The decrease is equivalent to 9 percent. This implies that the decrease is steeper for the high-growth firms, which supports our hypothesis.

The 2-year correlation ROA-based competitive advantage variable is also somewhat similar to the operating margin-based. It increases steadily from 03/05 onwards, when the medium-growth correlation starts to decline from the 05/07 correlation, one year ahead of the high-growth one. The medium-growth firms experience a longer-lasting, but slow decline by from 0.573 in 05/07 to 0.516 in 07/09. This is equivalent to almost 10 percent. The high-growth firms declines between the 06/08 and the 07/09 correlation, from 0.507 to 0.355 respectively. This is a fall of almost 30 percent. The high-growth firms experience a significantly steeper decline in correlations than the medium-growth firms, and this supports the hypothesis.

Low versus medium growth

Existing literature finds that rapidly growing and rapidly declining firms were found to be more sensitive to aggregate shocks than firms in the interior of the growth range. This means that we should expect to see a larger decline in correlation of the competitive advantage variable for firms with low growth rates. We state the hypothesis:

> *Hypothesis 11: During crisis, the competitive advantages of firms with low sales growth become less stable than for firms with medium sales growth.*

Here we have compared the lowest growth percentile (1) to the middle growth percentile (5) of the competitive advantage variable based on operating profit margin. The results follow:

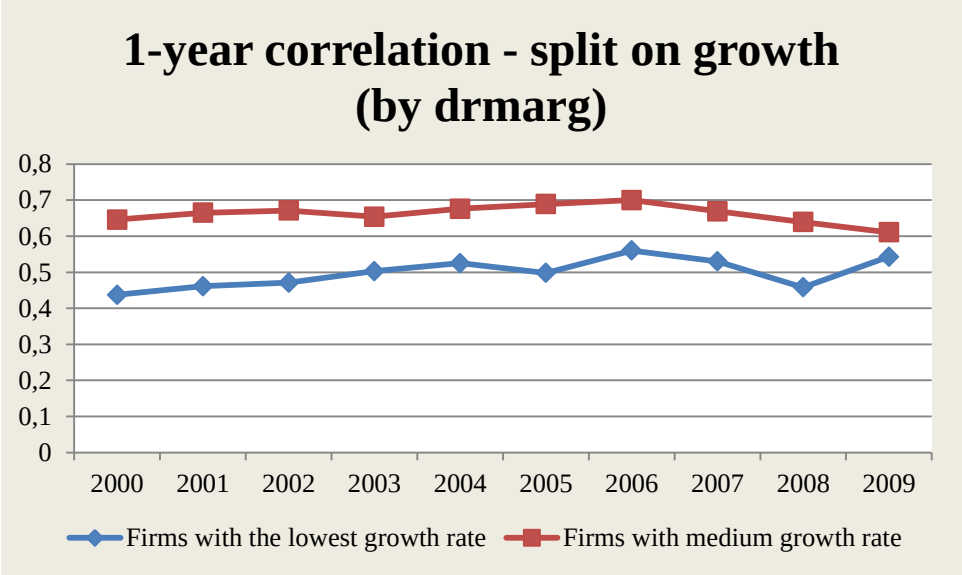

FIGURE 28: 1-YEAR CORRELATION: SPLIT ON LOW/MEDIUM GROWTH (BY DRMARG)

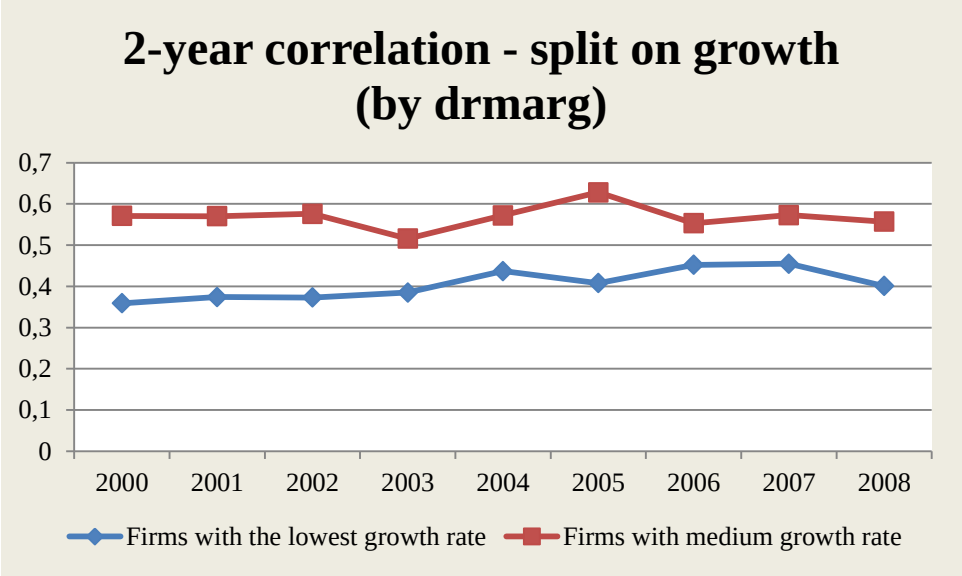

FIGURE 29: 2-YEAR CORRELATION: SPLIT ON LOW/MEDIUM GROWTH (BY DRMARG)

For the competitive advantage variable based on operating profit margin, firms with medium growth rate generally has a higher 1-year correlation coefficient than firms with low growth.

In addition, the 1-year correlation does not fluctuate as much for the medium-growth firms as it does for the low-growth firms throughout the entire period from 1999-2010. The medium-growth correlation declines steadily from 0.7 in the 06/07 correlation to 0.639 in the 08/09 correlation, a fall of 8.7 percent. By comparison, the correlation for low-growth firms decline from 0.56 in the 06/07 correlation to 0.458 in the 08/09 correlation. This is equivalent to an 18.2 percent decline. The low-growth firms then experience a sudden increase between 08/09 and 09/10. The analysis shows that low-growth firms experience a steeper decline in correlations than medium-growth firms, and these results support our hypothesis.

The 2-year correlation for medium-growth firms also has a generally higher correlation coefficient than the one for low-growth firms, but the correlations fluctuate more for both of the growth deciles. We observe a small increase of the two curves from the 06/08 correlation to the 07/09 correlation, which is a somewhat surprising result due to the fact that this is during the main crisis years. Nevertheless, the increase is larger for the medium-growth firms by 0.02 versus a mere 0.003 increase for the low-growth firms. This is equivalent to 3.6 percent and 0.7 percent respectively. The increase is followed by a decline for the two correlations, from 0.455 in 07/09 to 0.401 in 08/10 for the low-growth firms (11.9 percent) and from 0.573 in 07/09 to 0.557 in 08/10 for the medium-growth firms (2.8 percent). In other words, the fall in correlations is steeper for the low-growth firms. This indicates that the competitive advantages of low-growth firms become more unstable during crisis than those of medium-growth firms. These results support our hypothesis.

Next, we look at the results from the correlation of the competitive advantage variable based on ROA:

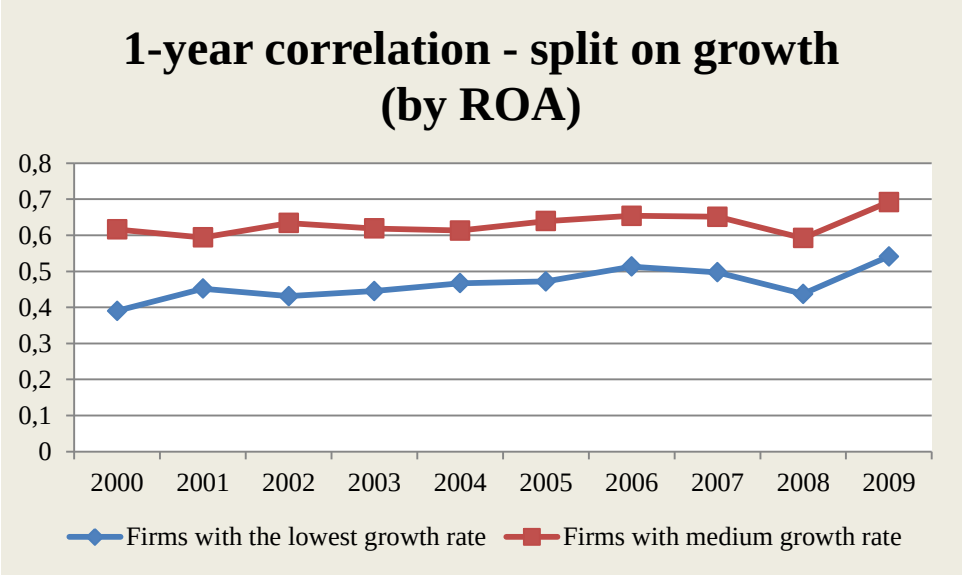

FIGURE 30: 1-YEAR CORRELATION: SPLIT ON LOW/MEDIUM GROWTH (BY ROA)

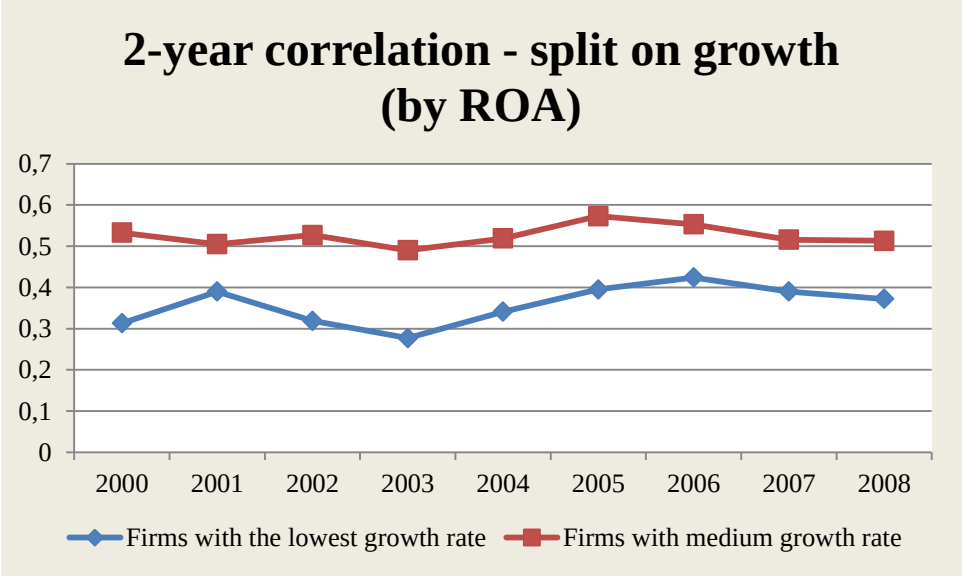

FIGURE 31: 2-YEAR CORRELATION: SPLIT ON LOW/MEDIUM GROWTH (BY ROA)

Just like the ROA-results for high-growth versus medium-growth firms, we observe the same trends for ROA-based variable as for operating margin-based variable for low-growth versus

medium-growth. The 1-year correlation of the medium-growth firms generally has a higher coefficient than the one for low-growth firms, and the curves follow each other in a parallel manner. Regardless of this result, the decline from the 06/07 correlation to the 08/09 correlation is steeper for the low-growth firms by -0.076 versus -0.062 for medium-growth firms. This is equivalent to 14.8 percent and 9.5 percent respectively, which implies that the competitive advantages of low-growth firms become less stable during crisis than those of medium-growth firms. We conclude that the results support our hypothesis.

The 2-year correlation for medium-growth firms also has a generally higher correlation coefficient than the one for low-growth firms. From the 06/08 correlation to the 08/10 correlation, the decline is steeper for the low-growth firms than for medium-growth firms, by -0.052 (12.2 percent) and -0.04 (7.2 percent) respectively. However, the decline of the correlation for medium-growth firms has its origin in the 05/07 correlation, but if we add this to the decline for this percentile, it results in -0.06, a total fall of 10.5 percent. In other words, the low-growth firms experience a steeper decline than the medium-growth firms, whether the fall from 05/07-correlation is included or not. The result thus implies that the competitive advantages of low-growth firms become less stable during crisis than those of medium-growth firms, which supports our hypothesis. Because of our sampling criteria, it is reasonable to assume that these findings are conservative, and that the effects are somewhat larger due to the survivorship bias.

6.3 Summary of findings

To sum up, the analyses showed that the financial crisis affected both aggregated firm performance and the short-term stability of the competitive advantages. The first analyses examined the aggregated firm performance of Norwegian firms during the financial crisis, and found that both operating profit margins, return on assets and sales growth declined significantly. Further analyses showed that firms in the bottom decile based on profitability experienced a larger decline in both operating profit margins and return on assets than firms in the top decile. Next, analyses of standard deviation showed that the Norwegian economy became more volatile during the crisis. Also here, further analyses found that the effect was more severe for the bottom decile, in terms of profitability, than for the top decile.

The next set of analyses examined the stability of competitive advantages during recessions. First, the analyses of the sample as a whole showed that competitive advantages based on both operating profit margins and return on assets became less stable during the crisis. Next, the effects of different firm characteristics were examined. The first analyses explored the effects of firm size on the stability of competitive advantages, and found that the effects were different for the two different profitability measures used to compute the competitive advantage variable. When the variable is based on operating profit margins, small firms were found to be more severely affected than large firms, while the analysis of the variable based on return on assets found the opposite result. The next analyses explored the effect of financial leverage, and showed that competitive advantages become less stable for highly leveraged firms, than for low-leveraged firms during crisis. This is true for competitive advantages based on both operating profit margins and return on assets. Last, the effects of pre-crisis sales growth rate were explored. Since this is a non-linear variable, the effects for both low, medium and high growth were analyzed. First we found that the competitive advantages of firms with high pre-crisis growth were less stable than for those of firms with low growth rates. Next, we found that the competitive advantages of high- and low-growth firms became less stable than for medium growth firms. To sum up, performance declines and volatility increases, and competitive advantages become less stable, during recessions. Highly leveraged firms or firms with high pre-recession growth experience the most instability in competitive advantages and the effects of size depends on the chosen profitability measure.

7. Discussion and implications

7.1 Introduction

The purpose of this thesis was to conduct a quantitative analysis on secondary financial data to find out how recessions affect the short-term stability of firms' competitive advantages, and how firm characteristics affect the outcome. Our motives were to deliver a contribution to the NHH research project Crisis, Restructuring and Growth, to present new insights and fill some of the gaps in the strategic management field, and to present some directions for future studies on the subject.

This section will present the main findings of the study, give interpretations of the results, and discuss possible implications for future research. First, we will present findings that highlight the effect of the financial crisis of 2008 on Norwegian firms. Second, we will show the effect the financial crisis of 2008 had on the short-term stability of firms' competitive advantages and the influence of different firm characteristics on the effect, before we discuss some possible explanations for the results. Finally, limitations in the study will be discussed, before results and discussions are summarized in a final conclusion.

7.2 Discussion of the results

7.2.1 – Main Finding I: The crisis had negative impact on firm performance in Norway

7.2.1.1 The crisis had negative impact on aggregate firm performance in Norway

To affirm the effect of the financial crisis on Norwegian companies, the first analyses investigated the progress of profitability and volatility of Norwegian firms. When it comes to profitability, we found that both average and median operating profit margins and return on assets experienced significant drops during the crisis years. The effect occurred one year earlier for operating profit margins than for return on assets, but both profitability measures declined considerably. The mean declined more than 40 percent and the median almost 30 percent for operating profit margins, while the mean fell almost 60 percent and the median 32 percent for return on assets. These results support the findings of Geroski and Gregg (1997), who found that average profit margins vary procyclically. Similarly, our results showed that the average and median sales growth experienced a steep decline during the crisis, indicating a significant fall in demand and sales. The demand declined so severely that the Norwegian economy experienced a negative aggregated sales growth in 2008 by median and in 2009 by mean. These results indicate that the financial crisis had a considerable negative effect on the aggregate firm performance of Norwegian firms.

The analyses also showed that the Norwegian economy became more volatile during the financial crisis. The standard deviation of both operating profit margins and return on assets increased significantly during the years of the financial crisis. Geroski and Gregg (1997)

found that there was a significant rise in the standard deviation of profit margins during recessions, and our results coincide with this. The effects peaked at different time periods for the two variables; the standard deviation of return on assets peaks one year later (2009) than that of operating profit margins (2008). This coincides with the fact that the effect on operating profit margins comes one year ahead of the effect on return on assets. Whatever the reason for this effect, the analyses clearly show that the Norwegian market became more volatile during the financial crisis.

The analyses found results confirming that the financial crisis had negative impact on firm performance, but the results do not reveal anything about what underlying effects that have caused the reduction in firm performance. According to literature, there are many different reasons that may have caused these effects; e.g. reductions in demand for the products the companies offer, problems with excess capacity, inventories or indebtedness, cash flow constraints, problems accessing capital and changes in inter-industry competition (Geroski & Gregg, 1997; Lien, 2010; Nishimura, et al., 2005). Based on our analyses, it is not possible to decide which of these factors that caused the most problems during the financial crisis of 2008. However, the results are still important as they underline the negative effect of the crisis on the Norwegian economy, and why it is interesting to further explore the impact of the crisis. They also showed that the crisis hit Norway as an exogenous shock and that it was unanticipated, thus satisfying the conditions of a natural experiment. If it had been anticipated, the adaptation to it would have been initiated earlier, and some kind of later treatment would probably not have been as necessary. When a bubble bursts, it will always come as a shock to everyone, and our results easily satisfy these terms.

7.2.1.2 The average performance of the lowest performing firms falls more during crisis than the average performance of the highest performing firms. The lowest performing firms also experience more volatile markets during crisis than the highest performing firms.

The analyses found that both operating profit margins and ROA declined during recessions for both the 10 percent highest performing firms and the 10 percent lowest performing firms. The results showed that the ratios for firms within the lower decile based on profitability fell

further than for the firms in the top decile. These results follow findings in the literature of Geroski and Gregg (1997), who investigated the upper and lower quartile of operating profit margin for 2,300 large UK companies in the period of 1971-93. They found that the spread in of margins across firms was greater than the variation in median and mean margins over time, and that margins for firms within the lower quartile of the sample fell further than the margins of the firms in the top quartile. Our results coincide with this. For the firms in the upper decile, the average operating profit margin increased just prior to crisis years. We observed the same results for average ROA. What we see more generally, is that the spread of firm performance measured by average operating profit margin and average ROA increases in recessions, and that some firms manage to maintain high performance even in times that are difficult. Geroski and Gregg (1997) explained their findings with a relatively small percentage of firms had profits falling relatively heavy. This group will pull down the percentile average, and can be an explanation of why we observe the large dips in average operating profit margin and average ROA for the firms in the lowest decile. Maybe the opposite can count for the firms in the highest decile. Alchian (1950) and Friedman (1953) stated that the least productive firms leave the market, while the most productive ones survive, and we can deduce that this is also true during crisis. Even if we cannot say anything about how many of the firms in the lowest decile that go out of the market in recessions or how many that survive based on the analyses of average operating profit margin and ROA, it is plausible that this decile represents a group where many of the firms go bankrupt. We can assume this from the increasingly negative average operating profit margin and ROA, which is a very bad token of a firm's condition before, during and after a crisis.

Next, we wanted to take a closer look on whether firms with lower profitability experience a more volatile market during times of crisis than firms with high profitability prior to the crisis. The analysis of the standard deviation showed the 10 percent lowest performing firms in the population experienced a larger increase in standard deviation during crisis years, than the 10 percent highest performing firms did. This result held through for both profitability measures, which implies that those firms that initially perform poorly experience more volatile market conditions during a crisis, than firms that perform well before the crisis hits.

7.2.2 – Main finding II: Competitive advantages become less stable during crisis

The main purpose of this thesis is to examine what happens to the short-term stability of firms' competitive advantages during crises. As this is a subject which is practically non-existing in current literature, our hypotheses was formulated from literature of general firm performance during recessions, as well as what we would expect to see from literature of competitive advantages. The first hypothesis stated that competitive advantages would be less stable during times of crisis. This was hypothesized because crises cause firms to face new challenges in a changing economic environment. Competitive advantages are caused by resources that the firms possess. The value of these resources might change as a consequence of the changes in the economic climate, and this makes it more difficult for firms to maintain their competitive advantages. This indicates that competitive advantages become less stable during times of crisis. The results we found for the whole sample was somewhat vague. The graphs for both operating profit margins and return on assets were rather flat, but there was a small increase in correlations during the boom and a small decrease during the crisis. Even though the effect was small, we considered the hypothesis to be supported. This implies that firms' competitive advantages become less stable during recessions. However, it is interesting to discuss why the effect was so small. The financial crisis affected different companies differently. Even though some industries were severely hit by the crisis, others were almost unaffected, and this flattens out the graph for the whole sample. The results are diluted by large and stable industries that are rather unaffected by the crisis. These results make it interesting to investigate the crisis further, on more fragmented levels. Which firms were severely hit by the crisis, and which firms were less affected? Did size, leverage or pre-crisis growth have any impact on how severely companies were affected by the crisis?

7.2.3 – Main finding III: Firm characteristics affect the stability of competitive advantages during crisis

7.2.3.1 During crisis, the competitive advantages of small firms become less stable than for those of large firms when the competitive advantage variable is based on operating profit margins. When the competitive advantage variable is based on return on assets, large firms' competitive advantages become less stable than for those of small firms.

Following findings in the literature review (Geroski & Gregg, 1997; Gertler & Gilchrist, 1994 and Lang & Nakamura, 1995), it was hypothesized that the competitive advantages of small firms were less stable during a crisis, than those of large firms. The results were contradictory for the two different profitability measures that the competitive advantage variable is based on. Based on operating profit margin, the 1-year and 2-year correlation tests found that the correlation of the competitive advantage fell harder for the 10 percent smallest firms in the population, than it did for the 10 percent largest firms measured by sales revenue. This supports our hypothesis, and is also in accordance with Geroski and Gregg (1997), Gertler and Gilchrist (1994) and Lang and Nakamura (1995). This result may be explained by the economies of scale and easier access to external finance and other resources that larger firms enjoy, and that make them better equipped to handle recessions than small firms. However, the 1-year and 2-year correlation tests for the ROA-based competitive advantage found the opposite results; the 10 percent largest firms experienced a more severe fall in correlation than the 10 percent smallest firms. These findings tell us that larger firms' competitive advantages are less stable during a crisis, than those of the smaller firms, which contradicts our hypothesis. However, these results are in accordance with the findings of Knudsen (2011). He explains that the largest firms are more severely hit by a crisis, because smaller firms are more flexible than larger firms. Large firms tend to be more rigid than smaller firms, which makes it more difficult to adjust business when demand drops. Another explanation for why large firms experience less stable competitive advantages during recessions, is that large firms more often sell durable products than small firms, and thus are more exposed to declines in demand than small firms during economic downturns. Yet another possible explanation is that large firms are more export intensive, and since the financial crisis of 2008 hit most of Norway's international trade partners, it is reasonable to believe that this affected the competitive advantage of export intensive firms. What we can draw from the two conflicting results is that differences in firm size in one way or another contributes to differences in the stability of competitive advantages.

An interesting discussion is what causes the contradictory results between the analyses based on the two different profitability measures. When competitive advantage is measured based on operating profit margins, the results show that the competitive advantages of small firms are less stable during crisis than those of large firms. When competitive advantage is measured based on return on assets, the results show the opposite; the large firms experience less stable competitive advantages during crisis than small firms do. There are some possible explanations for why we see two different effects from firm size depending on which financial ratio our competitive advantage variable is based on. The main explanation might be related to the firm's assets. Larger firms often have larger shares of fixed assets, e.g. machinery, plants and other manufacturing equipment, than smaller firms. "Total assets" is the denominator of the ROA-variable, which implies that firms with large assets will be more affected in terms of ROA when revenues decline during recessions. This indicates that larger firms will be more affected in terms of ROA than small firms, and this may explain why the large firms experience less stable competitive advantages when the CA-variable is based on ROA. However, this does not apply for firms in the service sector. Another explanation is related to operating profit margins. Because of market power, larger firms often have higher operating profit margin than smaller firms, and it is in their interest to maintain it during recessions. They will therefore rather decrease sales volume than reduce the price. Small firms are price takers, and therefore have to let their operating profit margin drop in order to maintain business. Higher margins make the larger firms able to handle more challenges than small firms before they start to really suffer economically. This might explain why the smaller firms experience less stable competitive advantages than larger firms, when the CA-variable is based on operating profit margins.

Other explanations for the difference in results which are not related directly to the choice of variable may be differences in inventory between small and large firms, flexibility, financing and scale effects. A bigger inventory of goods might contribute to the larger firms being better equipped to handle a crisis. They can experience a lower decline in sales revenue because they have more inventories to sell, and they do not necessarily have to produce new products right there and then. Again, this does not apply for the firms in the service sector. This, in addition to differences in the length of contractual obligations, might explain why the effects of the crisis hit the larger firms one year later than it hit the small firms. Large firms tend to

have longer lasting contracts, and thus have a fixed demand for their products for some time. This delays the effects of the crisis.

Larger firms often experience economies of scale and an easier access to external finance during a crisis. Since the financial crisis of 2008 brought with it a credit crunch, which were also felt by firms in Norway, this could be the most probable explanation for why smaller firms' competitive advantages are less stable during crisis. On the other hand, large firms are often more rigid than small firms, and changes in the economy as a whole can have greater consequences for larger firms than for small firms. The large firms might take less action in recessions than small firms, and this could be a combination of at least two things: them being bureaucratic and unable to adapt to the changes, and that they think the crisis is only going to be short-term. The latter may lead to the firm suffering for some time, in order to recover later when "the storm has passed." Large firms have the possibility to choose not to make changes that will reduce profitability in the long run because they have resources and ruggedness to handle short-term declines in profitability. Small firms do not have the same option, and the changes they have to make may turn out to be unprofitable in the long run. Another feature that might have affected the results is the share of exports.

Finally, we should remember the fact that we are investigating Norwegian data, which means that our largest firms may be small in an international context. Our result that larger firms' competitive advantages are less stable, may be partially explained by this. One should also look out for possible biases attached to the removal of small firms from the population sample, and the negative effects such choices may have for generalizability. Future studies should be aware of the country of origin from which the data they use come from.

7.2.3.2 The competitive advantages of high-leveraged firms become less stable during crisis than those of low-leveraged firms

The literature review clearly showed that companies with high debt ratios will be more severely affected by a recession than companies with low debt ratios. From this, it was hypothesized that the competitive advantages of highly leveraged firms become less stable

during a crisis than those of firms with low leverage. Our 1-year and 2-year correlations found proof for the hypothesis, independent of the financial ratio the competitive advantage variable was based on. This means that the highest 10 percent of the firms measured by leverage have got a lower probability than earlier of performing according to the last year, and the lowest 10 percent of the firms measured by leverage have got a higher probability than earlier of performing accordingly. From the results we can say that firms' capital structure contributes to differences in the stability of competitive advantages and disadvantages; low-leveraged firms have more stable competitive advantages, and high-leveraged firms have less stable competitive advantages. This effect expands during times of crisis.

Possible explanations can be capital market imperfections, which can make it difficult for highly leveraged firms to get access to external finance (Lien, 2010). The reason is that these firms often have more risk. Also, high-leveraged firms are often export or import intensive firms that have high costs, which can lead to lower operating profit margin. Opler and Titman (1994) highlights the high direct and indirect costs of financial distress as an explanation for high-leveraged firms to be more affected by crisis than firms with low debt ratios. These results contradict Miller & Modigliani's (1958) first proposition, which claims that capital structure does not affect firm value. Critics argue that the proposition does not hold because the real world involves taxes, financial distress, bankruptcy costs and conflict of interest among shareholders, and our results support these arguments. This will affect the competitive advantage variable through lower ROA or operating profit margin. Future studies should investigate the relationship between leverage and stability of competitive advantages in further detail.

7.2.3.3 The competitive advantages of firms with high sales growth become less stable during crisis than those of firms with low sales growth

Following findings in the literature review, it was hypothesized that the competitive advantages of firms with high growth were less stable during a crisis than those of firms with low growth. With the exception of 1-year correlation for operating profit margins, our 1-year and 2-year correlations found proof for the hypothesis. This means that the highest 10 percent

of the firms measured by growth will struggle more to maintain their competitive advantages than the lowest 10 percent of the firms will.

Possible explanations for the results can be that companies experiencing a high growth late in a boom will experience a steep decline in demand for their products during a crisis, because these firms have a large share of marginal customers which will be the first ones to cut consumption in difficult times (Lien, 2010). Other explanations for this, is connected to the liquidity and solidity of high-growth firms. These firms often have many attractive investment opportunities, which lead to high opportunity costs of building financial reserves. They will choose to invest rather than pay off debt or in other ways increase their liquidity, and firms with low liquidity are thus more severely hit during crisis. Further, it can be difficult to combine high growth with efficiency. Operational efficiency is often reduced by large expansions, and poor operational activities make the firms even more vulnerable during recessions. Capacity expansion often lags behind growth in demand for a firm's products, which indicates that fast-growing firms are stuck with idle capacity when crisis hits. This can negatively affect the stability of competitive advantages during crisis. All our graphs support the hypothesis, except for the 1-year correlation based on operating profit margin, which shows the opposite result. We do not know the exact reason for this result, but it may have something to do with the fact that growth is a complex and non-linear variable. Future studies should investigate this relationship further.

7.2.3.4 The competitive advantages of firms with high sales growth become less stable during crisis than those of firms with medium sales growth

Following findings in the literature review, it was hypothesized that the competitive advantages of firms with high growth were less stable during a crisis, than those of firms with medium growth. Both our 1-year and 2-year correlations based on operating profit margin, and our 1-year and 2-year correlations based on ROA found proof for the hypothesis. This means that the highest 10 percent of the firms measured by growth have got a lower probability than before of maintaining their competitive advantages than the medium 10 percent of firms measured by growth.

Possible explanations for this result are the same as for finding 7.2.3.3 about high and low growth. Issues of large shares of marginal customers, squeezed liquidity, poor operational efficiency and lag in capacity building will all make high-growth firms more vulnerable for recessions than medium-growth firms that do not experience the same problems. Future research will have to investigate this further.

7.2.3.5 The competitive advantages of firms with low sales growth become less stable during crisis than those of firms with medium sales growth

Following findings in the literature review, it was hypothesized that the competitive advantages of firms with low growth were less stable during a crisis, than those of firms with medium growth. Both our 1-year and 2-year correlations based on operating profit margin, and our 1-year and 2-year correlations based on ROA found proof for the hypothesis. With support for our hypothesis, the results tell us that the lowest 10 percent of the firms measured by growth have got a lower probability than earlier of performing according to the last year, which implies that they have less stable competitive advantages.

Possible explanations for these findings can be that many firms with low growth have a poor performance prior to the crisis, which will worsen when the crisis hits. This will make the competitive advantages less stable and the curves in the graphs to fluctuate. Future research will have to investigate this relationship further.

To sum up the findings regarding pre-recession growth rates, the results show that the firms with high growth prior to the crisis experience the most unstable competitive advantages when crisis hits. The competitive advantages of these firms are less stable than both those of low-growth and those of medium-growth firms. Further, the results showed that it is the firms with medium growth that experience the most stable competitive advantages during crisis. In other words, the competitive advantages of high-growth companies are most negatively affected by crisis, and then follow the competitive advantages of low-growth companies. The

firms in the interior range of pre-recession growth are the least negatively affected in terms of the short-term stability of competitive advantages when crisis hits. It is reasonable to assume that this is because both high-growth and low-growth firms have characteristics that makes them more vulnerable to crisis. Those in the top decile in terms of growth most likely experience extraordinary growth caused by marginal customers that leave the market when crisis hits, squeezed liquidity, poor operational efficiency and lag in capacity building. The firms in the bottom decile in terms of growth experience hard times even before the crisis hits, and an economic downturn will make it even more difficult for these firms to maintain their competitive advantages.

7.3 Theoretical implications and directions for future studies

We want to give directions for future studies which can contribute to filling some of the remaining gaps in the strategic management field. Our first suggestion is to conduct analyses of the sustainability of firms' competitive advantages, as a continuation of our study. This can be done when the distance to the financial crisis of 2008 is considered suitable, and when data from these years has been collected. As mentioned in chapter 1.3, the theory does not give an answer to the exact number of years that defines a sustainable competitive advantage. However, we consider the term 'sustainability' to imply several years, and will advise the researcher to make a subjective consideration of the exact appropriate time frame.

Our next suggestion is to conduct analyses on industry level. Our dataset consists of industries parceled in individual 2-digit NACE codes, and industry groups (appendix B). Each industry group is a collection of similar industries identified by 2-digit NACE codes. The dataset could be split into industries, and one could base hypotheses on different industry characteristics and the respective theoretical background. However, one should be careful with the use of the industry groups as a grouping prior to the analysis. The reason for this is that the industry groups can be considered too broad, because some of them are classified by industry codes which are too heterogeneous internally. It can thus be difficult to generalize and draw conclusions based on the analysis results. Analyses on industry codes are more transparent, and in addition to the industry analyses we suggest splitting the industry codes into deciles or quartiles based on firm- and industry characteristics. For instance, one can explore which

industries that were severely affected by the crisis and compare the competitive advantages of these to the competitive advantages of industries that were not affected by the crisis. Further, instead of using NACE-codes, one can conduct multiple case studies on an industry level where one defines the industry boundaries from a meaningful industry definition that is more precise than the one official statistics are using. This makes it possible to investigate what happens in specific industries in greater detail. Another suggestion is to conduct the same analyses on similar datasets or samples from other countries. If one observes similar results from these analyses as we have found in our study, this would strengthen our research and make it easier to generalize the findings. One could also complement our study by using other types of firm characteristics or measures of profitability, and find other interesting results.

Our last suggestion is that one could do a qualitative study based on primary survey data as an alternative to financial data. Another option is to combine the two, to eliminate as many weaknesses as possible. Survey data can make it possible to find out exactly how firm profitability was affected by the crisis, e.g. if the crisis mostly reduced the demand for the firms' products, or if the problems were related to access to external capital, excess inventory, etc. In addition, survey data can reveal information about other types of firm characteristics, industry characteristics and firm behavior during crisis. By conducting a survey, one could get access to information that could be used to categorize firms in other ways than from the information available through financial data. Examples of firm characteristics that are difficult to identify through financial data are R&D, knowledge-intensity and customer loyalty, while industry characteristics like rivalry, bargaining power, competitors and substitutes also can be used as categorizations. Since we have found that firm size, leverage and growth affect the short-term stability of firms' competitive advantages it would be interesting to use surveys to get information about firms with different leverage- and growth strategies. Finally, subjective evaluations of firms' performance relative to its competitors, i.e. survey data on market shares, could also provide new valuable insights.

7.4 Limitations

All studies have limitations, implying that the findings must be carefully interpreted in relation to its limitations. In the following, limitations in this study will be presented.

The validity of a study is the extent to which the data collection method accurately measures what it was intended to measure, and the extent to which research findings are really about what they profess to be about (Saunders et al., 2009). There are some concerns to the validity of this study. Firstly, the analyses in this study are based on a sample rather than the whole population of Norwegian firms, and by excluding a number of firms the external validity of the study is reduced. However, this is done in order to remove firms that might have caused inaccurate results. The internal validity is also fragile to the sampling procedure, because the results theoretically may come from the selection of the firms to the sample, rather than being effects from the crisis. Firms that go bankrupt or start up during the analysis years are excluded from the sample because of missing observations, and this causes a firm-age bias. A weakness related to the sample is the survivorship bias - the bias related to only studying surviving firms. Another limitation with regards to the sample is that all firms with sales revenue less than 10.0 MNOK (in 2007 and adjusted according to CPI) have been removed. This excludes a large number of small firms, which might affect the analysis of the effects of firm size. When interpreting these results it is important to remember that all of the smallest companies have been removed from the sample. However, our sampling criteria are conducted in order to achieve results that are as accurate as possible.

Competitive advantage is in this study quantified in accordance with the definition of Barney (2007); a firm that has economic returns above the industry mean has a competitive advantage. We have chosen the two profitability variables operating profit margins and return on assets as measures of economic returns, but there exists no literature that suggests that this is the correct way to do it. In addition, it is impossible to analyze whether it actually is competitive advantage or disadvantage that causes returns above or below industry average. There may be many different reasons for why firms are performing the way they do; Porter (1985) for instance states that above-average performance also can be a sign of harvesting. However, it is impossible to explore what is causing the returns of each firm in the sample in

a study of this scope, so this is why we, according to the definition, assume that profitability above industry average implies that the firm has a competitive advantage.

Our study is conducted entirely from financial data. This makes it easy to see patterns and draw objective conclusions from analyses, but it does not say anything about what is behind the numbers. In order to understand this, more qualitative analyses should have been conducted, e.g. surveys or interviews. However, as mentioned, the scope of this thesis makes these kinds of additional analyses impossible.

There are also some limitations in regards to using correlation as the only analytical tool. While the correlation analysis clarifies whether there is a relationship between variables, it does not say whether or not the relationship is causal. In order to prove this, more experimental methods, like regression analysis, must be conducted. The last limitation is that the study is based on Norwegian data. It is important to interpret the results with this in mind. The results would have been different for other samples from other countries that were affected differently by the crisis than Norway was.

7.5 Concluding remarks

The purpose of this study was to analyze how recessions affected the short-term relative economic performance between firms by measuring the short-term stability of Norwegian firms' competitive advantages and disadvantages during the financial crisis of 2008. A further purpose was to explore whether specific firm characteristics affected the changes in their stability. The study is a part of the NHH research project Crisis, Restructuring and Growth. As far as we know, no previous studies have analyzed the effect of recessions on firms' competitive advantages. In addition, the literature in the strategic management field is inadequate when it comes to research on firms' relative performance during recessions, and a lot of relevant literature is simply byproducts of financial or macroeconomic research. It was therefore natural for us to focus on the broad patterns and the short-term effects of the crisis, instead of the long-term effects. Based on the literature gaps, we wanted to make a contribution to the field by i) analyze how the financial crisis of 2008 affected the profitability

of Norwegian firms, ii) analyze the financial crisis' effect on the short-term stability of the firms' competitive advantages and iii) analyze how different firm characteristics can influence the effect that the crisis had on the stability of the competitive advantages. Finally, we wanted to give some directions for future studies on the subject.

The main findings of this study and important implications of the results are presented in the following. The first main result was that the financial crisis of 2008 had considerable negative impact on the aggregate firm performance of Norwegian firms. The main implication of such findings is that we can use the financial crisis of 2008 as a natural experiment as described in chapter 1.2. The analyses also show that the Norwegian economy became more volatile during the financial crisis, and why it is interesting to further explore the impact of the crisis. However, the results do not reveal anything about what underlying effects that have caused the reduction in firm performance, and this should be explored in further detail by future studies.

Further analyses of firms' performance during the financial crisis of 2008 showed that firms in the bottom decile in terms of profitability experienced a steeper decline in both operating profit margins and return on assets during crisis years than the firms in the top decile. In addition, the low-performance firms experienced a steeper increase in standard deviations of both profitability measures during crisis years than the high-performance firms. These findings show that firms that are performing poorly before an economic downturn are those who are most affected by the recession, both in terms of profitability and volatility.

The second main finding of the study found that firms' competitive advantages were less stable in crisis, and more stable in booms, but the effects were small. It is plausible to think that this is due to the heterogeneity of the population, i.e. that each firm managed differently, causing the results to be diluted. The main implication of this finding is that it can give directions for relationships between firm characteristics and firm performance to be studied in more detail. We therefore investigated the effects on more fragmented levels. This led us to

the last main finding of the study; that different firm characteristics affected the stability of firms' competitive advantages.

Out first finding regarding firm characteristics was that the effect of firm size on the stability of competitive advantages depends on the profitability measure used to compute the competitive advantage variable. When competitive advantage was computed based on operating profit margins, the competitive advantages of small firms were found to be less stable than those of large firms during crisis. When competitive advantage was computed based on return on assets, the results were opposite. Different reasons for the contradicting results were discussed, and we concluded with differences in firm size in one way or another contributed to differences in the stability of competitive advantages. This result underlines the purpose of studying competitive advantages by more than one profitability measure. Our second finding was that the competitive advantages of high-leveraged firms became less stable during crisis than those of low-leveraged firms. This effect was as expected, based on unambiguous findings in previous literature. Last, we analyzed how sales growth affected the results, and found that the competitive advantages of firms with high sales growth became less stable during crisis than those of firms with low sales growth. This result was as expected. Further analysis of the two growth percentile extremes versus the medium growth percentile showed that the competitive advantages of both firms with high and low sales growth became less stable during crisis, than those of firms with medium sales growth. These results supported the hypotheses. Reasons for this were discussed, and we concluded that the firms in the interior range of growth rates were to be the least affected by recessions, while the firms with high pre-recession growth were the ones to be the most affected by crisis. The implication of these findings is that they can give directions for future studies of the relationships to be investigated in more detail.

We conclude that firms' competitive advantages are less stable in crisis, and more stable in booms, and that different firm characteristics affect the stability of firms' competitive advantages in different ways. More specifically, firms with high debt ratios and/or high pre-recession sales growth experience the most instability in competitive advantages during crisis. As for the effect of firm size, the results depend on the profitability measure used as basis for

competitive advantage. We believe that future research on the stability of firms' competitive advantages and disadvantages should be conducted on an industry level to see how industry characteristics can affect the stability. We would also suggest conducting research on the sustainability of firms' competitive advantages and disadvantages when the time horizon is suitable.

8. References

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9. Appendices

9.1 Appendix A: Consumer Price Index (CPI)

Salgsinn = Sales revenue, in 1000 NOK

Lonnsos = Labor costs and social expenses, in 1000 NOK

	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	***2007***	**2008**	**2009**	**2010**
Salgsinn	8626	8895	9165	9283	9511	9553	9705	9924	*10000*	10379	10599	10860
Lonnsos	2588	2669	2750	2785	2853	2866	2911	2977	*3000*	3114	3180	3258

(Source: Statistics Norway, 2012)

9.2 Appendix B: Industry classification

Industry groups based on two-digit NACE codes (2002)

Code	NACE Industry group
1	Primærnæring
2	Petroleum
3	Industri
4	Bygg
5	Handel og hotell- og restaurantvirksomhet
6	Utenriks sjøfart
7	Transport
8	Finans, forsikring
9	Tjenester
10	Helse
11	Kultur, media
12	IT

Two-digit NACE codes 2002 Revision

Code	NACE Industry
1	Jordbruk og tjenester tilknyttet jordbruk. Jakt og viltstell
2	Skogbruk og tjenester tilknyttet skogbruk
5	Fiske, fangst og fiskeoppdrett. Tjenester tilknyttet fiske, fangst og fiskeoppdrett
10	Bryting av steinkull og brunkull. Utvinning av torv
11	Utvinning av råolje og naturgass. Tjenester tilknyttet olje- og gassutvinning

12	Bryting av uran- og thoriummalm
13	Bryting av metallholdig malm
14	Bergverksdrift ellers
15	Produksjon av næringsmidler og drikkevarer
16	Produksjon av tobakksvarer
17	Produksjon av tekstiler
18	Produksjon av klær. Beredning og farging av pelsskinn
19	Beredning av lær. Produksjon av reiseeffekter, salmakerartikler og skotøy
20	Produksjon av trelast og varer av tre, kork, strå og flettematerialer, unntatt møbler
21	Produksjon av papirmasse, papir og papirvarer
22	Forlagsvirksomhet, grafisk produksjon og reproduksjon av innspilte opptak
23	Produksjon av kull- og petroleumsprodukter og kjernebrensel
24	Produksjon av kjemikalier og kjemiske produkter
25	Produksjon av gummi- og plastprodukter
26	Produksjon av andre ikke-metallholdige mineralprodukter
27	Produksjon av metaller
28	Produksjon av metallvarer, unntatt maskiner og utstyr
29	Produksjon av maskiner og utstyr
30	Produksjon av kontor- og datamaskiner
31	Produksjon av andre elektriske maskiner og apparater
32	Produksjon av radio-, fjernsyns- og annet kommunikasjonsutstyr
33	Produksjon av medisinske instrumenter, presisjonsinstrumenter, optiske instrumenter, klokker og ur
34	Produksjon av motorvogner, tilhengere og deler
35	Produksjon av andre transportmidler
36	Produksjon av møbler. Annen industriproduksjon
37	Gjenvinning
40	Elektrisitets-, gass-, damp- og varmtvannsforsyning
41	Oppsamling, rensing og distribusjon av vann
45	Bygge- og anleggsvirksomhet
50	Handel med, vedlikehold og reparasjon av motorvogner. Detaljhandel med drivstoff til motorvogner
51	Agentur- og engroshandel, unntatt med motorvogner
52	Detaljhandel, unntatt med motorvogner. Reparasjon av husholdningsvarer og varer til personlig bruk
55	Hotell- og restaurantvirksomhet
60	Landtransport og rørtransport
61	Sjøtransport
62	Lufttransport
63	Tjenester tilknyttet transport og reisebyråvirksomheter
64	Post- og telekommunikasjoner
65	Finansiell tjenesteyting, unntatt forsikring og pensjonskasser
66	Forsikring og pensjonskasser, unntatt trygdeordninger underlagt offentlig forvaltning
67	Hjelpevirksomhet for finansiell tjenesteyting
70	Omsetning og drift av fast eiendom
71	Utleie av maskiner og utstyr uten personell. Utleie av husholdningsvarer og varer til personlig bruk
72	Databehandlingsvirksomhet
73	Forskning og utviklingsarbeid
74	Annen forretningsmessig tjenesteyting

75	Offentlig administrasjon, forsvar og trygdeordninger underlagt offentlig forvaltning
80	Undervisning
85	Helse- og sosialtjenester
90	Avløps- og renovasjonsvirksomhet
91	Interesseorganisasjoner ikke nevnt annet sted
92	Fritidsvirksomhet, kulturell tjenesteyting og sport
93	Annen personlig tjenesteyting
95	Lønnet arbeid i privat sektor
99	Internasjonale organer og organisasjoner

(Source: Statistics Norway)

Two-digit NACE codes 2007 Revision

Code	NACE Industry
1	Jordbruk og tjenester tilknyttet jordbruk, jakt og viltstell
2	Skogbruk og tjenester tilknyttet skogbruk
3	Fiske, fangst og akvakultur
5	Bryting av steinkull og brunkull
6	Utvinning av råolje og naturgass
7	Bryting av metallholdig malm
8	Bryting og bergverksdrift ellers
9	Tjenester tilknyttet bergverksdrift og utvinning
10	Produksjon av nærings- og nytelsesmidler
11	Produksjon av drikkevarer
12	Produksjon av tobakksvarer
13	Produksjon av tekstiler
14	Produksjon av klær
15	Produksjon av lær og lærvarer
16	Produksjon av trelast og varer av tre, kork, strå og flettematerialer, unntatt møbler
17	Produksjon av papir og papirvarer
18	Trykking og reproduksjon av innspilte opptak
19	Produksjon av kull- og raffinerte petroleumsprodukter
20	Produksjon av kjemikalier og kjemiske produkter
21	Produksjon av farmasøytiske råvarer og preparater
22	Produksjon av gummi- og plastprodukter
23	Produksjon av andre ikke-metallholdige mineralprodukter
24	Produksjon av metaller
25	Produksjon av metallvarer, unntatt maskiner og utstyr
26	Produksjon av datamaskiner og elektroniske og optiske produkter
27	Produksjon av elektrisk utstyr
28	Produksjon av maskiner og utstyr til generell bruk, ikke nevnt annet sted
29	Produksjon av motorvogner og tilhengere
30	Produksjon av andre transportmidler
31	Produksjon av møbler
32	Annen industriproduksjon
33	Reparasjon og installasjon av maskiner og utstyr
35	Elektrisitets-, gass-, damp- og varmtvannsforsyning
36	Uttak fra kilde, rensing og distribusjon av vann

37	Oppsamling og behandling av avløpsvann
38	Innsamling, behandling, disponering og gjenvinning av avfall
39	Miljørydding, miljørensing og lignende virksomhet
41	Oppføring av bygninger
42	Anleggsvirksomhet
43	Spesialisert bygge- og anleggsvirksomhet
45	Handel med og reparasjon av motorvogner
46	Agentur- og engroshandel, unntatt med motorvogner
47	Detaljhandel, unntatt med motorvogner
49	Landtransport og rørtransport
50	Sjøfart
51	Lufttransport
52	Lagring og andre tjenester tilknyttet transport
53	Post og distribusjonsvirksomhet
55	Overnattingsvirksomhet
56	Serveringsvirksomhet
58	Forlagsvirksomhet
59	Film-, video- og fjernsynsprogramproduksjon, utgivelse av musikk- og lydopptak
60	Radio- og fjernsynskringkasting
61	Telekommunikasjon
62	Tjenester tilknyttet informasjonsteknologi
63	Informasjonstjenester
64	Finansieringsvirksomhet
65	Forsikringsvirksomhet og pensjonskasser, unntatt trygdeordninger underlagt offentlig forvaltning
66	Tjenester tilknyttet finansierings- og forsikringsvirksomhet
68	Omsetning og drift av fast eiendom
69	Juridisk og regnskapsmessig tjenesteyting
70	Hovedkontortjenester, administrativ rådgivning
71	Arkitektvirksomhet og teknisk konsulentvirksomhet, og teknisk prøving og analyse
72	Forskning og utviklingsarbeid
73	Annonse- og reklamevirksomhet og markedsundersøkelser
74	Annen faglig, vitenskapelig og teknisk virksomhet
75	Veterinærtjenester
77	Utleie- og leasingvirksomhet
78	Arbeidskrafttjenester
79	Reisebyrå- og reisearrangørvirksomhet og tilknyttede tjenester
80	Vakttjeneste og etterforsking
81	Tjenester tilknyttet eiendomsdrift
82	Annen forretningsmessig tjenesteyting
84	Offentlig administrasjon og forsvar, og trygdeordninger underlagt offentlig forvaltning
85	Undervisning
86	Helsetjenester
87	Pleie- og omsorgstjenester i institusjon
88	Sosiale omsorgstjenester uten botilbud
90	Kunstnerisk virksomhet og underholdningsvirksomhet
91	Drift av biblioteker, arkiver, museer og annen kulturvirksomhet
92	Lotteri og totalisatorspill
93	Sports- og fritidsaktiviteter og drift av fornøyelsesetablissementer

94	Aktiviteter i medlemsorganisasjoner
95	Reparasjon av datamaskiner, husholdningsvarer og varer til personlig bruk
96	Annen personlig tjenesteyting
97	Lønnet arbeid i private husholdninger
99	Internasjonale organisasjoner og organer

(Source: Statistics Norway)

9.3 Appendix C: Normality tests

9.3.1 Normality tests for operating profit margin – basis year 2007

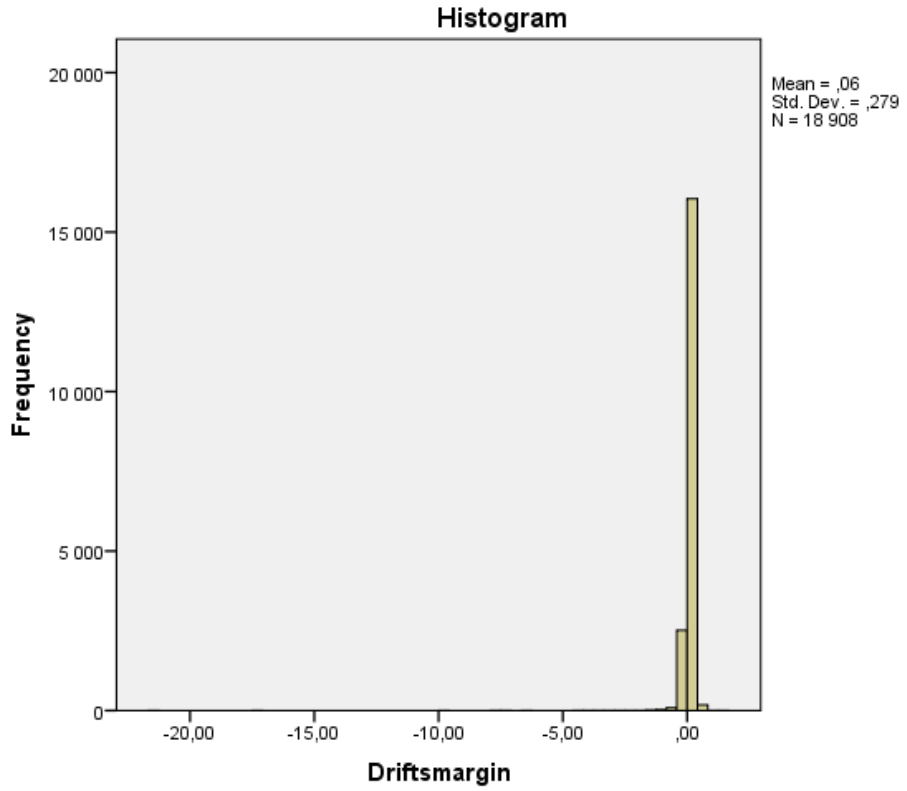
Case Processing Summary

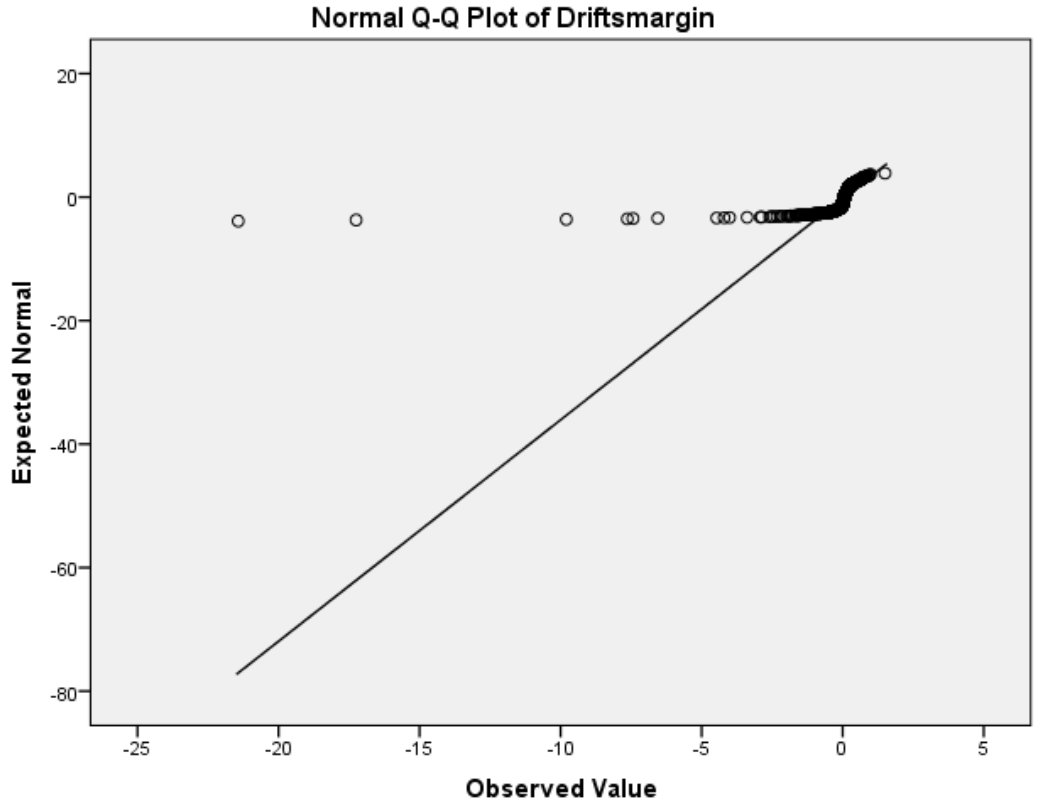
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Driftsmargin	18908	85,2%	3279	14,8%	22187	100,0%

Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Driftsmargin	,294	18908	,000

a. Lilliefors Significance Correction


Histogram
Mean = ,06
Std. Dev. = ,279
N = 18 908
Frequency
20 000
15 000
10 000
5 000
0
-20,00
-15,00
-10,00
-5,00
,00
Driftsmargin


Normal Q-Q Plot of Driftsmargin
Expected Normal
20
0
-20
-40
-60
-80
-25
-20
-15
-10
-5
0
5
Observed Value

9.3.2 Normality tests for ROA – basis year 2007

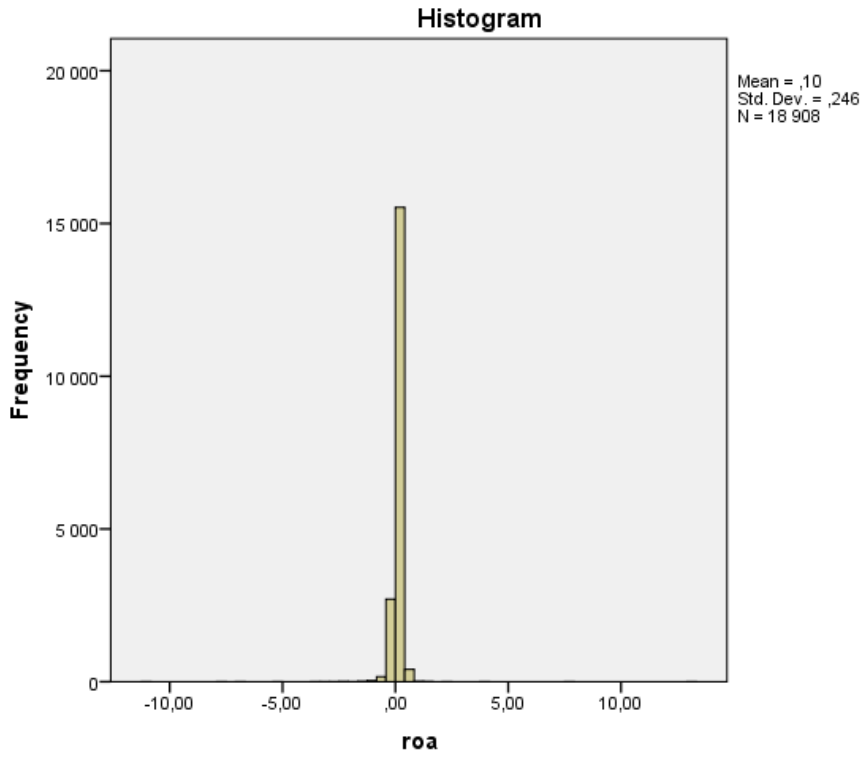
Case Processing Summary

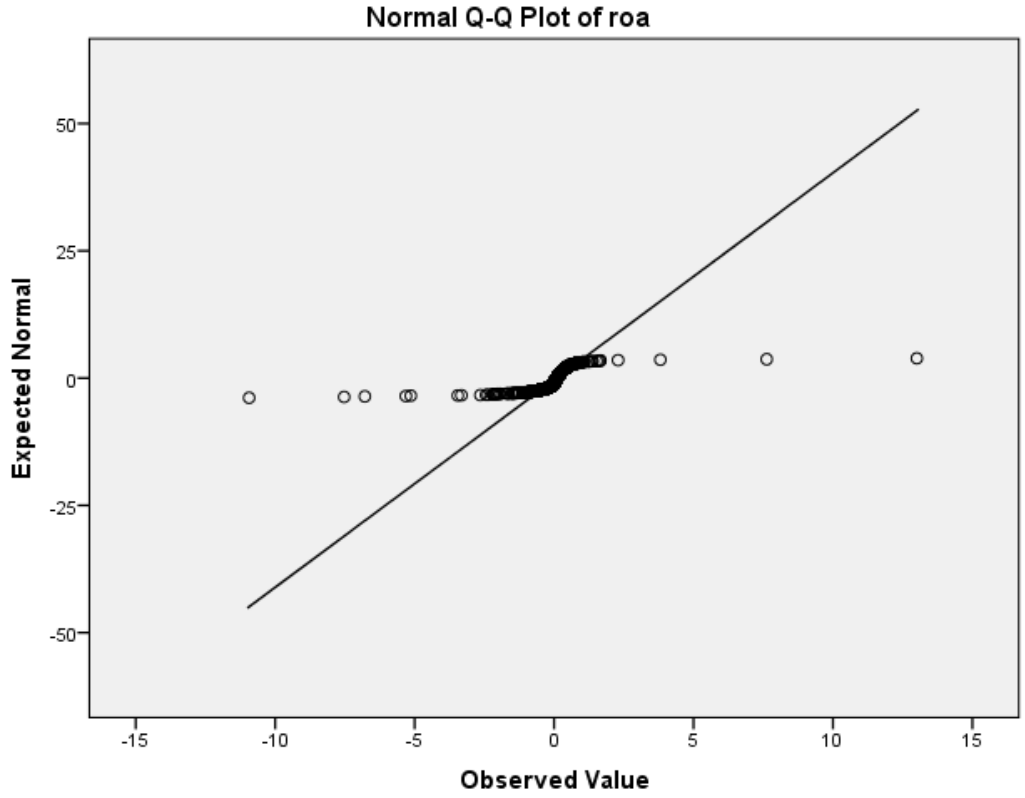
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
roa	18908	85,2%	3279	14,8%	22187	100,0%

Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
roa	,194	18908	,000

a. Lilliefors Significance Correction


Histogram
Mean = ,10
Std. Dev. = ,246
N = 18 908
Frequency
20 000
15 000
10 000
5 000
0
-10,00
-5,00
,00
5,00
10,00
roa


Normal Q-Q Plot of roa
Expected Normal
50
25
0
-25
-50
-15
-10
-5
0
5
10
15
Observed Value

9.4 Appendix D: Comparison of median and mean after removing outliers

In this appendix, we present graphs that show the differences between the median and the mean after outliers have been removed in accordance with sample criteria 8. This is done for the sample as a whole and for the top and bottom deciles used in the analyses on profitability. We wanted to show that the operation of removing outliers is sufficient in order to use the mean as the basis for our analyses throughout the study.

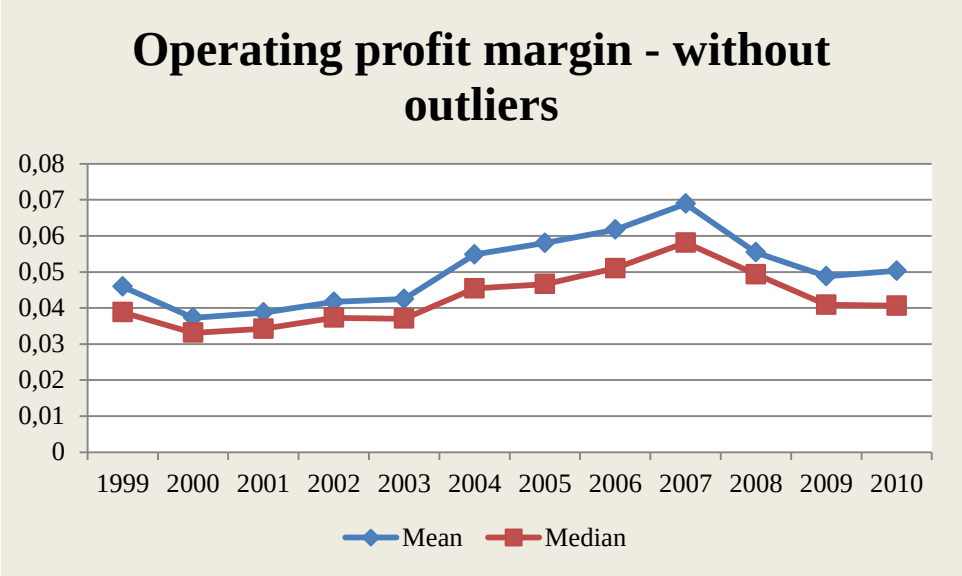


FIGURE 32: OPERATING PROFIT MARGIN WITHOUT OUTLIERS - MEAN VS. MEDIAN

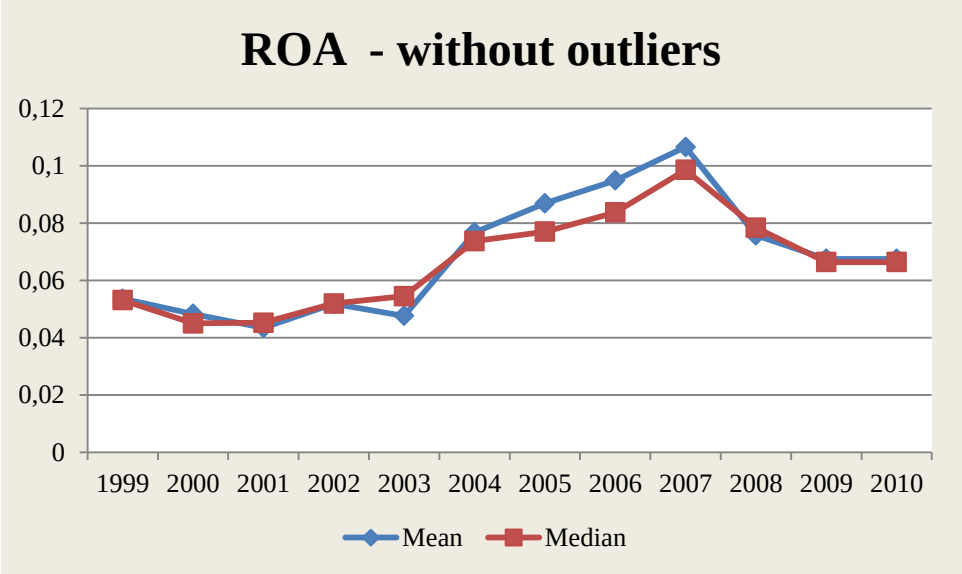


FIGURE 33: ROA WITHOUT OUTLIERS - MEAN VS. MEDIAN

The graphs show that there are small differences between the mean and the median after outliers have been removed. This implies that the mean is no longer severely affected by extreme observation after observations +/- two standard deviations from the mean have been excluded from the sample. The mean and the median have very similar courses and this justifies our use of mean in the analyses throughout our study.

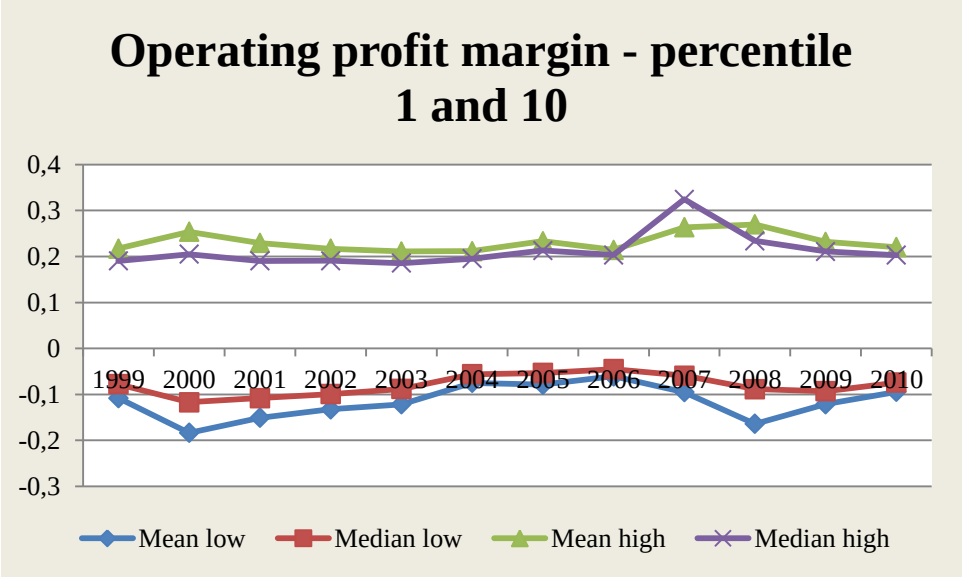


FIGURE 34: OPERATING PROFIT MARGIN, PERCENTILE 1 AND 10 - MEAN VS. MEDIAN

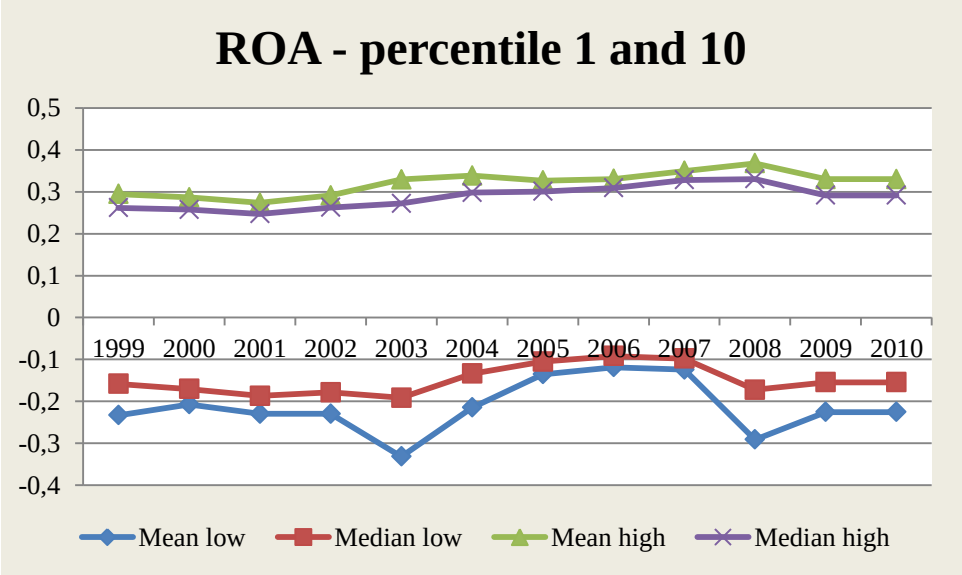


FIGURE 35: ROA, PERCENTILE 1 AND 10 - MEAN VS. MEDIAN

The graphs show that the mean and median of both operating profit margins and ROA for the high performers are almost identical in movement, and the difference between the two is minimal. The median for the low performers stays on a generally higher level than the mean, and the differences are somewhat larger for these firms. However, the differences are still very small.