Investments Across Resource Categories

A study of Norwegian Firms' Investment Decisions in the Covid-19 Pandemic

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Abstract

This thesis examines how firms respond to recessions, and the purpose of this thesis is to research how Norwegian firms' prerequisites influenced planned investment decisions across several resource categories. A survey conducted by NHH in the spring of 2020 provide the foundation of this thesis. This survey resulted in responses from 1 300 Norwegian firms on their responses to the Covid-19 pandemic, and this data was combined with registry data to trace how firm responses are affected by the firms' financial prerequisites.

The findings indicate that on average, firms reduced the investment levels across all resource categories. Based on the multiple regression model several factors are identified to reliably predict firm's investment decisions

The findings from the regression analysis indicated that firm growth could explain investment reductions across all resource categories and financial leverage could explain investment reductions in research and development, human capital, and organizational capital and a more surprising finding was that liquidity significantly could significantly investment reductions in research and development and organizational capital. While the analyses provided interesting results, more detailed analyses with improved specifications are necessary to further comprehend the observed differences.

Acknowledgements

The journey with this thesis started in 2020, and it has been exceptionally interesting to write about a topic that has affected everyone to a greater or lesser extent since the Spring of 2020. I want to thank my supervisor Lasse B. Lien for providing me access to this data and for excellent insights and discussions during the writing process. A special thanks to Jan Nore for encouraging me to study at the Norwegian School of Economics.

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1. Introduction

In 2020, the Covid-19 pandemic affected all countries, and the impact on the Norwegian economy was, and still is, substantial. On March 12th, 2020, the Norwegian government implemented several measures that limited the overall activity in Norway. Only a limited number of countries adopted a strategy that consisted of doing nothing in response to the Covid-19 pandemic, and as most countries implemented restricting constraints, the economic activity dropped across the world. Therefore, several firms have been affected by the measures implemented by the government, and not by the Covid-19 pandemic directly. The economic implications following the Covid-19 pandemic can be observed in the development of several macroeconomic variables, and from the second to the third quarter of 2020, the unemployment rate increased from 3.6 percent to 5.4 percent in Norway, making this the largest increase in unemployment during one quarter in the last ten years.

As exogenous macroeconomic shocks become more common, business cycle literature provides useful understanding. In the strategy literature, how firms are influenced and adapt to the surroundings has been well-researched, however, the link between business cycles and firm strategy has been neglected in the literature (e.g., Mascarenhas & Aaker, 1989). In addition, only a fraction of the research has addressed firm behavior in recessions, and how the phases of the business cycle affect firms' investments (Bernanke, 1983; Ghemawat, 2009; Campbello, et al., 2010). Business cycle literature often emphasize the aggregate effects of recessions, and not firm specific effects (Knudsen, 2014), it is therefore interesting to study Norwegian firms' early responses to the recession following the Covid-19 pandemic in 2020. Following this, the main goal of this thesis is to contribute to the growing management and strategy literature on how firms respond to exogenous shocks and recessions (e.g., Gerorski and Gregg, 1997; Agarwal et al, 2009; Mascarenhas & Aaker, 1989).

In addition to in the business cycle literature, firm behavior across the business cycle has also been researched in the economics and finance literature, examples of these studies include investment changes across the business cycle (e.g., Bernanke, 1983), and studies of the impact on firms from financing constraints (e.g., Hubbard, 1997; Myers & Majluf, 1984). A considerable amount of the existing research concerns investments in specific resource categories, e.g. physical capital or research and development (Aghion et al., 2012), while other resource categories such as organizational and human capital have received less attention (e.g., Greer, Ireland, & Wingender, 2001; DeJong & Ingram, 2001). Furthermore, these investment

categories are often researched separately (Knudsen & Lien, 2019), which is a possible limitation of the previous studies, as firms may face a trade-off between investments (Maritan, 2001; Alessandri & Bettis, 2003). This trade-off is amplified in firms with limited financing abilities and credit constraints, and these issues may be more prominent in recessions. That is, the assumption of efficient financial markets (Barney, 1986; Peteraf, 1993) may not hold in recessions if external financing opportunities are reduced or unevenly distributed across resource categories. Therefore, financing opportunities could vary across both firms and investment categories.

The resource-based view in the strategy literature highlight the importance of resources and capabilities, including how these may affect firms' ability to obtain a competitive advantage (Barney, 1986; Dierixkx and Cool, 1989). As it is possible to acquire strategic resources at a discount in downturns, firms should adjust both investment levels, and the distribution of investments in different resource categories across the business cycle. It is therefore interesting to research firms' investment decisions in several resource categories across the business cycle, as well as how firm characteristics influence these decisions. In this thesis, investment decisions are studied across the resource categories research and development, human capital, organizational capital, and physical capital.

To gain knowledge on Norwegian firms' response to the recession in 2020 the following research question has been created:

How did Norwegian firms' prerequisites affect the responses to the crisis caused by the Covid-19 pandemic?

The purpose of this research question is to provide insight in firms' early investment decisions across resource categories, as well as how several factors influenced these decisions.

The research model presented in Figure 1 provide a visual presentation of the main concepts in this thesis, and the relationship between these. The research model illustrates how firm responses are affected by relevant factors, and consist of both dependent variables (research and development, human capital, organizational capital, and physical capital), independent variables (growth, financial leverage, and liquidity) and control variables (industry, size, age, and prior performance), these are presented in detail in chapter 3.

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┌──────────────────┐                              ┌──────────────────┐
│  Exogenous shock │──────────────┐──────────────▶│   Firm response  │
└──────────────────┘              ▲               └──────────────────┘
                                  │
                        ┌──────────────────┐
                        │ Firm and industry│
                        │  characteristics │
                        └──────────────────┘
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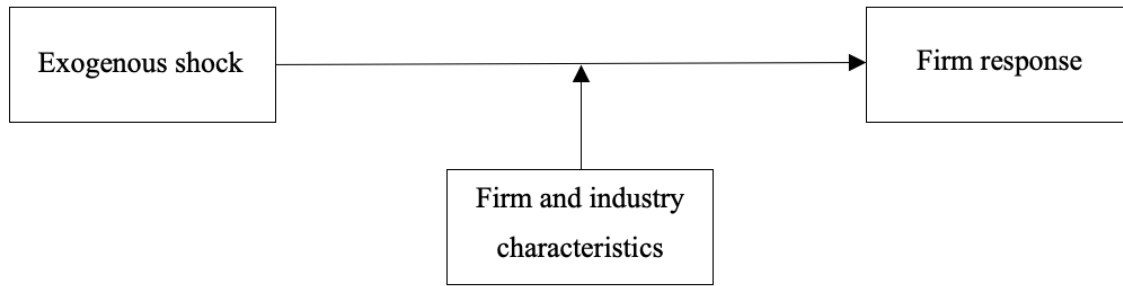
Figure 1: Simplified research model

Both firm and industry characteristics influence to what extent a firm is impacted by the shock, and firm responses is dependent on both the shock and the characteristics.

In this thesis, the planned (ex-ante) investment changes are investigated, and not the observed (ex-post) outcomes. The link between firms' financial situation and characteristics prior to the crisis and firms' decisions during the crisis is examined by combining survey and accounting data. Gerorski and Gregg (1997) have used similar methods to analyze firm behavior in recessions, this study is further described in this thesis. The recession is considered as an exogenous shock, and while the effects of the recession is described, the cause of the recession will not be described in detail.

2.   Theoretical background

2.1 Introduction

In this section the theoretical foundations that provide an understanding of how firms respond to recessions are outlined. First, the resource-based view is presented, as this is important to understand firms' decisions. Second, firms' decisions are influenced by the characteristics of the different phases of the business cycle, therefore theory about business cycles is presented. Third, as this thesis research firms' decisions based on their prerequisites, basic capital structure and corporate finance principles are presented. Forth and finally, this chapter is concluded by a presentation of the developed hypotheses combined with a description of the relevant resource categories.

2.2 Resource-based view

In the field of strategy, understanding how firms can obtain and sustain a competitive advantage has been an important research area (e.g., Porter, 1985; Rumelt, 1984). An important part of this includes understanding the role of products and resources as a source of obtaining above normal returns and a competitive advantage (e.g., Porter, 1980; Wernerfelt, 1984; Barney, 1986). There are several theories of how firms can obtain a competitive advantage. In the following sub-sections, the theory of the resource-based view is presented, as this provide an understanding of how capabilities and resources influence firms' ability to obtain a competitive advantage. Resources are central both in the resource-based view and this thesis, therefore firm resources are described in the next subsection, followed by a discussion of how investments in several resource categories influence firms' competitive position.

2.2.1 Resources

In the resource-based view firms' competitive position is presumed to depend on internal resources and competence. By analyzing firms' internal resources and expanding the definition of resources to include human capital, Penrose was the first to describe the resource-based view in 1959 (Penrose, 1959). In the RBV, firm resources are central, and there are several definitions of resources in the literature. According to Porter (1981) resources can be considered as strengths that firms can use to implement strategies. Wernerfelt (1984) further

describe resources as either tangible or intangible assets that are semi-permanently tied to the firm. Daft (1983) define firm resources as *"all assets, capabilities, organizational processes, firm attributes, information and knowledge controlled by a firm that allow firms to implement strategies that improve the efficiency"*. Resources can be divided into separate resource categories depending on the characteristics of the resources. Barney (1991) distinguish between three resource categories, namely physical capital resources, human capital resources, and organizational capital resources. According to Barney (1991), physical capital includes location, access to technology and materials, and property, plant, and equipment (PPE), while human capital resources include intelligence, relationships, managerial knowledge, and training, and organizational capital refers to the internal and external informal relationships, the formal reporting structure, and coordination systems. The resource categories physical capital, human capital, organizational capital and research and development are further described in section 2.5.

The resource needs and requirements differ across firms as they have different strategies and compete in different markets, this can also explain differences in firms' investment prioritizations. In general, exogenous shocks may cause firms to adjust both existing strategy and resource stock. However, imperfect resource mobility could make these adjustments costly (Barney, 1991; Peteraf, 1993). In addition, structural characteristics within different markets tend to be relatively stable (Porter, 1980). Some resources and market characteristics could therefore be more prone to the demand effects of recessions, which could explain why the impact of economic shocks is not randomly distributed across firms (Knudsen, 2019). Several other factors, for instance how equipped firms are to adapt to external shocks, could also influence how firms adjust their investment levels following exogenous shocks. It is therefore interesting to research how several factors influence how firms adjust their investments in resources, and whether these differ across resource categories.

2.2.2 Competitive position and investment adjustments

In macroeconomic theory, production factors within sectors are often assumed to be homogenous (Agarwal et al., 2009). In the resource-based view, the assumptions of resource heterogeneity and resource immobility is important to understand how firms can obtain a competitive advantage, as firms are considered as heterogeneous units that exploit their resources and capabilities (Barney, 1991; Barney & Clark, 2007). As mentioned, the first assumption is that firm resources within an industry are assumed to be heterogenous. Second,

resources are assumed not to be perfectly transferable across firms. The implication of these assumptions is that long lasting heterogeneity is possible. These assumptions do not hold for all industries, however, Barney and Hoskisson (1989) found that they hold in most industries. Dierickx and Cool (1989) also emphasize the role of resources or strategic asset stocks to achieve these market positions, and how implementation of a strategy may require assets that are non-appropriable, i.e., firm specific assets. According to Dierickx and Cool (1989) assets that are not imitable, tradeable, or substitutable are considered strategic asset stocks. Firms face strategic trade-offs in their investment decisions that could be emphasized in exogenous shocks, and these factors are important in understanding how firms adjust investment levels and how investments in different resource categories are prioritized. That is, firms should be less willing to reduce certain investments, e.g., investments in firm specific assets that are non-appropriable.

The ability to obtain a competitive advantage is closely related to firms' investment decisions as these decisions have a strategic impact that influences firms' short-term and long-term competitive position both directly and indirectly. A competitive advantage can be obtained by executing a strategy that is not being implemented by current or future competitors, and the competitive advantage is said to be sustained when other firms are not able to implement the same strategy or duplicate the benefits from the strategy (Barney, 1991). Barney (1991) describe four attributes that firm resources must have to have potential to yield a sustained competitive advantage. First, the resources must be valuable. Second, among the current and potential competition the resources must be rare. Third, the resources must be imperfectly imitable. Fourth, the resources must be non-substitutable. This is often referred to as the VRIN-framework, and several similar frameworks have been created and described in the literature. Therefore, firms' investment decisions should be influenced by the attributes of the resources and VRIN-resources should be the last group of resources where firms reduce investments. While which resources are considered VRIN may be firm-specific, these could for include resources such as knowledge as these are more difficult to scale up and down compared to physical assets.

Following the increased focus on heterogeneity of both firms and resources, knowledge and managerial skills has received increased attention in strategy and organizational literature (Barney, 1991). However, firms competitive position rely on a combination of resources, specific relations and co-specializations are necessary (Agarwal et al., 2009; Barney, 1991; Dierickx and Cool, 1989; Teece, 2009). Having a sustainable competitive advantage does not

imply that it is forever lasting as resources have different economic life expectancies, and without the required maintenance, the value of resources depreciates. This holds for both tangible and intangible resources. For instance, firms can add to their knowledge stocks by investing in research and development, however, as knowledge stocks also depreciate, the value of more mature R&D investments is reduced (Hausmann, Hall, & Griliches, 1984). A source that previously yielded a sustained competitive advantage may no longer be valuable for a firm due to unanticipated changes, i.e., preference changes or technological development can lead to a redefinition of which assets are viewed as resources, and which are not. This also influences firms' investment decisions, and how firms adjust to external changes across the business cycle is described more in detail in the next sub-chapter.

2.3 The business cycle

Several research fields have described economic fluctuations and its implications. While it is a central topic in the business cycle literature, most of the existing research is from the finance and macroeconomic literature. In this section, business cycle theory is presented, followed by theory on recessions, often is described as declines in economic activity. Lastly this is linked to firm investments and how this affect firms' competitive position.

2.3.1 Business cycles

Business cycles and the phases of business cycles have been described and researched in several studies. According to Burns and Mitchell (1946), business cycles are characterized by co-movements in economic variables and fluctuations in the aggregate economic activity around the long-term trend of the economy. As cited in Legrand and Hagemann (2017), Juglar (1862) describe business cycles as economic alternations between prosperity and depression where crisis is the turning points, while Schumpeter (1926) describe business cycles as unavoidable waves where crises are considered as the turning points of the economic development. Four phases of economic fluctuations are often described, these include recovery, prosperity, recession, and depression, where depression and prosperity are movements away from equilibrium, and recovery and recession are movements towards equilibrium. More precisely, the recovery phase is characterized by upward movements returning to equilibrium. Movement beyond equilibrium is known as the prosperity or expansion phase. Recessions are characterized by downward movement towards equilibrium,

while further decline past equilibrium is characterized as depression (Legrand & Hagemann, 2017). A simplified figure of the phases of the business cycle is illustrated in Figure 2.
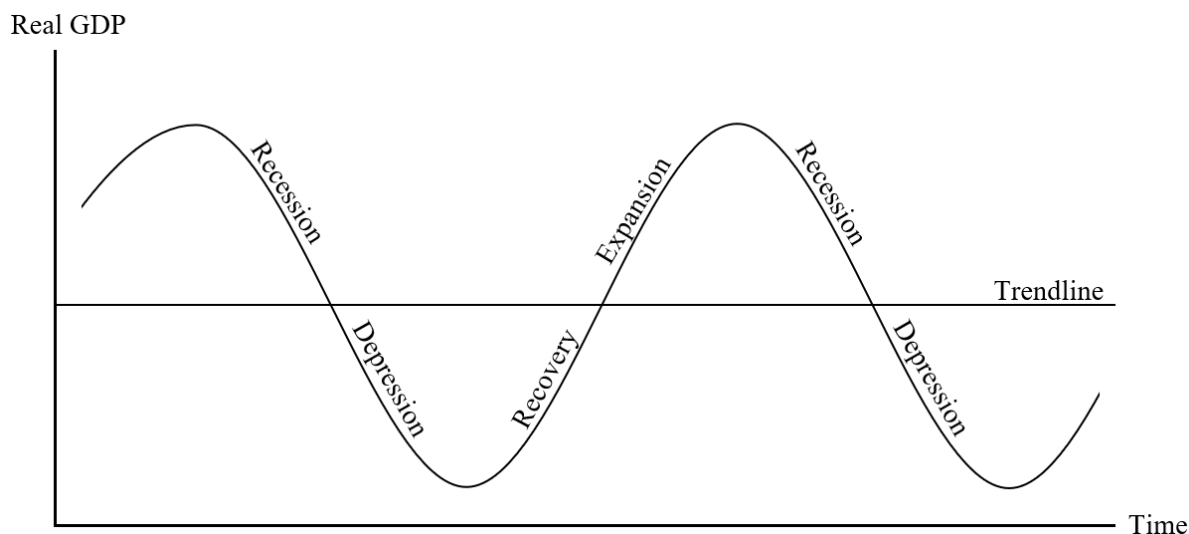
Figure 2: Simplified model of the phases of the business cycle.

The duration of business cycles is not clearly defined, as business cycles are not uniform. Burns and Mitchell (1946) describe the duration to vary from more than one year to twelve years, and the expansion phase is typically longer than the contraction phase, which reflect the long-term growth potential of the economy (Sørensen & Whitta-Jacobsen, 2010). Much of the existing literature on business cycles concerns the US economy. However, the economic development in the US influences the EU, which is one of Norway's most important export markets as Norway is a small, open economy that depend on export of gas and oil (Statistics Norway, 2019). This separate Norway from other Scandinavian and EU countries, as well as the US. It is therefore not clear that Norwegian business cycles should be completely synchronized with business cycles of other countries in these areas (Aastveit, Jore, & Ravazzolo, 2016). However, Aastveit, Jore, and Ravazzolo (2016) found Norwegian business cycles to be more closely related to US business cycles, compared to the EU, UK and Sweden in terms of duration, amplitude, and dating. While studies and measures of Norwegian business cycles is limited, Fushing et al. (2010) studied the development of three variables, namely monthly industrial production, quarterly GDP, quarterly employment, in several countries, including Norway. The development in some of these variables is described in section 4.2.

2.3.2 Recessions and investment adjustments

In this section, recessions will be described further before it is linked to investments as this thesis covers Norwegian firms' responses to the recession following the Covid-19 pandemic. NBER's "Business Cycle Dating Committee" (2008) define recessions as *"a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales"*. This definition of recessions include both severity and duration, although, recessions are highly unpredictable, both in terms of when occurrence and duration (Reinhart & Rogoff, 2013). According to IMF(2010), global recessions occur approximately every 7-10 years, and Romer (1999) found that most recessions last from 6 to 12 months, while a more recent study by Reinhart & Rogoff (2013) found that they could last from 8 to 18 months.

There are often several factors that can explain why recessions occur, some of these include endogenous shocks such as war or financial crisis, or endogenous factors, such as changes in customer demand (Mascarenhas & Aaker, 1989). Even though the causes, intensity and duration vary in different recessions, a tightened credit supply and demand reductions are often observed in recessions (Agarwal et al., 2009; Aghion et al., 2010). The impact from these impulses varies across firms, industries and across recessions (Ramalho, Rodríguez-Meza, & Yang, 2009; Tong & Wei, 2008). Reinhart & Rogoff (2009) found that firms experienced a reduced demand for their services and products in recessions, and that these demand changes in turn influenced firms' decisions. Other researches, such as Bernanke (1983) and Ghemawat (2009) researched how firms' investments and growth opportunities were affected by demand reductions, and Ghemawat (2009) specifically researched how firms balance the competitive risk of not investing against the financial risk of investing. Several factors influence firms' investment decisions, including how severely firms are affected by the recession (Geroski and Gregg, 1997), and how firms prioritize between short-term and long-term strategies. Several other factors also influence the impact of recessions and firms' responses. Global crises may for instance make issue mitigation more difficult as it is harder to succeed with growth through increased exports and foreign borrowing (Reinhard and Rogoff, 2009).

Structural firm and market changes in recessions have been an object of prior research, and Geroski and Gregg (1996; 1997) found that the number of these changes increase in recessions. This is consistent with Schumpeter (1942), that described the economy to be pulled out of recessions in waves of innovation that lead to structural changes and long-term growth. A

precondition for this is that firms have sufficient funds to be able to reorganize or adjust its activities (Aghion, 2012). Another explanation of the increase in organizational changes in recessions is that redirecting resources is less costly as the demand collapse makes current production and sales less profitable (Geroski and Gregg, 1997). That is, the opportunity cost varies across the business cycle, and firms are more willing to make investments that require the use of labor and management in recessions as the opportunity cost is relatively lower. In recessions, when the current demand is reduced, long-term investments will have a lower opportunity cost (Aghion, 2012), and firms face a trade-off between long-term and short-term investments. It has therefore been argued by several researchers (e.g., Hall, 1993; Gali and Hammour, 1992; Aghion and Saint-Paul, 1998) that firms' short-term investments should therefore be procyclical, while long-term investments should be countercyclical. This trade-off is also influenced by firms' financial situation, as severely affected firms tend to prioritize short-term survival (Mann & Byun, 2017), while less severely affected firms are more likely to maintain long-term strategies and exploit and acquire underpriced labor and assets, and capture market shares (López-Garcia, Montero, & Moral-Benito, 2013). A demand collapse may provide the available time and capacity to prioritize investments and other actions that is not normally prioritized. On the other hand, a demand collapse is likely to affect firms cash flows, which in turn reduces firms' ability to lend. Firms' financial prerequisites may therefore influence how affected a firm is by a negative shock, as well as how the firm responds. In addition, the impact of recessions is not evenly distributed across investment categories, this is further discussed in section 2.5 where the resource categories, research and development, human capital, organizational capital, and physical capital is described.

2.4 Corporate finance principles and capital structure

This section consists of corporate finance principles that are relevant for firms' investment decisions as the analysis investigate how several factors, including capital structure influence these decisions. Capital structure refers to the level of equity and debt within a firm. In the field of finance, the research on capital structure is extensive (e.g., Brealey, Myers, & Allen, 2008). The aim of this subchapter is to provide an overview and understanding of the foundation for the analyses in this thesis.

2.4.1 Modigliani-Miller theorem

Modigliani and Miller (1958) laid the foundation of capital structure theory by presenting the irrelevance theory stating that capital structure should not affect the value of a firm. The first proposition state that a firms' debt-equity ratio should not affect the market value of the form. In the second proposition a firm's cost of equity is positively related to a firm's leverage, to compensate for the risk of increased leverage. In Modigliani and Miller's paper from 1963 firm value is proposed to increase with leverage. The value of the levered firm is the value of the equity and the present value of the tax shield. The tax shield increases with debt, therefore firm value increases with leverage. This follow from interest deductions that reduce the tax payments. In the second proposition the cost of equity is postulated to increase with debt as the risk to equity increases with leverage, however, the tax shield from increased debt pull in the opposite direction. The Miller and Modigliani theorem has received criticism as Modigliani and Miller make several assumptions that are strict and unrealistic as they do not hold in the real world.

2.4.2 Trade-off theory

The trade-off theory was presented by Kraus and Litzenberger in 1973 as a response to the Miller Modigliani theory. The trade-off theory indicates that there is an optimal balance between equity and debt in terms of the increased financial distress costs (bankruptcy risk) and tax shield benefits. Tax shield benefits arise as interest payments on debt are tax deductible. This could be indicated by the simplified equation below indicate that the value of the firm depends on both financial distress costs and the tax shield, and that the optimal debt level balances these two aspects.

$$V_L = V_U + PV(Tax\ shield) - PV(Financial\ distress\ costs)$$

In the equation the value of the levered firm (V_L) depend on the value of the unlevered firm (V_U), as well as the value from tax shields and financial distress costs. The implications of this theory include that increased debt increase the firm value through the tax shield, however, this only holds true until a certain level as the financial distress costs increase with the increased debt. In recessions, firms may experience demand reductions that reduce the cash flows and asset values, as well as debt capacity. That is, firms' ability to pay off debt could be reduced in recessions. In turn, this could influence firms' investment decisions, as the ability to pursue or increase planned investments is reduced.

2.4.3 Agency costs

When control and ownership is separated in firms, conflicts of interest between shareholders and managers, or between owners and managers can arise, and these conflicts could result in agency costs (Copeland, 2013). Based on a set of assumptions presented in Jensen and Meckling (1976), agency costs can explain firm value reductions due to debt. This is because debt financing can increase firms' risk tolerance and lead to overinvestment in riskier projects due to a substitution effect where low-risk assets are replaced with riskier assets (Berk and DeMarzo, 2014). In addition to overinvestment, agency costs can also explain underinvestment. This is often referred to as debt overhang and explain how financial distress in firms with a debt overhang causes firms to forego positive NPV-investments. In addition to agency costs, Jensen (1986) also describe agency benefits of debt, these benefits include reductions in wasteful spending as the available funds is reduced. Therefore, in finding the optimal capital structure, firms face a trade-off between agency costs and agency benefits.

2.4.4 Pecking order theory

The pecking order theory does not describe what the optimal capital structure is, instead, Myers and Majluf (1984) describe how asymmetric information between the firm and the market influences firm's capital structure decisions. Due to the information asymmetry, firm actions have a signalling effect. For example, if a firm issue debt, this could indicate that the equity is undervalued, or that the firm is assumed to be able to meet their obligations. Therefore, Myers and Majluf (1984) rank firms financing options based on what they should prefer given the market reaction to the signalling, as well as the costs related to the asymmetric information. As a result, firms should prefer internal financing before external financing including debt and new equity. Differences between the use of financing sources across the resource categories are described in section 2.5. In general, the asymmetric information issues are more prominent regarding immaterial investments as these do not provide collateral. This could reduce the opportunities to obtain external financing for these investments. Furthermore, Fazzari et al. (1988) described how internal financing is important for firms' investments in recessions, as the access to external financing may be reduced in recessions.

2.4.5 Other theories

In addition to the presented theories, there are several other theories that attempt to explain firms' financing decisions. The market timing theory describes how firms' financing decision

should depend on where it is beneficial to acquire funding, and not what the perceived optimal capital structure is (Baker and Wurgler, 2002). Further, Baker and Wurgler (2002) found that firms attempt to time the market and issue new equity when the share price is high. That is, when the firm is perceived as overvalued, equity is issued, but if the firm is undervalued, debt is issued. In addition to the presented theories, several studies with a survey format have been conducted. Graham and Harvey (2001) conducted a survey on capital structure and found that financial flexibility was the most important for the CFOs. These findings were supported by Bancel and Mittoo (2004). While financial flexibility is important for firms, it is difficult to measure as several factors influence the financial flexibility (Bancel and Mittoo, 2011).

2.5 Hypotheses

The previous sub-sections lay the theoretical foundation and provide an overview of the resource-based view, business cycles and corporate finance principles necessary to develop the hypotheses about how firms' investment decisions following the Covid-19 pandemic. This is interesting to research as investment decisions are among the most important decisions within firms (Maritan, 2001). These decisions may require large commitments in several resource categories and entail large costs, and even though the outcome of these decisions is difficult to predict, capital investment decisions have long-term implications on firms' achievements. In this thesis, investments in several resource categories is researched, enabling an investigation of investment decisions at an investment-level, and not only at a firm-level. This provides valuable insight as firms adjust investment levels in several resource categories simultaneously (Maritan, 2001). Maritain (2001) also found the effects of investments in separate investment categories to be overlapping, e.g., that investments in physical capital may improve organizational capabilities. While the effects of the investment decisions lie outside the scope of this thesis, this highlight the importance of studying investments at an investment-level. The amount, scope and focus of the existing literature varies across resource categories. Despite sparse literature in some areas, the same hypotheses are used for all included resource categories as this could provide valuable insight in the differences in the investments across the resource categories. Prior literature (e.g., Aghion et al., 2012) have studied investments in specific resource categories, and highlighted that the findings also should hold for other resource categories.

While most of the existing literature has focused on specific resource categories, some of the literature has studied several resource categories simultaneously. Campello et al. (2012) studied how EU firms planned investments changed in the 2008-2009 crisis and found that on average the firms planned to reduce investments by approximately 11 percent from 2009 to 2010. In this study Campello et al. (2010; 2012) also observed differences between EU and US firms, and the average planned reduction in investments was about 15 percent for US firms. Gerorski and Gregg (1997) studied how UK firms responded to the recession by combining financial data with survey data. In this study they studied whether firms increased, reduced, or did not adjust investments, and found that between 40 to 60 percent of firms did not alter their investment decisions. Further, they found the recessionary pressures not to be evenly distributed across investment categories, and that the firms that made investment adjustments were more likely to abandon investments in physical assets, such as plant and machinery and buildings, where 47 and 42 percent of firms reduced the investments. Investments in these categories was only brought forward in 14 and 10 percent of the firms. Furthermore, investments in product innovation and training were the most likely to be brought forward and the smallest investment reductions were found in product innovation and process innovation, in these categories, 11 and 13 percent of firms reduced the investments. To summarize, Gerorski and Gregg (1997) found that the recessionary pressures had the strongest impact on investments in physical capital, followed by investments in training and the effects on investments in research and development were the weakest.

To provide an overview, the hypotheses that are tested across the resource categories are summarized before the resource categories are described separately:

Hypothesis 1: *Firms with strong growth prior to the crisis are <u>less likely</u> to bring forward and/or increase investments, compared to firms with weaker growth.*

Hypothesis 2: *Highly leveraged firms are <u>less likely</u> to bring forward and/or increase investments, compared to firms with lower liquidity.*

Hypothesis 3: *Firms with high liquidity are <u>more likely</u> to bring forward and/or increase investments, compared to firms with lower liquidity.*

2.5.1 Investments in research and development

In this section, theory on investments in research and development is presented, including several factors that could influence these investment decisions within firms. In the survey used in this thesis, investment research and development and innovative activities such as adjustments of existing products and processes in studied separately. Archibugi, Filippetti, and Frenz (2013) studied UK firms using a panel data set spanning from 2004 to 2008 and found that the 2008 recession resulted in an aggregate reduced spending of 8 percent in innovative activities. This study also found innovative activities to be concentrated to fewer firms, i.e., fewer firms accounted for a larger amount of the innovation expenditure. These firms were characterized by significant growth and substantial innovative activities prior to the crisis. In addition, Archibugi, Filippetti, and Frenz found differences in the predictors of innovative activities prior to the crisis and during the crisis. Before the crisis, size, economic performance, and having an exploitation strategy could predict increased innovative activity. Size and economic performance was less important during the crisis, instead, the firms that increased their investments had a strong presence of in-house R&D departments and an exploratory strategy.

Hypothesis 1: *Firms with strong growth prior to the crisis are <u>less likely</u> to bring forward and/or increase investments in research and development, compared to firms with weaker growth.*

A possible limitation in the study by Archibugi, Filippetti, and Frenz (2013) is that industry effects or the effects of financial constraints is not included. Aghion et al., (2012) included the effect of credit constraints in a study of the cyclicality of R&D investments in French firms that strongly rely on external financing or have a low degree of asset tangibility. In this study R&D investments were found to be countercyclical in firms without credit constraints, but procyclical in credit constrained firms. That is, credit constrained firms were less likely to make long-term investments (Aghion et al., 2010). In addition, Aghion et al., (2012) found that the investment reductions were not recouped during upturns in later periods, implicating that these decisions can have a long-term strategic impact. Another study by Männasoo and Meriküll (2020) examined the effect of credit constraints on R&D investments across the business cycle in manufacturing firms in Central Eastern European countries. They found credit constrained firms to reduce R&D investments by 32 percent, a significantly larger reduction compared to the findings of Archibugi, Filippetti, and Frenz (2013). Männasoo and

Meriküll (2020) suggested that this could be explained by differences in the financial- and venture capital markets in these countries, which resulted in more adverse effects from credit constraints. Brown et al., (2009; 2012) also found country-specific differences in the structure of R&D financing, specifically that in the UK and US, a larger amount of external equity was common.

Hall (2002) describe two market characteristics that influence research and development financing and explain underfinancing of these investments. First, firms invest less than optimal in research and development as knowledge is non-rival. Second, these investments could be extensive and therefore require external financing. As external financing is more costly than internal financing, firms often aim to finance R&D investments internally (Hall, 2010; Bakker, 2013). This could limit the R&D investments in firms with credit constraints or small and young firms with less access to financing (Brown et al., 2009; 2012; Martinsson, 2010). To succeed with R&D investments, firms also need sufficient cash holdings to meet possible adjustment costs and maintenance requirements (Brown & Petersen, 2011). This applies to both larger and smaller firms (Bakker, 2013).

Hypothesis 2: *Highly leveraged firms are <u>less likely</u> to bring forward and/or increase investments in research and development, compared to firms with lower liquidity.*

Hypothesis 3: *Firms with high liquidity are <u>more likely</u> to bring forward and/or increase investments in research and development, compared to firms with lower liquidity.*

2.5.2 Human capital investments and downsizing

In this section, human capital investments are described, including several factors that could influence firms' investments in human capital. In the survey used in this thesis, human capital investments refer to competence development and training of employees, and downsizing and layoffs is studied separately. The demand reductions following recessions also affect the human capital in firms, and firms' ability to exploit the existing human capital as previously could be reduced, resulting in excess human capital resources. In this section, the advantages and disadvantages related to these effects are described, including possible actions firms can take to mitigate these issues, however, these actions depend on several factors, including firm strategy and financial situation.

Consistent with studies of other resource categories, Greer (1984) found that firms' human capital investments and employment tend to follow the business cycle, and López-García et al. (2013) described a countercyclical pattern of human capital investments within firms. Employment is an important part of human capital that is related to competence development and training. Davis and Haltiwagner (1990) studied job creation and destruction in US manufacturing firms across the business cycle and found gross job creation to be strongly procyclical, while gross job destruction was strongly countercyclical. That is, during contractions, they found substantial increases in gross job destruction and small reductions in gross job creation, while the gross job creation was above average, and the gross job destruction was below average in expansion periods. Davis and Haltiwagner (1990) further describe that this could be explained by contractions the idiosyncratic effects reinforce the rise in gross job destruction and offset the reduction in gross job creation. In addition, they found several industry differences, the employment declined across all industries in recessions, while the gross job reallocations increased within industries (Davis and Haltiwagner, 1990). The industry differences can be explained by varying exposure to other cyclical influences across industries, and that some industries generally tend to be less affected by recessions (e.g., government, trade industries and the financial industry) (Moore, 1980). Greer (1984), Davis and Haltiwagner (1990) and Geroski and Gregg (1997) also observed differences regarding downsizing due to firm size, as substantial downsizing in a small number of large firms could explain much of the job reductions in recessions.

The amount of job destruction in recessions could indicate a surplus of investment opportunities in human capital, and Greer (1984) described some of the advantages, disadvantages and implementation issues related to countercyclical hiring. Some of the advantages includes the opportunity to hire high quality employees at a discount, as the competition to recruit talented individuals may be lower. Another advantage is the increased time for training and development due to the demand effects of recessions. While training and competence development could be costly, firms also face an opportunity cost in terms of these, as the cost of removing the employees from their regular roles is lower when the demand and need for these is lower. These positive effects from countercyclical hires indicate that firms should invest in human capital in recessions. However, the disadvantages of countercyclical hiring include costs related to having underutilized employees, employee dissatisfaction and turnover, and issues related to forecasting future human capital resource demand. According to Davies and Helti (1990) investment reductions can be explained by the increased

uncertainty related to the current investments, and many of the disadvantages described by Greer (1984) are related to implementation issues, including organizational resistance and integration of the planning of hiring with firm strategy planning. Greer (1984) also suggest that use of part time or temporary employees and adjustment of labor hours as an alternative strategy. As a result, firms face a trade-off between the increased costs of not laying off excess employees, and the reduced costs due to reductions in the future costs of recruiting and training in the future (Becker, 1962). If the employees have rare firm or industry specific knowledge this is even more costly.

To some extent, the considerations regarding financing of human capital investment is similar to the considerations regarding research and development financing. As with research and development, internal financing is the most common for human capital investment, as it is difficult to borrow funds or use the capital market to finance these investments (Becker, 1962). According to Becker (1962), this could be explained by that human capital provides poor collateral. The trade-off between temporary savings from scaling down and limiting the costs related to excess capacity is emphasised in credit constrained firms. As it is the most common to finance human capital investments with internal funds, firm liquidity should influence the investment decision. The amount of leverage should also influence the investment decision, as highly leveraged firms may have bigger issues with both obtaining external funding and meeting their existing financial obligations. In this section, the effects of growth on investments in human capital is not described, however, the same effects as in the prior sections are hypothesized.

Hypothesis 1: *Firms with strong growth prior to the crisis are <u>less likely</u> to bring forward and/or increase investments in human capital, compared to firms with weaker growth.*

Hypothesis 2: *Highly leveraged firms are <u>less likely</u> to bring forward and/or increase investments in human capital, compared to firms with lower liquidity.*

Hypothesis 3: *Firms with high liquidity are <u>more likely</u> to bring forward and/or increase investments in human capital, compared to firms with lower liquidity.*

2.5.3 Investments in organizational capital

In this thesis, investments on organizational capital include investments in organizational development and improvement projects. The existing literature on investments in

organizational capital across the business cycle is limited, and in the existing literature, organizational capital is often studied in combination with human capital or with research and development as these often are intertwined and mutually influence each other. Maritan (2001) describe the link between investments in physical capital and organizational capabilities in a manufacturing setting (where organizational capabilities are defined as firms' ability to utilize assets to perform activities). Maritan (2001) further described how investments in physical capital could influence existing tangible and intangible assets and thus organizational capabilities (Baldwin & Clark, 1992). One example of this includes how capacity improvements made to meet demand simultaneously could increase the overall flexibility of the firm. Furthermore, the existing literature concerning organizational capital is often described in an organizational structure setting and does not take the financial aspect into consideration.

As mentioned, firms often face demand reductions in recessions, which could increase firms' ability to spend time on organizational development. Koberg (1987) describe five forms of organizational adjustments, including strategic, structural, process, personnel, process, and procedural adjustments. Mintzberg (1979) describe organizational characteristics that are important when firms face uncertainty and external disruptions, including factors such as decentralization and flow of information that increase firms' flexibility and ability adapt to the environment. This view is supported by Ruekert, Walker, and Roering (1985) that find that to adjust to external shocks and new strategic realities, firms need an ability to adjust organizational structures (i.e., flexibility). Other research, such as Porter (1980) have also examined the link between firm strategy and organizational structure. According to Noble (1999), firms may need to adjust the organizational structure due to changes in the competitive environment. As cited in Koberg (1987), Toffler (1970) state the pre-existing organizational forms may be inadequate as firms face external changes and problems they have not faced before.

In the resource-based view, organizational learning is important as firms need to be able to both recognize and develop the necessary capabilities and resources (Uhlenbruck, Meyer, and Hitt, 2003). Organizational learning is therefore important in firms' exploitation and development of available resources (Penrose, 1959), this could also widen the range of strategic options within the firm (Huber, 1991). According to Uhlenbruck, Meyer, and Hitt (2003) an important part of organizational learning is knowledge acquisition, which consist of the use of existing firm knowledge, experience, scanning of the environment, and participation

in networks and alliances (Huber, 1991). It is common to distinguish between explicit and tacit knowledge on the individual and on the organizational level. While explicit knowledge is easily transferrable, tacit knowledge is not (Teece et al., 1997), as it is rooted in such as culture, routines, individual skills, and relationships within the firms. Whether the resources are easily transferrable or not should influence firms' investment decisions and make firms less willing to reduce investments in tacit knowledge. Investments in organizational capital can further include improvements of the information processing within the firm, which is strongly influenced by the firms' prior knowledge as well as the firms' knowledge capacity (Cohen and Levinthal, 1990).

The discussion in this section demonstrate that growth firms should be more likely to invest in organizational capital. This could be explained by that growth firms may not have faced downturns previously, and as they face new issues, adjustments are necessary. More mature firms may have more knowledge about how to handle crises and made necessary adjustments in prior crises. In addition, growth firms may have a strategy that is founded in an upturn phase and may therefore not be as suitable in recessions.

Hypothesis 1: *Firms with strong growth prior to the crisis are <u>less likely</u> to bring forward and/or increase investments in organizational capital, compared to firms with weaker growth.*

The existing literature on organizational capital mainly highlight the importance of other factors than financial factors in firms' decision to make changes in its organizational capital. However, the factors that are described to influence investments in the previous resource categories should have a similar effect on investments in organizational capital.

Hypothesis 2: *Highly leveraged firms are <u>less likely</u> to bring forward and/or increase investments in organizational capital, compared to firms with lower liquidity.*

Hypothesis 3: *Firms with high liquidity are <u>more likely</u> to bring forward and/or increase investments in organizational capital, compared to firms with lower liquidity.*

2.5.4 Physical capital investments

In this thesis, investments in physical capital include investments in machinery, equipment, and property. The payoff from these tangible assets are more easily observed compared to intangible assets, which could reduce the asymmetric information problems related to external financing. In default states creditors are also able to capture more value from tangible assets,

which implies that it should be easier to secure external financing for tangible assets compared to intangible assets (Almeida and Campello, 2007). Furthermore, Almeida and Campello (2007) found that firms with a high amount of tangible assets were less likely to face financial constraints. While physical capital provides better collateral compared to the other resource categories, the collateral value may be reduced when the opportunities to generate profit from the assets is reduced (Bernanke & Gertler, 1990).

As described previously, Aghion et al. (2012) studied the opportunity cost of making short-term and long-term investments across the business cycle, while the emphasis of this study was R&D investments Aghion et al. (2012) argued that the findings would be relevant for other investments in other resource categories. As described in the previous sections, firms often face demand reductions in recessions, which could result in a lower degree of capacity utilization within firms. Compared to the resources described in the previous section, physical capital could more easily be scaled up and down, which would indicate that it is more likely that firms adjust these investments. This could for instance follow from important as firms are able to reduce the variable costs by reducing the use of the assets (e.g. reduce production). On the other hand, the demand effects may enable purchase of the assets at a discount.

The increased uncertainty in recessions could also reduce the incentives to invest in physical assets (Bernanke, 1983), as it is not obvious whether these resources will be valuable or useful in the future. Bernanke (1983) find this trade-off to be of particular importance when firms are facing irreversible investments, which may be the issue with certain investments in physical capital. By waiting, firms gain new information and reduce the uncertainty, however, this could also result in a loss of potential extra returns from early commitment.

While the effect from firms financial prerequisites on investments in physical assets may be similar to the other resource categories (i.e., highly liquid firms have more funding available to bring forward investments in physical assets, or that highly leveraged firms have less funds available to increase investments in physical assets), this section has emphasized how physical assets provide better collateral compared to the other resource categories. It is therefore possible that firms' financial prerequisites are less important in the decision to reduce or increase investments in physical capital. Instead, demand effects could be more important as firms are able to reduce the variable costs by reducing the use of the assets (e.g. reduce production). Based on the discussion above, other factors than firms' financial prerequisites could be more important in firms' decision to change investments in physical assets.

Nevertheless, it is interesting to research how firms' financial prerequisites influence firms' investments and the same hypotheses as described previously are tested for investments in physical capital.

Hypothesis 1: *Firms with strong growth prior to the crisis are <u>less likely</u> to bring forward and/or increase investments in physical capital, compared to firms with weaker growth.*

Hypothesis 2: *Highly leveraged firms are <u>less likely</u> to bring forward and/or increase investments in physical capital, compared to firms with lower liquidity.*

Hypothesis 3: *Firms with high liquidity are <u>more likely</u> to bring forward and/or increase investments in physical capital, compared to firms with lower liquidity.*

3. Research Methodology

3.1 Introduction

In this section the methodological choices in the thesis are described. This consist of several parts. First, the research design is presented. Second, the data collection and the sampling criteria used is presented. Third, the relevant variables are presented. Fourth, the regression analysis is presented. Fifth and finally, data concerns and limitations are presented.

3.2 Research design

The research question lay the foundation for the choice of research design, as well as the research methods used. The research design provides the framework for data collection and the following analysis (Ghauri & Grønhaug, 2010). The purpose of this thesis is reflected in the research design that is supposed to enable identification of the mechanisms that drive firms' investments in recessions and provide answers to the types of decisions firms make.

Saunders, Lewis, & Thornhill (2016) divide research methods into four main categories; exploratory, descriptive, explanatory, and evaluative. It is also possible to use a combination of these methods. When the goal of the research is to gain insight on an issue, an exploratory research method is useful (Saunders, Lewis, & Thornhill, 2016, p. 174). As described in the previous chapter, multiple studies have been conducted on this topic and lay the foundation for this thesis. As the aim of this thesis is to contribute to this research; a descripto-explanatory research design is used. This allow an accurate description of the impact on the firms in the sample and how they responded, and the relationship between the variables is examined using explanatory information. This study will be descriptive in terms of describing firms' responses, including industry differences and describing the data set. Its explanatory element is that the study examines firm responses during the Covid-19 crisis.

Saunders, Lewis, & Thornhill (2016) further distinguish three research approaches: deductive, inductive and abductive. An inductive research approach starts by collecting and exploring data, and form a theory based on this. In an abductive approach, a new theory is created, or existing theory is modified, and data is collected to explore a phenomenon and to explain patterns (Saunders, Lewis, & Thornhill, 2016, p.145). In a deductive approach a theory is

developed first, and a research strategy is designed to test the theory. In this study a deductive approach is used, as the framework to be tested is developed based on existing literature.

3.3 Data collection

In this thesis, two sources of data are used to analyse firm responses. The first source of data is based on the results from a questionnaire survey conducted by NHH**.** The basis of this thesis is primary data from a questionnaire about the effects of the Covid-19 pandemic on Norwegian firms, and secondary financial register data from Brønnøysundssregisteret. The survey was a part of a research program at NHH between two research centres (FAIR Centre and The Hub). The survey was conducted between May 13th and June 5th and was distributed to 20763 managing directors in a cross-section of Norwegian companies from a randomized sample. Firms from public sector, health, and education were all excluded from the sample. The survey had 1299 responses which provides a response rate of 6.3%. Due to the extent of this thesis and the relevant questions for this purpose, the final sample size is 488 firms. The register data is retrieved from the database, Smartcheck, which is delivered by Bisnode. The data is delivered annually from Brønnøysundregisteret to Bisnode, and is classified as secondary data as it is existing data collected for a different purpose and is available through public registries. This survey was distributed in the spring of 2020, after several restrictions had been placed to limit the spread of Covid-19 in Norway, and the activity in the Norwegian economy had been significantly reduced. This survey is therefore well suited to capture how firm characteristics influenced firms' response to the Covid-19 pandemic. The survey consists of six sections and 28 questions, covering the firms' current financial information, investments, organizational structure and strategy, impact on human capital, expectations of number of employees, and expectations of the duration of Covid-19. The full survey is presented in the appendix. The questionnaire provided quantitative information on the firms in the sample and the second source of data consist of is publicly available accounting data on the represented firms, retrieved from proff.no. This data consists of financial information as well as other information including the number of employees, graphical location, and industry code.

3.4 Empirical setting and sampling strategy

For the sample to be representative of Norwegian firms, certain firms are excluded based on the criteria's presented in this section. Including as many firms as possible can increase the

external validity, on the other hand, it can lead to inaccuracies and reduce the internal validity of the study. There is therefore a trade-off between including as many firms as possible and excluding the firms that could distort the data. The sampling method that is used in this thesis is known as a non-probability purposive sampling (Saunders, Lewis, & Thornhill, 2016, s. 301). In the existing literature, research on firm investments have frequently been conducted within a specific industry (often manufacturing). In this thesis the effects of recessions are researched across several industries, nevertheless, select industries are excluded as they differ from the rest of the sample (Moore, 1980). These differences are described in the remaining part of this section.

Government owned firms

Firms owned by the government are excluded as they may differ from other firms in terms of their focus on profit maximization. Government owned firms may have other priorities (e.g., social concerns), unlike private firms. The competition in some of these markets may also differ from other the competition in other markets.

Select industries

Of the 13 industry categories (63 two-digit NACE codes) represented by the respondents, 3 (7 two-digit NACE codes) are excluded. These industries are excluded as respondents within financial services industry differ from the other respondents in terms of business foundation, capital structure and debt levels. According to Reinhart & Rogoff (2009) these firms could be more exposed to crises as their capital is relatively low compared to the amount of assets, that is, firms that heavily depend on leverage. However, financial institutions are also often supported by governments in crises. Respondents in the water supply, sewerage and waste management consist of both public and private firms and are therefore excluded. In addition, these groups are represented by only one or very few respondents.

Code	Industry group
D	Electricity, gas, steam and air conditioning supply
	35 Electricity, gas and steam
E	Water supply; sewerage, waste management and remediation activities
	36 Water supply
	37 Sewerage
	38 Waste act., materials recovery
K	Financial and insurance activities
	64 Financial service activities
	65 Insurance, pension funding
	66 Auxiliary financial acivities

Table 1: Excluded industries including two-digit NACE codes of the subgroups (Source: Statistics Norway, 2016)

Organizational form classification

The firms in the sample have different organizational form classification, these and the frequency is included in the Appendices. To maintain a representative sample, only AS firms are included, while other organizational forms are excluded, as the number of firms in the other categories are low.

Extreme observations

Outliers are observations that differ from the rest of the sample and occur because of error or due to unusual observations. The decision to include or exclude outliers must be considered explicitly in each case based on why the outliers occur and the impact from including or excluding the outliers. In this thesis, the outliers are not excluded, as the outliers do not cause violations of the normality criteria for the regressions. In addition, tests both including and excluding outliers show that the impact on the regression results from the outliers are limited. There is little reason to believe that the registry data is incorrect, and the survey data does not appear to have any observable obvious errors, the outliers are therefore considered to be unusual observations of the respondents, and not due to errors. The outliers could be explained by that most Norwegian firms are medium sized, and the number of large firms in the sample will therefore be lower and they will therefore naturally deviate from the rest of the sample. Omitting these observations can therefore lead to valuable information being removed. By excluding these firms, the sample size is reduced from 1 299 to 1 049. However, in the analyses presented in the following chapters, the number of firms within a category may appear to be lower as firms with missing responses or missing financial information are excluded.

3.5 Variables

The aim of this thesis is to analyse how firm differences affect investment responses. In this section the dependent, independent, and control variables used in the thesis is presented. Saunders, Lewis & Thornhill (2016) define dependent variables as variables that might change in response to changes in other variables, while independent variables are the variables that are altered to measure the effect on the dependent variables, and control variables are defined as an observable and measurable variable that must be kept constant not to influence the effect of the independent variable on the dependent variable.

3.5.1 Dependent Variables

Geroski and Gregg (1996) describe that the amount of restructuring increases in recessions, and that possible explanations include exits, aging capital being disposed, or workers becoming redundant. In this thesis, four dependent variables are used to capture changes in firms' investment behaviour during the recession, the selected variables include investments in (a) research and development, (b) human capital, (c) organizational capital, and (d) physical assets. The data on the dependent variables is collected using a survey approach, as this allow collection of more detailed information on several firms compared to if only secondary accounting data was used. The survey data consist of information on how the firms have adjusted and believe they will adjust their future investments in the various investment categories as a response to the Covid-19 pandemic in 2020.

Research and development

Several questions in the survey cover firms' responses in terms of innovative activities. First, the respondents were also asked how they believe the firms investments in innovation and research and development will change compared to what they had planned. Respondents answered on a scale from -10 (indicating a large reduction in investments) to 10 (indicating a large increase). Second, the respondents were asked if they had developed new products or services following the crisis. Third, the respondents were asked if available capacity was utilized to increase innovation and R&D. The respondents answered on a scale from -10 (completely disagree) to 10 (completely agree).

Human capital

Several survey questions cover the firms' responses regarding multiple aspects of human capital investments. First, the respondents were asked how they believe the firms investments in knowledge and learning will change compared to what they had planned. Respondents answered on a scale from -10 (indicating a large reduction in investments) to 10 (indicating a large increase). Second, the firms were asked to report whether they had downsized as a response to the crisis. This ensures that downsizing that can be explained by other reasons, such as retirement, is excluded. In addition, the firms were asked to report the number of employees at January 31st of 2020, and the number of employees at the time the survey was answered. Third, the respondents were asked if available capacity due to the crisis was utilized to increase the knowledge and learning within the firms. The respondents answered on a scale from -10 (completely disagree) to 10 (completely agree).

Organizational capital

The respondents were asked how they believe the firms investments in organizational development will change compared to what they had planned. Respondents answered on a scale from -10 (indicating a large reduction in investments) to 10 (indicating a large increase).

Physical capital

The respondents were asked how they believe the firms investments in physical capital will change compared to what they had planned. Respondents answered on a scale from -10 (indicating a large reduction in investments) to 10 (indicating a large increase).

3.5.2 Independent Variables

The independent variables in this thesis consist of firm characteristics, as the purpose of this thesis is to investigate how these characteristics affect firms' responses in a crisis. The independent variables include firm growth, financial leverage, and liquidity. While the literature does not provide an unanimous answer to the inclusion of book values and market values in analyses of capital structure, book values are used in the financial independent values in this thesis. Some disadvantages of using book values includes that it is backward looking accounting figures that need not reflect the true economic state of the firm. However, both Myers (1977) and Fama and French (2002) favor the use of book values as Myers (1977) found current market values to include the much of present value of future growth, and Fama and French (2002) described market values as a volatile measure as it depend on factors outside the firm.

Growth

A variable for pre-recession sales growth is included as previous studies have found a relationship between how firms are affected and pre-recession growth rates. Several studies (e.g. Geroski and Gregg, 1994; 1996) have found that firms with high growth before previous recessions were more vulnerable during the recessions. It is therefore interesting to include this variable in the analysis. In Geroski and Greggs (1994) study of the 1991-1992 recession in the UK, the firms that were the most severely affected, were the firms with above average growth rates prior to the recessions. Compared to the other firms, the most severely affected firms' growth level were 22 percent higher (e.g., following acquisitions), while the firms that were not affected had 50 percent lower growth levels. Several measures can capture firm growth. In this thesis, sales growth in the year prior to 2020 is used as a measure of firm

growth. The period is reduced to 2018-2019 to capture the effect from growth in the years close to the recession, as this allows for research on how growth prior to the recession affect firm decisions.

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

Financial leverage

The financial leverage ratio describes the capital structure of a firm. The amount of financial leverage in a firm can affect a firm's liquidity and the possibility of financial distress. In contrast to Modigliani and Millers propositions from 1958, several studies have found capital structure to be important for firms in recessions. Geroski and Gregg (1994) studied firms in the British recession from 1991-1992 and found that firms with a higher amount of debt before the recession, were more severely hit, compared to the less leveraged firms. Financial leverage can therefore explain some differences in how firms are affected by recessions. In the literature, there are several measures of financial leverage that can be used. In this thesis, both debt-to-assets and debt to capital was tested. The measure of financial leverage included in the analyses was debt-to assets, and this measures how much of a firm's assets are financed with debt.

$$Financial\ Leverage = \frac{Total\ Debt}{Total\ Assets}$$

Liquidity

Liquidity describes a firm's ability to pay off its short-term debt and liabilities. Campello, Graham and Campbell (2010) found that firms may have increased issues to meet their obligations due to low liquidity in recessions. In addition, firms without sufficient liquidity may be forced to forego on investment opportunities (Wang 2002; Lang et al.,1996). Liquidity can be measured using several ratios, in this thesis the current ratio and the quick ratio is used. The current ratio below indicates how firms can cover its short-term obligations. The quick ratio measures the same relationship as the current ratio, but it is stricter as it excludes less liquid current assets such as inventory and prepaid expenses. In this thesis the current ratio is used as a measure of liquidity, as the quick ratio will be less accurate du e to lack of accounting information.

$$Current\ Ratio = \frac{Current\ Assets}{Current\ Liabilities}$$

3.5.3 Control Variables

According to Gerorski and Gregg (1997), the impact from recessions is not randomly assigned to firms, several control variables are therefore included in the analysis. Control variables are variables that must be kept constant to prevent it from affecting the effect from the independent variable on the on the dependent variable (Saunders, Lewis, and Thornhill, 2016, p. 191). The control variables included in the analysis is industry, firm size, firm age and prior profits, these are included as these have been found to impact how severely firms are affected by recessions in previous studies.

Industry

Industry is used as a control variable to limit the effect from industry specific unsystematic risk, as the impact of recessions varies across industries (Geroski & Gregg, 1994). In their studies of the UK recession, Geroski & Gregg (1994) found retail, construction and business services to be more affected compared to other industries including energy and chemicals. To ensure that the analysis provides accurate estimates, differences across industries are controlled for by including industry dummies based on NACE industry codes. The industry representation of the sample can be observed in Table 3 in section 4.3.1.

Firm size

Previous studies of have found differences in the impact of recessions on firms based on the size of the firms. There is however no empirical consensus on whether smaller or larger firms are the most affected by the recessionary pressures. Several studies (e.g. Geroski & Gregg, 1997; Gertler & Gilchrist, 1994; Lang & Nakamura, 1995) found that smaller firms were more severely hit by recessions compared to larger firms when the access to finance was limited. Other studies (e.g. Bumgardner, Buehlmann, Schuler, and Crissy et al., 2011) found larger firms to be more affected by recessions or that firm size was not important for the impact of recessions (e.g. Opler and Titman, 1994). There are several measures of firm size, and in this thesis, three measures of size are considered, including the logarithm of total assets, the logarithm of total revenues and the logarithm of the number of employees. The number of employees reported in the registry data was used as the measure of firm size in the analysis, as this was found to have the lowest correlation with the other variables and the highest number of reported values.

$$Firm\ Size = ln(Number\ of\ Employees)$$

Firm age

Firm age can influence how vulnerable firms are to exogenous shocks, and a study by Geroski (1995) found that younger firms were more exposed to bankruptcies compared to more mature firms. This can be explained by younger firms having less experience and may not have faced prior downturns, in addition, these firms may be in a growth phase with a different focus. In addition, younger firms have smaller financial reserves on average and fewer stable relations to suppliers and customers, as well as less established products compared to more mature firms (Knudsen & Lien, 2014). More mature firms are more likely to have experienced exogenous shocks before and have knowledge on relevant measures that might mitigate possible issues. Firm age is therefore included as a control variable. The age effect should decrease as firms mature, therefore the variable used is the natural logarithm of firm age.

$$Firm\ Age = \ \ln\left((Year\ of\ Analysis - 1) - Founding\ Year\right)$$

Prior performance

Prior studies have also found firm performance to influence firms' decisions. However, firm performance in upturns does not indicate firm performance in downturns (Mascarenhas & Aaker, 1989). While both EBITDA margin and return on assets was tested and considered as possible measures of firm performance, profit margin is the measure that was included in the analysis. One issue with these measures is that it provides a simplified snapshot of the financial status of the firm and does not take into account that for example high growth firms could have large investments (e.g., acquisitions) and phases of inefficiency (e.g., adjustment costs from training). Using performance as a measure could therefore yield an inaccurate portrayal of some firms, as adjustment costs may result temporary inefficiency in otherwise successful firms (Geroski & Gregg, 1996).

$$Profit\ margin = \frac{Net\ income}{Revenue}$$

3.6 Regression analyses

In this thesis, regression analyses are used to analyse the data set consisting of survey responses converted to numerical variables combined with the firm's registry data. Regression analysis is useful in analysing these data as it can be used to test the relationship between the

variables. Several types of regression models can be used for this purpose, the models used in this thesis and the necessary preconditions are presented in this section.

3.6.1 Regression analyses

An ordinary least squares (OLS) regression fit the best line for values of Y_i, given X, by minimizing the sum of the squared residuals of the intercept estimators and the slope. A simple linear regression model postulates a linear relationship between an independent variable X and a dependent variable Y and can explain how a one-unit change in X will affect Y (Stock & Watson, 2015, p. 155). More precisely, this can be written as:

$$Y_i = \beta_0 + \beta_1 X_i + u_i$$

Single linear regression models are vulnerable to omitted variable bias. By including the immitted variable in the regression, this issue can be mitigated. The subject of study in this thesis is affected by several factors, therefore, a multivariate linear regression model is used to test the relationship between several independent variables and dependent variables is examined.

Formulated as separate OLS regressions, the $i = 4$ independent variables are indicated by $Y_1, Y_2, \dots, Y_i$ and the k predictors are indicated by $X_1, X_2, \dots, X_k$.

$$Y_1 = \beta_0 + \beta_1 X_{11} + \beta_2 X_{21} + \cdots + \beta_k X_{k1} + u_i$$

$$Y_2 = \beta_0 + \beta_1 X_{12} + \beta_2 X_{22} + \cdots + \beta_k X_{k2} + u_i$$

$$\dots$$

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + u_i$$

This could also be formulated as a multivariate regression model, where n indicate the sample size, and $X_{n*(k+1)}$ is a vector of the k predictors and the coefficients to be estimated are denoted by $\beta_{i*(k+1)}$ and the error term is u_{n*i}.

$$Y_{n*i} = X_{n*(k+1)} \beta_{i*(k+1)} + u_{n*i}$$

In multiple regressions, the dependent variable must be continuous, or possible to treat as continuous. The variables in many of the survey questions are ordinal with more than four

categories and can therefore be treated as continuous in STATA. If the dependent variables are categorical, i.e., yes/no, a multiple regression will not be well suited. Instead, a logistic regression is used.

3.6.2 Criterias for unbiased regressions

Several assumptions must hold if regression models are to provide unbiased estimates. These assumptions are listed below and discussed in this section.

Assumption 1: The errors have a mean of zero ($E(u_i|X_i) = 0$)

Assumption 2: The variance of the error term is the same for any value of X_i (homoscedasticity) ($Var(u_i|X_i) = \sigma^2$)

Assumption 3: The errors are uncorrelated with one another (no autocorrelation) ($Cov(u_i, u_t) = 0$)

Assumption 4: The regressors are uncorrelated with the error term ($Cov(u_i, x_i) = 0$)

Assumption 5: The error term is normally distributed ($u_i \sim N(0, \sigma^2)$)

Assumption 6: The explanatory variables are not correlated with one another (no perfect multicollinearity)

To test if the presented assumptions hold, several tests are conducted in STATA. These tests are described in this section.

The first assumption requires that the errors have an average value of zero. This assumption could be violated if variables correlated with the independent variables is omitted, or if the variables are not included correctly. This is a potential issue in the as the regression models are simplified due to the available data, and it is therefore likely that other explanatory variables are omitted in the regression. Due to this issue, this assumption could be violated.

If the second assumption does not hold, the error term is heteroskedastic. This is tested for in STATA using the Breusch-Pagan test as well as the White test, which is more general. If the Breusch-Pagan test is not statistically significant, the distribution of the error term is likely to be homoscedastic. Regardless of heteroskedasticity and homoskedasticity, the OLS estimator is still unbiased, consistent, and normal, as the least squares assumptions do not restrict the conditional variance, and thus applies in both cases of heteroscedasticity and homoscedasticity. However, the standard errors, t-values, f-values, and the confidence interval may be erroneous. Where this is an issue, valid results are ensured by using heteroscedasticity

robust standard errors. The Breusch-Pagan test indicated that heteroskedasticity could be an issue regarding physical capital and organizational capital investments. Heteroscedasticity is often a problem that occurs due to wrongful specification of the model. To test whether the model is correctly specified, i.e., if important variables are omitted, or if irrelevant variables are included or if the functional form is correct, the Ramsey RESET test is conducted. This test was not significant, and the null hypothesis was not discarded, indicating that the models are not mis specified.

If the errors are uncorrelated with one another, the third assumption holds. Autocorrelation may be an issue if the errors are correlated, therefore this is tested for by plotting the residuals. This can also be tested for using the Durbin-Watson test or the Breusch-Godfrey test. If autocorrelation is present, as with heteroscedasticity, the coefficient estimates will still be unbiased, however, the standard error estimates may be inaccurate. The OLS standard error estimates can be biased downward if there is positive correlation in the residuals, which can lead to wrong conclusions, and increase the likelihood of type I errors (i.e., rejecting the null hypothesis when it is correct). This can also result in an inflated R^2.

If the regressors are uncorrelated with the error term, the OLS estimator is consistent and unbiased. Correlation between x_i and u_i can lead to inconsistent parameter estimates, and the model can appear to be a better fit than it is.

If the error term is normally distributed, the probability of overestimating and underestimating a value is the same. To test this assumption STATA is used to plot histograms and q-q-plots that indicate whether the residuals have a satisfactory normal distribution. Perfect normal distributions are not common in regression models. It is therefore important to consider whether the normal distribution is satisfactory, or if there are deviations that cause problems for the regression model.

The independent variables should be strongly related to the dependent variable, but not to other independent variables. To check for multicollinearity in the independent variables, variance inflation factors (VIF) are estimated in STATA. In this test, 5 was used as a cut-off value, and values above this level would indicate that multicollinearity was an issue. Correlation analyses were also conducted and variables that are strongly correlated with other variables in the models were excluded. If the model has a high explanatory power, but few variables are significant, multicollinearity could be an issue. Tufte and Christoffersen (2004) have described

that a correlation above 0.7 between two independent variables indicate that multicollineariy may be an issue. The regression results may be influenced by correlation between the included variables, the correlations between the control and independent variables is therefore included in the correlation matrix in the table below. The results in the correlation matrix does not indicate that correlation is an issue as no variables appear to be highly correlated. Both tests indicated that multicollinearity is not an issue in the models.

Table 2: Correlation matrix

	N	M	SD	1	2	3	4	5	6
1. Age[a]	1 006	2.702	.810	1					
2. Size[a]	1 006	2.877	.964	.266***	1				
3. Profit margin	1 006	-.215	4.892	.003	.028	1			
4. Growth	1 006	.366	3.366	-.190***	-.025	-.084***	1		
5. Financial leverage	1 006	.767	2.088	-.034	-.007	.005	.006	1	
6. Liquidity	1 006	1.770	1.831	.048	-.081***	-.150***	.029	-.089***	1

[a]The natural logarithm of the variables is not used to calculate mean and standard deviation.
Abbreviations: N, population, M, mean, SD, standard deviation.
***Statistical significance at the 1 percent level.
** Statistical significance at the 5 percent level.
* Statistical significance at the 10 percent level.

3.7 Data concerns and limitations

When using survey data in research, there are several concerns to be aware of. In the following, concerns that are relevant for this thesis is described.

First, the survey data was not collected for the purpose of this thesis. While this should not surpass the regular limitations of using secondary data, this is further described in section 5.4. Second, missing data or incomplete variables could be an issue. This problem arises due to the respondents not completing the survey or not answering all questions. The multivariate regression does for instance only include respondents that have answered all relevant sections of the questions regarding investments in research and development, human capital, organizational capital, and physical capital. The number of observations included in this analysis is therefore lower compared to the total sample of firms that have responded to select parts of this question, and some differences between these samples was observed. Third,

respondent biases, including survival bias, is a potential issue as the survey was only distributed to surviving firms. This could lead to the most severely hit firms being underrepresented in the sample and influence the internal validity of the study. The figures presented in section 4.2.3 indicate that the number bankruptcies in Norway decreased in the relevant period. In addition, the survey was distributed in the spring of 2020, relatively close to the start of the Covid-19 pandemic, the survival bias is therefore considered to be limited. Nevertheless, survival bias can be checked by comparing firm characteristics of the firms that responded to the firms that did not. Single respondent bias could also be an issue as the survey was distributed to only one person within each firm, namely the CEO. The rationale behind this is that the top management have the main influence over the issues the firm is facing, including how these are attended (Bartunek, 1984; Hambrick & Mason, 1984). This is described further in section 3.9.1 regarding reliability. Fourth, industry effects are accounted for using two-digit NACE industry classification codes. The NACE industry categories are broad, and one category may contain firms that are dissimilar, and therefore be inaccurate. More detailed industry codes are available, however, by using these, the number of firms within each category is reduced. As the number of firms within each category is not evenly distributed, some categories would therefore have few or almost no firms, which in turn can lower the statistical validity. Fifth, the use of Likert-scale measures from -10 to 10 used in the survey imply that the data is ordinal. However, these variables are treated as continuous variables in the analyses. To test whether this is an issue, ordinal regressions were run, and as these yielded similar results, this is not considered to be an issue.

3.8 Reliability and validity concerns

Reliability and validity is important in assessing the quality of research (Saunders, Lewis, & Thornhill, 2016, p. 202). The following section consist of a description of reliability and validity (internal, external, and construct).

3.8.1 Reliability

Reliability refers to whether the research design is possible to replicate and if the findings are consistent (Saunders, Lewis, & Thornhill, 2016, p. 202). Saunders, Lewis, & Thornhill (2016) describe four threats to reliability: participant error and bias, and researcher error and bias. In this section these are considered based on the survey data as well as the accounting data.

For the survey data, participant errors include factors that affect the participants responds on the survey. To limit this issue, a cover letter providing information on the purpose of the survey and the time frame necessary to complete the survey was distributed along with the survey. Participant biases include factors that may influence the participants incentives to provide inaccurate or false responses. The data could be vulnerable to common method bias/single respondent bias as the survey was distributed to one respondent of each firm, namely the CEO. As described in the previous section, participant bias could occur if the respondents reported what would be favourable of the firm, however, the focus of the survey is investments and how they view the current situation, and there are no answers that are clearly favourable to the firms. Nevertheless, trends and what is perceived as preferable can influence what firms report, and this could result in slight distortions of the responses. A possible example of this includes that more than 70 percent of the surveyed firms reported to have taken innovative actions in response to Covid-19, if firms favour to be associated with innovative activities they could tend to report more innovative activities compared to if it was viewed as negative. These findings are presented section 4.3.5. Memory inaccuracies or knowledge gaps can also lead to participant bias. Memory issues is considered to not be an issue, as the survey is distributed close to the event, and the questions involve actions that the firm recently have taken or actions the firms plan. The questions regarding firms' plans are at a high level, and what firms report is not detailed enough to be considered a potential competitive risk. As the survey is distributed to the CEOs, knowledge gaps should also not be an issue. Researcher error refers to factors that may influence the researcher's interpretation, and researcher bias may occur due to inaccurate reporting or interpretation of the results. The survey and data is structured to limit these risks.

For the accounting data, participant error and bias could occur due to incorrect accounting data reporting, or due to adjustments of accounting information to portray a desired image of firm performance or to alter firms' financial position. Firms with poor performance may attempt to inflate accounting data to seem more attractive for investors, while highly performing firms may deflate their accounting data to reduce tax costs. The researcher error and bias are considered to be low as the accounting data and the interpretations are standardized and structured. As the study is structured and transparent in the methods used, the concerns regarding reliability are low, and the study should be replicable.

3.8.2 Validity

In addition to reliability, validity is an important characteristic of research quality, and it refers to whether the methods used accurately measures what it was intended to measure (Saunders, Lewis, & Thornhill, 2016). It is common to distinguish between internal, external and measurement validity.

Internal validity

Internal validity is defined as the "extent to which findings can be attributed to interventions, rather than flaws in your research design" (Saunders, Lewis, & Thornhill, 2016), in other words, internal validity is established if there is a causal relationship between the relevant variables.

First, omitted variables can affect the internal validity, to ensure internal validity, it is therefore important to include the relevant variables. To mitigate this issue, tests using various variables are conducted, and previous literature on relevant variables is reviewed. Second, it is important to know if the relationship between the included variables is causal or if it is influenced by correlation between the variables. Therefore, several tests are conducted in STATA, including correlation analyses, that provide information about multicollinearity between the variables. These tests are further described in section 3.6.2. Third, there is a potential survivor bias in the survey data as the survey was only distributed to surviving firms, which can result in the most severely hit firms being underrepresented in the data. In addition, some firms are excluded from the dataset prior to the analyses based on criteria presented in section 3.4. This could also influence the internal validity of the study.

External validity

If the research results can be generalised to all relevant contexts, the study is said to have external validity (Saunders, Lewis, & Thornhill, 2016). Regarding the external validity of this thesis, there are some concerns that is presented in this section. First, the theoretical foundation presented in this thesis is relevant for most firms in most countries, however, the impact of financial crises differs across countries, but also across firms within a country. In addition, the government responses also vary across countries, therefore, there could be context-specific elements that are not generalizable to other populations. Second, there are differences between recessions, depending on both the cause of the recession and the relevant circumstances.

While governments have implemented measures to limit the extent of previous crises, the descriptive analysis in section 4.2 indicate some deviations from previous recessions, it is possible that some of these effects can be explained by the extensive government support measures. For instance, the results may not be possible to generalise to all countries as factors such as the social welfare system could affect the decision to downsize or furlough employees. However, the findings in this thesis are still considered to be valid for other recessions, situations where firms experience exogenous shocks, and related to firms investment decisions.

Construct validity

Construct validity is the extent to how the measurement questions measure what we intended them to measure (Saunders, Lewis, & Thornhill, 2016, p. 451). In the survey, each survey question should measure a specific construct, and several questions should ideally cover the same construct to measure nuances. The survey covers a broad range of possible firm effects, which could affect the construct validity. However, as this was one of the first surveys distributed by the research team on this specific topic, a broad survey is useful as it could provide a guideline to which areas it would be interesting to direct future research.

Furthermore, this could also refer to whether the analyses performed in this thesis actually measures firms' investments, and whether the included variables measure what they intend to measure. To limit this issue, several analyses were conducted, and several measures of the included independent variables were tested.

4. Analysis

4.1 Introduction

In this chapter the findings are presented. This includes a presentation of the empirical context of the economic state in Norway in the relevant period, descriptive statistics of key variables, as well as the findings from the regression models. The analyses are conducted using the statistical software STATA.

4.2 Empirical Context

To provide an understanding of the context of the analysis, the empirical context and the economic situation in Norway is presented and discussed. As business cycles are relevant for this thesis, macroeconomic data is used to describe the impact on the Norwegian economy in this section. The macroeconomic data presented is collected from the Brønnøysund register and Statistics Norway.

4.2.1 GDP Development

Across the business cycle, the GDP development fluctuates. Following the restrictions that were implemented in the start of 2020, the economy entered a slowdown phase that indicated the start of the crisis. In the first quarter of 2020, the GDP in Mainland Norway was reduced by -2.1 percent, and in the second quarter of 2020, the reduction was -6.3 percent (Statistics Norway, 2020). Prior to this, the largest GDP drop in one quarter was -2.3 percent during the fourth quarter of the financial crisis in 2009. Considering this development, the severity of the crisis is considered as substantial, and how firm responses in this period is therefore considered to be interesting to research. The development is illustrated in Figure 3, where the dotted lines indicate the trendline from Q1 2006 to Q4 2020.
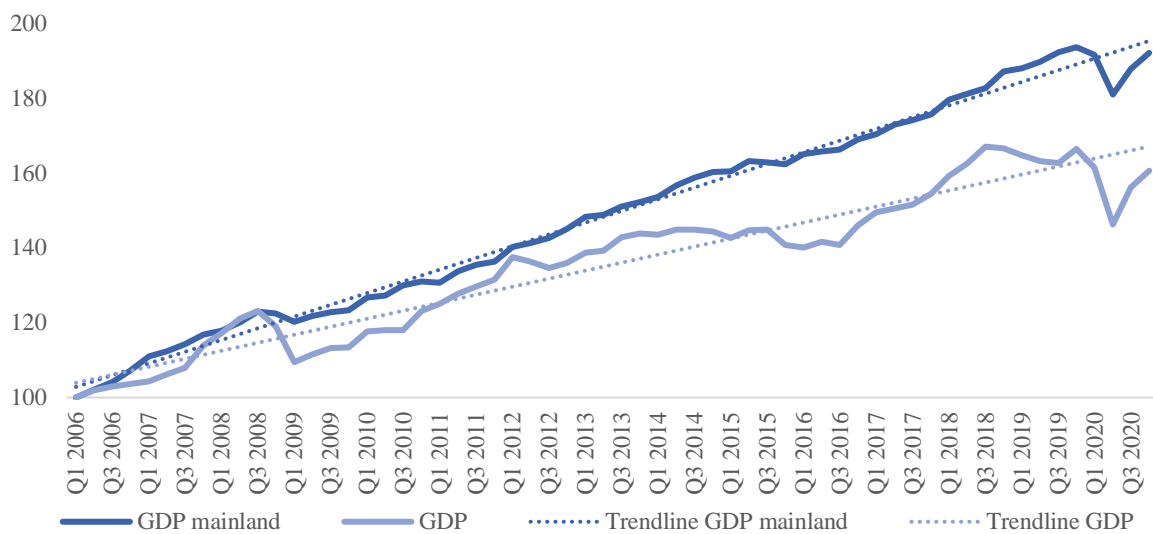
Figure 3: GDP growth development Q1 2000 – Q4 2020 (Fixed price year 2006 = 100)
(Market values, seasonally adjusted) (Source: Statistics Norway)

4.2.2 Employment

Throughout the business cycle, changes in economic activity also influence employment rates, however, employment is often described as a lagged variable (Reinhart and Rogoff, 2009). Geroski and Gregg (1997) described how the effects of recessions are easily observed in the labor market, as the wage growth slows down, and the employment rates decrease. As with GDP development, the employment rates decreased significantly in 2020, compared to the previous years. During 2020 the unemployment rate rose from 3.6 percent in the first quarter to 5.4 percent in the third quarter, which is the highest observed unemployment rate in the last 10 years. Compared to the third quarter of 2019, the unemployment rate in the third quarter of 2020 increased by 1.6 percentage points. In the years prior to 2020 one could observe a downward trend in the unemployment rates, with the previous unemployment peak in the first quarter of 2016, following the economic downturn due to the development in the petroleum industry.
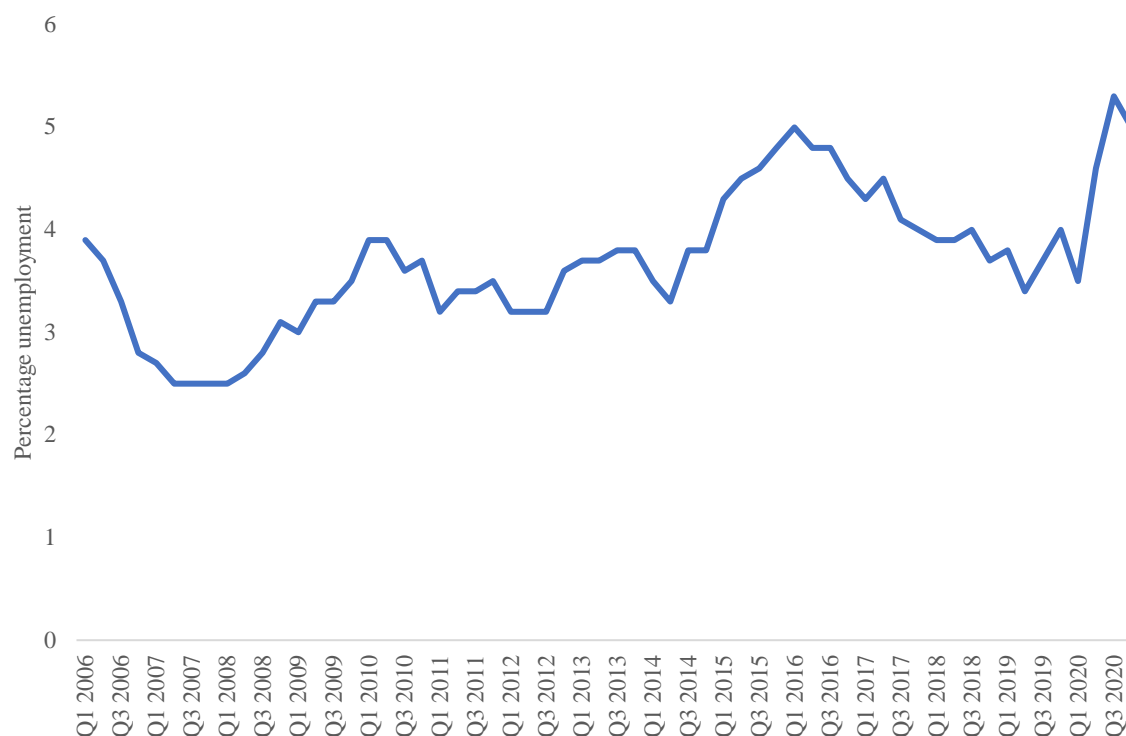
*Figure 4: Quarterly development in the unemployment rate in percent of the total workforce
(Source: Statistics Norway)*

4.2.3 Bankruptcies

The number of bankruptcies also normally follow business cycle fluctuations, however, in 2020, the number of bankruptcies across all industries in Norway was reduced compared to previous years (Statistics Norway, 2020). As Figure 5 illustrates, this development differs from the general tendency that has been observed in previous crises. While a reduction in bankruptcies was observed in 2020, there was a significant increase in the number of bankruptcies around the financial crisis, and from 2007 to 2009 the number of bankruptcies increased from 2 845 to 5 013.
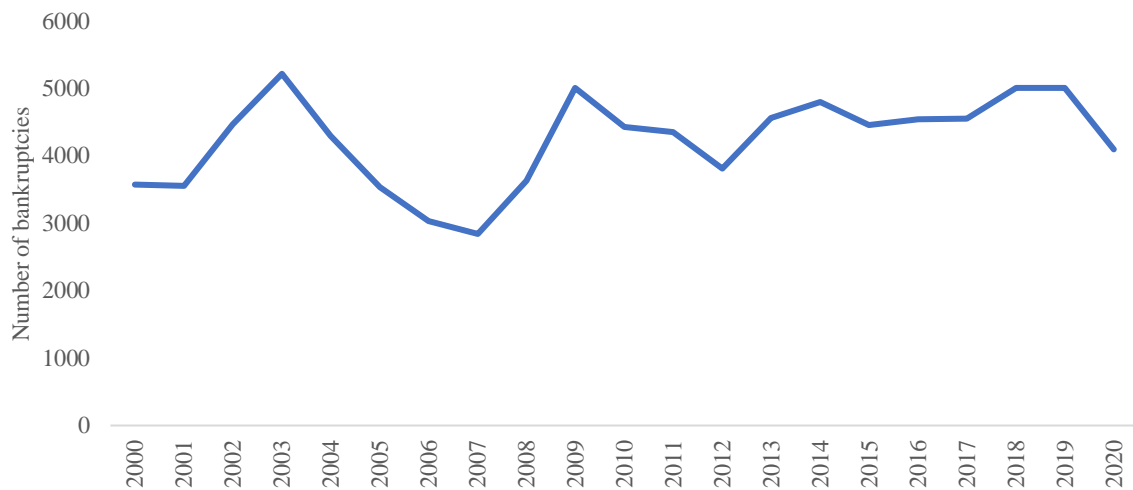
Figure 5: Annual bankruptcies from 2000 to 2020 (Source: Statistics Norway)

The number of bankruptcies also fluctuate throughout the year, therefore, annual bankruptcies are presented. Statistics Norway (2020) suggests several explanations for the reduction in the number of bankruptcies in 2020, including governmental restraint regarding filing for bankruptcy, compensation schemes leading to a delay of bankruptcies and/or increased case processing time due to quarantines and home offices (Statistics Norway, 2020). Hence, the number of bankruptcies could increase in the years to come, which in turn could influence the employment rate. Even though the overall picture shows a reduction in bankruptcies, there are some industry specific differences. Figure 6 include a more detailed overview of the monthly development in the number of bankruptcies and compulsory dissolution in 2020 compared to 2019.
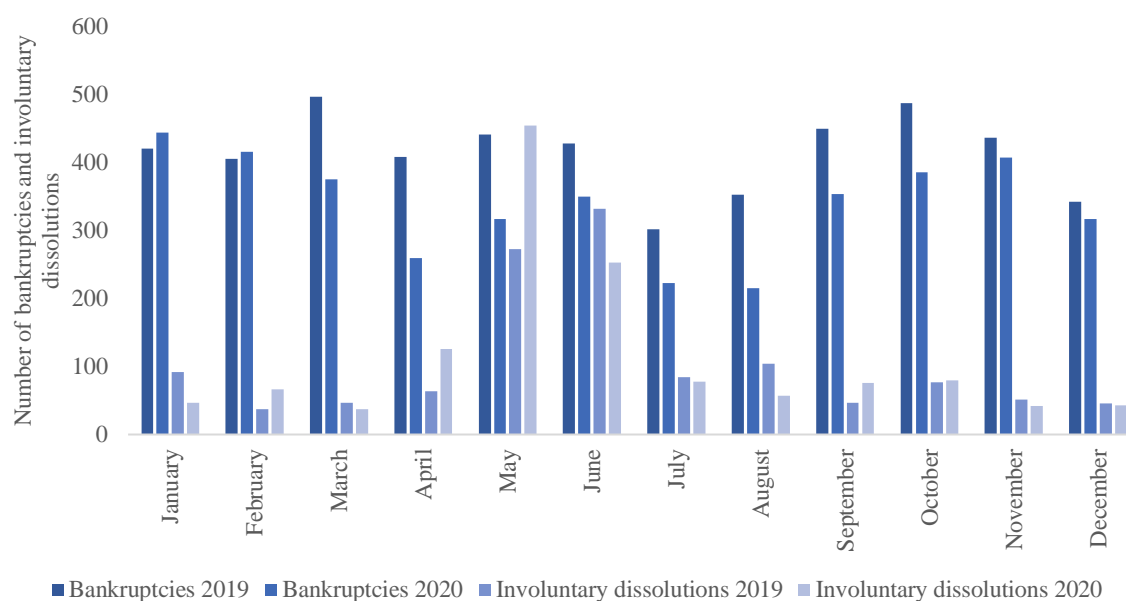
Figure 6: Bankruptcies and involuntary dissolutions in 2019 and 2020 (Source: The Brønnøysund Register, 2020)

4.2.4 Import and export

Import and export decreased in 2020, as illustrated in Figure 7. Import dropped by 17 percent in Norway, most of this reduction can be explained by travel reductions. Export of goods and services dropped by 9 percent in the second quarter of 2020, and the largest export reduction was in service exports (including foreign visitors and tourist's consumption in Norway). These effects differ from what have been observed in previous crises as the volume changes in import and export are larger than the observed changes during the financial crisis from 2007 to 2009. One possible explanation of this difference is the travel restrictions that were imposed following the Covid-19 pandemic.
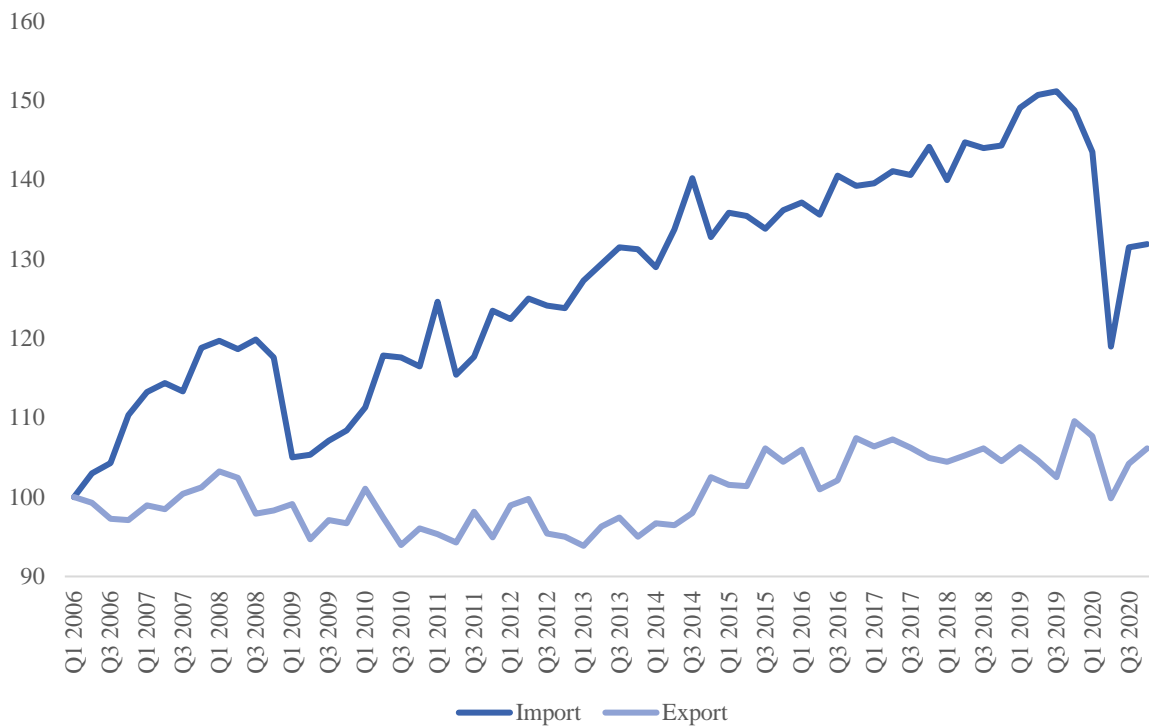
Figure 7: Quarterly volume changes in import and export (Fixed price year 2000 = 100)
(Seasonally adjusted)

4.2.5 Summary

The findings in this section reveal co-movements in several economic variables across the business cycle, including employment, import and export, and GDP development. The findings regarding GDP development and employment is consistent with previous studies of how these variables develop across the business cycle, and specifically in recessions. The other findings, including the reduction in bankruptcies and the large decrease in imports and exports, deviate more compared to what is normally observed in recessions.

4.3 Descriptive Statistics

This section consists of descriptive statistics of the respondents in the survey that may further the understanding of the context of the analysis.

4.3.1 Industrial representation

In Table 3 a breakdown of the included respondents based on industry is presented and compared to the firms in the Norwegian economy, the excluded industries described in section 3.4 are not included in the table. The distribution of industries represented by the respondents

is similar to the distribution of firms in the economy, although some industries were relatively overrepresented (e.g., manufacturing) and other were underrepresented (e.g., agriculture, forestry and fishing real estate, and human health and social work).

Table 3: Industrial breakdown of respondents and number of firms in the economy.

Industry group	Respondents		Firms in the economy	
	Frequency	Percent	Frequency	Percent
Agriculture, foristery and fishing	-	-	65 886	11.15
Mining and quarrying	-	-	1 636	.28
Manufacturing	147	14.03	21 660	3.67
Electricity, gas, steam and air conditioning supply	-	-	1 882	.32
Water supply, sewerage, waste management and remediation activities	-	-	2 324	.39
Consumption	188	17.92	69 607	11.78
Wholesale and retail trade; repair of motor vehicles and motorcycles	208	19.83	71 669	12.13
Transportation and storage	54	5.15	25 849	4.38
Accomodation and food service activities	83	7.92	17 053	2.89
Information and communication	93	8.87	23 615	4.00
Financial and insurance activities	-	-	4 468	.76
Real estate activites	16	1.53	57 579	9.75
Professional, scientific and technical activities	168	16.02	63 660	10.78
Administrative and support service activites	81	7.72	28 741	4.86
Public administration and defence, compulsory social security	-	-	4 975	.84
Education	-	-	19 477	3.30
Human health and social work activities	-	-	54 789	9.27
Arts, entertainment and recreation	-	-	29 047	4.92
Other service activities	11	1.05	23 241	3.93
Activities of household as employers, undifferentiated goods- and services- producing activities of households for own account	-	-	24	.00
Activities of extreterritorial organisations and bodies	-	-	8	.00
Undefined	-	-	3 620	.61
Total	1 049	100.00	590 810	100.00

4.3.2 Impact on operations

The differences in the impact on firms' operations is presented in Table 4. This table reveal that approximately half (56%) of the firms remained operative with normal capacity, while approximately one third (31%) were operative with reduced capacity. The low number of permanently closed firms is consistent with the findings in section 4.3.2, where a reduction of bankruptcies was observed.

Table 4: Frequency table of impact on operations

	Frequency	Percent
Operative with normal capacity	591	56.34
Operative with reduced capacity	320	30.51
Reopened after being closed	16	1.53
Reopened with reduced capacity after being closed	59	5.62
Temporarily closed, plan to reopen	28	2.62
Temporarily closed, uncertain about reopening	12	1.14
Permanentely closed due to Covid-19	0	.00
Permanently closed for other reasons	3	.29
Missing	20	1.91
Total	1049	100.00

As the impact from Covid-19 and the following restrictions is believed to not be evenly distributed across firms and industries, it is reasonable that the responses vary across industries. Figure 8 show industry differences in the short-term impact on firms' operations. The main response for all industries, except "Accommodation and food service activities" and "Administrative and support service activities" was to remain operative with normal capacity. The latter consist of rental and leasing activities, employment activities, travel agencies and tour operators, security investigation activities, buildings and landscape services, and business support. The main response for firms within the categories "Accommodation and food service activities" and "Administrative and support service activities" was to remain operative with reduced capacity, which was also the second most common response across the other industries. Given the nature of these industry groups and the circumstances, it is expected that the responses in these differ from the rest of the sample, as these are directly impacted by Covid-19 restrictions. The number of firms are presented in percent of the number of firms within the given industry, as the number of respondents differ across industries.
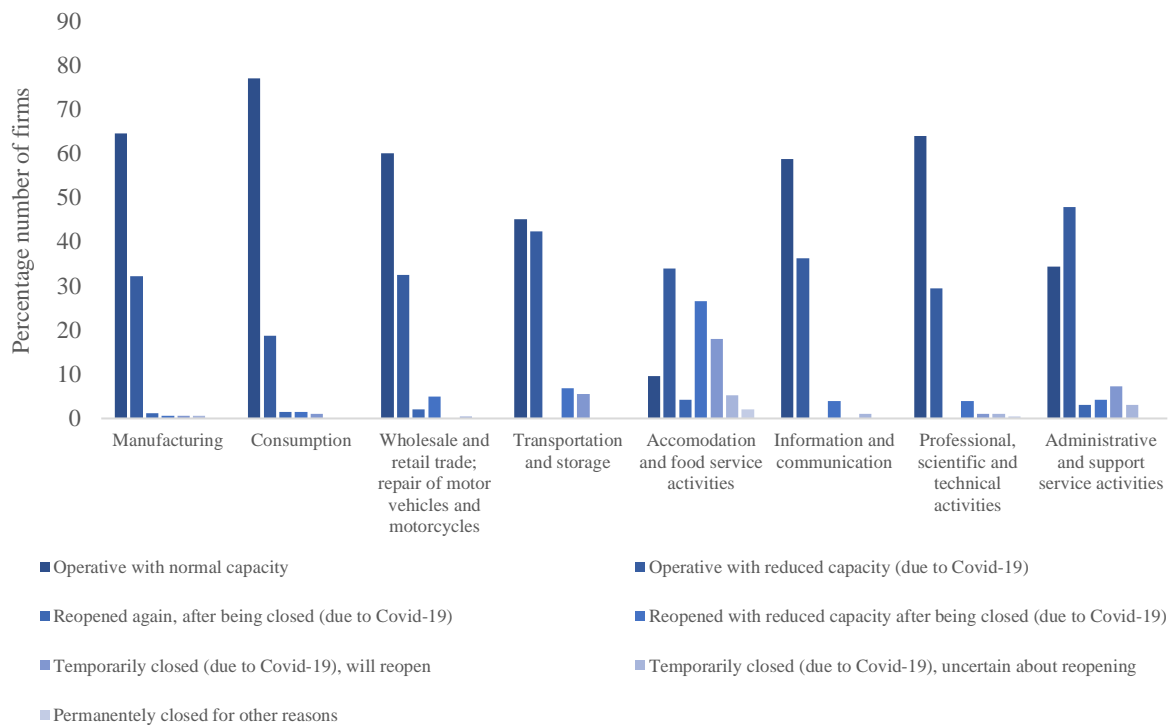
Figure 8: Industry differences in short-term effects on operations

Differences in firm response based on firm size is illustrated in Figure 9, and as the number of respondents differ across the defined categories, the number of firms are presented as a percent of the total number of firms in the relevant category. The firm size categories used in Figure 9 are based on The Confederation of Norwegian Enterprise (NHO) definition of firm size. NHO define firms with 1-20 employees as small, firms with 21-100 employees are defined as medium, and firms with more than 100 employees are defined as large firms (NHO, n.d.). According to NHO, 99 percent of all Norwegian firms are small or medium. The sample used in this thesis consist of 683 firms with 1-20 employees, 376 firms with 21-100 employees and 76 firms with more than 100 employees. Figure 9 show that firms' actions do not deviate a lot based on firm size, however, slightly more large firms reported to be operative with reduced capacity. This is consistent with previous studies that found downsizing to be concentrated in larger firms. In addition, no large firms reported to be reopened again after being closed due to covid-19 or to be temporarily closed due to covid-19 and uncertain about reopening.
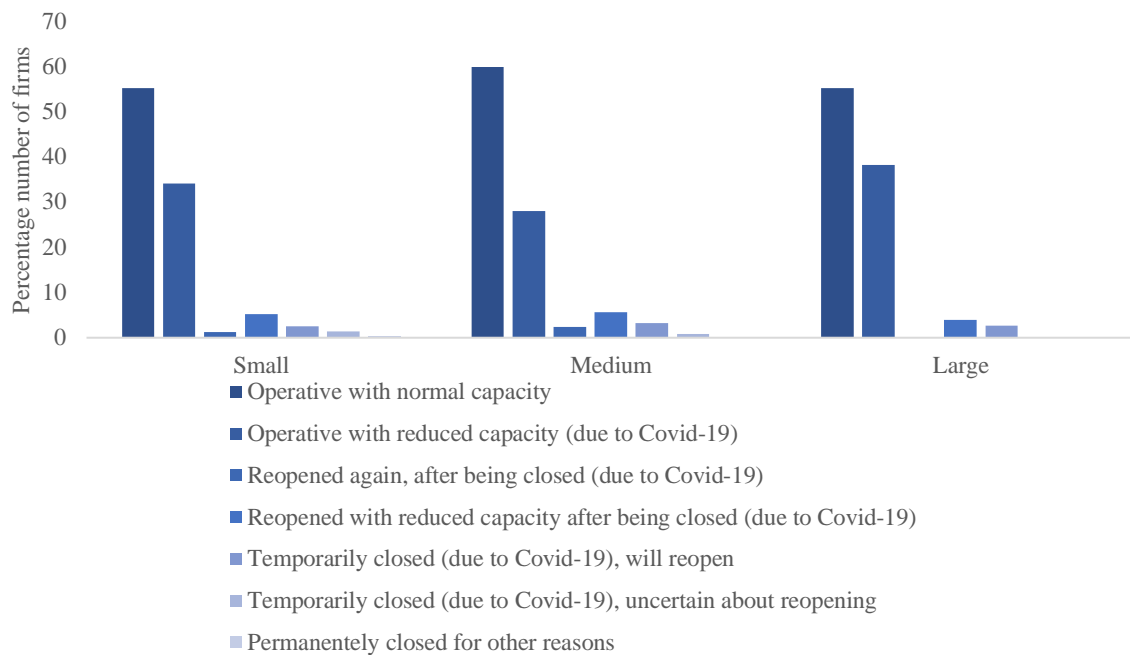
Figure 9: Firm size differences in short-term effect on operations

4.3.3 Downsizing

Of the respondents in the included categories, 522 firms responded that they had laid off or furloughed employees due to Covid-19, while 406 firms reported that they did not downsize or furlough employees. As mentioned in the section above, most firms maintained operative with normal capacity, or operative with reduced capacity. Regarding the number of employees that were laid off or furloughed, the firms that remained operative with normal capacity stand out. In this category, approximately 30 percent of employees were laid off or furloughed, while in the other categories this number was above 79 percent. The industry differences in terms of the percentage layoffs or furloughs is presented in Figure 10. The largest percentage layoffs or furloughs was found within the categories "Accommodation and food service activities" and "Administrative and support service activities", in these categories more approximately 79 and 66 percent of employees were laid off or furloughed. This is reasonable as the main operational response for these categories was to reduce the capacity. The smallest reduction was found in consumption, were almost 38 percent of the employees were furloughed.
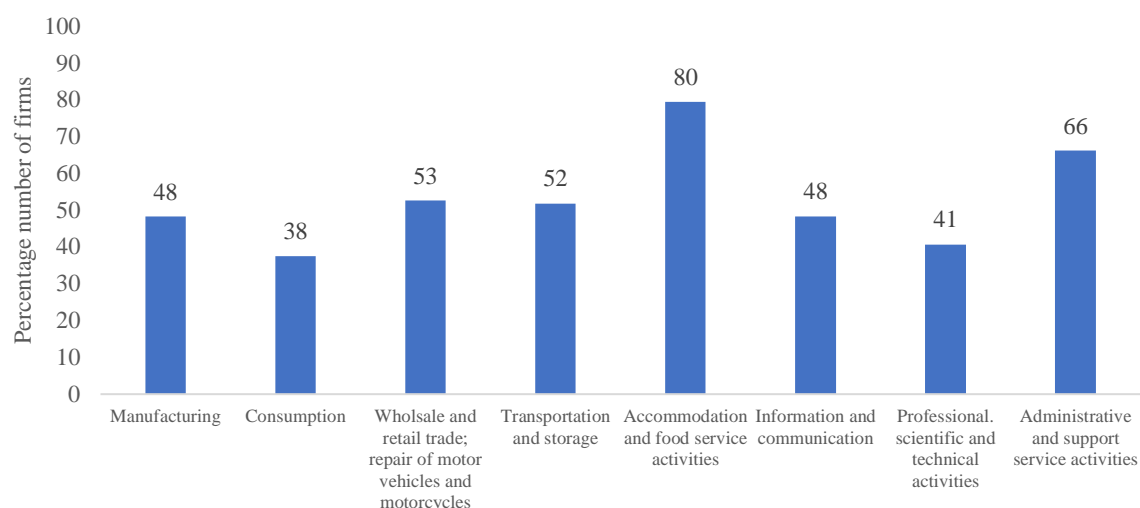
Figure 10: Downsizing across industry groups

Out of the 522 firms that downsized or temporarily laid off employees due to Covid-19, 498 reported that it was as a response to reduced demand. Table 5 show how this effect is distributed across the industry groups. More than 30 percent of firms across all industries represented by the respondents of the survey downsized or temporarily laid off employees as they experienced demand reductions due to Covid-19. In "Accommodation and food service activities" and "Administrative and support service activities" more than half (64% and 54%) of the firms downsized due to reduced demand. Many of these firms also reported other reasons in addition to demand reductions to be relevant for the decision to lay off or furlough employees.

Table 5: Industry differences in the demand effect on downsizing (due to Covid-19) (Number of firms that downsized due to reduced demand (due to Covid-19)

Industry	Frequency	Population	Percent
Manufacturing	66	165	40.00
Consumption	64	199	32.16
Wholesale and retail trade; repair of motor vehicles and motorcycles	110	248	44.35
Transportation and storage	37	78	47.44
Accomodation and food service activities	61	95	64.21
Information and communication	44	102	43.14
Professional, scientific and technical activities	64	205	31.22
Administrative and support service activities	52	97	53.61
Total	498	1189	

4.3.4 Investments

Table 6 consist of a simplified frequency table that show how firms planned to adjust their investments due to Covid-19. Details on the size and direction of the investment changes across the resource categories are included in the appendices. Across the included resource categories, the number of firms that did not change their planned investments were relatively stable. The resource category where the most firms planned to increase investments was organizational capital (18%), followed by human capital (12%), research and development (12%) and physical capital (10%). The number of firms that planned investment reductions were largest in physical capital (26%), followed by human capital (18%), research and development (14%), and organizational capital (13%). These findings are also somewhat consistent to the findings of Geroski and Gregg (1997), described in detail in section 2.5.

Table 6: Simplified frequency table of dependent variables

	Investments in research and development		Investments in human capital		Investments in organizational capital		Investments in physical capital	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Decrease	151	14.39	195	18.59	141	13.43	275	26.21
No change	111	10.58	114	10.87	94	8.96	103	9.82
Increase	127	12.10	129	12.31	191	18.22	104	9.93
Total	389	37.07	438	41.77	426	40.61	482	45.96

In addition, Similar to the findings of Campello et al. (2012), on average, planned investments were reduced across all resource categories. The size of the changes indicate that on average, investment reductions was observed across all resource categories, and on a scale from -10 to 10, the largest average reduction was observed in physical capital, followed by human capital, research and development, and organizational capital. The firms included in the multivariate

regression analysis deviate somewhat from the values for the entire sample as the multivariate regression only include respondents that reported investment adjustments across all included resource categories, these values are included in the apendices

Table 7: Descriptive statistics of independent variables of the entire sample

	N	**M**	**SD**	**Min**	**Max**
Research and development	389	-1.15	4.74	-10	10
Human capital	438	-1.46	4.21	-10	10
Organizational capital	426	-.40	4.56	-10	10
Physical capital	482	-2.05	3.43	-9	10

Abbreviations: N = population, M = mean, SD = standard deviation.

4.3.5 Innovative firms

Another interesting finding was that more than 70 percent of the respondents responded with innovativeness in the existing products or services, this includes development of new products or services, new or improvement of distribution, and/or distribution to new segments. The results are summarized in Table 9.

Table 8: Innovative responses

	Frequency	**Percent**
Develop new products or services	755	71.97
Distribute products or services to new segments	735	70.07
Develop or improve logistics or distribution of products and services	771	73.50

4.4 Regression results and hypotheses analysis

In this section the results from the analyses conducted to test the hypotheses are presented. Before the regression results are presented, the regressions that allow investigation of the relationship between firm characteristics and firm responses are repeated.

As described in section 3.5.1, the dependent variables are regressed on the independent and control variables using multivariate regression in Stata, as this enable testing of the effect of the independent variables across the dependent variables. In the simplified regression equation below, the dependent variables research and development, human capital, organizational

capital, and physical capital are denoted by $Y_1, Y_2, \ldots, Y_i$, the model is estimated four times for each of the dependent variables. The baseline model consists of the control variables, and the independent variables stepwise included in the order presented in the equation, as there is no definite and unambiguous order that the independent variables should be included.

$$Y_i = \beta_0 + \beta_1 Firmsize + \beta_2 Firm\ Age + \beta_3 Profit\ margin + \beta_4 Industry\ Dummies$$
$$+ \beta_5 Growth + \beta_6 Financial\ leverage + \beta_7 Liquidity + u_i$$

In the following sections, the regression results are presented. First, the results related to investments in research and development are presented, followed by the results related to investments in human capital, organisational capital and at last the findings related to physical capital are presented.

4.4.1 Investments in research and development

Table 10 summarize the results from the regressions where research and development is the dependent variable. The first model consisting of the control variables is significant with an explanatory power of approximately 24 percent. As expected, the explanatory power increases as the independent variables are added, and the full model has an explanatory power of approximately 30 percent. In regression model (4), the full model, sales growth and financial leverage was significant at a 1 percent level, and liquidity was significant at a 10 percent level in regression model. In addition, the control variable profit margin was significant at a 1 percent level.

The findings presented in the table indicated that, keeping the other variables constant, a one unit increase in growth was associated with a -1.18 (p<0.01) decrease in investments, a one unit increase in financial leverage was associated with a -2.03 (p<0.01) decrease in investments, and a one unit increase in liquidity was associated with a -0.525 (p<0.10) decrease in investments. Of the control variables, profit margin provided the most interesting findings, as a one unit increase in profit margin was associated with a -0.610 (p<0.01) decrease in investments.

Table 9: Multivariate regression - investments in research and development

Dependent variable	Research and development			
	(1)	*(2)*	*(3)*	*(4)*
Independent variables				
Growth		-1.145***	-1.180***	-1.178***
		(.439)	(.436)	(.434)
Financial leverage			-1.397**	-2.029***
			(.693)	(.782)
Liquidity				-.525*
				(.306)
Control variables				
Age	.606	.732*	.582	.650
	(.434)	(.441)	(.444)	(.444)
Size	.046	.109	.134	.010
	(.397)	(.397)	(.395)	(.399)
Profit margin	-.196	-.467**	-.560***	-.610***
	(.182)	(.209)	(.213)	(.214)
Industry dummies	Yes	Yes	Yes	Yes
Constant	8.295**	7.975**	9.545***	10.769***
	(2.515)	(2.454)	(2.558)	(2.645)
No. observations	270	268	268	268
R-squared	.235	.273	.286	.295
F-values	1.451**	1.709***	1.780***	1.820***

Unstandardized coefficients with standard errors in parenthesis.

***Statistical significance at the 1 percent level.

** Statistical significance at the 5 percent level.

* Statistical significance at the 10 percent level.

Investments in human capital

Table 11 summarize the results from the regressions where human capital is the dependent variable. The first model that consist of only the control variables has an explanatory power of approximately 21 percent, however, this model is not significant. As the independent

variables are included this is no longer an issue and the explanatory power of the full model increases up to approximately 25 percent. In the full model, sales growth is found to be significant at a 1 percent level, and financial leverage is significant at a 10 percent level. As in the prior model, the control **variable** profit margin is significant at 1 percent level.

Table 10: Multivariate regression - investments in human capital

Dependent variable	Human capital			
	(1)	*(2)*	*(3)*	*(4)*
Independent variables				
Growth		-1.052**	-1.083***	-1.082***
		(.416)	(.414)	(.415)
Financial leverage			-1.223*	-1.331*
			(.658)	(.747)
Liquidity				-.090
				(.293)
Control variables				
Age	.496	.501	.370	.382
	(.407)	(.419)	(.422)	(.425)
Size	.320	.420	.442	.421
	(.373)	(.377)	(.375)	(.382)
Profit margin	-.292*	-.547***	-.627***	-.636***
	(.171)	(.198)	(.202)	(.204)
Industry dummies	Yes	Yes	Yes	Yes
Constant	7.960***	7.825***	9.199***	9.409***
	(2.358)	(2.328)	(2.431)	(2.529)
No. observations	270	268	268	268
R-squared	.211	.239	.251	.252
F-values	1.262	1.436**	1.493**	1.459**

Unstandardized coefficients with standard errors in parenthesis.

***Statistical significance at the 1 percent level.

** Statistical significance at the 5 percent level.

* Statistical significance at the 10 percent level.

Keeping the other variables constant, a one unit increase in growth is associated with a -1.08 (p<0.01) decrease in investments in human capital, and a one unit increase in financial leverage was associated with a -1.33 (p<0.10) decrease in investments.

As liquidity was not significant in the model, the regression did not provide valuable information on the impact on human capital from liquidity. However, a one unit increase in profit margin was associated with a -0.64 (p<0.01) decrease in human capital investments.

4.4.2 Investments in organizational capital

Table X summarize the results from the regressions where organizational capital is the dependent variable. All models are significant, the first model that consist of only the control variables is significant at 10 percent level while the other models are significant at 1 percent level. The explanatory power of the first model is approximately 21 percent, and the explanatory power of the full model is approximately 29 percent. In the full model, sales growth is found to be significant at a 1 percent level, and financial leverage and liquidity is significant at a 5 percent level. The control variable profit margin is also significant at a 1 percent level. Keeping the other variables constant, a one unit increase in growth was associated with a -1.38 ($p<0.01$) decrease in investments in organizational capital, a one unit increase in financial leverage could explain a -1.70 ($p<0.05$) decrease, and a one unit increase in liquidity could explain a -0.58 ($p<0.05$) decrease in investments in organizational capital. Keeping the other variables constant, a one unit increase in profit margin was associated with a -.57 ($p<0.01$) decrease in investments.

Table 11: Multivariate regression - organizational capital

Dependent variable	Organizational capital			
	(1)	*(2)*	*(3)*	*(4)*
Independent variables				
Growth		-1.357***	-1.382***	-1.380***
		(.422)	(.421)	(.418)
Financial leverage			-1.012	-1.697**
			(.668)	(.753)
Liquidity				-.571*
				(.295)
Control variables				
Age	.352	.393	.285	.359
	(.419)	(.424)	(.429)	(.428)
Size	.198	.312	.330	.196
	(.383)	(.382)	(.381)	(.385)
Profit margin	-.118	-.444**	-.511**	-.565***
	(.176)	(.201)	(.205)	(.206)
Industry dummies	Yes	Yes	Yes	Yes
Constant	8.540***	8.322***	9.458***	10.788***
	(2.426)	(2.358)	(2.468)	(2.547)
No. observations	270	268	268	268
R-squared	.218	.268	.275	.288
F-values	1.318*	1.667***	1.689***	1.751***

Unstandardized coefficients with standard errors in parenthesis.

***Statistical significance at the 1 percent level.

** Statistical significance at the 5 percent level.

* Statistical significance at the 10 percent level.

4.4.3 Investments in physical capital

Table 14 summarize the results from the regression models where physical capital is the dependent variable. The table show that none of the models are significant, and as the independent variables are added in model (2) – (4), the explanatory power of the model only increases from approximately 17 percent to 18 percent. This could indicate that other variables than the included are important in firms' investment physical capital decisions. This is supported by the findings from section 3.6.2, where the Breusch-Pagan test indicated that heteroscedasticity could be an issue. In addition, the presented findings regarding multicollinearity does not include the industry dummies, multicollinearity could therefore also explain this. As the presented results in the previous sections are based on model (4), the findings from this model is presented in this section as well. However, the discussion above indicate that it would be more interesting to study model (2), as over-specified models could provide less precise estimates. The biggest difference between these models is that firm age is significant at a 10 percent level, the direction and size of the other variables are otherwise relatively similar. In model 4, a one unit increase in growth, could explain investment reductions of -0.57 ($p<0.01$), keeping the other variables constant. In addition, profit margin was significant at a 5 percent level, and could explain investment reductions of -0.36 ($p<0.05$).

Table 12: Multivariate regression - investments in physical capital

Dependent variable	Physical assets			
	(1)	*(2)*	*(3)*	*(4)*
Independent variables				
Growth		-.568*	-.569*	-.570*
		(.329)	(.330)	(.330)
Financial leverage			-.053	.094
			(.524)	(.594)
Liquidity				.122
				(.233)
Control variables				
Age	.665**	.568*	.562*	.546
	(.319)	(.330)	(.336)	(.338)
Size	-.506*	-.424	-.423	-.394
	(.292)	(.297)	(.298)	(.304)
Profit margin	-.228*	-.369**	-.372**	-.361**
	(.134)	(.157)	(.161)	(.163)
Industry dummies	Yes	Yes	Yes	Yes
Constant	10.584***	10.677***	10.737***	10.452***
	(1.846)	(1.838)	(1.934)	(2.012)
No. observations	270	268	268	268
R-squared	.167	.177	.177	.178
F-values	.949	.979	.955	.938

Unstandardized coefficients with standard errors in parenthesis.

***Statistical significance at the 1 percent level.

** Statistical significance at the 5 percent level.

* Statistical significance at the 10 percent level.

5. Discussion

5.1 Introduction

From the analyses conducted in this thesis, several findings stand out, and this section consists of a discussion of these findings from the previous sections. The theoretical frameworks presented in chapter 2 provides the foundation of this discussion. Possible limitations of the study and suggestions for further research concludes this section.

5.2 Implications of descriptive statistics

In this section implications of select descriptive statistics is discussed. In the literature described in this thesis, several studies have observed investment reductions following financial crises, for instance, Campello, M., Giambona, E., Graham, J. R., & Harvey, C. R., (2011) found that during financial crises, firms planned substantial investment reductions. Mascarenhas and Aaker (1989) studied firms across the business cycle and found that even though counter-cyclical investment strategies tend to improve profitability, few firms execute this strategy. Consistent with these studies, the findings in this thesis indicate that on average the investments were reduced across all resource categories. The largest average investment reduction was found in physical capital, followed by human capital, and research and development, and the smallest average reduction was in organizational capital

Consistent with previous findings (e.g., Gerorski and Gregg (1996)), the largest investment reductions were found in investments in physical capital. This can be explained by that investments in physical capital more easily can be accelerated, postponed, or abandoned without large adjustment costs (Knudsen and Lien, 2019). These adjustment costs could also explain why firms are less willing to reduce investments in research and development and human capital, as specific skills and knowledge could be more difficult and costly to acquire. The smallest average investment reduction was found in organizational capital. Organizational capital was also the only resource category where the number of firms that increased the investments was higher than the number of firms that reduced the investments. As cited in Koberg (1987), Toffler (1970) presented a possible explanation of this, namely that the pre-existing organizational forms may be inadequate as firms face external changes and problems they have not faced before. Organizational changes could for instance be necessary to facilitate

the requirements following the Covid-19 pandemic, and new processes may be needed as employees work from home.

5.3 Discussion of main findings

The regression models in this thesis predicted changes in firms' investments in research and development, human capital, organizational capital and physical capital from the independent variable's firm growth, financial leverage, and liquidity, as well as a set of control variables. MANOVA tests confirmed that the full models for research and development, human capital, and organizational capital were significant at a 0.01 level, however, the physical capital model was not significant. Table 15 summarize the direction of the impact across the included resource categories from the analyses. From the table it is also apparent that all the significant variables had a negative impact on investments.

Table 13: Direction of investment impact across resource categories

	Research and development	Human capital	Organizational capital	Physical capital	Total effect
Age	+	+	+	+	+
Size	+	+	+	-	+/-
Profit margin	-***	-***	-***	-**	-
Growth	-***	-***	-***	-*	-
Financial leverage	-***	-*	-**	+	+/-
Liquidity	-*	-	-*	+	+/-

***Statistical significance at the 1 percent level.

** Statistical significance at the 5 percent level.

* Statistical significance at the 10 percent level.

Hypothesis 1 predicted that firms with higher growth should be less likely to bring forward and/or increase investments. The findings from the regression analysis indicated that firm growth could explain investment reductions across all resource categories, as growth had a negative and significant impact on investments across all resource categories. The largest effect was found in investments in organizational capital, followed by research and development, human capital, and physical capital was the least sensitive to prior growth compared to the other resource categories. Hypothesis 1 was therefore supported for all resource categories, as growth significantly predicted investment reductions across all categories.

The findings from the regression analysis indicated that financial leverage could explain investment reductions in research and development, human capital, and organizational capital, as financial leverage had a negative and significant impact on investments in these resource categories. Regarding investments in physical capital, financial leverage was not significant. Hypothesis 2 suggested that highly leveraged firms were less likely to bring forward and/or increase investments. The regression results indicated that hypothesis 2 was supported for investments in research and development, human capital, and organizational capital.

The findings from the regression analysis indicated that liquidity significantly could significantly investment reductions in research and development and organizational capital, while liquidity was not significant for firms' investment decisions regarding human capital and physical capital. This was a surprising finding, as firms with increased liquidity were expected to increase investments, as liquidity both enable investment directly, as well as it could be important to secure external financing (Campello et al., 2012). Campello et al., (2011; 2012) researched the relationship between corporate finance and investments during the financial crisis from 2008 to 2009 and described this crisis to be characterized by a liquidity crunch, where the importance of internal and external financing was highlighted. In this setting, this could be less important due to the characteristics of the crisis and the level of government measures implemented to mitigate the issues. Hypothesis 3 postulated that firms with higher liquidity were more likely to bring forward and/or increase investments. However, the findings from the regression analysis indicated that increased liquidity could significantly explain investment reductions in research and development and organizational capital. Therefore, hypothesis 3 was not supported regarding investments in research and development and organizational capital.

To summarize, the findings indicated differences in the impact on the resource categories from the independent variables and control variables. The regression results indicated that Hypothesis 1 was supported for investments in research and development, human capital, organizational capital and physical capital. Hypothesis 2 was supported for investments in research and development, organizational capital and human capital. Hypothesis 3 was not supported for investments in research and development and organizational capital.

5.4 Limitations

In this sub-chapter, possible limitations of the thesis are presented.

As the survey was distributed as pilot study for a larger research project, the questions cover several effects, and not only effects at an investment level. Ideally, more of the investment-specific effects should have been covered regarding the purpose of this thesis. As mentioned, the main emphasis of this thesis is how firms adjusted planned investments changed due to Covid-19. The literature review in Chapter 2 reveal strategic differences between short- and long-term investments, and firms may prioritize different depending on the time perspective of the investments. This effect is not considered in the survey, as the survey question does not specify whether the changes in planned investment are temporary or permanent, or if the adjustment is in line with a long-term strategy. In addition, the respondents may not have an explicit understanding of this strategic trade-off. Furthermore, firms adjust investments and resources at different rates and at different times. While a cross-sectional survey picks up more details compared to a survey solely based on accounting data, a panel study is necessary to pick up these differences. This could be interesting to research as Mascarenhas and Aaker (1989) found that the firms that reduced investments early in the contraction made further reductions later in the contraction. Another possible limitation is that the investment variable does not specify whether the increase or decrease in investments is in new or existing capabilities and resources, as Maritan (2001) found this to be important for firms' investment decisions.

Furthermore, respondents reported how they believe investments will change due to Covid-19 compared to what was originally planned. This does not measure the actual investment change and can therefore be a less accurate measure compared to asking how the firms changed or adjusted the investment level. On the other hand, the survey was distributed close to the event, and it is therefore possible that the investment adjustments had not been made at the time. By asking the respondents how they believe they will change their investments this can be picked up.

Furthermore, the results are confined to Norwegian firms, and there may be issues related to the external validity and generalizations outside of Norway due to differences in (i) impact, (ii) government response, and (iii) government support. The survey results indicated that the main reason that firms downsized and/or furloughed employees was due to demand reductions, and not due to changes in regulations regarding layoffs. However, differences in government response and level of government support is considered as a potential limitation of the external validity, and it is therefore not clear whether these findings will be consistent in other countries that do not have a similar support system.

5.5 Future Research

In this thesis how firms' prerequisites influence investment decisions are researched, however, these decisions are influenced by several other factors as well. In addition to the literature described in this thesis, other literature could also be relevant and interesting to research as the rational and implications following firm's investment decisions is complex and extends over multiple research fields. As described in the previous sections, how the CEO believe firm investments will change is researched, using a survey that was distributed early in the spring of 2020. As this thesis only cover firms' early responses, it would be interesting to compare the responses with the actual adjustments and changes that were made, as well as how accurate the CEOs responses compared to the actual investment changes. Furthermore, it would be interesting to research the long-term implications of these decisions.

While it is easy to think that "this time is different", the findings in this thesis identified several aspects of this crisis that differ from what have been observed in previous crises. Some of these aspects, including the bankruptcy and import and export effects described in section 4.2. It is not unlikely that these differences could be explained by the governmental measures implemented to mitigate the crisis. While these effects merely were described in this thesis, it is presumed to be highly interesting and relevant both for future research and for government responses in future crises.

6.   Conclusion

The main goal of this thesis was to study how firms manage investments in research and development, human capital, organizational capital, and physical capital in recessions as well as how several factors, including firm characteristics influence these investment decisions. This was done by studying how several factors affected Norwegian firms' investment responses in the start of the Covid-19 pandemic. In addition, the study attempted to research whether there were any differences in how these variables across the resource categories. The main findings are summarized in this conclusion.

First, the impact on the Norwegian economy following the Covid-19 pandemic was substantial, as often observed in recessions, the GDP level and employment dropped. However, these analyses also revealed some deviations from what is normally observed in crises, this includes the reduction in bankruptcies and the large reduction in import and export.

Second, the descriptive statistics revealed that more than half of the respondents were operative with normal capacity, and approximately the same number of firms downsized or laid off employees. Of the firms that downsized, demand effects were the most important. Consistent with the existing literature, the surveyed firms on average reduced the investment levels across all resource categories. Regression analyses were conducted to further research these differences, and the findings from the regression analysis indicated that firm growth could explain investment reductions across all resource categories and financial leverage could explain investment reductions in research and development, human capital, and organizational capital and a more surprising finding was that liquidity significantly could significantly investment reductions in research and development and organizational capital. While the analyses provided interesting results, more detailed analyses with improved specifications are necessary to further comprehend the observed differences.

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Appendices

Appendix I: Standard industrial classification and two-digit NACE codes of the respondents

Code	Industry group
C	Manufacturing
	10 Manufacturing
	11 Beverages
	13 Textiles
	14 Wearing apparel
	15 Leather and leather products
	16 Wood and wood products
	17 Paper and paper products
	18 Printing and reproduction
	20 Chemicals, chemical products
	21 Pharmaceuticals
	22 Rubber and plastic products
	23 Other non-metal mineral products
	24 Basic metals
	25 Fabricated metal prod.
	26 Electronic and optical products
	27 Electrical equipment
	28 Machinery and equipment
	29 Motor vehicles etc.
	30 Other transport equipment
	31 Furniture
	32 Other manufacturing
	33 Repair, installation of machinery
D	Electricity, gas, steam and air conditioning supply
	35 Electricity, gas and steam
E	Water supply; sewerage, waste management and remediation activities
	36 Water supply
	37 Sewerage
	38 Waste act., materials recovery
F	Consumption
	41 Construction of buildings
	42 Civil engineering
	43 Specialised construction activities
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
	45 Motor vehicles, trade and repair
	46 Wholesale trade

47 Retail trade

H   Transportation and storage

49 Land transport, pipeline transport

50 Water transport

51 Air transport

52 Support act. for transportation

53 Postal and courier activities

I   Accomodation and food service activities

55 Accommodation

56 Food and beverage service act.

J   Information and communication

58 Publishing activites

59 Motion pict./video/tv-progr. act.

61 Telecommunications

62 Computer programming, consultancy

63 Information service activities

K   Financial and insurance activities

64 Financial service activities

65 Insurance, pension funding

66 Auxiliary financial acivities

L   Real estate activities

68 Real estate activities

M   Professional, scientific and technical activities

69 Legal and accounting activities

70 Head offices, management consult.

71 Architecture, engineering act.

72 Scientific researc and development

73 Advertising and market research

74 Other prof., scientific, techn. act.

75 Veterinary activities

N   Administrative and support service activities

77 Rental and leasing activities

78 Employment activities

79 Travek agency, tour operators

80 Security, investigation activities

81 Buildings, landscape services act.

82 Business support activities

S   Other service activities

93 Sports activities and amusement and recreation activities

96 Other personal service activities

(Source: Statistics Norway, 2016)

Table 14: Frequency table of organizational forms

Organizational form	Frequency
AAFY	1
ANNA	1
AS	1 084
ASA	1
BBL	2
BRL	1
DA	6
ENK	21
FLI	7
GFS	3
IKS	10
KF	5
NUF	6
ORGL	6
PK	3
SA	13
SPA	8
STI	7
UNDERAVD	114
Total	**1 299**

Table 15: Frequency table of dependent variables

	Investments in research and development		Investments in human capital		Investments in organizational capital		Investments in physical capital	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
-10 Large reduction	47	4.48	37	3.53	29	2.76	-	-
-9	4	.38	5	.48	11	1.05	5	.48
-8	10	.95	13	1.24	7	.67	29	2.76
-7	2	.19	6	.57	6	.57	10	.95
-6	9	.86	18	1.72	16	1.53	49	4.67
-5	11	1.05	15	1.43	10	.95	26	2.48
-4	24	2.29	36	3.43	12	1.14	65	6.20
-3	10	.95	14	1.33	6	.57	15	1.43
-2	29	2.76	43	4.10	34	3.24	68	6.48
-1	5	.48	8	.76	10	.95	8	.76
0 No change	111	10.58	114	10.87	94	8.96	103	9.82
1	16	1.53	21	2.00	33	3.15	65	6.20
2	43	4.10	47	4.48	78	7.44	15	1.43
3	14	1.33	18	1.72	11	1.05	3	.29
4	21	2.00	27	2.57	26	2.48	7	.67
5	8	.76	5	.48	14	1.33	4	.38
6	14	1.33	5	.48	13	1.24	3	.29
7	1	.10	3	.29	5	.48	2	.19
8	4	.38	-	-	7	.67	-	-
9	-	-	-	-	-	-	-	-
10 Large increase	6	.57	3	.29	4	.38	5	.48
Missing	660	62.92	611	58.25	623	59.39	567	54.05
Total	1 049	100.00	1 049	100.00	1 049	100.00	1 049	100.00

Table 16: Employment development

	January	**May/June**	**Percentage change**
Fixed employees	23.26	21.47	-7.70
Temporary employees	15.11	12.50	-17.27
Total	38.37	33.97	-11.47

Table 17: Downsizing

	Frequency	**Percent**
Yes	522	56.25
No	406	43.75
Total	903	100

Table 18: Firms that downsized or furloughed employees

Category	Layoff or furlough employees	Total number of firms	Percent
Operative with normal capacity	170	591	28.76
Operative with reduced capacity	254	320	79.38
Reopened after being closed	13	16	81.25
Reopened with reduced capacity after being closed	48	59	81.36
Temporarily closed, plan to reopen	25	28	89.29
Temporarily closed, uncertain about reopening	11	12	91.67
Permanentely closed for other reasons	0	3	0.00
Total	521	1029	50.63

Table 19: Descriptive statistics of independent variables included in the multivariate regression

	N	M	SD	Min	Max
Research and development	268	-1.54	4.52	-10	10
Human capital	268	-1.82	4.38	-10	10
Organizational capital	268	-.93	4.52	-10	10
Physical capital	268	-1.71	3.32	-9	10

Table 20: Logistic regressions – innovative responses

Dependent variable	Develop new products or services	Distribute products or services to new segments	Develop or improve logistics or distribution of products and services
Independent variable			
Growth	1.243	1.012	1.024
	(.172)	(.025)	(.038)
Financial leverage	0.838	0.915	0.979
	(.202)	(.212)	(.220)
Liquidity	.891	1.030	.961
	(.064)	(.073)	(.058)
Control variable			
Age	1.271*	1.373***	1.120
	(.172)	(.169)	(.148)
Size	1.033	.798**	.827*
	(.118)	(.082)	(.090)
Profit margin	.801	.705	1.017
	(.194)	(.189)	(.016)
Industry dummy	Yes	Yes	Yes
Constant	2.347	3.054	1.562
	(2.158)	(2.853)	(1.242)
No. observations	863	854	855
Pseudo R-squared	.138	.085	.091
P-value	.000	.001	.000

Odds ratios with standard errors in parenthesis.

***Statistical significance at the 1 percent level.

** Statistical significance at the 5 percent level.

* Statistical significance at the 10 percent level.

Table 21: Logistic regression - downsising

Dependent variable	Downsizing
Independent variable	
Growth	1.022
	(.053)
Financial leverage	1.353
	(.350)
Liquidity	.951
	(.051)
Control variable	
Age	.751**
	(.085)
Size	1.212
	(.115)
Profit margin	.986
	(.015)
Industry dummy	
Constant	1.825
	(1.505)
No. observations	852
Pseudo R-squared	.124
P-value	.000

Odds ratios with standard errors in parenthesis.

***Statistical significance at the 1 percent level.

** Statistical significance at the 5 percent level.

* Statistical significance at the 10 percent level.

Table 22: Full regression model

Dependent variable	Physical assets				Human capital				Research and development				Organizational capital			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Independent variables																
Growth		-.568*	-.569*	-.570*		-1.052**	-1.083***	-1.082***		-1.145***	-1.180***	-1.178***		-1.357***	-1.382***	-1.380***
		(.329)	(.330)	(.330)		(.416)	(.414)	(.415)		(.439)	(.436)	(.434)		(.422)	(.421)	(.418)
Financial leverage			-.053	.094			-1.223*	-1.331*			-1.397**	-2.029***			-1.012	-1.697**
			(.524)	(.594)			(.658)	(.747)			(.693)	(.782)			(.668)	(.753)
Liquidity				.122				-.090				-.525*				-.571*
				(.233)				(.293)				(.306)				(.295)
Control variables																
Age	.665**	.568*	.562*	.546	.496	.501	.370	.382	.606	.732*	.582	.650	.352	.393	.285	.359
	(.319)	(.330)	(.336)	(.338)	(.407)	(.419)	(.422)	(.425)	(.434)	(.441)	(.444)	(.444)	(.419)	(.424)	(.429)	(.428)
Size	-.506*	-.424	-.423	-.394	.320	.420	.442	.421	.046	.109	.134	.010	.198	.312	.330	.196
	(.292)	(.297)	(.298)	(.304)	(.373)	(.377)	(.375)	(.382)	(.397)	(.397)	(.395)	(.399)	(.383)	(.382)	(.381)	(.385)
Profit margin	-.228*	-.369**	-.372**	-.361**	-.292*	-.547***	-.627***	-.636***	-.196	-.467**	-.560***	-.610***	-.118	-.444**	-.511**	-.565***
	(.134)	(.157)	(.161)	(.163)	(.171)	(.198)	(.202)	(.204)	(.182)	(.209)	(.213)	(.214)	(.176)	(.201)	(.205)	(.206)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	10.584***	10.677***	10.737***	10.452***	7.960***	7.825***	9.199***	9.409***	8.295**	7.975**	9.545***	10.769***	8.540***	8.322***	9.458***	10.788***
	(1.846)	(1.838)	(1.934)	(2.012)	(2.358)	(2.328)	(2.431)	(2.529)	(2.515)	(2.454)	(2.558)	(2.645)	(2.426)	(2.358)	(2.468)	(2.547)
No. observations	270	268	268	268	270	268	268	268	270	268	268	268	270	268	268	268
R-squared	.167	.177	.177	.178	.211	.239	.251	.252	.235	.273	.286	.295	.218	.268	.275	.288
F-values	.949	.979	.955	.938	1.262	1.436**	1.493**	1.459*	1.451**	1.709***	1.780***	1.820***	1.318*	1.667***	1.689***	1.751***

Unstandardized coefficients with standard errors in paranthesies.

***Statistical significance at the 1 percent level.

** Statistical significance at the 5 percent level.

* Statistical significance at the 10 percent level.

Appendix XX: The survey

Del 1. Introduksjon

Hva beskriver best bedriftens hovedvirksomhet ?
- o Bank og finans
- o Bygg og anlegg
- o Cateringtjenester
- o Helsetjenester (f.eks. tannlege/optiker, apotek, mental helse, fysioterapi, e.l.)
- o Hotell, reiseliv og turisme
- o Håndtverks- og husholdningsjenester (maler, rørlegger, renhold e.l.)
- o IT
- o Jordbruk, fiske og annen primærnæring
- o Kultur og underholdning
- o Media
- o Regnskap og revisjon
- o Restaurant, bar og cafe
- o Rådgivning og konsulentvirksomhet
- o Transport
- o Varehandel
- o Vareproduksjon
- o Annet (vennligst spesifiser):

Er bedriften en familiebedrift? (dvs. eid og/eller ledet av medlemmer av en familie)?
- o Ja
- o Nei
- o Vet ikke

Q1 Er bedriften operativ i disse dager?
- o Ja – operativ med normal kapasitet
- o Ja – operativ, men med redusert kapasitet (redusert åpningstid, tjenestetilbud eller aktivitetsnivå) på grunn av COVID-19
- o Ja – har åpnet opp for fullt etter etter midlertidig stengning på grunn av COVID-19
- o Ja – har åpnet opp med redusert kapasitet etter midlertidig stengning på grunn av COVID-19
- o Nei – midlertidig stengt på grunn av COVID-19, men vi vil gjenåpne
- o Nei – midlertidig stengt på grunn av COVID-19, og det er usikkert om vi vil gjenåpne
- o Nei – midlertidig stengt av andre grunner
- o Nei – permanent stengt på grunn av COVID-19
- o Nei – permanent stengt av andre grunner

Q2 Har dere som følge av COVID-19 gjort en eller flere av følgende endringer?

	Ja	Nei
Utviklet nye produkter og/eller tjenester?	○	○
Rettet eksisterende produkter eller tjenester til nye kundegrupper eller segmenter?	○	○
Utviklet ny eller vesentlig endret logistikk, levering eller distribusjon av produkter og/eller tjenester?	○	○

Q3 Hvor mange ansatte av følgende typer ansatte, hadde bedriften **den 31. Januar**, og hvor mange har den **i dag**? Gi ditt beste anslag. *Vennligst inkluder fulltids- og deltidsansatte, lærlinger, og innleid arbeidskraft som arbeider mer enn 0-timer. Ikke ta med permitterte eller andre som midlertidig jobber 0 timer.*

	Angi antall	
	31. januar 2020	I dag
Antall med fastlønn		
Antall med timelønn		

Q4 Har dere permittert eller nedbemannet som følge av COVID-19?
- o Ja
- o Nei

Q5 Hvis dere permitterte/nedbemannet som følge av COVID-19, hva er årsaken til dette? Kryss av alle relevante alternativer.
- o Bekymring for ansattes helse
- o Bekymring for kundenes helse
- o Bekymring for egen helse/egen families helse
- o Redusert etterspørsel som følge av COVID-19
- o Problemer i forsyningskjeden
- o Problemer med likviditet
- o Nasjonale, regionale eller lokale pålegg/reguleringer
- o Ansatte måtte ta permisjon for å ta vare på egne barn/familie
- o Ansatte tjener mer som permittert/arbeidsledig enn ved å fortsette å jobbe
- o Endringer av forretningsforhold som er urelatert til COVID-19
- o Annet (vennligst spesifiser):

Q6 Hvilken betydning har følgende kriterier for beslutningen om **hvem** som ble permittert eller nedbemannet?

Uten betydning   Svært viktig   ikke relevant

0   10   20   30   40   50   60   70   80   90   100

Utfra når de ble ansatt (ansiennitet)	
Utfra hvor dyktige de er i jobben sin	
Utfra om de jobber med kjerneoppgaver i bedriften eller i mer perifere funksjoner	
Utfra om de har kompetanse som krever lang opplæring internt i bedriften	
Utfra hvor høy lønn de mottar	
Utfra hvor stor andel av arbeidsoppgavene som har falt bort pga. krisen	
Personlig kjemi	

Q7 Hvor mange av følgende er **fremdeles ansatt** i bedriften? Gi ditt beste anslag.
   o   Helt eller delvis permitterte
   o   Ansatte som ikke er permittert men har redusert arbeidstid

Del 2. Økonomisk informasjon om bedriften

Q8 Omtrent hvor stor prosentandel av de typiske månedlige kostnadene (før COVID-19) var
lønnskostnader?

                                             0   10   20   30   40   50   60   70   80   90   100

prosentandel av månedlige kostnader	

Q9 Hvor lenge kan bedriften fortsette uten å bli nedlagt dersom den nåværende COVID-19-krisen
fortsetter, **uten** offentlig støtte?

Ta utgangspunkt i de ressursene dere har i dag i form av kontanter, kreditt og andre reserver, samt det
dere forventer å få tilgang til fra private aktører i løpet av de neste 3 månedene. Ikke inkluder midler
fra det offentlige.
▼ 31. mai … Bedriften er ikke påvirket av COVID-19

Q10 Hvor lenge kan bedriften fortsette uten å bli nedlagt dersom den nåværende COVID-19-krisen
fortsetter,
med offentlig støtte?

Ta utgangspunkt i dine forventninger til støtte fra det offentlige de neste 3 månedene.
▼ 31. mai … Bedriften er ikke påvirket av COVID-19

Del 3. Randomiserte spørsmål

Q11_jul Hvor mange **ansatte** forventer dere å ha **31. juli**? *Ta utgangspunkt i de ressursene dere har
i dag i form av kontanter, kreditt og annen støtte, samt det dere forventer å få tilgang til i løpet av de
neste 3 månedene (fra private, offentlige, eller andre). Inkluder bare ansatte som arbeider mer enn 0
timer og som mottar lønn   Vennligst inkluder fulltids-, deltids-, innleide- ansatte. Gi ditt beste
anslag.*
   o   Antall ansatte jeg forventer å ha 31. juli , 2020:

Q11_dec Hvor mange ansatte forventer dere å ha 31. desember?Ta utgangspunkt i de ressursene dere
har i dag i form av kontanter, kreditt og annen støtte, samt det dere forventer å få tilgang til i løpet av
de neste 3 månedene (fra private, offentlige, eller andre). Inkluder bare ansatte som arbeider mer enn

0 timer og som mottar lønn Vennligst inkluder fulltids-, deltids-, innleide- ansatte. Gi ditt beste anslag.

- o Antall ansatte jeg forventer å ha 31. desember, 2020:

Del 4. Forventinger om varighet på Covid-19

Q12 Hva tror du er den **mest sannsynlige datoen** hvor forretningsforholdene er tilbake til det normale?
▼ 31. mai ... 2022 eller senere

Q13 På en skal fra 1-100 ...

	Veldig usikker	Veldig sikker
	0 10 20 30 40 50 60 70 80 90 100	

hvor sikker føler du deg på svaret du ga på når krisen er over?	

Q14 Nå åpner den norske økonomien gradvis opp, har dere begynt å hente ansatte tilbake igjen?

- o Ja, vi er fullt bemannet igjen
- o Ja, men vi er fremdeles kun delvis bemannet
- o Nei

Q15 Hva er kriteriene for å velge hvem som hentes tilbake?

	Uten betydning	Svært viktig	Ikke relevant
	0 1 2 3 4 5 6 7 8 9 10		

Utfra når de ble ansatt (ansiennitet)	
Utfra hvor dyktige de er i jobben sin	
Utfra hvilke arbeidsoppgaver som har økt igjen	
Utfra hvilke arbeidstagere vi er redd for å miste	
Utfra lønnsnivå	
Utfra avtale med fagforeninger/tillitsvalgte	
Personlig kjemi	

Q16 Når du tenker på situasjonen etter at COVID-19 krisen er over og samfunnet er åpnet opp igjen, hvilken andel av de permitterte og oppsagte tror du **vil bli ansatt igjen** i bedriften?
- o 100% vil bli ansatt igjen
- o 80-99%
- o 60-79%
- o 40-59%
- o 20-39%
- o 1-19%
- o 0% vil bli ansatt igjen
- o ikke aktuelt, vi har ikke permittert/oppsagt noen

Del 5. Tiltak og effekter på humankapital

Q17 Hvordan er bedriften påvirket av restriksjonene på innen- og utenlandsreiser som følge av COVID-19?
- o Ingen påvirkning
- o Noe påvirket
- o Påvirket
- o Sterkt påvirket

Q18 **Lønnkompensasjon til permiterte**
For å begrense den økonomiske belastningen av COVID-19 for arbeidsgivere ble perioden en arbeidsgiver har plikt til å betale lønn ved permittering redusert til to dager. Stortinget har bevilget midler til en midlertidig stønad som skal sikre permitterte arbeidstakere full lønn, inntil 6G, i ytterligere 18 dager.

I hvilken grad er du enig med følgende utsagn: **Permitteringsordingen har bidratt til at vi har permittert flere ansatte enn vi ellers ville gjort**
- o Sterkt uenig
- o Uenig
- o Noe uenig
- o Nøytral
- o Noe enig
- o Enig
- o Sterkt enig

Q19 Regjeringen har innført en rekke tiltak rettet mot norsk næringsliv. En del av disse ordningene er rettet bredt mot alle bedriftene, mens andre er rettet mot spesifikke bransjer eller typer virksomhet (f.eks. grunderbedrifter).
Har din bedrift benyttet eller søkt en av disse ordningene?

	Benyttet/godkjent	Søkt og avventer svar	Søkt, men avvist	Planlegger å søke
Direkte støtte	○	○	○	○
Låneordninger (inklusiv låneordninger med lav rente)	○	○	○	○
Garantordninger	○	○	○	○
Utsettelse av betalinger	○	○	○	○
Reduserte administrative byrder	○	○	○	○

Q20_a Myndighetene har også enkelte tiltak som skal stimulere til kompetanseheving og kompetanseomstilling.

Har din bedrift benyttet eller søkt om kompetanserettede tiltak?

	Har brukt	Planlegger å bruke	Kommer ikke til å bruke	Kjenner ikke til slike ordninger
Heve kompetanse	○	○	○	○
Omstilling til annen kompetanse	○	○	○	○

Q20_b Hvem tilbyr eller finanserer tiltak for kompetanseheving og kompetanseomstilling som er relevant for dere? Flere svarmuligheter (alternative coding with one cumulative number for all answers in italic)
- lokale myndigheter
- regionale myndigheter
- nasjonale myndigheter
- bransjeforening
- utdanningsinstitutsjoner
- private aktører
- andre
- ingen

Del 6. Bedriftens investeringer

Q21 Hvordan tror du bedriftens **investeringer** vil bli endret i forhold til hva som var planlagt (som følge av COVID-19)?

	Stor reduksjon Uendret Stor økning ikke revelant
	-10 -8 -6 -4 -2 0 2 4 6 8 10
Investeringer i fysisk kapital (maskiner, utstyr, eiendom, osv)	▮
Investeringer i kompetanse og læring	▮
Investeringer i markedsføring og merkevarebygging	▮
Investeringer i innovasjon, forskning og utvikling	▮
Investeringer i organisasjonsutvikling og forbedringsprosjekter	▮
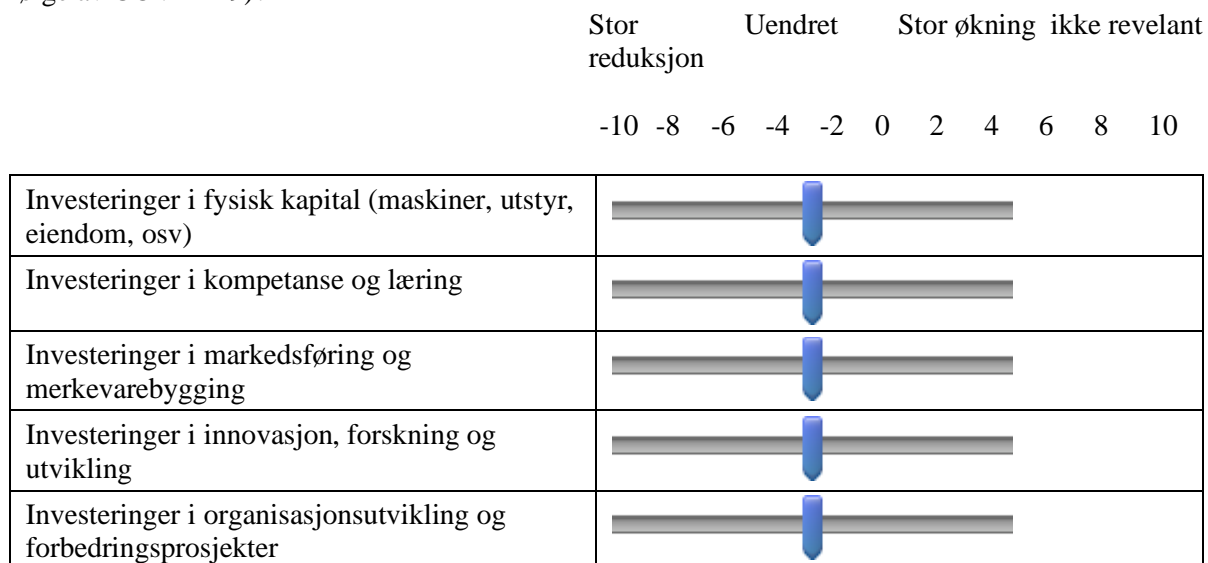
Q22 Er ansatte som fremdeles jobber under- eller overbeskjeftiget i sine normale oppgaver på grunn av COVID-19?

	Underbeskjeftiget Som vanlig Overbeskjeftiget
	-10 -8 -6 -4 -2 0 2 4 6 8 10
Arbeidsbelastning ift. normalt	▮
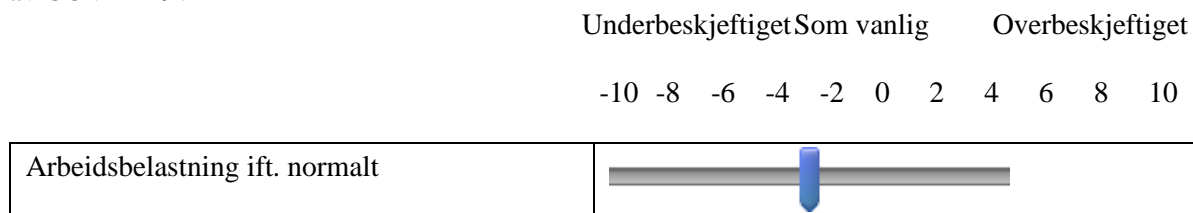
Q23 Dersom bedriften har ansatte som er underbeskjeftiget i sine normale oppgaver. Hvordan anvendes den ledige kapasiteten hos slike ansatte?

	Helt uenig	Nøytral	Helt enig	ikke relevant
	-10 -8 -6 -4 -2 0 2 4 6 8 10			

De får mer fritid	
De jobber med kompetanseheving	
De jobber med innovasjon, forskning og utviklingsoppgaver	
De utfører andre oppgaver enn vanlig for å erstatte ansatte som er permittert	
De løser problemer/oppgaver som vi ikke får tid til under vanlige forhold	
De velger selv hvordan de best kan gjøre nytte for seg	

Q24 Hvordan vil din bedrift på sikt endre bruken av følgende som en konsekvens av COVID-19?

	Vesentlig reduksjon	Ingen endring	Sterk økning	Ikke relevant
	-10 -8 -6 -4 -2 0 2 4 6 8 10			

Konsulenter	
Freelansere på timebasis	
Freelansere på andre kontrakter	
Faste ansatte	
Oppgaver som settes ut til leverandører	
Oppgaver som settes ut til kunder	
Oppgaver som settes ut til samarbeidspartnere	

Q25_org Benyttet bedriften **før** COVID-19-krisen noen av følgende metoder for tilrettelegging av arbeidet? *Vennligst angi hvor mange av virksomhetens medarbeidere som er omfattet. Ett svar pr. linje.*

	nei/ingen	under 25%	25-50%	over 50 %	Vet ikke
Selvstyrte grupper	○	○	○	○	○
Systemer for å samle inn forslag fra ansatte	○	○	○	○	○
Delegering av ansvar	○	○	○	○	○
Kvalitetssirkler/-grupper (formell delegering av kvalitetskontrol)	○	○	○	○	○
Tverrfaglige arbeidsgrupper	○	○	○	○	○
Integrering av funksjoner (f.eks. salg, produksjon)	○	○	○	○	○
Kvantitative prestasjonsmål (prestasjonsmål som kan telles eller måles i kroner, antall, prosent, e.l.)	○	○	○	○	○
Prosesser for å optimalisere ressursstyring ((f.eks. just-in-time eller lean)	○	○	○	○	○
Telependling/hjemmekontor	○	○	○	○	○

Q25_strat I hvilken grad vektla bedriften følgende i konkurransen med deres nærmeste konkurrenter **før** COVID-19-krisen?

Lite viktig					Meget viktig				Ikke relevant
0	1	2	3	4	5	6	7	8	9	10

Høyere kunde- /brukerservice	
Bredere produkt-/tjenestespekter	
Lavere priser	
Høyere kvalitet på produkter/tjenester	
Mer kundetilpasning /skreddersøm	
Reduksjon av driftskostnader	
Kvalitetskontroll/kvalitetsstyring	
Merkevarebygging	
Innovasjon/FoU	
Renommébygging	
Prosessforbedringer (optimalisering av prosesser)	
Implementering av nye løsninger (teknologi, systemer)	
Videreutvikling av eksisterende produkter/tjenester	
Lansering av nye produkter/tjenester	

Q26 Er bedriften medlem av en arbeidsgiverorganisasjon?
- o Ja
- o Nei
- o Vet ikke

Tusen takk for dine svar. Vi er nå kommet til slutten av denne surveyen. Vi vil gjerne avslutte med å gi deg muligheten til å motta informasjon om resultatene som du nå har fullført. I så fall ber vi deg oppgi din e-post adresse under
E-post adresse for å motta informasjon om undersøkelsen: