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Do active managers live up to their pitch?

An empirical study on Scandinavian active fund performance in crises

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Abstract

Active fund management is a heated topic. Investors have been willing to pay for skilled active managers in the belief that they will obtain greater returns. The literature remains skeptical. In their defence active managers counter that they outperform in times of crisis such that their involvement has a "hedging" or "insurance effect". Yet, existing literature do not support active manager's ability to deliver on their promise. This thesis challenges the active manager pitch by observing the performance of actively managed funds in Scandinavia in crisis relative to non-crisis. Debatable topics such as investment focus, fees, active share, and persistence are assessed. The main conclusion suggests that active managers fail to outperform across the Scandinavian market. Yet, the concept of an "insurance premium" gains some support. In sum, these findings add to the pile of literature on active fund underperformance, and thus managers failing to deliver on their pitch.

Keywords – Active management, Fund performance, Crises, Scandinavia

Contents

List of Figures

List of Tables

1 Introduction

A recently published Financial Times article described the active manager pitch as follows: "While they might underperform in bull markets, they prove their mettle in times of volatility" (Darbyshire, 2020). This thesis aims to figure out if this is really true by comparing fund performance in crisis relative to non-crisis.

The literature on this topic is not convincing. A recent study evaluating active fund performance during the Covid-19 pandemic suggests that the active manager pitch remains unproven, even at a time stricken by record high volatility levels (Pastor & Vorsatz, 2020). The crisis effectively resulted in the largest single-month drawdown observed in the past 20 years. In other words, if active managers do not prove their mettle amidst a severe crisis affecting all corners of the world – how can the active manager's pitch be tenable?

There are primarily three motivating factors for this thesis. The first is provoked by the current world situation - 2020 has been a year of deep global crisis. In this light, we want to observe how actively managed funds actually perform in a crisis context relative to non-crisis. The second factor is shaped by the existing literature gap on fund performance in Scandinavia, primarily due to the disproportionate focus on the US market. It is useful to highlight the geographic scope of our study due to differences in regulations, market structure and resource reliance. The third factor brings more reflection and attention to the existing literature gap on the manager perspective. In contrast to existing literature focusing on performance net of fees, we want to assess if managers add value before fees, and in so doing introduce new perspectives and market insights. All three factors together culminate into the question: Do Scandinavian active funds perform better in crisis relative to in non-crisis?

To provide depth to our analysis, four additional factors are observed: investment focus, fees, level of active management and persistence. First, studies suggest that managers' proximity to their investment choices matter, in particular due to the associated informational advantage.[1] Do domestically invested funds perform better in crisis? Second, most traditional studies[2] miss important nuances such as investors willingness to pay

[1] See e.g. Coval & Moskowitz (2001).
[2] See e.g. Jensen (1968); Carhart (1997).

higher fees during economic downturn (Pastor & Vorsatz, 2020). The high fee is often referred to as an "insurance" that hedges against negative return. Is it worth paying higher fees in times of crisis? Third, the limited literature on the level of active management in crisis suggests that funds with lower active share underperform and are more prevalent in crisis.[3] Do active funds perform better in crisis with higher levels of active management? Lastly, increasingly efficient markets challenges active managers' ability to outperform over time. Do top performing funds persistently outperform even in times of crisis?

Ultimately, the main goal is to establish whether active managers can justify their role despite the puzzling underperformance reported in existing literature.

The rest of this paper is structured as follows: In chapter 2 further background and related literature is introduced, which in turn provides a basis for the research questions presented in chapter 3. In chapter 4, the dataset and refined sample is introduced along with the selected variables of interest. Thereafter, the empirical methodology is developed in chapter 5 with the accompanying findings in chapter 6. Chapter 7 offers a discussion based on the findings, which is further wrapped up with a conclusion in chapter 8, while limitations and suggestions for further research are raised in chapter 9.

[3]See e.g. Petajisto (2013).

2 Background and Related Literature

In this section we introduce the foundation of our thesis with reference to relevant background and literature. First, we describe the mutual fund concept and the mutual fund market, specifically focusing on Scandinavia. Further, we consider mutual fund management and the value of active fund management in crises. Lastly, we introduce the active manager perspective by examining investment focus, fees and active management levels.

2.1 Mutual Funds

Mutual funds are pools of money from investors, designed to benefit from diversification and economies of scale. The main categories of mutual funds are equity, fixed income, and money market funds. In the pursuit of greater returns, investors choose mutual funds as an attractive and convenient way to access financial markets and increase their wealth. There are particularly three benefits mutual funds offer to investors: diversification, cost savings, and sharing of liquidity risk among mutual fund investors (Chordia, 1996). According to economist Harry Markowitz, diversification is the only "free lunch" that exists (Schwab, 2016). In result, due to the diversification of risk, mutual funds can still be a suitable choice for investors during economic downturns.

2.2 The Scandinavian Mutual Fund Market

The mutual fund market in Scandinavia was first established in Denmark in 1956, followed by Sweden in 1958 and finally Norway in 1982 (Järf, 2016). The Swedish fund market is the largest market in the region with a large presence of international asset managers such as JP Morgan and Goldman Sachs. In the first quarter of 2020, the Swedish equity fund market was 213.1bn USD in total net assets, while Norway had 53.3bn USD and Denmark 51.2bn USD (Rodriguez, 2020). In comparison, the US equity market is significantly larger with a total net asset value of 11,520bn USD (Rodriguez, 2020). It should therefore come as no surprise that existing research is heavily focused on the latter geographic region.

The Scandinavian fund market is characterized by high transparency, effective consumer

protection, and generally lower costs and greater attention toward sustainability than in other EU countries (Nordström, n.d.). The Scandinavian countries' high level of education, low crime rate, well-developed infrastructure and public welfare system serve as a competitive edge compared with other markets, especially by reason of their strong institutions and financial stability.

Scandinavia offers a unique variety of quality companies within various sectors including energy and seafood in Norway, commercial brands and export commodities in Sweden, and biotech and health in Denmark (Fjell, 2019). Large companies within the Scandinavian market include Equinor in oil and gas, Novo Nordisk in health care, and H&M in retail. The innovative nature and the high sustainability scores of the Scandinavian market serve as winning traits in the future equity market (Fjell, 2019).

Variations in market maturity, size, fund activity levels, fees, and flows differ substantially across time and countries (Plantier, 2014). Apparently, larger fund markets and lower fees tend to be linked to countries with high education and wealth (Khorana, Servaes & Tufano, 2005). Cremers, Ferreira, Matos & Starks (2016) find that actively managed funds have higher active share and charge lower fees in markets experiencing competitive pressure from passive funds. Keeping this insight in mind, we will consider fund management.

2.3 Mutual Fund Management

There are two main ways of managing a fund – active and passive management where the latter aims to mimic a market-weighted index or portfolio. The modern passive strategy emerged around 1970 and has since expanded quickly due to the growth of the Exchange Trading Funds (ETF) market (Lettau & Madhavan, 2018). In contrast to passive management, active management aims to outperform the market by deviating from the benchmark's portfolio holdings.

Despite a significant global shift from active to passive, active management is still a significant segment of the market. In this thesis, we choose to depart from the trendy passive versus active management discussion, and instead solely consider actively managed equity funds. Investors everlasting hope of outperformance in the "next" bear market can explain why the popularity of active management endures (Carlson, 2018). Yet, the modern active management industry is no longer what it once was due to tougher

competition and tighter margins (Wigglesworth, 2020). The implications of the constantly changing asset management landscape will not be further discussed here, but question whether active managers are able to create value will be explored.

2.4 Active Management

The following section will explain why active fund performance is worth investigating during crises, starting off with references to the academic literature and traditional financial theory.

The past 50 years of academic literature in this area was set in motion when Sharpe introduced "the traditional view" of active management in 1966. In the aftermath, few studies, if any, draw the conclusion that actively managed funds consistently outperform the benchmark (Carhart, 1997; Jensen, 1968; Malkiel, 1995). These studies are predominantly based on the mature and highly efficient US equity market.

US studies do not necessarily apply to the Scandinavian market. It is therefore necessary to consider the few existing studies on Scandinavian actively managed funds. Christensen (2013) found that only 7% of the 71 Danish mutual funds in his sample generated significantly positive alphas in the period between 2000 and 2010. The results of Flam & Vestman (2014) suggest that more than half of Swedish active funds outperformed between 1999 and 2009. Lastly, an extensive Norwegian study on fund performance between 1982 and 2008 did not find significant risk-adjusted abnormal returns (Sørensen, 2010).

The evolution of the fund market, in tandem with economic and financial development shapes what is ultimately observed in the fund market (Ferreira, Keswani, Miguel & Ramos, 2013). Modern research documents that these variations affect the market efficiency and active fund performance (Ito, Noda & Wada, 2014). Compared to the US market, both emerging markets and some developed European markets (although to a lesser degree), are considered to have a higher potential for continued misplacement. Given that the Scandinavian market is known for having a robust, well-functioning banking system, the level of inefficiency in this market is worth questioning. Dyck, Lins & Pomorski (2013) found that fund outperformance is dependent on underlying market efficiency.

The traditional market efficiency hypothesis has been a dominant financial theory as it

offers a theoretical basis for observations in the financial market (Fama, 1970). According to the efficient market hypothesis, all available and relevant information will be reflected in the price of securities. Hence it is no easy task for active managers to make money trading securities and effectively "beat the market".

However, Fama's theory has later been challenged by behavioural finance and the adaptive market hypothesis theories, as well as novel literature. Conditional performance models have evaluated the expected fund performance over time dependent on the state of the economy (Koswoski, 2011; Ferson & Qian, 2014). Von Reibnitz (2017) similarly finds that fund performance is strongly correlated with the underlying market environment and volatility levels.The resulting performance findings give more credit to managers´ ability to create value and outperform during recessions. After all, Albert Einstein's phrase «amidst every crisis, lies great opportunity» might apply to the fund market as well. The critical question is whether active managers are able to exploit the market inefficiencies during crisis?

2.5 Active Management in Crises

Market crises can offer opportunities for active managers due to financial market dislocations. These mispricings occur under stressful market conditions as the financial markets are not able to correctly price assets on an absolute and relative basis (Pasquariello, 2014). Inefficiency in the market therefore serves as a necessary condition for active managers to deliver alpha to investors (Waring & Siegel, 2003).

Research suggests that the value of active management depends on the state of the economy and the investors´ marginal utility of consumption.[4] From the investor perspective, periods of recession tend to be accompanied with higher marginal utility due to lower consumption and risk-taking. In this thesis, the bad state of the economy is represented by crisis periods.[5] Kosowski (2011) found that active managers add value by outperforming in recessions. The findings of conditional performance models suggest that active managers show better decision making and outperformance during recessions (Glode, 2011; De Souza & Lynch, 2012; Moskowitz, 2000; Kosowski, 2011). These findings suggest a positive

[4]See e.g. Ferson & Schadt, 2016; Glode, 2011; Kosowski, 2011.

[5]This paper does not make a distinction between crisis, bad state of the economy and recession, and likewise non-crisis, good state of the economy and expansion.

correlation between active return[6] and investors' high marginal utility during recessions, which indeed affects the value of active management. Studies that fail to consider investors higher marginal utility tend to undervalue manager performance in recessions (Berk & van Binsbergen, 2015; Kosowski, 2011). The above-mentioned results are predominantly based on US actively managed equity funds. None of the previously mentioned Scandinavian studies evaluate fund performance in the context of crisis.

Investor and manager investment decisions impacting fund performance during crisis will now be considered. This will form the basis for the additional research questions on investment focus, fees, and level of active management.

2.6 Investment Decisions in Crises

A cross-sectional study of the Swedish fund market found that features such as low fees, high active share, and past outperformance can explain fund performance (Dahlquist, Engström & Söderlind, 2000; Smørgrav & Næss, 2011). Due to the limited existing literature, there is good reason to see how these features have unfolded in the Scandinavian market.

2.6.1 Geographical Investment Focus

An interesting note will illustrate the domestic versus international mandate trend. Between 1994 and 2008, the share invested in equity mutual funds with a Norwegian mandate decreased from 90% to less than 20%. This shift does not suggest a contraction of the Norwegian fund market, but increasing investment in funds with international mandates (Sørensen, 2010). This trend aside, do funds with domestic investment focus perform better during crisis? Are there any competitive advantages of investing domestically compared to internationally during crisis?

Coval & Moskowitz (2001) find that managers who invest a significant part of their assets locally perform better. This suggests that managers´ proximity to their investment choices do matter. The informational advantage obtained from investing nearby is not as available to managers investing in more distant and less familiar markets. In other words, staying close to the investment object allows active managers to take advantage of the available

[6] Active return is defined as the fund return resulting from the active portion of the portfolio.

information to a greater extent, which can further lead to fund outperformance (Coval & Moskowitz, 2001). So how does this play out in the Scandinavian market?

2.6.2 Fund Fees

The annual fund fee is calculated by dividing total fund expenses with the total fund assets under management (Napoletano & Curry, 2020). The size of the premium necessary to get access to the famous “hedge” during crisis is questioned in existing literature. A handful of studies find that higher fees are associated with worse performance and therefore do not support the existence of skilled or informed managers (Carhart, 1997; Malkiel 1995). Glode (2011) finds that high fee funds display worse performance unadjusted for risk and expected return. Yet, the same funds display better risk-adjusted return during recessions suggesting a highly countercyclical behaviour. Glode (2011) suggests that this "insurance" potentially explains the survival of poorly performing funds.

The question regarding the premium payment for active management is a heated topic both for the investor and manager. Since correction of market mispricing helps facilitate market efficiency, active managers investing in securities whose price deviates from their fundamental value incorporate the “costly news into the prices” (Wermers, 2019). So, despite the skepticism around high-cost active strategies, active management can nonetheless collectively benefit all investors in the market, suggesting that both their time and price can be justified (Sharpe, 1966). This finding suggests that active managers can be worth positive fees in the aggregate, as they serve the important economic role of efficiently allocating resources (Gârleanu & Pedersen, 2018).

No manager would use resources to gather information if it did not pay to trade on it (Grossman & Stiglitz, 1980). Kosowski (2011) suggests that investors more willingly pay premiums for assets negatively correlated with consumption. Some mutual fund investors may even be willing to trade off some overall performance in favour of superior performance in bad states of the economy when the marginal utility of wealth is high (Kosowski, 2011).

What is an active manager worth? Do investors pay high fees to gain access to skilled managers or are they fooled? Although studies suggest that investors are willing to pay for higher return during bear markets, studies also suggest that higher fees do not necessarily

equal access to skilled managers net of fees (Jensen, 1968; Gruber, 1996; Wermers, 2000). The cost of gaining access to skill often offsets or even more than offsets its value. When fees are subtracted from return only 0.6% of fund managers show performance excess of fees, however this does not necessarily mean that active managers do not have skill and create value (Barras, Scaillet, & Wermers, 2010).

Based on the above, it is not clear if higher fee funds equal better insurance in crises. Even though the Scandinavian market can be considered a front runner by reason of its transparent and regulated market environment, a significant number of investors are still not well-informed decision makers in the investment process (Linderud, Bakken, Bøhmer & Vold, 2020). Gruber (1996) highlights in his paper that advertisers, brokers, and institutions influence investors to choose active management.

Studies have found that the combination of high fees and lower active share (closet indexers) substantially underperform relative to their benchmark (Cremers, 2017). This raises the next criterion: the level of active management and fund performance in crisis.

2.6.3 Active Share

Active share measures the percentage of the portfolio that differs from the benchmark index (Pestajisto, 2013). Active management is not a fixed strategy but rather a continuum. It is therefore interesting to consider how the level of active management relates to fund performance during crisis. Do active managers adjust their active management strategy to outperform in crisis? If so, what level of active share outperforms in crisis?

Historically, high fees and low active share funds appear more often in times of high volatility and economic uncertainty. For instance, closet indexing had a declining trend when the market was in a stable recovery phase in 2003. In contrast, the onset of the 2006 subprime mortgage-crisis and market uncertainty was accompanied with a sudden increase in closet indexing, more so-called “index hugging” and safer investment strategies (European Securities Market Authority, 2020). The phenomenon also gained more ground in the aftermath of the financial crisis (Petajisto, 2013). These findings suggest that fund managers tend to pursue a lower active share strategy during crisis.

Cremers & Petajisto (2009) consider performance both before and after fees, and conclude that low active share funds strongly underperform, whilst high active share funds

persistently outperform. A study of 55 active Norwegian funds found evidence that higher active share funds outperform lower active share funds, and that funds' active share proved to be higher in expansions and lower during recessions (Smørgrav & Næss, 2011).

The level of active management is not well studied in relation to fund performance in crisis. The available literature suggests that lower active management underperforms and is more prevalent during crises. Does this indicate that funds with lower active share perform worse, or is the underperformance a direct result of the market crisis? Could higher levels of active management make it easier to navigate in turbulent markets?

2.6.4 Persistence

According to Carhart (1997), persistence is well documented in the finance literature, yet not well explained. Persistence is here defined as the existence of funds' continued or prolonged performance. The drives of persistence in our sample will not be assessed, but the existence of performance persistence for winning and losing funds will be checked in the observed period, by observing the performance both pre-crisis, during crisis, and post-crisis. Do the same winners persist independent of the state of the economy?

Apparently, it is not common to observe persistence in the "modern" fund market due to increasing efficiency in the equity market (Bernstein, 1998). Barras et al. (2010) found in their study of funds from 1990 to 2006 that the proportion of skilled funds decreased dramatically from 14.4% to 0.6%. This suggests that it is increasingly more challenging for active managers to persistently outperform. According to an international study on equity funds, Denmark and Norway were the only countries (out of 28) whose results indicated that chasing past winners could produce abnormal return (gross alpha) (Ferreira, Keswani, Miguel & Ramos, 2012).

2.7 The Three Crises

Even though no crisis will ever be the same, crises share some similarities. There are particularly three elements that are similar in the event of a crisis: the triggering event, the spread of the shock, and the wider impact (OECD, 2008).

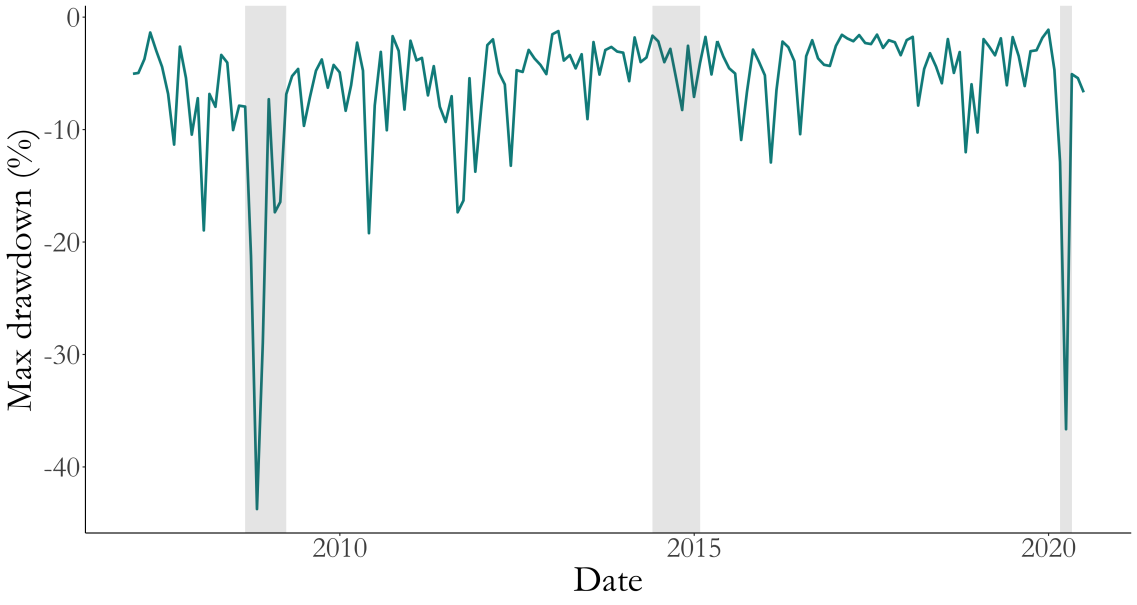
The Financial Crisis and the Covid-19 pandemic both qualify as the largest global recessions

since the Great Depression in the 1930´s, and both crises emerged out of two world leading economies, namely the US and China (Fontevecchia, 2020). The S&P500 index was considered overvalued prior to these crises, and stock valuations dropped with almost 75% of their valuations when the crises propagated (Fontevecchia, 2020). In addition to these global crises, we include the 2014 Oil Crisis, as this affected the Scandinavian market, and particularly the Norwegian market. The three crises were chosen to highlight and contrast fund performance in different crises.[7]

The Financial Crisis was primarily rooted in banking sector instability, the oil plunge occurred in response to supply-demand imbalance, and the Covid-19 pandemic developed from a deadly respiratory virus giving rise to deep macroeconomic and financial repercussions. We expect that these differences will have different implications on the financial markets and active fund performance.

Figure 2.1 illustrates the max drawdown of the sample funds, namely the drop from peak to trough before another peak is reached. This is relevant in a crisis perspective since the fund value is likely to fluctuate in response to market volatility. The max drawdown is large during both the Financial Crisis and the Covid-19 Pandemic, and we suspect that the deep global consequences of these crises explain these drops.

Figure 2.1: Max drawdown observed from 2007 to 2020



[7]See section 4.2 for definitions of the three crisis periods.

2.7.1 The Financial Crisis

The Financial Crisis in 2008-2009 was defined as a Financial Crisis. The US housing market bubble was the main catalyst of the extreme financial market stress that spread across the world from mid 2007 to mid 2009 (Reserve Bank of Australia, 2009). The combination of high default rates on subprime mortgages along with deregulation in the financial industry triggered various dysfunctional events in the banking system. As a result, stock prices plunged, investors fled to lower risk assets, and volatility rose to high levels. The official outbreak is often considered the Lehman Brother collapse on 15th of September 2008. The bank collapse triggered a global panic with investors starting to withdraw their money in fear that their banks would fail. As a result, liquidity evaporated due to the drastic fall in investment and consumption, which brought the global economy into deep recession (Reserve Bank of Australia, 2009).

2.7.2 The Oil Crisis

The Oil Crisis in 2014 is defined as a macroeconomic crisis, starting with an historical drop in the oil price. In the Scandinavian region, the Norwegian oil industry was particularly hurt, sending the sector into the worst crisis it had seen in many years (Aftenposten, 2020). The triggers behind the severe oil plunge were mainly supply-side issues, however lower demand and growth prospects were also part of the equation. Upward surplus in unconventional oil production, prospects for decreasing global demand of oil, shifting OPEC policies, geopolitical risks and appreciation of the US dollar were all contributing factors to the 70% drop in the oil price from mid 2014 to early 2016 (Stocker et al., 2018). It is recognized as one of the largest declines and long-lasting collapses since World War II (Stocker et al., 2018). In other words, the plunge was a product of both economic and political factors. Figure 2.2 illustrates the oil price in the period from January 2007 to June 2020. An oil price drop is observed for all three crises, suggesting that the oil price is strongly related to the economy and market volatility.

Figure 2.2: The oil price from 2007 to 2020

The initial drop in the oil price occurs between mid-2014 and the start of 2015 (59.2% fall over a 7-month period). This period is defined as the Oil Crisis. We observe the second drop in the period between mid-2015 until the start of 2016 (approximately 40% down). The latter drop is left out of our analysis.

Source: U.S. Energy Information Administration (2015).*Europe Brent Spot Price FOB.*

2.7.3 The Covid-19 Crisis

The Covid-19 crisis hit the Scandinavian market in March 2020. The pandemic is still ongoing, and is considered a special case of crisis since it has developed into both a macroeconomic and financial crisis (Grytten, 2020). The virus is predicted to leave a legacy even deeper and longer lasting than any prior crisis (Borio, 2020). The first case of the respiratory virus was reported in China in December 2019, apparently transmitted at a wholesale food market (World Health Organization, 2020). As of December 2020, more than 70 million people has been infected, including 1.6 million deaths worldwide (European Centre for Disease Prevention and Control, 2020). In contrast to the above-mentioned crises, Covid-19 started out as a health crisis, affecting the real economy and the supply side of production. Subsequently, lockdowns were self-imposed across countries to limit contagion. In result, this affected the demand side of tourism and trade, thereby influencing the viability of businesses and the financial sector. Enormous measures, in a historical context, with regard to monetary and financial policies were implemented worldwide. The attitude by central banks and governments were to limit the output contraction, and the largest increase in unemployment ever seen.

3 Main Hypothesis and Research Questions

3.1 Main Question and Hypothesis

The focus on fund performance in a crises context is of interest due to the following two reasons: there are more opportunities available to active managers and a higher willingness to pay amongst investors. The main goal is to figure out if Scandinavian active fund managers deliver what they promise or if they "let a good crisis go to waste". The main research question is thus:

Do actively managed funds outperform in crisis relative to non-crisis, and do we observe any differences across crises?

Whilst we observe that existing literature essentially contradicts active managers' pitch to outperform in crises, the desire is to find evidence that approves or disapproves this perception. Do active managers receive an "unfair" amount of criticism or can existing critical literature be justified? These questions motivate our main hypothesis:

"Actively managed funds outperform in crisis relative to non-crisis"

3.2 Additional Research Questions

In addition, cross-country variations and four debatable questions that extend the interpretation of our main hypothesis will be explored. The following research questions are identified.

- Does active fund performance vary across Scandinavian countries?
- Do funds with domestic investment focus perform better than funds with international investment focus in crisis?
- Do funds with higher fees perform better than lower fee funds in crisis?
- Do funds with higher active share perform better than lower active share funds in crisis?
- Does persistence exist for top performing funds even in times of crisis?

4 Data

This section describes the collection and refinement of our data sample and variables. In chronological order we present our sample selection, crises periods, variables of interest, and lastly descriptive statistics.

4.1 Data Source and Sample Selection

The data is collected from the Lipper Fund Database. The original sample is a panel dataset of 1075 open-ended mutual funds with monthly observations. The sample is refined in accordance to previous studies to increase the robustness of estimates whilst also avoiding selection bias. Each fund is represented by a unique Lipper-ID.

Time-period

Panel data includes both time-series and cross-sectional data. The time-series spans from January 2007 until June 2020. This allows us to observe our sample's fund performance over a period of more than 13 years, specifically 162 months. Similar to Kacperczyk et al. (2014), monthly observations are used, to increase the robustness of our sample compared to that of annual observations. Further, we make no attempt to separate stock selection from market timing during crisis, as this would require daily fund holdings over time. Our data availability is too limited to assess this topic.

Domicile

Considering the underlying Scandinavian focus, the sample is restricted to funds domiciled in Norway, Sweden and Denmark.[8] The Scandinavian focus provides the option to consider both region-specific and cross-country comparisons in our analysis. All Scandinavian funds regardless of their geographical focus are included. If only Scandinavian funds invested domestically were included, our sample would be significantly reduced.

Degree of active management

Following the definition of active management in chapter 2, our sample is refined to only

[8]In this thesis Scandinavia is defined as Norway, Sweden and Denmark.

include actively managed funds. Subsequently, all index funds are removed, and the remaining data sample leaves all funds with positive active share levels. For unleveraged actively managed equity funds the active share ranges between 0% to 100%.

Incubated funds

In line with Elton, Gruber & Blake (2001) we exclude small funds, as these can translate to extreme values in our sample. Kacperczyk et al. (2014) defines incubated funds as those with TNA[9] less than $5 million, and hence removes these from his dataset.[10] In comparison, Pastor & Vorsatz (2020) exclude all funds with TNA less than $15 million. In this analysis funds with TNA less than $10 million are excluded.

Controlling for survivorship bias

The panel data we used is unbalanced, meaning that the funds are unequally represented across the observed time-period. Survivorship bias is avoided by including both survivors and non-survivors. If this is disregarded, the selection bias can potentially overestimate the overall performance of active mutual funds (Elton et al., 1996).

Descriptive statistics

Table 4.1 shows the descriptive statistics of gross alpha after the sample refinement. The full sample consists of 79,045 monthly observations for 883 funds, consisting of 353 Swedish funds, 189 Norwegian funds, and 341 Danish funds. As the table below shows, the Swedish sample is the only country with a positive mean gross alpha. Both the maximum and minimum gross alpha value, respectively 5.520 and -2.572, are represented by two Swedish funds in the crisis-periods.[11]

Table 4.1: Summary statistics - Gross alpha

Statistic	N	Mean	St. Dev.	Min	Max
Full sample	883	−0.066	0.460	−2.572	5.520
Sweden	353	0.010	0.562	−2.572	5.520
Norway	189	−0.102	0.439	−1.654	2.186
Denmark	341	−0.125	0.324	−1.282	1.835

[9]Total net assets (TNA).
[10]Incubated funds are special funds often launched with a trial period (Chen, 2018).
[11]See section 6.3 for control of maximum and minimum values (outliers).

4.2 Data on Crises

From our total sample of 162 months approximately 14 months represent crisis periods, hence 8.6% of our total observations. We use several sources to define the crisis periods introduced in section 2.7.

4.2.1 Defining the Crises

Our data is based on monthly returns and the crisis periods will therefore be adjusted to meet this criterion. The National Bureau of Economic Research (NBER) defines a recession as a significant decline in economic activity that spreads across the economy and lasts more than a few months. The recession period occurs between a peak of economic activity and its subsequent through, or lowest point (NBER, 2020). Using the above recession definition and dates, as well as macroeconomic events such as the oil price, we define the Financial Crisis from September 2008 to March 2009, the Oil Crisis from June 2014 to January 2015, and the Covid-19 crisis from 20 February 2020 to 30 April 2020.

Nofsinger & Varma (2014) use the S&P500 index to define crisis periods for the US market from October 2007 to March 2009. Both NBER and most of prior crises and fund performance literature is based on the US market. Leite and Cortez (2015), however, offer observations from the European market and use the MSCI EMU stock market index to define the Financial Crisis between June 2007 and February 2009. Since our sample represents the Scandinavian market, which is located further away from the US, the recession period is less extensive than that of the US. The start of the crisis is defined as the Lehman Brother collapse in September 2008 as this is highlighted as the event that spread panic globally. The Covid-19 pandemic was somewhat different as it was initiated by a virus, which subsequently led to lockdowns to limit contagion. The first virus case and lockdown took place in Scandinavia at the same time as most European countries, but somewhat earlier than the US. The crises periods examined in previous literature, specifically the US, are not perfectly representing our Scandinavian sample, and hence solely used for guidance.

According to the NBER database, the Oil Crisis in 2014 to 2016 is not defined as a recession. We therefore use the development of the oil price as guidance. Using the

definition of a recession as the period between the peak to the bottom, we base our oil crisis definition on the first observed peak, and the following drop and bottom, which occurred between mid-June 2014 to January 2015. The second drop occurred between mid-2015 to early 2016 (Stocker, Baffes & Vorisek, 2018).[12] Due to the extensive length of the total oil price drop, the second drop is excluded from our analysis.

Table 4.2: Summary of crises

The Lehman Brother collapse on 15 September 2008 is here identified as the trigger event causing worldwide panic and financial crisis. The end date is set to 31 March 2009 for our Scandinavian sample. The Oil Crisis was initially marked by the sudden oil price peak and subsequent drop on June 23, 2014. This continued until October 16th, before the market gradually rebounded around 31 January 2015. The Covid-19 pandemic officially started when the stock market peaked on February 20th, continuing to rapidly descend until March 23rd. On April 30th the market had largely rebounded and it marks the end of the covid-19 crisis period in this thesis.

Crises	Time period	Length (months)	Triggering event
Financial	Sept. 2008-Mar. 2009	6	The Lehman Brother's collapse
Oil	Jun. 2014-Jan. 2015	6	The oil peak
Covid-19	Feb. 2020-Apr. 2020	2	The great lockdown

4.2.2 Market Events

To get a better understanding of how the crises impacted the Scandinavian financial market we have included the OMXN40 index. OMXN40 is the Nordic stock market index of the 40 most frequently traded stocks overall in the four Nordic markets: Sweden, Denmark, Norway, and Finland. We chose this index instead of country specific indexes due to diverging inception dates and currencies across different indexes. Figure 4.1 shows market fluctuations in Scandinavia from 2007 until 2020, based on the OMXN40 index.

The OMXN40 index drops noticeably during the Financial Crisis and the Covid-19 pandemic, in line with the definitions above. This suggests that crisis does indeed affect the financial market. Regarding the Oil Crisis, the stock price does not seem to drop drastically until after the observed crisis period. It is a common-held simplified rule stating that "stocks go up when oil goes down" (Fisher, 2019). Similarly, a relationship exists between economic growth prospects, companies' earnings and the stock price. The various supply and demand factors at play are complex to comprehend in the context of oil and stock prices, hence make no point to conclude on this here.

[12]The first drop was primarily driven by supply side factors. The second drop was primarily driven by demand side factors.

Figure 4.1: The Nordic Index from 2007 to 2020

Source: Nasdaq (2020). *I*ndex info OMXN40 - Nordic 40

A recent paper observed the performance of actively managed mutual funds during the Covid-19 Crisis highlighting the production output contraction and the sudden unemployment rise as two key reasons as to why this specific crisis offers a unique case for active managers (Pástor & Vorsatz, 2020).

Further, the fiscal support pumped into the Scandinavian economy in response to Covid-19 might have impacted the market volatility. Each country's government contributed with liquidity, respectively 5.7% (2019 GDP) in Denmark, 4.2% (2020 GDP) in Norway and 16% (2019 GDP) in Sweden. In sum, this confirms that there are several aspects to consider when defining a crisis period. In addition, research shows that economic growth makes the financial intermediary role of mutual funds more important, specifically stating that long-term mutual fund assets growth is strongly related to that of the gross domestic product (GDP) (Plantier, 2014).

4.3 Selection of Variables

In this section we present our variables of interest and associated summary statistics. An abbreviated table of variables can be found at the end of this section.

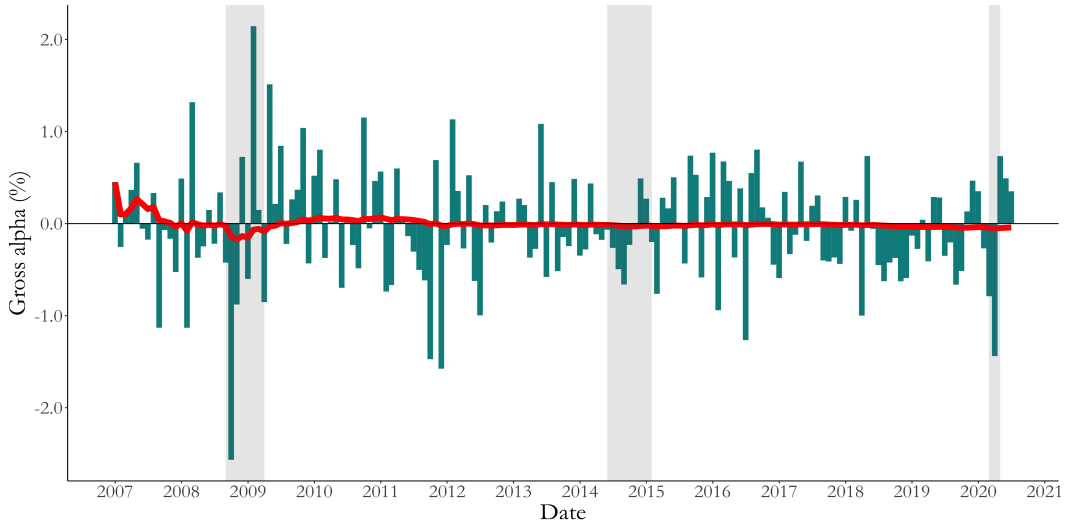
4.3.1 Dependent Variable

Alpha is defined as the difference between a fund's actual returns and its expected performance. We use alpha unadjusted for risk, assuming a beta equal to 1. Our analysis focuses specifically on gross alpha, which is the outperformance (positive alpha) or underperformance (negative alpha) of return before subtracting fees. By using alpha as a return measure it is possible to see if the fund manager's strategy is effective. (Stein, 2018).

Gross alpha (before fees return) is the relevant measure of the manager's ability to create value. Our choice to use gross alpha as a return measure is inspired by Berk & van Binsbergen (2015), who use the measure "value added" to find out if managers exhibit skill and add value in order to outperform the index.[13]

To get a better understanding on the development of gross alpha in our sample, figure 4.2 shows the monthly and cumulative gross alpha over time. The cumulative return represents the aggregate over- or underperformance (positive/negative alpha) for funds over time, independent of the time perspective. We note that for the past eight years gross alpha has stabilized close to zero.

Figure 4.2: Monthly and cumulative alpha over time



[13]Berk & van Binsbergen (2015) focus on "value added", the product of assets under management (AUM) and gross alpha. This results in a currency value, but we chose to only look at the return measure gross alpha in our analysis.

4.3.2 Independent Variables

Dummies

The mean gross alpha of the reference group represents the overall intercept in the model, and each group's dummy coefficient represents the estimated deviation from the reference group (Wooldridge, 2013). Hence, by including dummies, we allow the intercept to change over time. Dummies are binary variables that take the value of 0, or if the condition is met value equal to 1. The interpretation of dummies is based on the assumption that all other factors remain constant.

Crisis periods

In the main analysis, we introduce a dummy for the pooled crisis period, which represents all periods defined as *crisis* in our sample. Further, we add dummies for the three crises separately. This allows us to observe how fund performance vary in crisis versus in non-crisis, as well as across crises.

Interaction terms

To further explore the effect of active management in crises, we include interaction terms to capture the effect of investment focus, fees and active share in crisis. The presence and interaction between two independent variables can influence the result of the dependent variable. Thus, we add interaction terms between the crisis dummy variable and the independent dummy variables. The addition of the interaction term allows us to observe changes in fund performance as a result of different investment focus, levels of fees and active share in crisis.

Domestic investment focus

To capture the effect of domestically focused funds, we add a dummy variable called domestic, which represents the funds' domicile. The dummy *domestic* is 1 if the geographical investment focus equals the domicile. This allows for a distinction between internationally invested and domestically invested funds. In order to consider if domestically invested funds outperform internationally invested funds in crisis, we create an interaction term *domestic:crisis* between the dummy variables *domestic* and *crisis*.

This interaction term will capture the effect of domestic fund performance in crisis. The reference group is international funds in non-crisis.

Level of fees

Next, we introduce a dummy for fees to further explore the effect of different levels of fees on gross alpha. First, our sample is split into two groups based on high and low fees. The low fees group includes the funds with fees lower than 1.62% and represents the reference group (low fees in non-crisis). This cutoff is based on our sample median of 1.62%. High fee funds receive the value 1, and low fee funds receives the value 0. By including the *high fee* dummy, it is possible to observe whether high fee funds outperform low fee funds in non-crisis.

To further answer our research question on fees, we create an interaction term for high fee funds in crisis. The interaction term *high fees:crisis* is created to capture the additional performance effect of high fee funds in crisis. This allows us to observe whether high fee funds outperform low fee funds in crisis.

Level of active share

We introduce dummies for active share to further explore the effect of different levels of active share on gross alpha. In order to assess the level of active management on fund performance, we split our sample into three groups based on low, middle, and high active share. The reference group is low active share (0-60%) in non-crisis. The middle and high active share group receive the value 0 and 1, respectively. The coefficient *mid active* represents middle active share (60-80%) funds in non-crisis and *high active* represents high active share (80-100%) funds in non-crisis. By including these dummies for high and middle active share, it is possible to observe whether funds with higher levels of active share outperform funds with lower levels of active share in non-crisis.

To further answer our research question on the level of active management, two interaction terms *mid active:crisis* and *high active:crisis* are created to capture the effect of different levels of active management on performance in crisis. The interaction terms allow us to observe whether funds with higher levels of active share outperform funds with lower active share in crisis.

4.3.3 Control Variables

Previous literature present numerous control variables in order to increase the precision of our estimates. Similar to Kacperczyk et al. (2014) and Petajisto (2013), we include the following control variables: fees, active share, age, TNA, and net flow.

Fund fees and active share are included as control variables throughout our analysis, in addition to including them as independent variables in separate regressions. The annual fund fee is calculated by dividing total fund expenses with the total fund assets under management. Higher fees often accompany active funds managed by high-profile managers (Napoletano & Curry, 2020). As previously mentioned, we use active share to measure the degree of active management. However, due to missing data for active share, the sample size is reduced by approximately 50% when controlling for active share. Consequently, active share works as a control variable, but should not be heavily relied on in our main analysis.

Further, the natural logarithm of a fund's age in years since inception is included. We use the natural logarithm due to the non-linear relationship between age and gross alpha. We include the funds' total net assets measured at the end of each month as a control variable. Similar to age, we use the natural logarithm of TNA in million dollars due to the non-linear relationship between TNA and gross alpha.[14] Lastly, the funds' net flows represents the net value of cash in- and outflow of each individual fund. A positive net flow provides excess cash that the manager can use to invest. An increase in the aggregate level of inflows and outflows are also found to be associated with more volatile markets, thus an interesting control factor in the context of crises and fund performance (Thenmozhi & Kumar, 2009).

Table 4.3: Summary statistics - Control variables

Table 4.3 shows that the our sample has a mean fund fee of 1.65% and a mean active share of 71.72%.

Statistic	**Mean**	**St. Dev.**	**Min**	**Max**
Fund fee (%)	1.65	0.59	0.10	4.46
Active share (%)	71.72	20.41	22.33	100.23
Fund TNA (million)	256	517	10	4,632
Net flow (%)	1.37	7.56	−19.52	118.10
Fund age	11.12	8.17	0.21	46.33

[14]See appendix for the purpose of linearity regarding fund age and TNA.

Table 4.4: Description of variables

Dependent variable	**Definition**
Gross Alpha	Fund portfolio performance relative to its benchmark (before fees)

Independent variables	**Definition**
Crisis	Indicator variable equal to 1 for every month the economy is in crisis
Financial	Indicator variable equal to 1 for every month the economy is in The Financial Crisis
Oil	Indicator variable equal to 1 for every month the economy is in The Oil Crisis
Covid	Indicator variable equal to 1 for every month the economy is in The Covid-19 Crisis
Domestic	Indicator variables equal to one if the fund investment focus is domestic
Domestic:crisis	Interaction term that captures the effect of domestic investment focus in crisis period
High fee	Fund fee above 1.62% (sample median)
Mid Active	Level of active share 60% $\leq$ 80%
High Active	Level of active share >80%

Control Variables	**Definition**
Fund fee	Total expense ratio, annual
Active share	The percentage of a fund's portfolio deviating from the benchmark portfolio
Fund age	The natural logarithm of fund age in years
Fund TNA	The natural logarithm of a fund total net assets in million USD
Net flow	The net of all cash inflows and outflows of the fund in percent

5 Methodology

In the following chapter, the regression equations are introduced to explore and potentially approve or reject the main hypothesis and additional research questions presented in chapter 3.

5.1 Fund Performance in Crises

This section presents the basic regression model applied in our analysis. We apply the same regression to answer our main question *"Do actively managed funds outperform in crisis relative to non-crisis"*, as well as the research questions on cross-crisis and cross-country differences. The skeleton of our model is inspired by Kacperczyk et al. (2014).[15] Further, we expand our model with the variables described in section 4.3. The main regression model is applied to find the performance measure gross alpha. See appendix A1 for a table linking the mathematical expressions to regression variables.

5.1.1 Main Model with Pooled Crises

To answer the question of whether actively managed funds outperform in crisis relative to non-crisis, the first model is regressing the dependent variable *gross alpha* for fund i at time t with a crisis-dummy.

$$\alpha_{it}^{gross} = \beta_0 + \delta_1 D_t^{crisis} + v_{it} \tag{5.1}$$

5.1.2 Main Model with Separate Crises

To explore the individual crises, equation 5.2 includes additional crisis dummies to control and capture the effect of each crisis on fund performance. This equation is applied for each Scandinavian country to observe potential country differences, as was raised in the second research question.

[15] Kacperczyk et al. (2014) who review manager skills separating timing and stock-picking in recession and expansion. Due to data limitation, such as stock weightings, the model applied in this thesis is constricted to gross alpha

$$\alpha_{it}^{gross} = \beta_0 + \delta_1 D_t^{financial} + \delta_2 D_t^{oil} + \delta_3 D_t^{covid} + v_{it} \tag{5.2}$$

The crisis coefficients display gross alpha (fund performance) in crisis relative to the intercept determined by the reference group gross alpha in non-crisis.

5.1.3 Main Model with Control Variables

Similar to the model of Kacperczyk et al. (2014), the model above is expanded with control variables. Regression equations 5.1 and 5.2 are expanded with the vector *Xit* for more precise estimates and robust results, respectively equation 5.3 and 5.4. The vector represents fund characteristics that change over time.[16] The coefficient β1 represents individual fund characteristics, namely control variables.

$$\alpha_{it}^{gross} = \beta_0 + \delta_1 D_t^{crisis} + \beta_1 X_{it} + v_{it} \tag{5.3}$$

$$\alpha_{it}^{gross} = \beta_0 + \delta_1 D_t^{financial} + \delta_2 D_t^{oil} + \delta_3 D_t^{covid} + \beta_1 X_{it} + v_{it} \tag{5.4}$$

In panel data regressions, the error term *vit* consists of both idiosyncratic risk and unobserved effects. The risk of omitted variable bias in the error term is somewhat mitigated by including fund characteristics. If used correctly, panel data models are particularly capable of handling challenges associated with the error term.[17]

5.2 Fund Performance with Interaction Terms

To better understand and offer answers to the additional research questions related to investment focus, fund fees, and level of activity, the regression models are expanded with interaction terms. Equations 5.3 and 5.4 are expanded with dummies representing *domestic* investment focus. However, to limit the scope of this thesis, the remaining research questions on *fees* and *active share* are only considered for the pooled crisis period

[16] Active share is added as a control variable, however, not included in the main findings table. This is due to missing values, which in turn significantly reduce the original sample. See appendix.

[17] See appendix for robustness of the model and handling of the error term.

(extension of equation 5.3). In result, neither cross-country nor crises differences are taken into consideration for the questions on fees and active share.

5.2.1 Domestic Investment Focus

The *domestic* dummy represents an additional layer to our analysis. This variable captures the effect of funds invested in the domestic market (locally). The interaction term *domestic:crisis* measures the effect of funds with domestic investment focus in crisis. Equations 5.5 and 5.6 represent equations 5.3 and 5.4 with dummies and interaction terms for domestic. This analysis is also applied for each individual crisis to observe whether domestic investment focus varies between the crises.

$$\alpha_{it}^{gross} = \beta_0 + \delta_1 D_t^{crisis} + \delta_2 D_i^{domestic} + \gamma_1 (D_t^{crisis} \cdot D_i^{domestic}) + \beta_1 X_{it} + v_{it} \tag{5.5}$$

$$\begin{aligned}\alpha_{it}^{gross} = {} & \beta_0 + \delta_1 D_t^{financial} + \delta_2 D_t^{oil} + \delta_3 D_t^{covid} + \delta_4 D_i^{domestic} \\ & + \gamma_2 (D_t^{financial} \cdot D_i^{domestic}) + \gamma_3 (D_t^{oil} \cdot D_i^{domestic}) + \gamma_4 (D_t^{covid} \cdot D_i^{domestic}) + \beta_1 X_{it} + v_{it}\end{aligned} \tag{5.6}$$

5.2.2 Level of Fees

To explore the effect of fees in crisis, a dummy for *high fees* is included. See section 4.3 for a description of the fee sample. The interaction term *high fees:crisis* measures the effect of higher fees in crisis. Equation 5.7 is the expanded version of equation 5.3 with dummies and interaction terms for *high fee*.

$$\alpha_{it}^{gross} = \beta_0 + \delta_1 D_t^{crisis} + \delta_2 D_i^{highfee} + \gamma_{fee} (D_t^{crisis} \cdot D_i^{highfee}) + \beta_1 X_{it} + v_{it} \tag{5.7}$$

5.2.3 Level of Active Share

As explained in section 4.3, the sample is split in three groups dependent on the level of active share. The dummy coefficients for *mid active* and *high active* represent the effects on fund performance for different levels of active share. Two interaction terms are added

to the model to observe the effect in crisis and observe the performance difference between higher levels of active share funds in crisis to that of lower active share funds. Equation 5.8 is an extended version of equation 5.3 with dummies and interaction terms for *mid active* and *high active*.

$$\begin{aligned}\alpha_{it}^{gross} &= \beta_0 + \delta_1 D_t^{crisis} + \delta_2 D_i^{midactive} + \delta_3 D_i^{highactive} \\ &+ \gamma_{midactive}(D_t^{crisis} \cdot D_i^{midactive}) + \gamma_{highactive}(D_t^{crisis} \cdot D_i^{highactive}) + \beta_1 X_{it} + v_{it}\end{aligned} \tag{5.8}$$

5.3 Persistence amongst Top Performers

The next model is used to identify persistence amongst top performing funds. The simple model is used to identify whether the same winning and losing funds persist even through times of crises. The observation will hopefully give an indication of manager skill in the Scandinavian fund market pre-crisis, in crisis and post-crisis. Equation 5.9 illustrates how the persistence amongst top performers, *Top25*, change based on the mean gross alpha.

$$\Delta Top25 = \overline{Q}_1^{crisis} - \overline{Q}_4^{crisis} \tag{5.9}$$

The same pool of funds are considered pre-crisis, in crisis, and post-crisis.[18] The top 25% (Q1) performers as well as the bottom 25% (Q4) performers are identified based on the pre-crisis mean gross alpha. This is repeated for each crisis, namely the Financial Crisis, the Oil Crisis, and the Covid-19 pandemic. Second, the mean gross alpha of the same top and bottom performing funds are extracted for the crisis period and the post-crisis period. Further, the position is set to long in the Q1 group and short in the Q4 group, in order to observe if the relationship changes from that of the pre-crisis period. The observed difference indicates whether the mean gross alpha of top performing funds change between pre-crisis, in crisis and post-crisis. A positive difference indicate that the top and bottom performers remain the same, whilst a negative difference indicates a change. This will provide an indication to whether persistence exist.

[18]The pre-crisis and post-crisis periods have the same length as each crisis.

6 Findings

In this chapter we review the findings of our main hypothesis and additional research questions defined in chapter 3. First, we look at overall fund performance in the Scandinavian market. Second, we present the findings of our additional research questions on fund performance in crisis both cross-country and within-country. Third, we present the findings regarding the effect of high fees and high active share in crisis. Lastly, we present the findings in regards to persistence amongst top performers. The variables are explained in section 4.3. Further, see A1 in appendix for the link between variables and mathematical expressions from the equations in chapter 5.

6.1 Main Research Question

6.1.1 Do actively managed funds outperform in crisis relative to non-crisis?

Table 6.1 shows the findings in relation to our main question as to whether actively managed funds outperform in crisis relative to in non-crisis. In columns 1 and 2, looking at the overall result before controls are added, we observe that actively managed Scandinavian funds perform worse in crisis than in non-crisis. Considering gross alpha is expressed in monthly measures, we observe that active funds underperform by approximately 20 basis points (bps) per month, or 2.5% annually in crisis periods, relative to non-crisis periods. The results are significant at the 1% level and economically significant across models.

When we split the crisis period into *financial*, *oil* and *covid* we observe similar negative results, respectively by approximately 1.9% annually in the Financial Crisis, 1.2% in the Oil Crisis and 16.9% in Covid-19.[19] The results are significant at the 1% and 5% level, and of particular economic significance in the Covid-19 Crisis.

Overall, these findings do not support our hypothesis of fund outperformance in crisis relative to in non-crisis. Thus, our findings do not find that active managers add value by outperforming in recessions like Kacperczyk et al. (2014) and Kowoski (2011).[20] Yet, we

[19]Numbers presented as annual measures.
[20]See e.g. Glode (2011) and Kosowski (2011).

further analyse performance in crisis prior to revisiting the theme in chapter 7 Discussion.

Table 6.1: Fund performance in crises

The table below depicts the effect of the pooled crisis period (*crisis*) as well as each individual crises (*financial*, *oil*, *covid*) on gross alpha. The pooled OLS models are displayed in columns 1 and 2, and represent the actual (real) effect of crisis on gross alpha. The different results in columns 3 and 4 can be attributed to the added controls of the following fund characteristics: fund age, size (TNA), net flow and fees. Columns 5 and 6 show the results after controlling for fund fixed effects. See appendix for more information on controls and fixed effects. The mean gross alpha is not present in the table, however, it remains negative across models. Standard errors are shown in parenthesis, clustered at the fund level (see appendix). Significance levels *p<0.1; **p<0.05; ***p<0.01.

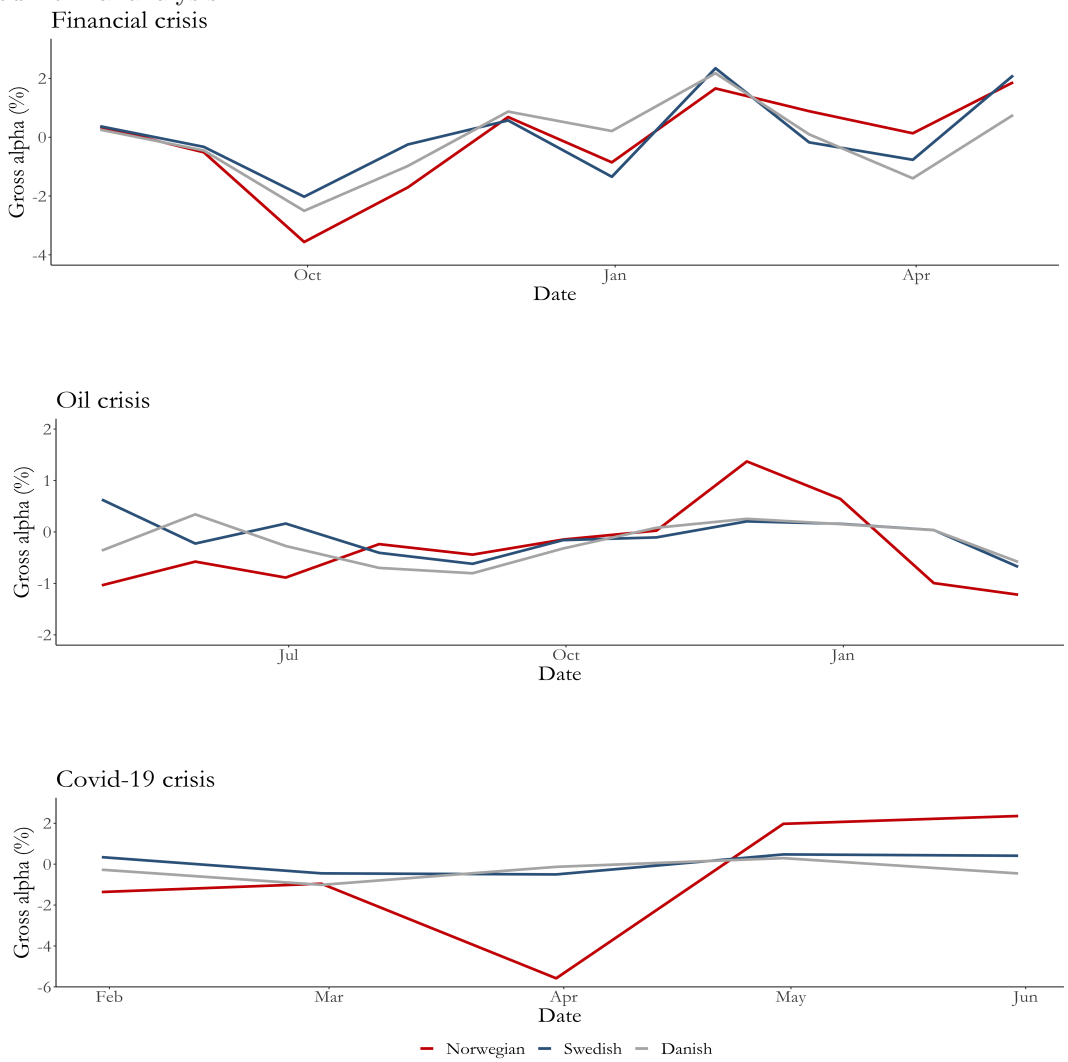
	Gross Alpha					
	(1)	(2)	(3)	(4)	(5)	(6)
crisis	-0.212***		-0.209***		-0.230***	
	(0.048)		(0.049)		(0.050)	
financial		-0.164**		-0.151*		-0.219***
		(0.078)		(0.081)		(0.084)
oil		-0.099**		-0.098**		-0.089**
		(0.045)		(0.046)		(0.045)
covid		-1.408***		-1.416***		-1.377***
		(0.262)		(0.263)		(0.265)
Controls	No	No	Yes	Yes	Yes	Yes
Fixed effects	No	No	No	No	Yes	Yes
Observations	79,045	79,045	76,543	76,543	76,543	76,543
R^2	0.001	0.003	0.002	0.004	0.017	0.019

6.2 Additional Research Questions

To gain a better understanding of Scandinavian fund performance in crisis, we present five additional research question. This section touches two main themes. The first focuses on cross-country and within-country differences. The second, presents the findings of the much-disputed topics fees and active share, and persistence.

Figure 6.1: Country differences in mean gross alpha across crises

Figure 6.1 presents three visual analyses of country differences across crises. This illustrates valuable insight on performance differences prior to the formal regression analyses. During the Financial Crisis the mean gross alpha does not deviate remarkably across the Scandinavian funds. Can this homogeneous result suggest the financial crisis was equally relevant for all three countries? A crisis far away from home? During the Oil Crisis, the performance of Norwegian funds were slightly more volatile than that of the other countries. Norwegian funds display positive alphas, and we question if this can be due to the local information advantage about the oil market. In the middle of the crisis period, all three countries fluctuates around zero gross alpha - does this imply less market volatility? In the second part of the crisis, the positive gross alpha peak for Norwegian funds imply that there exist greater opportunities to catch alpha in the Norwegian market and/or better Norwegian active managers. The performance level was overall worse in the Covid-19 compared to the other crises. Norway displays a significant drop in performance halfway through the crisis period. Can the oil price drop potentially explain the lower alpha observed in the Norwegian market compared to its Scandinavian peers? Did the oil price create an additional challenge for Norwegian managers? With these conceptual differences in mind, we continue with our formal analysis.



6.2.1 Does active fund performance vary across Scandinavian countries?

Table 6.2 reports the findings in relation to our additional research question on variations in fund performance across Scandinavia in crisis. In panel A we observe cross-country differences for the pooled crisis period. In columns 1 and 2 we observe that Swedish funds underperform by approximately 2.2% annually in crisis relative to non-crisis. Regarding Norwegian funds, the underperformance is approximately 6.7% annually as seen in columns 3 and 4.[21] In sum, we observe meaningful results for Sweden and Norway regarding crisis overall. The results for Denmark are neither significant nor economically significant as seen in columns 5 and 6 (approximately 0.6% annually).[22]

In columns 2, 4 and 6 of panel B, we observe the *financial*, *oil* and *covid* coefficients implying the effect on gross alpha in different crises across countries. As seen in columns 1 and 2, Swedish funds perform worse in all separate crisis compared to non-crisis, by respectively 2.2% (*financial*), 1.6% (*oil*) and 6.4% (*covid*) annually. However, the results are only significant in the Financial and Oil Crisis. In columns 3 and 4, we observe that Norwegian funds performed worse in the Financial Crisis and Covid-19, by approximately 6.9% and 67% annually. The results are significant at the 1% level and economically significant. We further observe that Norwegian funds outperformed in the Oil Crisis compared to non-crisis by approximately 0.5%. This is an interesting observation considering Norway's exposure to the oil market, which we will elaborate in chapter 7 Discussion. In columns 5 and 6, we observe that Danish funds received a higher alpha of approximately 0.7% in the Financial Crisis relative to in non-crisis. Regarding the oil and Covid-19 crises, Danish funds underperform by approximately 1.8% and 0.6%. The results are significant in the Oil Crisis, yet of small magnitude.

In sum, the findings remain consistent with those observed in section 6.1, suggesting that funds underperform in crisis relative to non-crisis independent of country. The results are in line with prior Scandinavian studies on fund performance showing no significant results

[21] Numbers show annual changes to performance in crisis periods, namely coefficients multiplied by 12.

[22] Due to relatively consistent results, the table displays results for each country before and after controlling for fund characteristics and fixed effects. Extensive tables including control variables and fixed effects for individual countries can be found in the appendix.

of outperformance.[23] However, some cross-country differences across crises are observed, which we will revisit in chapter 7 Discussion.

Table 6.2: Fund performance across Scandinavia in crises

Panel A shows the effect of the pooled crisis period (*crisis*). Panel B shows the effect of each individual crisis (*financial*, *oil*, *covid*) on gross alpha across the three Scandinavian countries. Columns 1, 3 and 5 show the real effect on gross alpha for the entire sample per individual domicile, respectively Sweden, Norway and Denmark. Columns 2, 4 and 6 show the results with added controls for fund characteristics: fund age, TNA, net flow and fees, as well as fund fixed effects controls. See appendix for more information on controls and fixed effects, as well as extended tables for each country. Standard errors are shown in parenthesis, clustered at the fund level (see appendix). Significance levels *p<0.1; **p<0.05; ***p<0.01.

Panel A: Performance with pooled crisis

	Gross Alpha					
	SE	SE	NO	NO	DK	DK
crisis	-0.182**	-0.185**	-0.561***	-0.620***	-0.053	-0.056
	(0.075)	(0.077)	(0.129)	(0.132)	(0.066)	(0.067)
Controls	No	Yes	No	Yes	No	Yes
Fixed effects	No	Yes	No	Yes	No	Yes
Observations	28,933	28,922	17,912	17,566	32,200	30,055
R^2	0.001	0.024	0.004	0.019	0.0001	0.012

Panel B: Performance with separate crises

	Gross Alpha					
	SE	SE	NO	NO	DK	DK
financial	-0.183*	-0.211*	-0.579***	-0.745***	0.064	0.087
	(0.108)	(0.117)	(0.201)	(0.208)	(0.124)	(0.137)
oil	-0.134**	-0.125*	0.044	0.098	-0.143***	-0.153***
	(0.065)	(0.064)	(0.148)	(0.150)	(0.048)	(0.048)
covid	-0.530	-0.473	-5.580***	-5.655***	-0.043	0.050
	(0.398)	(0.393)	(0.574)	(0.587)	(0.346)	(0.353)
Controls	No	Yes	No	Yes	No	Yes
Fixed effects	No	Yes	No	Yes	No	Yes
Observations	28,933	28,922	17,912	17,566	32,200	30,055
R^2	0.001	0.024	0.028	0.045	0.0003	0.012

[23] See Flam and Vestman, 2014; Christensen, 2013; Sørensen, 2010.

6.2.2 Do funds with domestic investment focus perform better than funds with international investment focus in crisis?

To get a deeper understanding of the observed cross-country differences in fund performance across crises, we add a domestic dummy and the associated interaction term.

In table 6.3 panel A, in columns 1, 3 and 5, the variable *domestic* shows that for the pooled crisis, domestically invested funds tend to outperform internationally invested funds in non-crisis. Domestically focused Swedish funds outperform by approximately 2.6% annually, Norwegian funds by approximately 3.2% and Danish funds by 0.7%. All results are significant at the 1% level and in line with Coval and Moskowitz (2001) who proposed that managers investing a significant part of their assets locally perform better.

Further, we observe that the coefficient *domestic* remains at the level of statistical and economic significance in columns 2, 4 and 6. However, by including the interaction term *domestic:crisis*, we observe positive values for Norwegian funds (16.1% annually) in contrast to Swedish (1.2%) and Danish funds (4.6%). The interaction term captures the difference in slope coefficient between international and domestic funds in crisis. It is worth noting that the results are only significant for Norwegian and Danish funds.

Panel B, considering each individual crisis, we observe that the *domestic* coefficient results are consistent to the observations in panel A. Interestingly, both Swedish and Norwegian funds with international investment focus significantly underperform in the Financial Crisis relative to non-crisis, respectively at 2.2% and 6.9% annually.

However, when interaction terms are included to determine the difference between funds with international versus domestic investment focus in each individual crisis and per country, the coefficients reveal some interesting results.[24] Across all countries, positive coefficients are observed in the Financial Crisis, which indicates that funds with domestic investment focus performed better in this period. However, the results are only significant for Norwegian funds.

[24]The total effect between domestically invested funds and internationally invested funds in crisis are obtained by adding *domestic:crises* + *domestic*, which ultimately gives: Sweden -0.097 + 0.224 = 0.127, Denmark -0.386 + 0.091 = 0.295, Norway 1.341 + 0.165 = 1.506

Table 6.3: Fund performance dependent on investment focus in crises

The tables below illustrate the performance dependent on the funds' investment focus. Panel A shows the effect of domestic investment focus for the pooled crisis period (*crisis*). Panel B shows the effect of each individual crisis (*financial*, *oil*, *covid*) on gross alpha across the three Scandinavian countries. In contrast to the above-mentioned tables, the entire sample is split into three different samples based on domicile. In addition to the pooled crisis variable, we observe gross alpha when controlling for domestic investment focus (*domestic*) in columns 1, 3 and 5, respectively Sweden, Norway and Denmark. To better capture the effect of domestically focused funds in crisis, the interaction term (*domestic:crisis*) is included. The interaction term is included in columns 2, 4 and 6. Standard errors are shown in parenthesis, clustered at the fund level (see appendix). Significance levels *p<0.1; **p<0.05; ***p<0.01.

Panel A: Domestic vs. international pooled crisis

	Gross Alpha					
	SE	SE	NO	NO	DK	DK
crisis	-0.181**	-0.150	-0.555***	-0.990***	-0.053	-0.006
	(0.075)	(0.095)	(0.128)	(0.155)	(0.066)	(0.074)
domestic	0.216***	0.224***	0.270***	0.165***	0.059**	0.091***
	(0.026)	(0.029)	(0.035)	(0.036)	(0.023)	(0.025)
domestic:crisis		-0.097		1.341***		-0.386***
		(0.150)		(0.201)		(0.123)
Observations	28,933	28,933	17,912	17,912	32,200	32,200
R^2	0.003	0.003	0.007	0.012	0.0002	0.0005

Panel B: Domestic vs. international separate crises

	Gross Alpha					
	SE	SE	NO	NO	DK	DK
financial	-0.186*	-0.257*	-0.573***	-0.841***	0.065	0.061
	(0.108)	(0.131)	(0.200)	(0.276)	(0.124)	(0.138)
oil	-0.132**	-0.096	0.051	-0.772***	-0.143***	-0.159***
	(0.065)	(0.087)	(0.147)	(0.118)	(0.048)	(0.053)
covid	-0.514	0.056	-5.580***	-3.849***	-0.044	0.863**
	(0.399)	(0.484)	(0.575)	(0.682)	(0.347)	(0.341)
domestic	0.216***	0.224***	0.273***	0.165***	0.059**	0.091***
	(0.026)	(0.029)	(0.036)	(0.036)	(0.024)	(0.025)
domestic:financial		0.205		0.817**		0.041
		(0.229)		(0.341)		(0.208)
domestic:oil		-0.115		2.574***		0.129
		(0.117)		(0.192)		(0.104)
domestic:covid		-2.238***		-5.029***		-6.356***
		(0.767)		(1.020)		(0.651)
Observations	28,933	28,933	17,912	17,912	32,200	32,200
R^2	0.003	0.004	0.031	0.047	0.0004	0.007

On the contrary, the interaction terms are significantly negative for all Scandinavian countries in Covid-19, on an annual basis, respectively 26.9% for Swedish funds, 60.3% for Norwegian funds, and 76.3% for Danish funds. The results is considered to be of high economic significance at the 1% level. Moreover, the interaction term for Norwegian domestic funds in the Oil Crisis is positive by 30.9% annually at the 1% significance level[25]. This is an interesting observation considering Norway's oil dependence.

In sum, the findings suggest that funds with domestic investment focus perform better than that of funds with international investment focus in crisis. The tendency of domestically invested funds to outperform relative to internationally invested funds in crisis deserves a further discussion. This "close to home" vs. "far away" analogy will be further mentioned in chapter 7 Discussion.

6.2.3 Do funds with higher fees perform better than lower fee funds in crisis?

In table 6.4 we consider the level of fees in relation to fund performance in crisis relative to non-crisis. The sample is split in two groups: high and low fees, see 4.3. The coefficient *high fees* indicates that high fee funds perform worse than low fee funds by approximately 0.9% annually during the non-crisis period.[26] The results are significant and consistent across models. The interaction term *high fee:crisis*, however, indicates that gross alpha of high fee funds differ from that of low fee funds by a positive 1.9% annually in crisis. The result is significant at the 10% level and economically significant.[27] Although high fee funds might not be worth the investment in non-crisis, our results suggest that the same funds can be worth the investment in crisis. This suggests that the premium paid can in the context of crisis work as an "insurance".

Our results indicate that high fee funds do not offer a competitive advantage relative to low fee funds in non-crisis. However, higher fees in crisis yields outperformance. This suggests that active managers are worthy of their high fees in crisis. These findings are aligned with Glode (2011) who suggests that the performance of high fee funds is countercyclical.

[25]Positive but insignificant results for Danish funds.

[26]This corresponds with our results on fund fees as a control variable (see extended tables in appendix), suggesting that fund fees are negatively associated with fund performance.

[27]The total effect of higher fees in crisis, *high fees:crisis* + *high fees*: 0.159 + -0.076 = 0.083

The results also support Kosowski (2011) who emphasized that investors' higher marginal utility of consumption during recessions increase their willingness to pay for "insurance" in crisis. These findings will be further discussed, see section 7 Discussion.

Table 6.4: Fund performance dependent on the level of fees in crisis

The table shows the effect of different levels of fees, in particular *high fee* on gross alpha in crisis. The pooled OLS model is applied on column 1 and represents the real effect of high fees on gross alpha during crisis. In contrast, column 2 include added controls for fund characteristics: fund age, size (TNA), net flow and fees. In addition, controls for fund fixed effects are added in column 3. To better understand the how gross alpha varies in crisis dependent on the funds fee levels, the interaction term *high fee:crisis* is created. This term capture the effect of high fee funds in crisis relative to lower fee funds in crisis. Standard errors are shown in parenthesis, clustered at the fund level (see appendix). Significance levels *p<0.1; **p<0.05; ***p<0.01.

	Gross Alpha		
	(1)	(2)	(3)
crisis	-0.290***	-0.287***	-0.310***
	(0.060)	(0.059)	(0.060)
high fee	-0.076***	-0.067***	-0.074**
	(0.018)	(0.019)	(0.037)
high fee:crisis	0.159*	0.160*	0.164*
	(0.096)	(0.096)	(0.096)
Controls	No	Yes	Yes
Fixed effects	No	No	Yes
Observations	76,543	76,543	76,543
R^2	0.001	0.002	0.017

6.2.4 Do funds with higher active share perform better than lower active share funds in crisis?

In table 6.5 we observe how the level of active share relates to fund performance in crisis relative to non-crisis. The sample is divided into three groups based on low, middle and high active share, see section 4.3. The *crisis* coefficient is negative, which implies worse performance for funds with lower active share in crisis compared to non-crisis. This result is consistent with the previous results suggesting that overall worse fund performance in crisis.

Moreover, the increasingly negative coefficients, respectively negative *mid active* and *high active*, suggest a downward performance trend as the level of active share increases. The interaction terms, *mid active:crisis* and *high active:crisis*, indicate that the performance

(gross alpha) for mid active funds drops by an additional 1.5% annually in crisis. Similarly, high active funds drop by 4.2% annually. Both results are relative to low active share funds in crisis. The worse performance of high active funds remains consistent as the level of active share increases. *high active:crisis* is the only interaction effect with significant coefficients in the table .

It is common to assume that greater portfolio deviations from the index, the easier it will be to beat the benchmark. Yet, our results suggest the opposite as higher active share displays worse performance. This finding also contradicts Cremers & Pestajisto (2009) who suggest that funds with high active share (>60%) outperform the benchmark before fees.[28] The result makes us question whether it is worth paying for funds with higher active share in crisis, which will be further discussed in chapter 7 Discussion.

Table 6.5: Fund performance dependent on the level of active share in crisis

This table shows how gross alpha varies in crisis dependent on different levels of active share (active mid, active high). The pooled OLS models is applied in column 1 to observe the real effect on gross alpha in crisis dependent on middle and high levels of active share sample. In contrast, column 2 include added controls for fund characteristics: fund age, TNA, net flow and fees. In addition, controls for fund fixed effects are added in column 3. The interaction terms *mid active:crisis* and *high active:crisis* are created to better capture the effect on gross alpha in crisis based on higher levels of active share compared to that of lower active share. Standard errors are shown in parenthesis, clustered at the fund level (see appendix). Significance levels *p<0.1; **p<0.05; ***p<0.01.

	Gross Alpha		
	(1)	(2)	(3)
crisis	-0.186*	-0.160*	-0.160*
	(0.096)	(0.095)	(0.097)
mid active	-0.072***	-0.070***	-0.003
	(0.023)	(0.023)	(0.039)
high active	-0.099***	-0.093***	0.035
	(0.027)	(0.028)	(0.058)
mid active:crisis	-0.122	-0.145	-0.174
	(0.161)	(0.162)	(0.164)
high active:crisis	-0.347**	-0.392***	-0.418***
	(0.144)	(0.146)	(0.148)
Controls	No	Yes	Yes
Fixed effects	No	No	Yes
Observations	37,034	36,362	36,362
R^2	0.004	0.005	0.033

[28]Notably, our sample is significantly reduced when including active share, more on the inference of these results in section 6.3 on robustness.

6.2.5 Does persistence exist for top performing funds even in times of crisis?

In table 6.6 we see the results of the simple model used to assess persistence in our sample. These results do not show fund specific effects; yet the results illustrate the relationship between the top performing funds (Q1) and the bottom performing funds (Q4) to observe if performance persist across pre-crisis, in crisis, and post-crisis.

The results suggest that the same top performing funds persist. This is confirmed by the positive sign suggesting that the mean gross alpha of the top 25% performing funds pre-crisis still outcompete that of the bottom 25% performing funds in crisis. Similarly, the difference is observed for the post-crisis period to check if the underperforming funds during crisis and post-crisis persist.

Table 6.6 shows that the persistence exist for top and bottom performing funds pre-crisis, during crisis, and post crisis for both the Oil Crisis and the Covid-19 pandemic. These results are in line with the findings on Kacperczyk et al. (2014), who find that the same top performing funds outperform independent of the state of the economy. This indicates that skilled managers potentially exist and engage in investment strategies to outperform both in crisis and non-crisis periods. The later will not be further assessed in our thesis.

However, the results in the Financial Crisis flips from positive to negative in post-crisis. This suggests that the mean gross alpha of the bottom performing funds pre-crisis and in the Financial Crisis exceed the mean value of the top performing funds post-crisis. In other words, performance persistence does not exist for funds pre-, during and post the financial crisis. More on this in chapter 7 Discussion.

Table 6.6: Persistence amongst top performers

	Crisis	**Post-crisis**
	Q1-Q4	**Q1-Q4**
Financial	0.37	−0.02
Oil	0.32	0.28
Covid	2.35	0.69

6.3 Robustness

This section covers the robustness of our empirical findings. We emphasize the robustness of our models to ensure that the applied models are correctly specified and can provide unbiased and efficient estimates.

6.3.1 Statistical inference and control variables

Even though the results are highly significant with small p-values, it is still necessary to be aware of the statistical interpretation of our results and potential lack of it (Fornell, Mithas & Morgeson, 2009). Our intention is to better understand if active managers create value during crisis in Scandinavia and whether it is possible to draw interesting inferences from the regression results. Robustness is key in an econometric sense, but we prefer to still include interesting observations despite the lack of statistical inference, yet with great caution to final conclusions.

Control variables

The results are consistent when controlling for fund characteristics and fixed effects. We observe that the model fit, R-squared, increases when controlling for other fund characteristics and fixed effects. Due to the scope of our thesis, none of the control variables, except fees and active share are used in further regression models for individual assessments. See appendix for extended regression tables with control variables.

The control variable *fund fee* suggests that higher fund fees are related to worse fund performance, before controlling for fixed effects. The relationship between higher fees and worse performance is suggested in previous research (see section 7.3).

When including *active share* as a control variable, the sample is reduced drastically (by 53%) due to missing values in the dataset. In result, regressions including active share should not be heavily relied on. Note that a new dataset is extracted in the separate analysis on level of active share and fund performance, which does not rely on the inclusion of other variables in the dataset.

Data limitations

A smaller sample size has a negative effect on the statistical power (Fornell et al., 2009). In our sample we observe abnormal returns for Norwegian funds. This is worth noting, as observed in Table 4.1 the sample of Norwegian funds is smaller than that of Swedish and Danish funds.

Further, we observe abnormal results for Covid-19. There are several aspects to this, one being the amount of time, as Covid-19 is restricted to two months in our sample. Second, previous state-dependent studies on fund performance consider milder recession periods. Thus, the results of Covid-19 are difficult to compare to the findings of previous studies on fund performance in recession.

The oil crisis period was limited to the first drop in the oil price, and did not include the second drop. The performance results can therefore be misrepresenting the total effect of the oil crisis. However, the decision to exclude the second drop was based on the idea of including comparative similar length crises, and hence the Oil Crisis length was restricted.

A particular issue arises with fund fees as they are listed on an annual basis. Consequently, our original sample does not include fund fees for the months of 2020. The issue is resolved by replacing the missing values with the last observed fee (2019) for each individual fund. Glode (2011) computed total fund fees over seven-year holding periods.[29] For that reason, the inserted values of fund fees are controlled against seven-year averages.

Dealing with outliers

With a sample of 79,045 observations and 883 funds we do not consider outliers to cause biased estimates in our sample. Smaller samples have higher chances of outliers (Osborne & Overbay, 2004). When plotting individual mean gross alphas over time, a couple of outliers are identified. We control for these values in our regression analysis, but do not find evidence that they affect the implications of our results. Thus, the outliers are not removed.

[29] Average holding period for equity mutual funds (Sirri & Tufano, 1998)

6.3.2 Model specifications

To observe the actual loss (gain) of fund value during crisis, we include regressions both before and after controlling for fund characteristics and fixed effects. However, considering the use of panel data, challenges such as heteroscedasticity and serial correlation arise. To account for these challenges, standard errors are clustered at the fund level in accordance with Newey & West (1987). See appendix for handling of these, in addition to other OLS assumptions.

7 Discussion

In this section, we further discuss the empirical findings from chapter 6. The goal is to draw interesting inferences between our findings and the real world. What are the implications of our results and what can we learn from them? This discussion aims to demystify our results, and at the same time set the scene for further research in the field (see chapter 9 Limitations and Further Research).

7.1 Impact of active management in crises

The findings in our thesis allow us to reject our hypothesis *"Actively managed funds outperform in crisis relative to non-crisis"* – the pitch of active managers remains unproved. That said, the discussion of this result is far more complex and extensive. One might ask, why do active funds underperform in crises?

7.1.1 Fund performance in crisis

Crises are times of stock market anomalies, in other words offering potential market inefficiency opportunities that active managers can harvest (Brunnermeier & Oehmke, 2013). Our findings indicate that active managers do not appear able to exploit these inefficiencies during crisis.

The modern asset management industry is "a different story" than what it once was. The underperformance of active funds tends to be blamed solely on the manager; however, we question whether a partial explanation is linked to fundamental industry changes. Collectively, our findings support the notion that during recessions investors seek liquidity and index tracking funds as revenues are drying up and unemployment rises (Osborne & Clarke, 2020). Market efficiency, tougher competition, tighter margins and outflow are some of the key trends that possibly explain why active managers struggle to live up to their pitch.

Revisiting Figure 4.2 (gross alpha over time), we observe greater fluctuations in gross alpha in the Financial Crisis than in Covid-19. This suggests that the increasing flows of information and market transparency in recent years, make it more costly and time-

consuming for active managers to seek alpha, and hence more difficult to outperform.

7.1.2 Fund performance across crises

Although no crisis is a clone of another, there are always lessons to be learned from one crisis to the next. The Financial Crisis offered an opportunity for the government and regulators to experiment and figure out how to respond to a crisis and how to best support their economies. It taught the world the importance of having a robust and well-functioning banking sector. We suspect that the Scandinavian Banking Crisis in 1990 was "a blessing in disguise" for the Scandinavian economy as it potentially helped prepare the Scandinavian banking sector for the Global Financial Crisis eighteen years later. The resilient financial system in Scandinavia can help ease volatility and uncertainty in crisis. In result, active managers have more predictable preconditions to perform because more noise is removed.

In contrast to the Financial Crisis, the Covid-19 pandemic, although starting out as a health crisis, had massive implications far beyond the spread of the virus. The resulting lockdown in the spring of 2020 has been accompanied with severe financial and macroeconomic consequences, thus limiting the time for managers to utilize opportunities. The global scale as well as the complex and interconnected factors affecting the financial markets make Covid-19 a challenging environment to navigate for active managers.

To sum up, the effects of a crisis on the financial market can determine how well an active manager responds and eventually performs. Although both the Financial Crisis and the Covid-19 pandemic have had deep global repercussions, the unfamiliar environment during Covid-19 stands out as an additional hurdle for active managers.

7.2 Impact of active management across Scandinavia

Although the Scandinavian countries share similarities, our findings suggest dissimilarities worth highlighting at the country level. This section covers the differences observed in the cross-country and within-country analyses. What can we learn from the performance differences across and within the relatively homogeneous Scandinavian market?

7.2.1 Fund performance across Scandinavia in crises

When separating the crises, the performance of Norwegian active funds should be highlighted. Norwegian funds performed better in the Oil Crisis than in non-crisis (however not significant results). Similar outperformance was not observed for Danish and Swedish funds.

We suspect that this difference can be due to the informational advantage Norwegian active managers have from operating in an oil producing country like Norway. This suggests that staying close to markets, sectors and companies can offer an informational advantage in crisis, and hence allow active managers to quickly respond and adjust their strategies in response to oil price fluctuations.

Norwegian funds performed worse than its Scandinavian peers during the Covid-19 pandemic. This suggests that staying close to a sector, such as oil, can also come with challenges. The oil price drop that occurred alongside the pandemic did not boost the Norwegian economy. The oil price collapse was accompanied by other strong structural trends, and the significant increase in preference for low carbon energy investments might have created a tougher environment amplifying the underperformance of Norwegian active funds.

In sum, active managers across Scandinavia tend to deliver similar negative results in crises. At the same time, we find evidence that sector exposure comes with both advantages and disadvantages. We continue this discussion in relation to active managers investment focus.

7.2.2 Fund performance dependent on domestic investment focus

The effect of domestic investment focus offers some interesting fund performance results both across countries and crises.

For all three countries, we find evidence that funds with domestic investment focus performed better in the Financial Crisis. A study suggests that active managers liquidate their investments in remote locations first in times influenced by market volatility (Giannetti & Laeven, 2016). This suggests that the benefit of investing locally disappears the further away from home the investment. Scandinavian active managers investing

"close to home" rather than "far away" in the Financial Crisis might benefit since the main damage of the crisis also occurred outside of the Scandinavian region.

Our results indicate that Norwegian funds invested domestically performed better during the Oil Crisis than in non-crisis. We find evidence that managers investing "close to home" have an informational advantage, which is aligned with the findings of Coval and Moskowitz (2001). Active managers who manage to foresee how the oil price develop can potentially dampen and at best avoid underperformance. Norway's oil dependence and possible information advantage both in the industry and respective companies might have contributed to Norwegian active managers' unique position and ability to outperform in the Oil Crisis.

Our findings suggest that managers investing "close to home" can increase the chance of exploiting market inefficiencies and keeping up with the fast-paced transitions in the market.

7.3 Implications for investors

Revisiting our findings from chapter 6, we find that independent of crises high fee funds and high active share do not offer competitive advantages relative to lower levels. However, in crisis, higher fee funds outperform lower fee funds.

7.3.1 Fund performance dependent on the level of fees

The outperformance of high fee funds in crisis relative to low fee funds can potentially justify the high fees. The result supports the purpose of the "insurance premium", namely the additional cost investors pay to hedge against market volatility. The positive interaction effect suggests that higher fee funds offer a hedge in crisis compared to in non-crisis. This ultimately confirms that active managers do more than collecting fees.

However, the fee discussion brings up the consideration of investors' expectations. A recently published article on the Norwegian active fund market highlights that active managers collect excessively high fees for an active management service that does not deliver. Customers investing in active funds contribute extensive amounts in additional revenue to the banking and asset management firms (Linderud et al., 2020).

In sum, the worth of an active manager is difficult to quantify. We believe that there are contradicting expectations between the manager and investor about what the high fee seeks to deliver. Hence, we highlight the investor perspective as it does not seem to harmonize with what the manager actually delivers. It is important that investors are aware that the additional cost of active funds is primarily an "insurance" to hedge against deep losses in crisis, and not a promise to outperform.

7.3.2 Fund performance dependent on the level of active share

Although a positive level of active management is a necessary condition for outperformance, we find that higher levels of active management do not necessarily equal outperformance in crisis.

Even though the investor pays a premium to get access to actively managed funds, our results suggest that it is not worth paying more for a fund with higher active share than a fund with lower active share in crisis. We contend that managers of funds with high active share try too hard to outperform the index during crisis, ultimately outweighing the benefits with costs. Hence, we find that higher levels of active management do not make it easier to navigate in turbulent markets, but rather the opposite.

Many active managers use high fees to hide the true level of active management, as investors easily assume that more costly funds represent better quality. This occurrence of so-called closet indexing is disclosed more frequently in the news. The prevalence of these funds is concerning as few tools exists to help investors distinguish costly active funds with managers who fail to deliver the promised active share. This discussion is for another time, but it is highly relevant in light of our results suggesting that higher fees and lower active share are better performance indicators in crisis.

7.3.3 Persistence amongst top performing funds

The analysis on persistence of top performing funds show that persistence exist, however not as apparent in the Financial Crisis. This indicates a potential for manager skills in our fund sample. Again, the evidence of persistence can have implications for investors when making investment decisions. However, this analysis is primarily meant as an inspiration for further research on the topic. More on this in chapter 9 on further research.

7.4 Implications for the future of active management

The underperformance we observe in the active fund market suggests that the ongoing shift from active to passive will not reverse anytime soon. As other studies suggest, investors vote with their best and most precious capital to "safer" index funds during crisis (Darbyshire, 2020). Does this indicate that active managers have failed to prove themselves for too long? If this trend is continuing, studies find that it can have bad consequences. Apparently, the shift away from active management can disturb the financial stability in the Scandinavian market due to inefficient allocation of resources among others (Nimmo, 2020). And why is this a bad thing? Index funds primarily invest in larger, stable and capital-intensive companies that do not necessarily contribute to disruptive technology and innovation. This is concerning at a time were sustainability, energy transition and innovation are more important than ever, especially when viewed in hindsight of a year impacted by deep market crisis. However, increased focus on indexing may lead to opportunities for active managers arising from trends linked to sustainability, energy transition, disruptive technology and innovation. The following question remains: Should investors stay hopeful until the next crisis proves differently? If you are worried about the future the answer is yes, but if you pursue alpha our findings offer a more daunting answer.

8 Conclusions

In this thesis we have explored mutual fund performance in crisis in an effort to figure out whether Scandinavian active managers live up to their pitch to outperform in crisis relative to non-crisis. The findings suggests that active managers do not deliver. We therefore have to reject our main hypothesis *"Actively managed funds outperform in crisis relative to non-crisis"*. The key take away is that Scandinavian active funds do not offer a meaningful hedge in crisis.

Although our main hypothesis is rejected, the additional research questions raise intriguing insights. In fact, active fund performance differs across the Scandinavian countries. Differences are dependent on the exposure to the market where the crises unfold. This result suggests that even though markets share similarities in size, transparency and efficiency, additional factors such as resource reliance and proximity to investment opportunities play a role in times of crisis.

We have also observed important features that potentially affect active managers ability to produce alpha such as the funds' investment focus, fees, active share, and persistence. Funds with Norwegian investment focus outperformed during the Oil Crisis. This finding suggests that the informational advantage of investing locally can come into fruition and lead to better performance in crisis.

Higher fees have no relation to better fund performance in non-crisis. However, this finding flips in times of crisis, and the active manager collecting the higher fees perform better. This implies that higher fees can give access to a "hedge" or an "insurance premium". However, it is key that investors understand the mechanism of an "insurance premium" as a hedge as opposed to a promise to deliver positive returns net of fees. The test of persistence reveal outperformance of top performing funds over time. This can further indicate the potential existence of skilled managers.

Our findings also suggest that higher levels of active management are not advantageous in crisis, in fact the opposite is true. Funds with higher levels of active share display worse performance compared to those with lower levels both in crisis and in non-crisis. In other words, it is not worth paying more to gain access to portfolios that substantially deviate from the benchmark in crisis. The findings suggest that managers of high active share

funds strive too hard to capture alpha so that the costs outweigh the benefits.

To conclude, our findings add to the existing pile of literature on active fund underperformance. Besides some promising results under the performance criteria of investment focus, fees, active share, and persistence, the general conclusion is that active managers struggle to live up their pitch.

9 Limitations and Further Research

There are various opportunities to extend the research based on our findings. Below we present suggestions for further research particularly related to the underlying market, fund characteristics, manager skills, investor expectations, and the modern fund market.

The research questions we consider throughout this thesis can be considered in different markets and crises. Our study is based on a market considered efficient in a global context. Future research can consider less efficient markets in crisis in order to observe whether active managers outperform. The market competition can also be investigated to better understand how it impacts active fund performance. As highlighted in a Dagens Næringsliv article, industry experts have divergent views on the existence of competition in the Norwegian fund market (Linderud et al., 2020). In our study we did not make an effort to identify sector exposure in crisis. However, this can be assessed in future research to evaluate the sector winners in times of crisis.

Regardless of sector exposure, it can be of interest to identify what characterizes winning funds. What types of funds outperform in crisis? Large or small sized funds, younger or more mature funds? Moreover, we do not consider the underlying factors such as trading and investment style. For instance, trading frequency and holding duration can be additional issues that can serve as inspiration for further research. Additionally, we mainly focus on how active share is associated with fund performance in crisis, and do not distinguish between the four types of active management. Future studies can combine both active share and tracking error to explore how the combination of these measures determine fund performance in a crisis context.

Our simple model on persistence can be used as inspiration to further assess the drivers of persistence in the Scandinavian market. The indication of fund persistence brings us to the topic of manager skills. Previous studies suggest that highly selective and patient active managers outperformed in periods of high cross section dispersion in return (Von Reibnitz 2017; Cremers, 2017). What strategies do managers apply to outperform? Kacperzcyk, Van Nieuwerburgh, and Veldkamp (2014) provides insight and inspiration that can be applied to the Scandinavian market to help determine if the winning managers engage in regime-switching strategies to outperform.

Although existing research mentions investor expectation it can be further highlighted due to the divergent expectations of what the active manager actually delivers and what the investor pays for the service. Future research can evaluate why this gap exists in the first place and offer solutions to close it.

Financial industry experts state that asset management firms desperately need innovation to survive in the market. Particularly three themes are highlighted as necessary in order to remain competitive in the asset management field: cost cutting, technology to keep up with the fast pace and changing landscape, and retention of the right people who can constantly reinvent the business (Finnerty, 2019). Further research can assess the future fund market to assess how funds can outperform in the future.

References

Aftenposten (2016). Oljekrisen har ført til 25.000 færre arbeidsplasser. *Aftenposten*, Retrieved from: https://www.aftenposten.no/okonomi/i/vQwgw.

Barras, L., Scaillet, O., and Wermers, R. (2010). False discoveries in mutual fund performance: Measuring luck in estimated alphas. *Journal of Finance*, 65(1):179–216.

Berk, J. B. and van Binsbergen, J. H. (2015). Measuring skill in the mutual fund industry. *Journal of Financial Economics*, 118(1):1–20.

Bernstein, P. L. (1998). Where, oh where are the hitters of yesteryear? *Financial Analysts Journal*, 54(6):6.

Borio, C., Drehmann, M., and Xia, F. D. (2020). Forecasting recessions: the importance of the financial cycle. *Journal of Macroeconomics*, 66.

Brunnermeier, M. K. and Oehmke, M. (2013). The maturity rat race. *Journal of Finance*, 68(2):483–521.

Carhart, M. M. (1997). On persistence in mutual fund performance. *Journal of Finance*, 52(1):57–82.

Carlson, B. (2018). Prepare for the Next Bear Market in Stocks. *Bloomberg*, Retrieved from: https://www.bloomberg.com/opinion/articles/2018-01-10/prepare-for-the-next-bear-market-in-stocks.

Chen, J. (2018). Incubated Fund. *Investopedia*, Retrieved from: https://www.investopedia.com/terms/i/incubatedfund.asp.

Chen, J. (2020). Fund Flow Definition. *Investopedia*, Retrieved from: https://www.investopedia.com/terms/f/fund-flow.asp.

Chordia, T. (1996). The structure of mutual fund charges. *Journal of Financial Economics*, 41(1):3–39.

Christensen, M. (2013). Danish mutual fund performance. *Applied Economics Letters*, 20(8):818–820.

Coval, J. D. and Moskowitz, T. J. (2001). The geography of investment: Informed trading and asset prices. *Journal of Political Economy*, 109(4):811–841.

Cremers, K. J. and Petajisto, A. (2009). How Active Is Your Fund Manager? A New Measure That Predicts Performance. *Review of Financial Studies*, 22(9):3329–3365.

Cremers, M. (2017). Active share and the three pillars of active management: Skill, conviction, and opportunity. *Financial Analysts Journal*, 73(2):61–79.

Cremers, M., Ferreira, M. A., Matos, P., and Starks, L. (2016). Indexing and active fund management: International evidence. *Journal of Financial Economics*, 120(3):539–560.

Curry, B. and Napoletano, E. (2020). What is an expense ratio? *Forbes Advisor*, Retrieved from: https://www.forbes.com/advisor/investing/what-is-expense-ratio/.

Dahlquist, M., Engstrom, S., and Soderlind, P. (2000). Performance and Characteristics of Swedish Mutual Funds. *The Journal of Financial and Quantitative Analysis*, 35(3):409.

Darbyshire, M. (2020). UK active managers fail to prove their mettle in a bear market. *Financial Times*, Retrieved from: https://www.ft.com/content/71029acc-21c2-4453-bcb5-6527d8003534.

De Souza, A. and Lynch, A. (2012). Does Mutual Fund Performance Vary over the Business Cycle? *National Bureau of Economic Research*, August 201(No. 1).

Dyck, A., Lins, K., and Pomorski, L. (2013). Does Active Management Pay? New International Evidence. *The Review of Asset Pricing Studies*, 3(2):200–228.

ECDC (2020). COVID-19 situation update worldwide. *European Centre for Disease Prevention and Control*, Retrieved from: https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases.

Elton, E. J., Gruber, M. J., and Blake, C. R. (1996). Survivorship bias and mutual fund performance. *Review of Financial Studies*, 9(4):1097–1120.

Elton, E. J., Gruber, M. J., and Blake, C. R. (2001). A First Look at the Accuracy of the CRSP Mutual Fund Database and a Comparison of the CRSP and Morningstar Mutual Fund Databases. *The Journal of Finance*, 56(6):2415–2430.

European Securities and Markets Authority (2017). ESMA Report on Trends, Risks and Vulnerabilities. Technical Report 2.

Fama, E. F. (1970). Efficient Capital Markets : A Review of Theory and Empirical Work. *The Journal of Finance*, 25(2):383–417.

Ferreira, M. A., Keswani, A., Miguel, A. F., and Ramos, S. B. (2012). The flow-performance relationship around the world. *Journal of Banking and Finance*, 36(6):1759–1780.

Ferreira, M. A., Keswani, A., Miguel, A. F., and Ramos, S. B. (2013). The Determinants of mutual fund performance: A cross-country study. *Review of Finance*, 17(2):483–525.

Ferson, W. and Qian, M. (2014). Conditional Performance Evaluation , Revisited. *The Research Foundation of the Association for Investment Management and Research*, (January 2004).

Ferson, W. E. and Schadt, R. W. (2016). Measuring Fund Strategy and Performance in Changing Economic Conditions. *The Journal of Finance*, 51(2):425–461.

Finnerty, P. (2019). Mutual fund outlook: The time to act is now. *PWC Report*.

Fisher (2019). Oil and Stocks' Fickle Relationship. *Reuters*, Retrieved from: https://www.reuters.com/article/sponsored/oil-and-stocks.

Fjell, (2019). Why investing in the Nordics is a good idea. *DNB Asset Management*, Retrieved from: https://dnbam.com/en/finance-blog/why-investing-in-the-nordics-is-a-good-idea.

Flam, H. and Vestman, R. (2014). Swedish Equity Mutual Funds: Performance, Persistence and Presence of Skill. *Swedish House of Finance Research Paper*, 14(04).

Fontevecchia, A. (2020). Dominique Strauss-Kahn: This Crisis Is Harder To Handle Than The Great Depression. *Forbes*, Retrieved from: https://www.forbes.com/sites/afontevecchia/2020/05/28/dominique-strauss-kahn-this-crisis-is-harder-to-handle-than-the-great-depression.

Fornell, C., Mithas, J. S., and Morgeson, F. V. (2009). The economic and statistical significance of stock returns on customer satisfaction. *Marketing Science*, 28(5):820–825.

Gârleanu, N. and Pedersen, L. H. (2018). Efficiently Inefficient Markets for Assets and Asset Management. *Journal of Finance*, 73(4):1663–1712.

Giannetti, M. and Laeven, L. (2016). Local Ownership, Crises, and Asset Prices: Evidence from US Mutual Funds. *Review of Finance*, 20(3):947–978.

Glode, V. (2011). Why mutual funds "underperform". *Journal of Financial Economics*, 99(3):546–559.

Grossman, J. S. and Stiglitz, E. J. (1980). On the Impossibility of Informationally Efficient Markets. *The American Economic Review*, 70(3):393–408.

Gruber, M. J. (1996). Another puzzle: The growth in actively managed mutual funds. *Journal of Finance*, 51(3):783–810.

Grytten, O. H. (2020). *The Corona crisis: How different is this crisis really?*, Norge Handelshøyskole, Retrieved from: https://www.youtube.com/watch?v=Sz69zv3sYq8.

Ito, M., Noda, A., and Wada, T. (2014). International stock market efficiency: a non-Bayesian time-varying model approach. *Applied Economics*, 46(23):2744–2754.

Järf, A. (2016). Nordic market mutual fund performance and persistence. Hanken School of Economics, Helsinki.

Jensen, M. C. (1968). The performance of mutual funds in the period 1945-1964. *The Journal of Finance*, 23(2):389–416.

Kacperczyk, M., Nieuwerburgh, S. V., and Veldkamp, L. (2014). Time-varying fund manager skill. *Journal of Finance*, 69(4):1455–1484.

Khorana, A., Servaes, H., and Tufano, P. (2005). Explaining the size of the mutual fund industry around the world. *Journal of Financial Economics*, 78(1):145–185.

Kosowski, R. (2011). Do mutual funds perform when it matters most to investors? us mutual fund performance and risk in recessions and expansions. *Quarterly Journal of Finance*, 1(3):607–664.

Leite, P. and Cortez, M. C. (2015). Performance of European socially responsible funds during market crises: Evidence from France. *International Review of Financial Analysis*, 40:132–141.

Lettau, M. and Madhavan, A. (2018). Exchange-Traded funds 101 for economists. *Journal of Economic Perspectives*, 32(1):135–153.

Linderud, E., Bakken, J., Vold, S., and Berg, M. (2020). Bankene har superprofitt på salg av aktive fond – kundene taper. *Dagens Næringsliv*, Retrieved from: https://www.dn.no/magasinet/dokumentar/aksjefond/indeksfond/sparing/bankene-har-superprofitt-pa-salg-av-aktive-fond-kundene-taper.

Malkiel, B. G. (1995). Returns from Investing in Equity Mutual Funds 1971 to 1991. *The Journal of Finance*, 50(2):549–572.

National Bureau of Economic Research (2019). Business Cycle Dating USA. *NBER site*, Retrieved from: https://www.nber.org/research/business-cycle-dating.

Newey, W. K. and West, K. D. (1987). Hypothesis Testing with Efficient Method of Moments Estimation. *International Economic Review*, 28(3):777.

Nimmo, H. (2020). Active managers play a vital role in raising capital. *Financial Times*, Retrieved from: https://www.ft.com/content/1c33c086-0302-412a-aecd-adef76ed2fd0.

Nofsinger, J. and Varma, A. (2014). Socially responsible funds and market crises. *Journal of Banking and Finance*, 48:180–193.

Nordström, F. (2020). The contemporary Swedish fund market. *Swedish Investment Fund Association*, Retrieved from: https://www.fondbolagen.se/en/FactsIndices.

OECD (2008). Financial Market Highlights – May 2008 : The Recent Financial Market Turmoil, Contagion Risks and Policy Responses. Technical Report May.

Osborne, J. W. and Overbay, A. (2004). The power of outliers (and why researchers should always check for them). *Practical Assessment, Research and Evaluation*, 9(6):1–12.

Pasquariello, P. (2014). Financial market dislocations. *Review of Financial Studies*, 27(6):1868–1914.

Pástor, , Stambaugh, R. F., and Taylor, L. A. (2015). Scale and skill in active management. *Journal of Financial Economics*, 116(1):23–45.

Pástor, and Vorsatz, M. B. (2020). Mutual Fund Performance and Flows during the COVID-19 Crisis. *The Review of Asset Pricing Studies*, 10(4):791–833.

Petajisto, A. (2013). Active share and mutual fund performance. *Financial Analysts Journal*, 69(4):73–93.

Plantier, L. (2014). Globalisation and the Global Growth of Long-Term Mutual Funds. *ICI Global Research Perspective*, 1(1):1–43.

Reserve Bank of Australia (2009). The global financial crisis. Technical report.

Rodriguez, N. (2020). Worldwide regulated open-ended fund assets and flows First Quarter 2020. Technical report, The International Investment Funds Association, Toronto, Ontario.

Schwab, C. (2016). Why Global Diversification Matters. *Forbes*, Retrieved from: https://www.forbes.com/sites/charlesschwab/2016/04/22/why-global-diversification-matters.

Sharpe, W. F. (1966). Mutual Fund Performance, Part 2: Supplement on Security Prices. *The Journal of Business, The University of Chicago Press*, 39(1):119–138.

Sirri, E. R. and Tufano, P. (1998). Costly search and mutual fund flows. *Journal of Finance*, 53(5):1589–1622.

Smørgrav, B. O. and Næss, A. (2011). Active share i norsk fondsforvaltning: En empirisk analyse. Norges Handelshøyskole, Bergen.

Sørensen, L. Q. (2010). Mutual Fund Performance at the Oslo Stock Exchange. *Idunn Praktisk økoinomi & Finans*, 26(02):79–91.

Stein, W. (2018). Alpha. *Morningstar*, Retrieved from: https://www.morningstar.ca/ca/news/187610/the-morningstar-dictionary-alpha.aspx.

Stocker, M., Baffes, J., Some, Y., Vorisek, D., and Wheeler, C. (2018). The 2014-16 Oil Price Collapse in Retrospect. *World Bank Policy Research Working Paper*, (8419).

Thenmozhi, M. and Kumar, M. (2009). Dynamic interaction among mutual fund flows, stock market return and volatility. *NSE Research Papers*.

Von Reibnitz, A. (2017). When opportunity knocks: Cross-sectional return dispersion and active fund performance. *Critical Finance Review*, 6:303–356.

Waring, M. B. and Siegel, L. B. (2003). The Dimensions of Active Management. *The Journal of Portfolio Management*, 29(3):35–51.

Wermers, R. (2000). Mutual fund performance: An empirical decomposition into stock-picking talent, style, transactions costs, and expenses. *Journal of Finance*, 55(4):1655–1703.

Wermers, R. R. (2019). Active Investing and the Efficiency of Security Markets. *The Journal of Investment Management, 2020, Forthcoming*.

Wigglesworth, R. (2020). Active managers struggle to prove their worth in a turbulent year. *Financial Times*, Retrieved from: https://www.ft.com/content/621d51de-f732-48e3-b3e3-be83f42baec3.

Wooldridge, J. M. (2013). *Introductory Econoemtrics: A modern approach*. South-Western Cengage Learning, Mason, 5 edition.

World Health Organization (2020). Archived: WHO Timeline - COVID-19. Retrieved from: https://www.who.int/news/item/27-04-2020-who-timeline—covid-19.

Appendix

A1 Linking Regression Tables and Equations

Table A1.1: Description of variables from equations

This table shows the connection of variables. *Variables* as presented in regression tables in chapter 6, *Expressions* of dummy variables and *Estimates* as presented in the equations of chapter 5.

Variable	**Expression**	**Estimate**
gross alpha		β_0
crisis	D_t^{crisis}	$\delta_1(eq.5.1)$
financial	$\mathrm{D}_t^{financial}$	$\delta_1(eq.5.2)$
oil	D_t^{oil}	$\delta_2(eq.5.2)$
covid	D_t^{covid}	$\delta_3(eq.5.2)$
domestic	$\mathrm{D}_i^{domestic}$	$\delta_2(eq.5.5), \delta_4(eq.5.6)$
high fee	$\mathrm{D}_i^{highfee}$	$\delta_2(eq.5.7)$
mid active	$\mathrm{D}_i^{midactive}$	$\delta_2(eq.5.8)$
high active	$\mathrm{D}_i^{highactive}$	$\delta_3(eq.5.8)$
domestic:crisis	$\mathrm{D}_t^{crisis} \cdot D_i^{domestic}$	$\gamma_1, \gamma_2, \gamma_3, \gamma_4$
high fee:crisis	$\mathrm{D}_t^{crisis} \cdot D_i^{highfee}$	$\gamma_{midactive}$
mid active:crisis	$\mathrm{D}_t^{crisis} \cdot D_i^{midactive}$	$\gamma_{highactive}$
high active:crisis	$\mathrm{D}_t^{crisis} \cdot D_i^{highactive}$	γ_{fee}

A2 Extended Regression Tables

Below the extended regression tables are presented. Note that the extended tables for each country regarding investment focus (Table 6.3) is not included, due to similar and consistent results with those presented in chapter 6.

Table A2.1: Fund performance in crises - Extended

	Gross Alpha							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
crisis	-0.212***		-0.209***		-0.362***		-0.230***	
	(0.048)		(0.049)		(0.067)		(0.050)	
financial		-0.164**		-0.151*		-0.735***		-0.219***
		(0.078)		(0.081)		(0.150)		(0.084)
oil		-0.099**		-0.098**		0.005		-0.089**
		(0.045)		(0.046)		(0.062)		(0.045)
covid		-1.408***		-1.416***		-1.417***		-1.377***
		(0.262)		(0.263)		(0.265)		(0.265)
log(fund age)			0.012	0.014	0.028*	0.030*	-0.092***	-0.075***
			(0.010)	(0.010)	(0.016)	(0.016)	(0.020)	(0.020)
log(fund tna)			0.008	0.008	0.006	0.004	-0.033**	-0.039**
			(0.006)	(0.006)	(0.009)	(0.009)	(0.016)	(0.017)
fund fee			-0.051***	-0.055***	-0.002	-0.011	-0.058	-0.066
			(0.019)	(0.019)	(0.023)	(0.023)	(0.046)	(0.046)
net flow			0.005***	0.005***	0.006***	0.006***	0.004***	0.004***
			(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
active share					-0.002***	-0.003***		
					(0.001)	(0.001)		
constant	-0.025***	-0.025***	-0.005	-0.003	0.054	0.082		
	(0.009)	(0.009)	(0.053)	(0.054)	(0.081)	(0.083)		
Observations	79,045	79,045	76,543	76,543	36,362	36,362	76,543	76,543
R^2	0.001	0.003	0.002	0.004	0.004	0.010	0.017	0.019
Significance levels								*p<0.1; **p<0.05; ***p<0.01

Table A2.2: Fund performance for Swedish funds in crises - Extended

	Gross Alpha							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
crisis	-0.182**		-0.175**		-0.505***		-0.185**	
	(0.075)		(0.075)		(0.126)		(0.077)	
financial		-0.183*		-0.170		-1.381***		-0.211*
		(0.108)		(0.109)		(0.196)		(0.117)
oil		-0.134**		-0.133**		-0.009		-0.125*
		(0.065)		(0.064)		(0.115)		(0.064)
covid		-0.530		-0.511		-0.500		-0.473
		(0.398)		(0.398)		(0.389)		(0.393)
log(fund age)			0.006	0.006	0.019	0.018	-0.087**	-0.084**
			(0.019)	(0.019)	(0.029)	(0.029)	(0.038)	(0.037)
log(fund tna)			0.020*	0.020*	0.046***	0.039**	0.011	0.008
			(0.012)	(0.012)	(0.018)	(0.018)	(0.031)	(0.032)
fund fee			-0.041	-0.042	0.009	0.007	-0.052	-0.053
			(0.027)	(0.027)	(0.038)	(0.038)	(0.099)	(0.099)
net flow			0.012***	0.012***	0.015***	0.015***	0.011***	0.011***
			(0.002)	(0.002)	(0.004)	(0.004)	(0.002)	(0.002)
active share					0.00001	-0.001		
					(0.001)	(0.001)		
constant	0.029*	0.029*	-0.040	-0.039	-0.301**	-0.217		
	(0.016)	(0.016)	(0.087)	(0.087)	(0.152)	(0.153)		
Observations	28,933	28,933	28,922	28,922	10,639	10,639	28,922	28,922
R^2	0.001	0.001	0.004	0.005	0.010	0.018	0.024	0.024
Significance levels								*p<0.1; **p<0.05; ***p<0.01

Table A2.3: Fund performance for Norwegian funds in crises - Extended

	Gross Alpha							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
crisis	-0.561***		-0.575***		-0.669***		-0.620***	
	(0.129)		(0.131)		(0.139)		(0.132)	
financial		-0.579***		-0.629***		-0.685***		-0.745***
		(0.201)		(0.202)		(0.240)		(0.208)
oil		0.044		0.083		0.064		0.098
		(0.148)		(0.153)		(0.158)		(0.150)
covid		-5.580***		-5.597***		-5.577***		-5.655***
		(0.574)		(0.576)		(0.581)		(0.587)
log(fund age)			0.073***	0.080***	0.079***	0.082***	-0.015	0.069
			(0.025)	(0.025)	(0.030)	(0.031)	(0.052)	(0.057)
log(fund tna)			-0.022*	-0.023*	-0.020	-0.024	-0.152***	-0.187***
			(0.013)	(0.014)	(0.016)	(0.016)	(0.036)	(0.039)
fund fee			-0.050	-0.065*	-0.006	-0.029	-0.053	-0.093
			(0.036)	(0.036)	(0.037)	(0.037)	(0.073)	(0.082)
net flow			0.005***	0.005***	0.009**	0.008**	0.004**	0.004**
			(0.002)	(0.002)	(0.004)	(0.004)	(0.002)	(0.002)
active share					-0.005***	-0.006***		
					(0.001)	(0.001)		
constant	-0.0003	-0.0003	0.020	0.035	0.332**	0.405***		
	(0.019)	(0.019)	(0.112)	(0.114)	(0.145)	(0.151)		
Observations	17,912	17,912	17,566	17,566	12,952	12,952	17,566	17,566
R^2	0.004	0.028	0.005	0.031	0.010	0.045	0.019	0.045
Significance levels								*p<0.1; **p<0.05; ***p<0.01

Table A2.4: Fund performance for Danish funds in crises - Extended

	Gross Alpha							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
crisis	-0.053		-0.038		0.051		-0.056	
	(0.066)		(0.067)		(0.075)		(0.067)	
financial		0.064		0.146		0.607*		0.087
		(0.124)		(0.135)		(0.357)		(0.137)
oil		-0.143***		-0.151***		-0.0005		-0.153***
		(0.048)		(0.048)		(0.054)		(0.048)
covid		-0.043		-0.040		-0.015		0.050
		(0.346)		(0.349)		(0.359)		(0.353)
log(fund age)			-0.020	-0.019	-0.026	-0.025	-0.115***	-0.108***
			(0.013)	(0.013)	(0.021)	(0.021)	(0.026)	(0.026)
log(fund tna)			-0.004	-0.002	-0.014	-0.012	-0.007	0.0004
			(0.009)	(0.009)	(0.011)	(0.011)	(0.019)	(0.020)
fund fee			-0.047	-0.046	-0.018	-0.021	-0.022	-0.016
			(0.034)	(0.034)	(0.037)	(0.037)	(0.065)	(0.065)
net flow			-0.002*	-0.002*	0.0002	0.0002	-0.002**	-0.002*
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
active share					-0.002***	-0.002***		
					(0.001)	(0.001)		
constant	-0.087***	-0.087***	0.067	0.053	0.195*	0.185*		
	(0.012)	(0.012)	(0.078)	(0.079)	(0.103)	(0.102)		
Observations	32,200	32,200	30,055	30,055	12,771	12,771	30,055	30,055
R^2	0.0001	0.0003	0.0003	0.001	0.001	0.002	0.012	0.012
Significance levels								*p<0.1; **p<0.05; ***p<0.01

Table A2.5: Fund performance dependent on the level of fees - Extended

	Gross Alpha		
	(1)	(2)	(3)
crisis	-0.290***	-0.287***	-0.310***
	(0.060)	(0.059)	(0.060)
high fee	-0.076***	-0.067***	-0.074**
	(0.018)	(0.019)	(0.037)
high fee:crisis	0.159*	0.160*	0.164*
	(0.096)	(0.096)	(0.096)
log(fund age)		0.011	-0.092***
		(0.010)	(0.020)
log(fund tna)		0.008	-0.033**
		(0.007)	(0.016)
net flow		0.005***	0.004***
		(0.001)	(0.001)
constant	0.019	-0.052	
	(0.013)	(0.041)	
Observations	76,543	76,543	76,543
R^2	0.001	0.002	0.017
Significance levels	*p<0.1; **p<0.05; ***p<0.01		

Table A2.6: Fund performance dependent on the level of active share - Extended

	Gross Alpha		
	(1)	(2)	(3)
crisis	-0.186*	-0.160*	-0.160*
	(0.096)	(0.095)	(0.097)
mid active	-0.072***	-0.070***	-0.003
	(0.023)	(0.023)	(0.039)
high active	-0.099***	-0.093***	0.035
	(0.027)	(0.028)	(0.058)
mid active:crisis	-0.122	-0.145	-0.174
	(0.161)	(0.162)	(0.164)
high active:crisis	-0.347**	-0.392***	-0.418***
	(0.144)	(0.146)	(0.148)
log(fund age)		0.028*	-0.083*
		(0.016)	(0.043)
log(fund tna)		0.008	-0.031
		(0.009)	(0.025)
fund fee		-0.004	-0.050
		(0.023)	(0.059)
net flow		0.006***	0.005***
		(0.002)	(0.002)
constant	0.034**	-0.070	
	(0.015)	(0.074)	
Observations	37,034	36,362	36,362
R^2	0.004	0.005	0.033
Significance levels	*p<0.1; **p<0.05; ***p<0.01		

A3 Choice of Model

Our regression models are based on panel data. Panel data, or longitudinal data, consists of time-series for each cross-sectional member of the data set. In our case, we observe the same funds across time. Including multiple observations of the same units allow us to control for unobserved characteristics for each individual fund. Two of the benefits of using panel data includes its ability to capture greater complexity and uncover dynamic relationships. Yet, panel data also introduces some challenges. (Wooldridge, 2013)

There are particularly two assumptions that need close attention in panel data: homoskedasticity and serial correlation. The OLS assumptions exist to ensure that the estimators are unbiased and efficient, and that we can draw valid and robust inferences from our model. If not, it will be difficult to draw inference from our results, for instance due to underestimated error terms (Wooldridge, 2013). Below we test for the assumptions and apply correction when necessary.

Homoscedasticity

Heteroskedasticity occurs when the variance of the unobservable error *uit*, conditional on control variables, is not constant. Namely, there is covariance between unobserved effects in the error term and coefficients. With panel data the assumption must hold true for the whole composite error term $vit = ai + uit$. If not, we observe heterogeneity caused from time-constant variables *ai*.

Working with panel data, the variation within each error term will likely vary, hence *not* homoscedastic (Wooldridge, 2013). For our sample, effects such as manager skill and sector focus could make the sample heteroscedastic. If this is not corrected for, we might have correlation within the fund across time. We test for heterogeneity using Breusch-Pagan test and observe p-values below 0.05, indicating that heteroscedasticity is present.

No serial correlation

Serial correlation occurs when the error term in one period is correlated with the error term in another period (Wooldridge, 2013). The error terms can be correlated with each other across funds, as the same funds are observed over time in our sample. This

violates the assumption of no correlation between the error terms as well as no correlation between the control variables. In our panel data, time-varying controls, such as fund age, TNA and net flow can correlate over time. If serial correlation exists, the standard errors are underestimated. We test for serial correlation using a Breusch-Godfrey and a Durbin-Watson test. With p-values above 0.05 the test indicates no problem of serial correlation. This might be due to time-dependent dummy controls.

Table A3.1: Testing for Heteroskedasticity and Serial correlation

Test	**p-value**
Breusch-Pagan	2.2e-16
Breusch-Godfrey	0.586
Durbin-Watson	0.288

Robust standard errors

To account for the challenges of panel data, we follow a general approach to obtain fully robust standard errors by clustering at the fund level. Each fund is defined as a cluster of observations over time, whereby serial correlation and heteroscedasticity are allowed within each fund-cluster (Wooldridge, 2013). Standard errors are clustered at the fund level in line with the theory of Newey-West (1987). It is expected that clustered standard errors will be larger than those that are not clustered, as they better reflect the sampling error in the pooled OLS coefficients (Wooldridge, 2013).

Fixed effects

To minimize endogeneity problems, we also control for fixed effects. By checking for fund fixed effects at the fund level, we control for variations in gross alpha due to cross-sectional differences on fund characteristics (i.e., manager skills or sector exposure). The fixed effects model removes unobserved effects and any variable that is constant over time (i.e., manager skills) will be demeaned away. We control for fixed effects to compare the results from what the OLS regressions with controls show. If the results are significantly different, it indicates that the control variables are correlated with the fixed effects. Considering our control variables, some of them might be correlated with the unobserved effects. For that reason, we include regressions with fund fixed effects to control for omitted variables bias in our regression models (Pástor, Stambaugh & Taylor, 2015).[30]

[30]There are other panel data estimators such as the random effects model (RE). The RE model assumes that the unobserved effects are random, an assumption that often fails (Wooldridge, 2013). To

A4 Remaining OLS Assumptions

Here we present the remaining assumptions for our regression estimates to ensure unbiasedness and efficiency. We chose to stress the assumption of serial correlation and homoskedasticity as these are common econometric pitfalls associated with panel data. The remaining OLS assumptions are presented below.

Linear in parameters

It is important to be aware of the relationship between the independent variables and the dependent variable. When plotting the model residuals of control variables against gross alpha, two variables show no-linear relationships. The control variables fund age and fund TNA are log-transformed to improve their linear relationship to the dependent variable, gross alpha.

Random sampling

The data is collected from a reliable source (Lipper database) and we there for assume the sample to be representative. However, we cannot be complete sure that selection bias is not introduced after filtering the dataset and removing missing values that were not applicable to our analysis.

Zero conditional mean

The zero conditional mean assumption implies that the error term v has an expected value of zero given any value of the control variables (Woolridge, 2013). When this assumption is violated, the control variable is said to be endogenous and could ultimately bias the results. By including dummy variables (i.e., crisis periods and domestic geographical focus dummies) that might affect our dependent variable (gross alpha) and are correlated to our control variables, we account for possible endogeneity problems. We also control for fund fixed effects.

test whether the RE model is more efficient for our data we conduct a Hausman test. The low p-value allows us to reject the null hypothesis of the RE model, suggesting that the FE model is the most efficient model to control our estimates.

No perfect collinearity

No perfect collinearity assumes that there is no association between two independent (control) variables (Woolridge, 2013). Multicollinearity can occur if more than two control variables are associated, which can decrease the observed statistical significance. We test for multicollinearity in two ways: correlation matrix and variance inflation factor (VIF). The results show no presence of multicollinearity. Table A4.1 illustrate the Pearson correlation coefficient for the dependent variable (gross alpha), the control variables, and the crisis dummy variable representing the crisis periods. Table A4.2 shows the results from the VIF-test. None of the tests suggest violation of no perfect collinearity.

Table A4.1: Pearson Correlation Matrix

	gross alpha	fund age	fund tna	net flow	financial	oil	covid
gross alpha	1.00	0.01	0.01	0.03	-0.01	-0.01	-0.05
fund age	0.01	1.00	0.24	-0.07	-0.05	0.01	0.03
fund tna	0.01	0.24	1.00	-0.01	-0.05	0.01	0.01
net flow	0.03	-0.07	-0.01	1.00	0.00	-0.00	-0.02
financial	-0.01	-0.05	-0.05	0.00	1.00	-0.04	-0.01
oil	-0.01	0.01	0.01	-0.00	-0.04	1.00	-0.02
covid	-0.05	0.03	0.01	-0.02	-0.01	-0.02	1.00

Table A4.2: VIF-test for Multicollinearity

Values around 1 indicate zero correlation to other variables.

Variable	**VIF**	**VIF**
crisis	1.07	
financial		1.14
oil		1.10
covid		1.05
log(fund age)	1.09	1.11
log(fund tna)	1.16	1.18
fund fee	1.12	1.13
net flow	1.04	1.05

Normality

Normality states that errors are independent of the control variables and are normally distributed (Wooldridge, 2013). However, normality is not a required OLS-assumption. Considering the central limit theorem, we assume approximate normal distribution with a sample of 883 funds, and respectively 79,045 observations. We can therefor assume our estimators to satisfy asymptotic normality.

A5 Measures of Active Management

There are primarily two measures of active management: active share and tracking error. A prior study based on the Norwegian equity market finds strong correlation between active share and tracking error (Smørgrav & Næss, 2011). The first measures the percentage of the portfolio that differs from the benchmark index. The latter measures the added volatility in the portfolio returns due to the active portfolio strategy (Pestajisto, 2013). In our analysis, we use active share to measure the level of active management.