NTNU
Norwegian University of
Science and Technology

Carbon Risk and the Norwegian Stock Market

An Investigation into the Risk and Returns of Carbon Efficient Portfolios

Frøydis Eidissen

Finansiering og Inverstering
Submission date: May 2019
Supervisor: Hans Marius Eikseth

Norwegian University of Science and Technology
NTNU Business School

Preface

This master thesis is the final product of a masters degree in Economics and Business Administration in the field of Finance and Investment at NTNU Business school. This work has given me valuable insight into asset pricing and risk and allowed me to develop my econometric modelling skills and learn a new programming language. It has allowed me to dive deeper into the topics of climate change finance and economics which I believe to be very important and feel passionate about.

I would like to thank my supervisor Hans Marius Eikseth for supporting me in the process and providing constructive feedback and valuable insights throughout the semester. I would also like to thank all friends and family for their consistent support and interesting insights. Finally, I would like to mention my appreciation for all the people who share their (programming and finance) insights on sites like *stackoverflow*, without these insights this master thesis would hardly have been possible.

The author takes full responsibility for the content of this thesis.

Signed: ____________________

Frøydis Eidissen

Trondheim, May 2019

Abstract

In this thesis we define risks of regulatory and transitional changes related to emissions as two types of climate change risk (carbon risk), and investigate pricing of these risks in the Norwegian market. The analysis consider all firms listed on the Oslo Stock exchange between 1997 and 2018, and two types of portfolios are created based on these risks (scope 1 and scope 2). The results of the analysis show that for the past couple of years you could make abnormal returns from a trading strategy that goes long in risk efficient and short in risk inefficient firms when the risk is defined as Stranded Asset risk (scope 2). There is however no evidence that this abnormal return is linked to carbon pricing or a transition away from fossil fuels. We investigate if a Carbon risk premium is present using a GRS-test and find small, but significant, alphas across both scopes. These significant alphas are interpreted as an indication of a small risk premium related to carbon. Further analysis conducted with a Fama-Macbeth cross-sectional regression does however show that this risk is not priced in the market. Based on this the conclusion is that there is no, or very little, perceived risk among investors related to pricing of carbon (scope 1) or the possibility of fossil fuels becoming obsolete (scope 2).

Sammendrag

I denne masteroppgaven defineres risikoen for økt regulering av utslipp og en overgang til et lavutslippssamfunn som to typer klimaendringsrisiko med tett tilknytning til karbonrisiko. Vi undersøker prisingen av disse typene risiko i det norske markedet. Studien inkluderer alle børsnoterte selskaper på Oslo børs i tidsrommet 1997 til 2018 og det konstrueres to typer porteføljer basert på risikodefinisjonene (scope 1 og scope 2). Resultatet av analysen viser at over de siste par årene har man kunnet få positiv meravkasting ved å benytte en handlestrategi der man går lang i risiko-effektive og kort i risiko-ineffektive selskaper når typen risiko vi benytter er *Stranded Asset risk* (scope 2). Det er allikevel ikke noen beviser for at denne meravkastningen kan settes i sammenheng med en økt prising av karbon. Videre undersøker vi om det er en premie i markedet for eksponering mot karbonrisiko. Vi bruker en GRS-test og finner en liten, men signifikant, alfa under begge scopene. Dette tolkes som en liten risikopremie for eksponering mot karbonrisiko. I den videre analysen benyttes en Fama-Macbeth regresjon og vi finner ut at karbonrisikoen ikke er signifikant priset. Basert på disse funnene konkluderer vi med at investorer ikke oppfatter en risiko assosiert med prising av karbon (scope 1) eller muligheten for at energi fra fossile kilder kan bli overflødig (scope 2).

Contents

List of Tables

List of Figures

1. Introduction

The global focus on how economic activity affects the environment has been increasing for a number of years. Today we are close to a global consensus around the devastating effects a global warming of over 2 degrees will have on the planet, and the focus on sustainable development is increasing. Sustainable Development was first defined as early as 1987 by Brundtland et al. (1987), and the concept has been focus of much research and many reports since. Although the focus on the environment and sustainable development has increased over the past decade we fail to see large behavioural changes from investors. As is highlighted by a number of people (including Cline (2004) and Sneddon et al. (2006)), caring about the environment is the same as caring about the welfare of our future generations, and finance is arguably very suitable to realise (or not realise) the needs of future generations. This is because money and capital have a storage function that is suitable for inter-generational transfer (Soppe, 2004). The question that remains to be answered is if this is enough of an incentive for investors to change their behaviour, and if not, what other incentives are in place and what incentives are needed to prompt a change? There has been a lot of research done within the field of environmental economics into inter-generational transfers and social discount rates and a number of researchers have concluded that considering the effects of global warming on the future economy climate-abatement projects should be discounted using a lower discount rate or a social discount rate (Sandsmark & Vennemo, 2007; Stern, 2007; Weitzman, 1998; Nordhaus & Boyer, 2000).

While the application of social discount rate is a quite feasible way to incentivise environmentally friendly investments in public sector it needs to be translated into other types of incentives for the private sector. Environmentally friendly investments have to be made more attractive than other investment options. One way to do this is to impose a carbon tax, as has been done my a number of countries and was suggested as a solution by Nordhaus & Boyer (2000). Imposing a carbon tax or allowing for the possibility of a an increase in carbon tax could have a number of effects on carbon emitting firms, one is associated with the (increase in) carbon risk which would lead to the introduction of, or increase in, the carbon risk premium. A carbon risk premium would in turn be associated with a higher required return for carbon intensive firms, and could be seen in larger excess returns of stocks of these types of firm (compensation for taking a risk in the market). This reports aims to investigate if such carbon risk premiums can be detected in the Norwegian market. This is done by analysing the return of a clean-minus-dirty portfolio constructed based on emissions statistics for Norwegian sectors for the past 22 years and (Caldecott, 2014) definition of Stranded Assets. To investigate if carbon risk is present in the Norwegian market the thesis address the following research questions

1. How does climate risk efficient portfolios perform compared to the market?
2. Can excess return in the climate risk efficient portfolio be explained by known risk factors? If not, is the alpha significantly different from zero across all portfolios?
3. Is climate change risk a priced risk in the Norwegian market?

We also investigate how/if this has changes over time and if such changes can be connected to regulatory changes. To assess the exposure of our climate risk efficient portfolio to known risk factors we use the CAPM for assessing the exposure to market risk and Fama and French factor models (three factors and five factors) to assess exposure other known risks. We investigate the intercepts, which we identify as the carbon risk premium, using a GRS-test and a Fama-Macbeth cross-sectional regression.

The results of the analysis show that after the summer of 2014, the climate risk efficient portfolios that go short in firms with a high degree of exposure to stranded asset risk have reasonably high abnormal returns. This does however coincides with the large drop in oil price and we find no evidence that can link these abnormal returns to carbon pricing or a transition away from fossil fuels. We find that the variation in our portfolio returns cannot be explained by known risk factors, and that the intercepts are significantly different from 0. We interpret this as a climate risk premium. Further analysis does however show that this is premium is not significantly priced. Based on these findings we conclude that there is no, or very little, percieved risk among investors related to pricing of carbon or the possibility of fossil fuels becoming obsolete.

The thesis is structured as follows. In section 2 we start by looking at previous work done on climate change risk focusing in on carbon pricing risk and Stranded asset risk. We then look briefly at how the Norwegian government historically has attempted to regulate emissions before we turn to look at asset pricing theory. Section 3 details the data selection as well as the development of climate risk efficient portfolio. The methods applied in this thesis are detailed in Section 4 and the results of the application can be found in section 5. Discussion and conclusion can be found in section 6.

2. Literature Review

In this section relevant literature for the later analysis is discussed. The first part of this section looks at relevant theories and empirical work done in the subject areas of climate economics and finance. Following this the current and historical regulatory/policy environment in Norway is outlined. In the second part of this section a brief overview of how risk is handled in modern financial theory is provided. The final part of this section revisit the thesis research questions, and some hypothesis are developed based on the Literature Review.

2.1 Dealing with Climate Change Risk

2.1.1 Climate Change Risk

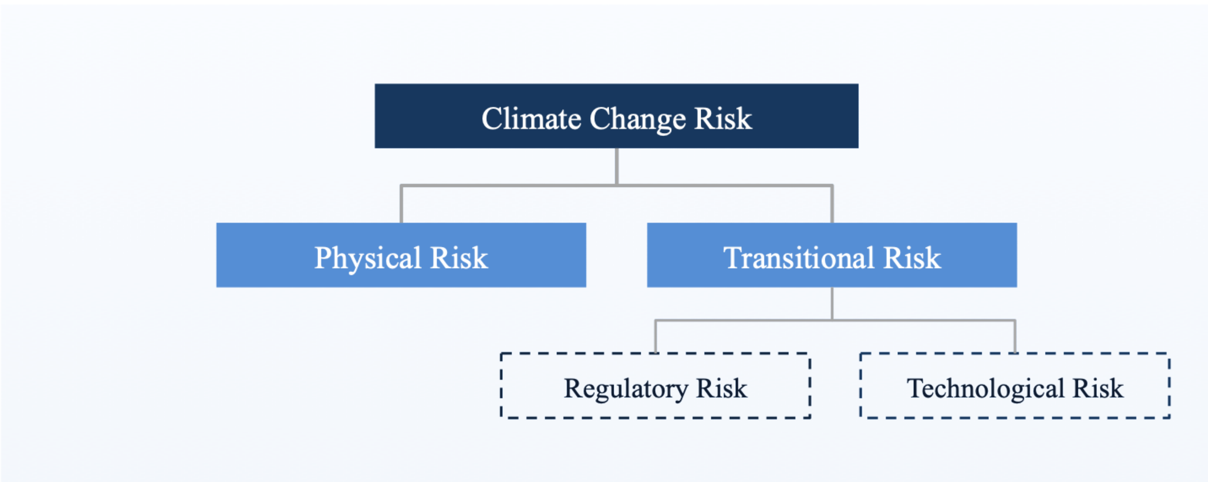
Over the past decade the global population has become increasingly aware of the detriments caused by the global warming, and the potentially damaging prospect we face unless we change the way we conduct ourselves. According to The Global Risks Report for 2019 (World Economic Forum , 2019) environment related risks dominate the Global Risk Perception Survey (GRPS) for the third year in a row. Among the factors highlighted by this survey was the risks of extreme weather (e.g. storms, fires, floods), environmental policy failure and combinations of the above. From this we can gather that environment-related risk is a multifaceted type of risk. Environment-related risks, or as we will refer to it from now on, Climate Change Risk (CCR), can not be defined as one specific outcome but a number of outcomes of environmentally damaging human activity. CICERO (2017) split the different risks into two different categories, Physical Risks and Transitional Risks, while Krueger et al. (2018) split Transitional Risks into Regulatory and Technological Risks, the split between the types of risks is illustrated by figure 1. The definitions of the different types of CCR split the risks on the basis of why they arise, Physical climate risks arise because sectors and firms will face costs related to the physical change in the climate, this includes events such as extreme weather or sea level rise. Regulatory risk arise from changes in policies and regulations due to attempts to mitigate climate change, for example carbon tax. The final type of CCR, Technological Risk, arise because of environmentally friendly innovations that disrupt traditional production, a good example of this is how the production of electrical vehicles is putting pressure on traditional car manufacturers to follow.

While there is a consensus around the *need* for change, *where* to start the change and *how* to do it is a topic of much controversy. This is especially the case when it comes to the government regulation needed to incentivise a change in the behaviour of the population. When we consider changing the behaviour of private sector investors we encounter a number of challenges. The majority of private investors consider a horison of up to 15 years, while the benefits of investment in climate change mitigation could take between 50 and 100 years to materialise (Sandsmark & Vennemo, 2007). Many researchers within the field of environmental economics have studied what discount rates are appropriate when discounting climate abatement projects with long time horizons, this discount rate is often referred to as *the social discount rate*. Stern (2007) found that the socially optimal discount rate for climate change abatement projects was approximately 1.4%. Cline (2004) and Sneddon et al. (2006) have similar estimations of social discount rates and argue that these lower discount rates are needed on climate abatement projects as a measure to ensure inter-generational fairness. While using social discount rates, regardless of rationale for imposing them, might be a good way of ensuring a public sector shift to climate neutral or negative (reduction of CO^2 in atmosphere e.g. Carbon Capture and Storage technologies (CCS)) investments, other incentive structures have to be created to change the behaviour in private sector.

While physical changes are less likely to affect firm returns in the short run and thus are harder to price, other changes are already happening and therefore easier to see clear results of. One of these is reputational risk associated with firm behaviour. There is a significant body of research that considers firms adherence to different ESG-criteria (Environmental, Social and Governance-criteria) or CSR-criteria (Corporate Social Responsibility) and their profitability/stock return, many of the researchers conclude that any impact on profitability/stock return of the adherence to these criteria is asssociated with reputational risk. Some of these include Manescu (2011) who assessed a number of U.S. listed firms between 1992 and 2008 on the basis of seven different ESG-criteria and found that only one criteria, community relations, had a significant impact on the return of the firm and found that this was likely a mispricing rather than compensation for risk. And, a meta analysis conducted by Orlitzky et al. (2003) on research on the correlation between CSR perfomance and financial performance concluded that the majority of benefits from CSR are linked to reputational risks. While findings such as these prompt some companies to change their behaviour to not damage their reputations, other companies use marketing to change the public perception of their operations without actually making a change, this is known as *greenwashing*. As such we see that reputational risk can translate into initiatives that does not necessarily address the problem it claims to solve, other types of CCR are also influencing companies to change their behaviour. One of these is known as Carbon Risk and is the focus in the next section.

Figure 1: Definitions of Climate Change Risk

This diagram illustrates the split between physical and transitional risk as defined by CICERO (2017) and Krueger et al. (2018).



2.1.2 Carbon Risk

Carbon risk can be seen as a type of transitional risk. A growing body of research is linking climate events to emissions of CO^2 and as such the likelihood of seeing new regulations being introduced to reduce emissions is increasing. At the same time we see a significant amount of money is invested in the development of new technologies that could potentially make carbon intensive sources of energy obsolete. This *should* mean that we seen an increase in the presence of Carbon Risk in the market, but as we will discuss later this is not always the case. Carbon Risk can be split into several different types of risk, the focus of this thesis is on two types. We have Carbon Pricing Risk which is the risk of regulations that increase the cost of using Carbon as an input. The other type of risk we will consider is Stranded Asset risk which is the risk that carbon intensive product stock becomes obsolete. Andersson et al. (2016) argues that both types of risk should be seen as increasingly important for investor, especially for those with a longer investment horizon. We will start by taking a closer look at the two types of Carbon Risk

The first type of Carbon Risk is Stranded Asset Risk. The concept of stranded assets is defined by Caldecott (2014) as assets that have 'suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities'. The definition normally include all fossil fuel sources from oil and gas to coal. Stranded asset risk is associated with both regulatory and technological changes. If we first consider regulatory changes such as an increase in carbon tax, this would increase the price of carbon for the consumer without increasing the income per unit sold for the firm. Depending on the price elasticity of demand and the size of the tax, we could see a shift towards other sources of energy. The demand would decrease and this would decrease the profitability of the firms in question. The other driver of stranded asset risk is innovation. Technological advances could over time render fossil fuels obsolete. The second type of Carbon Risk is Carbon Pricing Risk which can be seen as a pure form of regulatory risk. The Carbon Pricing Risk increases as regulation on emissions such as taxation (or emissions trading schemes such as the EU ETS) become more likely. Companies that are carbon intensive will experience increased costs with an increase in carbon price, and a carbon price risk can therefore be detected as a risk premium as investors need compensation for risk. As mentioned, an increase in carbon price is also likely to impact, and potentially be a driver, of stranded asset risk. As carbon becomes more expensive we will see an increased demand for less carbon intensive sources of energy and are likely to see a phasing out of dependence on fossil fuels.

A number of empirical works attempt to estimate the current priced Carbon Risk Premium in the market and establish if, and how, you can hedge the risk or potentially make money on the mispricing. A good example of this is Andersson et al. (2016) who create a decarbonized index that hedges against carbon risk while minimizing the tracking error compared to benchmark indices. This ensures that the lowest possible return of the index, if carbon pricing is not increased, is the benchmark index return. In et al. (2017) constructed an Efficient-Minus-Inefficient (EMI) portfolio based on carbon intensity of U.S. firms between 2005 and 2012. They find that the portfolio has large cumulative returns after 2009 which suggests that carbon efficient firms outperform inefficient firms in the market. Testing the EMI as a factor against industry they also establish that carbon efficiency has explanatory power on its own. Oestreich & Tsiakas (2015) study the impact of the European Unions Emissions Trading Scheme (EU ETS) on German and UK firms, they compare the performance of dirty and clean companies, as well as construct a dirty-minus-clean portfolio. They establish that there is a large, statistically significant, carbon premium in stock returns that starts disappearing after 2009. This means that before 2009 the carbon intense firms show a large positive expected returns, the premium is attributed to two main reasons, the first one being a flaw in the ETS scheme which allows carbon intensive firms to make money of allocated carbon quotas and the second being a higher required return for these firms as investors are aware of the future restrictions on emissions.

From the studies above a key takeaway is that, while most researchers suggest that there is likely an underpricing of Carbon Risk in the market, it is still possible to detect some pricing today. This indicates that carbon risk is not risk that is completely misunderstood by investors. The investors understanding of carbon risk is confirmed to some extent by a study conducted by Krueger et al. (2018). They investigate the most frequently used techniques to manage climate risks and find that the two most frequently reported techniques were the reduction of carbon footprint (29%) and reducing the exposure to 'stranded assets' (23%). The reason for the focus on these specific measures among investors comes from the expectation of a change in the prices of carbon due to the increased attention on how the emissions have to be limited. In 2018 Nordhaus won the nobel price in economics for the the RICE and DICE models (Nordhaus & Boyer, 2000) these are integrated assessment models that estimate the actual price of Carbon. These prices reflect the cost which should be imposed to correct the market for externalities associated with emissions. They are estimated with the aim of slowing down global warming enough to increase the likelihood of avoiding the worst case scenarios. This correction of market failure (externalities) does however require government intervention if the change is going to happen fast enough. We will now take a closer look at what the Norwegian government has done to correct the market failure of pricing carbon.

2.1.3 The Norwegian Regulatory Environment

Stern (2007) referred to global warming as the result of the biggest market failure in history. And, as Pigou (1920) stated, market failure (externalities) should be corrected by governement. Ways to do this include taxing the externality to discourage the use of it and shift the consumption/production towards alternative sources of energy. Carbon taxes were introduced in Norway as early as 1991 (Norwegian Ministry of Finance, 1996) and has largely dominated as a climate policy instrument since. While optimal taxation would mean a uniform tax rate for all sources both the Norwegian system and other European environmental taxation have included both exemptions from taxes and differentiation between sectors/products (Bruvoll & Larsen, 2004; NOU, 2018).

The national Norwegian target translates to a reduction in emissions of 30% from the 1990-level by 2020. Norway has also committed to reductions according to the Paris agreement which means that by 2030 the emissions have to be reduced by 40% compared to 1990 (NOU, 2018). Additional regulation is imposed through the EU ETS which some Norwegian firms are included in. The EU ETS is the first multinational cap-and-trade system for carbon and has been introduced in three phases (Oestreich & Tsiakas, 2015; European Commission, 2019). While some economists see the Carbon tax as an efficient way to reduce emissions others have conserns regardig whether it will make international competition challenging for Norwegian firms, or that it might adversely affect income distribution. An alternative approach to carbon tax that would not affect income distribution and that is recommended by a number of academics is known as *Carbon fee and dividend* (CFD). CFD adds a fee for the use of carbon and pays out the income as dividends to the population. Canada imposed this form of taxation from the 1st of January 2019 (for more detail on carbon fee and dividend see Klassekampen (2019) as linked in references).

From the above it is clear that the Norwegian government has been trying to correct the market failure with taxes for a number of years. While the current price of carbon is lower than what is optimal according to Nordhaus & Boyer (2000) it is likely that we will see increases and changes to this given the pressure added by the increasing body of research. We can also see the direct consideration of the financial climate risk in the Norwegian Government Pension Fund Global divesting from a number of oil exploration and production companies (upstream oil and gas, potential stranded assets) as recently as March 2019 (Norwegian Ministry of Finance, 2019). Having spent a number of pages looking at the rationale for including climate and carbon as a risk factors we will in the next section of this chapter outline how risk is handled in financial theory.

2.2 Risk and the Market for Securities

There are a number of theories that attempt to explain the prices of assets by identifying factors that are drivers of price, or *risk factors*. All of these theories rest on the assumption of efficient capital markets. To gain an understanding of this we will start this section by taking a look at the efficient market hypothesis (EMH), before we move on to the theory around the asset pricing models considered in this thesis.

2.2.1 Efficient Market Hypothesis

The Efficient Market Hypothesis explains why markets, especially the markets for securities, are efficient. Prices will always reflect all relevant information available to the market participants under this hypothesis. In other words, prices are accurate signals for resource allocation. A majority of the work done in area is based on the assumption of that the conditions of market equilibrium can shown in terms of expected returns, where this expected return equilibrium would be a function of the security's risk and can be described with the following equation(Malkiel & Fama, 1970).

$$E(\tilde{p}_{j,t+1}|\Phi_t) = [1 + E(\tilde{r}_{j,t+1}|\Phi_t)]p_{jt} \tag{2.1}$$

Where E is the expected value operator, p_{jt} is the is the price of security j at time t, $\tilde{p}_{j,t+1}$ is the price at time $t + 1$ and $\tilde{r}_{j,t+1}$ is the percentage of security j between t and $t + 1$. Φ_t is a symbol for the information that is assumed to be reflected in the price at time t. Using conditional expectation notation implies that the model in question that the information in Φ_t is fully utilized when the price of the security is determined. It is however important to note that expected value is purely one of many options for summary measure of distribution of return, it is not a necessary measure to determine market efficiency. All results of tests that are based on this assumption will in addition to test market efficiency be dependent on the validity of the assumption. The assumption has major empirical implications as it rules out the possibility of expected profits or return in excess of the equilibrium if the trading system is based in the information in Φ_t. We can show this with the following equations:

$$X_{j,t+1} = p_{j,t+1} - E(p_{j,t+1}|\Phi_t) \tag{2.2}$$

$$E(\tilde{x}_{j,t+1}|\Phi_t) = 0 \tag{2.3}$$

This implies that the X_jt is a "fair game" with respect to t, that is the expected market value of security j at time t given the information available is 0 (Malkiel & Fama, 1970). If one assumes a submartingale model, that is for (2.1) we assume that for all t and Φ_t

$$E(\tilde{p}_{j,t+1}|\Phi_t) \geq p_{jt}, \text{ or equivalently, } E(\tilde{r}_{j,t+1}|\Phi_t) \geq 0 \tag{2.4}$$

Which means that the return between time t and $t+1$ based on available information must be equal to or greater than the current price. If the above holds as an equality, and price change is equal to zero, the price sequence follows as a martingale. Submartingale prices, which are when the price change are larger than or equal to zero, implies that trading based on the information Φ_t will not have greater profits than simply buying and holding the security in question for the future periods in question.

Independent successive price changes was assumed in the early treatments of the efficient market model, in addition to this the successive changes were also often assumed to be identically distributed. These two assumptions, or hypotheses, together constitute the random walk model, formally stated as

$$f(r_{j,t+1}|\Phi_t) = f(r_{j,t+1}) \tag{2.5}$$

Which shows that the conditional and marginal probability distributions of an independent variable are identical, the density function, f, must also be the same for all t. By restricting (2.1) and holding the expected return of security j constant over time, we get

$$E(\tilde{r}_{j,t+1}|\Phi_t) = E(\tilde{r}_{j,t+1}) \tag{2.6}$$

Which shows that the distribution if $\tilde{r}_{j,t+1}$ is independent of the information at time t, Φ_t. In the Random walk model, (2.5), the entire distribution is independent of Φ_t. Malkiel & Fama (1970) argue that the Random walk model should be viewed as an extension of the "fair game" efficient markets model. While the "fair game" model simply states that market equilibrium can be shown by using expected returns, a random walk process arises within such a context when the environment stimulates a equilibria of investor tastes and process generating new information where return distributions repeat themself. In their article Malkiel & Fama (1970) also define the market conditions that can aid an efficient pricing process as having no transaction costs in trading securities, all information available to all market participant, and consistent agreement among all participants about the implications of the information on price and distribution of future prices of each security. Although these conditions are rarely met in reality we can still find efficient markets, as they're sufficient for market efficiency but not necessary.

Malkiel & Fama (1970) defines three types of efficiency in capital markets. Weak-form efficiency where investors cannot make excess returns by basing their trading strategy on historical price/return information, Semistrong-form efficiency where excess return cannot be made from any publicly available information and Strong-form efficiency where no excess return can be made on any available information, be that publicly available or not. While Malkiel & Fama (1970) concludes that in most cases the efficient market theory stands, there has since then been a number of critiques to the theory of efficient markets. A simple logic argument against the strong-form efficient market is that the existence of this would mean that there would be no money to make of insider trading as the information in question would already be reflected in the prices of securities (Copeland & Shastri, 2013).

As we know from a number of classical examples, as well as the one mentioned above, markets are not always efficient, not even the market for securities. One of the most obvious, and widely discussed, reason for this is that the humans are not perfectly rational. This means we have to relax the assumption of rationality that is key for most theories developed in both economics and finance. Behavioural finance is an area of finance that does exactly this. One of the many things it looks at are observed anomalies in the market. Anomalies are empirical results that are inconsistent with the existing theories that attempt to explain asset-pricing behaviour. An anomaly indicates a market inefficiency or a poorly defined asset-pricing model. Schwert (2003) explore how anomalies that are documented in academic literature behave after initially being discovered and find that after being discovered these anomalies normally gradually disappear.

In the previous section we discusses Climate Change Risk and the pricing of this in the market. Assuming that (1) there is a likelihood of increased regulation on carbon emissions, or of fossil fuels becoming obsolete and (2) the market is efficient according to the Efficient Market Hypothesis we should be able to detect a pricing of carbon risk in the Norwegian equities market. We will now take a look at asset pricing theory to gain an overview of what risk factors have previously been found to have explanatory power for returns of assets.

2.2.2 Asset Pricing Theory

Modern asset pricing theory, or factor pricing theory, tries to explain the prices or expected return of financial assets. It rests on the assumption of efficient markets as discussed above. Asset pricing models are based on two concepts, the no arbitrage principle and the financial market equilibrium (Ferson, 2003) and attempt to identify the factor(s) that drive the risk premium. Such factor pricing models are based on the assumptions of rational investors and investors with utility that is increasing at a decreasing rate for consumption (Cochrane, 2005). A number of models have been developed that identify different factors as driver for risk premiums, the CAPM is a basic model which use the covariance with excess market return.

The Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) is a known equilibrium pricing model that builds on the theories of mean-variance preferences, and portfolio diversification (Markowitz, 1952). It was developed in the 1960s and 70s (Sharpe,1963,1964; Treynor, 1961; Mossin, 1966; Lindtner, 1964, 1969; Black, 1972) and shows that the equilibrium rates of return on all risky assets are a function of their covariance with the market portfolio (Copeland & Shastri, 2013). In equilibrium the CAPM market portfolio must be efficient (lie on the upper half of the mean-variance curve). This is because, according to one of the assumption for the model, all investors have the same expectations and will, regardless of attitude to risk and availability of a risk free asset, always choose efficient portfolios. The market is the sum of the n efficient portfolios and will therefore be efficient. This assumption is known as the assumption of homogeneous expectations, if the assumption does not hold, as is the case for most empirical works, the market is not necessarily efficient and the CAPM does not hold (Copeland & Shastri, 2013). A number of empirical works test the validity of the CAPM when applied to real life portfolios and markets. Most of the early empirical work on the CAPM (pre-fama and french 1992) show that the intercept (α) is normally positive and significantly different from zero (Black et al., 1972) which means we reject the CAPM and that the markets in question are not efficient. Studies done by Fama and French (1992), Roll and Ross (1994) and Kothari, Shanken and Sloan (1995) tested the CAPM against other factors and found that results became statistically significant when the models included one or more of the factors size and book to market in addition to the beta of the excess return of the market (Copeland & Shastri, 2013). This led to the development of the Fama and French (1996) three factor model, that consisted of all of these three factors.

Fama and French Factor Models

The Fama-French approach to beta pricing models uses the cross-sectional empirical relation of stock returns to firm attributes to rank stocks on different characteristics (Pástor & Stambaugh, 2000). The original model consisted of three factors (FF3), the market risk (captured by the excess return of the market portfolio such as in the CAPM), size (market value of equity - 'SMB') and ratio of book value to market value (high minus low - 'HML'). In later developments additional factor have been added. Among these we have the momentum factor (up minus down - 'UMD') introduced by Carhart (1997). In 2015 Fama and French introduced a five factor model (FF5) that included a factor that considered the robustness of firms based on profitability (Robust minus weak - 'RMW') and a measure of aggressiveness of firms' net investment (conservative minus aggressive - 'CMA'). Others have also proposed own versions of Fama and French factors, such as Hou, Xue and Zhang (2015) and Asness and

Frazzini (2013).

An investor will typically face constraints on borrowing and short sales which are not present in the theoretical models we consider above. Pastor and Stambaugh (2000) found, when comparing CAPM, Fama and French (1993) and Daniel and Titman (1997), that the results associated with a dogmatic approach to either of these models was losses, the largest ones from applying the CAPM. These findings highlight the importance of considering the models flaws and incorporating other considerations when exploring investment opportunities. It does not however render the findings from such models valueless.

2.3 Research Questions and Hypothesis

In section 2.1 we consider why climate change risk *should* be considered by investors in both private and public sector today. We look at a number of different studies that have investigated if a climate risk premium is present in the financial markets and whether it is possible to make money on a total returns swap going long in efficient and short in inefficient firms. From this, the regulatory environment in Norway and financial theory I have developed some research questions I will try to answer in this thesis as well as some hypothesis on what we will find. The main objective is to investigate the pricing of carbon risk in the Norwegian market and I will thus attempt to answer the following research questions

1. How does climate risk efficient portfolios perform compared to the market?
2. Can excess return in the climate risk efficient portfolio be explained by known risk factors? If not, is the alpha significantly different from zero across all portfolios?
3. Is climate change risk a priced risk in the Norwegian market?

To assess the exposure of our climate risk efficient portfolio to known risk factors we use the CAPM for assessing the exposure to market risk and Fama and French factor models (three factors and five factors) to assess exposure other known risks. In accordance with the findings of Oestreich & Tsiakas (2015) we expect to see a considerable Carbon Risk Premium in the Norwegian market attributed to the threat of Carbon tax being present for a number of years. As discussed in Litterman (2013) the unwillingness of certain nations to impose regulations on emissions thus far (which he links to behavioural finance and irrational behaviour) is a behaviour anomaly and is likely to disappear once understood. When this market corrects we will see a rational price on emissions and carbon intensive assets would underperform the market. This leads us to the defining a couple of hypothesis

H_1**: *We can observe a considerable, and statistically significant, carbon risk premium in the Norwegian market***

We detect this in the high returns of the carbon intensive portfolios under both scopes which we interpret as a compensation for taking additional risk. We expect to find that excess return in our Climate Risk Efficient (Efficient-minus-Inefficient) Portfolio cannot be explained by other risk factors. Thus, we expect to find statistically significant, negative, alphas for our Climate Risk Efficient portfolios confirming that while there is a carbon premium the carbon pricing is not yet present enough to adversely affect the price of carbon intensive firms.

H_2**: *We expect the carbon premium, if present, to decrease as pricing increases***

More specifically we will compare the premium over three periods, the first being for our initial years 1997-2004, where there was purely a Norwegian government imposed taxation of carbon. The second period spanning phase I and II of the EU ETS (2005-2012) where a small number of the larger Norwegian firms were affected by the quotas, and the third period between 2013 and the end of 2018, 2013 being the year EU ETS phase III was introduced. In accordance with the findings of Oestreich & Tsiakas (2015) we expect to see a considerable risk premium prior to the introduction of the ETS phase III, identifiable by high returns and significantly negative alphas. Further we expect this premium to decrease as carbon price increase as seen in both In et al. (2017) and Oestreich & Tsiakas (2015), to establish this we will look for a decrease in returns of carbon intensive firms and less negative (or potentially statistically insignificant) alphas.

3. Data and Portfolio Scope Descriptions

This section outlines the data used in the analysis and the construction of the Climate Risk Efficient (CRE) Portfolios under the two different scopes. Section 3.1 describes the definition of the market used in this thesis, the selection of firms and extraction of data on these firms. In section 3.2 and subsequent sections I describe the data and development of the CRE portfolios used for the comparison with the market. Section 3.3 details the source of the risk factors used in the model as well as the risk free rate and the rationale for using oil as variable.

3.1 Defining the Market

This paper looks at all companies listed on the Oslo Stock Exchange (OSE) from 1997 until the end of 2018. Creating a complete list of all companies listed on Oslo Stock Exchange in this period was done by using information on listing changes provided by OSE (Oslo Stock Exchange, 2019). Daily stock price data is extracted from Thomson Reuters Eikon Datastream on all companies as defined by the list above. As we can see from figure 3 on page 23 the total value of the companies listed on OSE was increasing until the financial crisis (marked by the red line), and has since the dip following this been increasing consistently until 2018. The Norwegian market is dominated by a number of large firms, as we can tell from the large difference between the mean and median values for all years (table 3.1)

For the purpose of this paper we will consider an equally weighted market portfolio. There are a number of conflicting views on whether an equally-weighted market portfolio or a market capitalisation-weighted market portfolio is preferred. Market capitalisation-weighted portfolios are found to be more common in developed markets (Bhattacharya & Galpin, 2011), for the Norwegian market I will however argue for the use of an equally weighted market portfolio. This is due to the market being dominated by a small number of larger firms in terms of market value. By using equally weighted portfolios I will thus allow for more of an exposure to risks related to size and value (Plyakha et al., 2012) in the market portfolio which is something that will also be reflected in the later development of the Climate Risk Efficient portfolios. Our equally-weighted market portfolio is calculated as follows

$$R_{mt} = \sum_{i=1}^{N} \frac{r_{it}}{Nfirms_t} \tag{3.1}$$

where r_{it} is the return on stock i at time t and $Nfirms_t$ is the number of stocks in the portfolio at time t. The descriptive statistics of the equally-weighted market portfolio can be found in table 3.1 and the cumulative returns over time and distribution of returns is shown in figure 4 and figure 5 respectively.

Figure 2: 10 Largest Sectors in Represented in Datasample

This figure shows the 10 sectors with the largest number of firms listed on Oslo stock exchange across the 22 years investigated in this thesis.

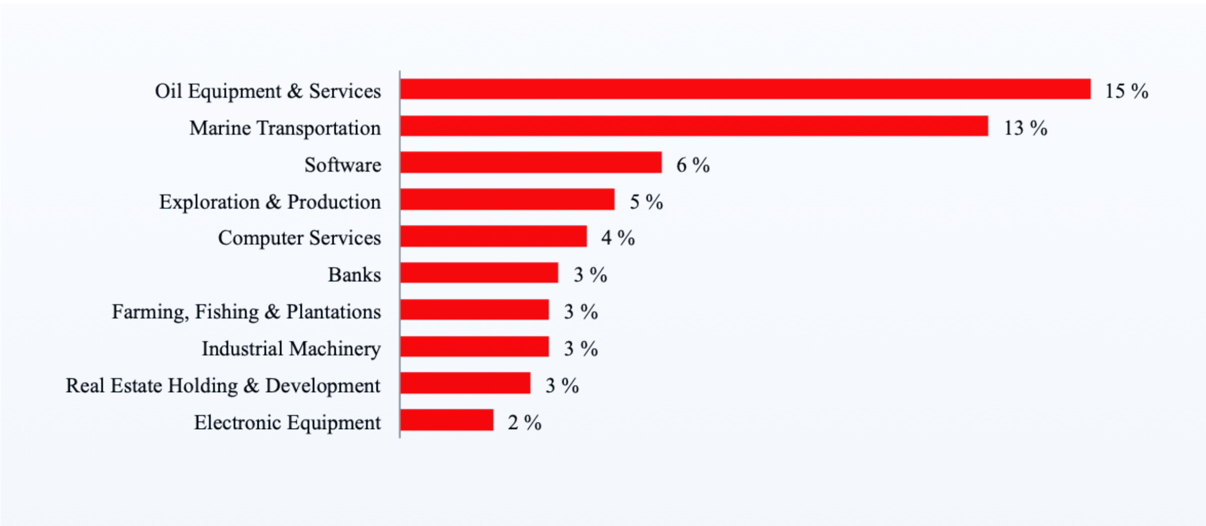


Table 3.1: Market Portfolio Descriptives pr. Year

Table lists the characteristics of the market portfolio per year. The Market Value data is shown in million Norwegian Kroners (mNOK).

		Market value			
Year	Number of Stocks	Min	Max	Mean	Median
1997	146	22.56	79030.13	2468.494247	773.925
1998	185	33.07	82351.69	2790.018757	861.7
1999	206	14.15	58871.72	2109.463058	384.83
2000	189	8.65	91842.63	3159.520899	598.02
2001	187	11.94	99440.63	3556.837487	596.87
2002	184	7.81	134659.5	3954.254565	501.925
2003	177	0.22	128090.8	3093.184294	320.49
2004	154	10.65	163671.4	4938.435714	555.375
2005	163	24.8	206368.3	5935.366258	781.56
2006	190	10	337196.1	7478.534316	1116.31
2007	203	15.33	361828.9	9605.462118	1620.14
2008	213	47	538881.2	10218.21352	1627.96
2009	201	5.47	363186.8	4793.527612	549
2010	188	5.33	461715.9	7838.217394	1004.42
2011	188	35.6	447367	9295.634202	1210.29
2012	180	7.79	494877.9	8539.100722	952.2
2013	173	3.62	443221.8	9320.094798	1197.99
2014	166	17.95	468731	11593.55964	1608.585
2015	167	31.92	418350.3	11368.56844	1286.62
2016	165	4.27	394435.5	11852.03667	1178.83
2017	169	40.14	519207,7	12410.80337	1845.28
2018	165	30.09	582218.8	14745.4863	2301.29

Figure 3: Total Value of All Companies Listed

This figure shows the total value of all companies listed on Oslo Stock Exchange for every year investigated in this thesis.

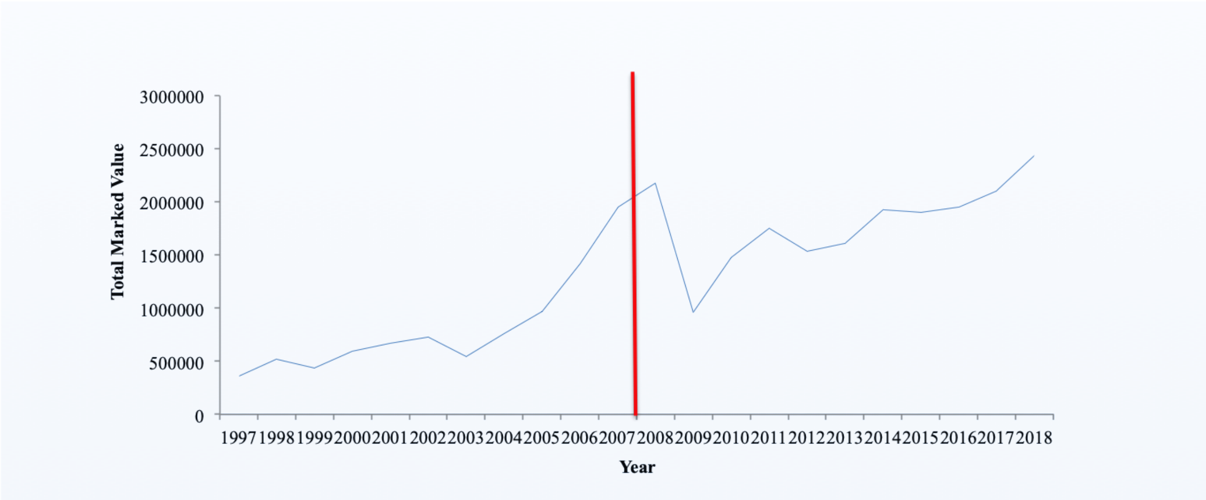


Table 3.2: Market Descriptive Statistics

This table shows the descriptive statistics of the equally weighted market portfolio. The numbers are daily returns expressed as rates.

Measure	Values
Min	-0.0704
Max	0.1230
Mean	0.0002
Std	0.0097
Skewness	-0.3061
Kurtosis	10.3969
Number of observations	4738

Figure 4: Distribution of Market Returns

This figure shows the distribution of market returns for the 22 years. The horisontal axis shows the size of the return and the vertical axis is the frequency of the observed return. The returns are expressed as rates.

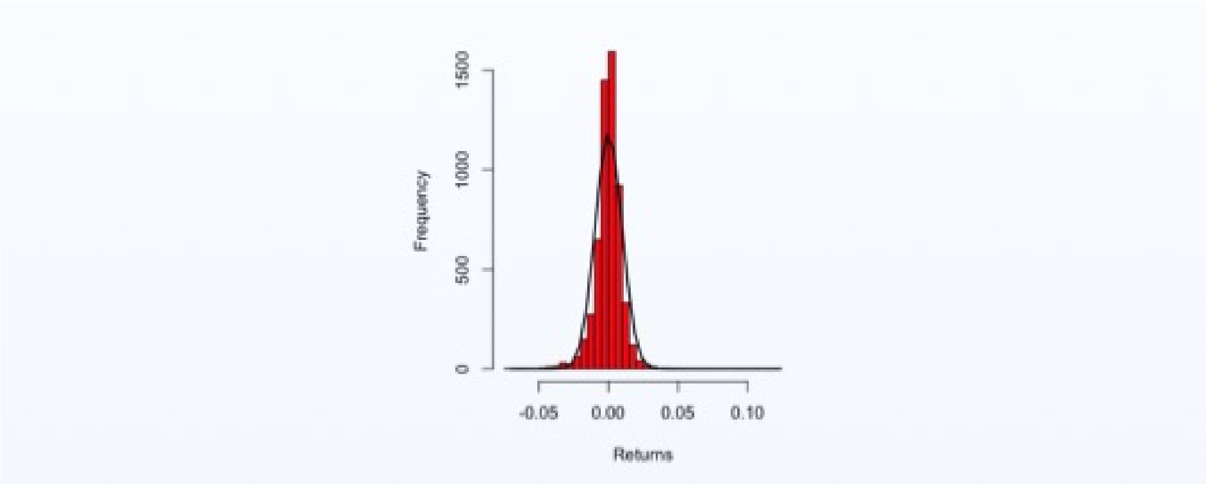
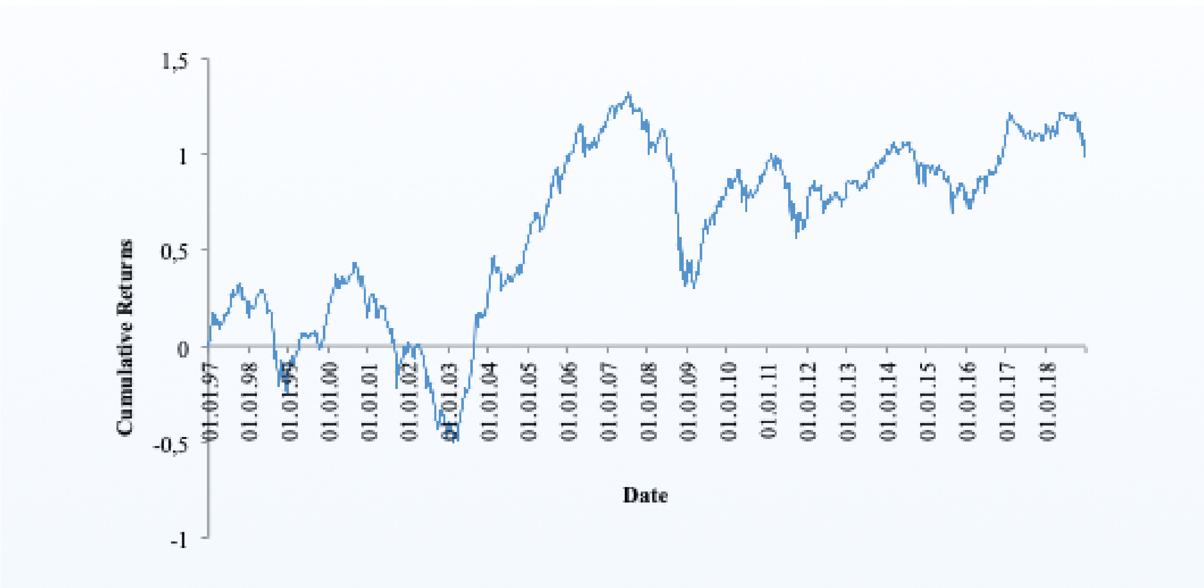


Figure 5: Market Cumulative Returns

This figure shows the cumulative returns of the market portfolio across the 22 years in our sample. The returns are expressed as rates.



3.2 Development of Climate Risk Efficient Portfolios

For the Climate Risk Efficient (CRE) Portfolios I use the dataset as described for the market portfolio. The development of CRE Portfolios in this report is a replication of the method used by In et al. (2017) , with some slight adjustments due to slightly differing data availability. In et al. (2017) constructs an EMI ("Efficient-minus-inefficient") portfolio, going long in efficient and short in inefficient firms, based on carbon efficiency. The EMI portfolio is double sorted to account for size of firms, and is constructed as follows:

$$EMI = 0.5(\text{Small Efficient } + \text{ Big Efficient}) - 0.5(\text{Small Inefficient } + \text{ Big Inefficient})$$

Where the Small(Big) firms are the Bottom(Top) 10% in terms of market capitalization and the efficient(inefficient) firms are the top (bottom) 10%. The CRE portfolios in this report is also constructed based on efficiency, as defined in the following sections. To control for the size of firms I allow for a double sort based on size with larger categories for small/big firm . Our "Big" category is the top 33% in terms of market capitalisation and the "Small" category is the bottom 33%. The portfolios are rebalanced on the first day of each year based on the emissions data for the previous year and the current size of each firm. The creation of the portfolios is done using Rstudio, script can be found in Appendix F on page 115.

3.2.1 Scope 1 - Carbon Pricing Risk

As described in the Literature review (section 2.1.2) one of the two types of Carbon Risk is linked to pricing of carbon as an input. The first definition of a CRE portfolio (scope 1) used in this thesis attempts to capture this risk and is based on the carbon efficiency of production in the primary sector of the firm. I have extracted data from Statistics Norway (SSB) on the efficiency (emissions per gross value of production) of the sector in Norway (SSB, 2018a). The SSB sector is mapped against the ICB sector definitions of each firm provided by Eikons Datastream, this mapping is done using SSB statistics guidance (SSB, 2018b) and ICB sector guidance provided by FTSE Russell (FTSE Russell, 2019). The efficiency ranking of the firms are re-balanced on the first day of every year based on the sector efficiency for the previous year.

3.2.2 Scope 2 - Stranded Asset Risk

The second type of Carbon risk discussed in the Literature review is Stranded Asset Risk. The second scope is designed to capture this, it allows for consideration of climate risk efficiency not only in the input side of a firms operation, but allows for the inclusion of risks associated with holding stranded assets. Under this scope I score all companies fitting with the below description with an additional score for climate inefficiency and replicate the creation of scope 1 Portfolio.

The concept of stranded assets is defined by Caldecott (2014) as assets that have 'suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities'. While stranded assets is an area of much research and identification of more stranded assets is possible in the near future, I will for the purpose of this paper define stranded assets as fossil fuel supply and generation resources (Carbon Tracker, 2017), and identify the following ICB sectors as fitting with this description:

Table 3.3: ICB Stranded Asset sectors

This table contains the sectors we define as being upstream downstream stranded assets. The two sectors marked with a star (*) spans both firms who does and does not fit this description and has as such required consideration on a firm by firm basis.

Industry	Sector	Supersector
0001 Oil & Gas	0530 Oil & Gas Producers	0533 Exploration & Production
0001 Oil & Gas	0530 Oil & Gas Producers	0537 Integrated Oil & Gas
0001 Oil & Gas	0570 Oil Equipment, Services & Distribution	0573 Oil Equipment & Services
0001 Oil & Gas	0570 Oil Equipment, Services & Distribution	0577 Pipelines
1000 Basic Materials	1770 Mining	1771 Coal
7000 Utilities	7530 Electricity	7535 Conventional Electricity
2000 Industrials	2720 General Industries	2727 Diversified Industrials*
2000 Industrials	2750 Industrial Engineering	2757 Industrial Machinery*

3.2.3 Portfolio Construction

To create the portfolios used for the analysis I do, as mentioned, use a double sort on size and CO^2 efficiency. This means that the available data is first split into tertiles depending on size (market value) and then each tertile is split into nine tiles depending on the score described by scope 1 (section 3.2.1) and scope 2 (section 3.2.2) (step 1). I now have four relevant 'bins', big efficient, big inefficient, small efficient and small inefficient which in turn have three 'sub-bins' each. The next step is conducted by creating portfolios from all possible combinations of the two efficient-bins and all possible combinations of the inefficient bins (step 2). This leaves me with nine efficient portfolios and nine inefficient. The final step is to create the CRE-portfolios going long in the efficient and short in the inefficient, I do this for all possible combinations of the two bins and end up with 81 CRE-portfolios (step 3). All the portfolio returns are winsorized at 1% and 99%, this is done to control for outliers in the dataset. Descriptive statistics and distribution of returns can be found in table 3.4 on page 27 and figure 6 on page 28 respectively. Figure 7 on page 29 illustrates the creation of the portfolios, and the R-code used for the development can be found in Appendix F.

Table 3.4: Descriptive statistics CRE portfolios

This table shows the descriptive statistics of the portfolios constructed under Scope 1 and Scope 2. The returns are expressed as rates.

Descriptive Statistic	**Scope 1**	**Scope 2**
Min	-0.06038	-0.0680787
Max	0.05722	0.0583968
Mean	-0.000142	-0.0001217
Median	-0.00008487	0.0001735
Std	0.01634414	0.01797409
Skewness	-0.2168366	-0.2551766
Kurtosis	1.580061	1.534843
Number of observations across portfolios	442 260	443 260
Number of portfolios	81	81
Observations pr portfolio	5460	5460

Figure 6: Distribution of Returns CRE Portfolios

This figure shows the distribution of returns for the portfolios under Scope 1 and Scope 2 over the 22 years. The horisontal axis shows the size of the return and the vertical axis is the frequency of the observed return. The returns are expressed as rates.

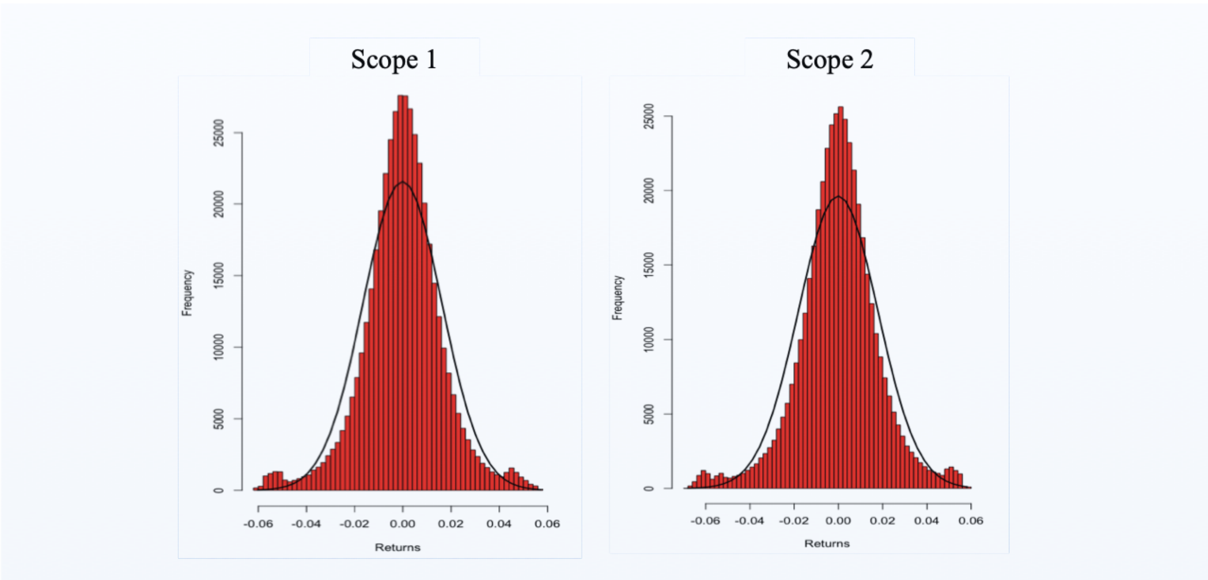
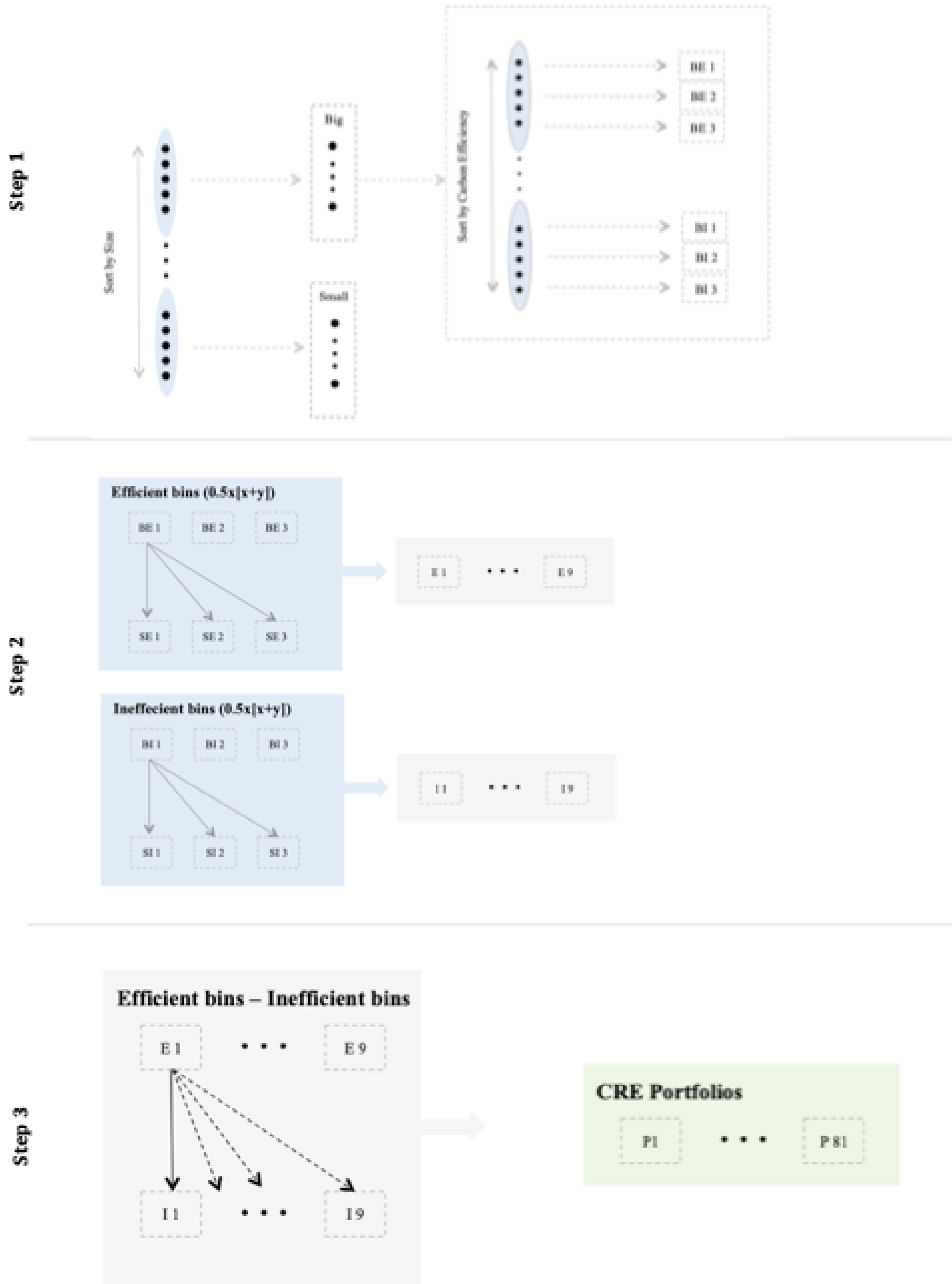


Figure 7: Creation of CRE portfolios



3.2.4 Rationale for Double Sorting by Size

As we know from the Literatire Review, the Fama and French factors are constructed using a double sort, this is a technique I am mimicking when creating the CRE portfolio. The double sort is done to control for one factor when trying to measure another, in our case this factor is market capitalization (size). The rationale for double sorting on size comes from a number of different studies. Some studies show a lack of explanatory power of factor models when portfolios are formed based on size, among these we find Reinganum (1981) and Banz (1981) who found that creating portfolios by firm size decreased the explanatory power of the CAPM. Others find that the problems with estimating the beta are systematically related to a number of different factors, among these size. Rosenberg and Marathe (1977) found that beta estimates improved when adding variables such as dividend yield, trading volume and firm size. Roll (1981) argued that the infrequent trade of shares in small firms could be the explanation for the estimation errors of the betas.For Norwegian firms, a number of studies conclude that we can see a significant size effect. Heston et al. (1995) observed this effect between 1978 and 1990, and Næs et al. (2009) find the same for 1980 til 2006. To isolate the effect of this from the measure of carbon efficiency I will therefore use a double sort. The double sort is done by first sorting the stocks by size and then each size group is sorted by carbon efficiency as described in the data section.

3.3 Variables Used for the Model

3.3.1 Asset Pricing Data for OSE

The excess return of the portfolios in this paper are tested against the CAPM and Fama, French (1996) and Carharts(1997) (FFC) factors to test if any excess return can be explained by these. The FFC factor values for all points in time are extracted from Ødegaard's website which provides these for Oslo Bors, Ødegaards methodology can be found in Ødegaard (2018). Ødegaards factor include Small-minus-big (SMB), High-minus-low (HML), Momentum (PR1YR), an alternative momentum factor (UMD) and Liquidity (LIQ). SMB and HML factors were created by Fama and French (1996) and uses a double sort on Size and Book/Market to construct the factors, as illustrated by the following equations.

$$SMB = average(S/L, S/M, S/H) - average(B/L, B/M, B/H)$$

$$HML = average(S/H, B/H) - average(S/L, B/L)$$

Where the first sort is divides the firms by size into Small (S) and Big (B) and the second sort is done by Book/Market value and splits the firms into three groups by High (H), Medium (M) and Low (L) Book/market value. Carharts momentum factor (1997), PR1YR, calculates each months return over the past eleven months and rank and split the portfolios into three different groups (top 30%, middle 40% and bottom 30%). The factor is then calculated by taking the difference between the top and the bottom group and is recalculated every month. French's Momentum factor, UMD, is calculated in a similar way, but includes a sort on size. The calculation of the Liquidity factor, LIQ, is calculated based on the relative spread (the difference between the bid and ask prices at close and the midpoint price) as described in Næs et al. (2009)

3.3.2 Risk Free Rate

The models I use in this report are all dependant on the existence of a risk free asset, a theoretical size defined as the rate of return of an investment with no risk. In empirical works this is represented by the risk free rate which is static for all points in time (Copeland & Shastri, 2013). There are a number of different guidelines as to the rate to be used as risk free in empirical works, returns on government bonds or overnight rates are often a good reference. In this report I have used Ødegaards estimatons of the risk free rate which can be extracted from his website (Odegaard, 2019) and are an estimation of the overnight rate for each day.

3.3.3 The Price of Oil as a Risk Factor

For the analysis of the risk factors that could explain excess return of the CRE portfolios I have chosen to include the historical daily oil price as a risk factor. This has been done for a number of reasons. Firstly, the Norwegian financial markets are oil-company heavy, from figure 2 we can see that Oil related firms account for approximately 20% of all companies in our sample. Secondly, our CRE portfolios are developed with the aim of capturing the firms exposure to carbon pricing. This will also capture fluctuations in oil price, and it is therefore necessary to control for this variable when we are investigating the climate risk in the market. The price of oil is extracted from Thomas Reuters Datastream and is the price of Crude oil in USD per barrell ("Crude Oil Dated Brent U$/BBL"), to control for exchange rate as the majority of companies listed on OSE are Norwegian I have converted the price in USD to NOK by using data from the Bank of Norway (Norges Bank, 2019).

3.3.4 Time-periods and Scope Structure

The analysis conducted in this thesis considers two scopes that each define a type of portfolio, as well as four different time-scopes. As is explained above scope 1 portfolios are constructed to capture carbon pricing risk and scope 2 portfolios are constructed to capture stranded asset risks. The four time-scopes we consider are firstly a consideration of the whole period, and then a split according to when there has been regulatory changes in the Norwegian market. The three periods are defined as follows

- **Period 1** goes from the beginning of 1997 til the end of 2004
- **Period 2** goes from the beginning of 2005 til the end of 2012
- **Period 3** goes from the beginning of 2013 til the end of 2018

These periods are created based on when there has been a change in the regulatory environment which could translate into an increase in, or an increased likelihood of, a future change in regulation on carbon. As the Norwegian regulation of carbon has only changed marginally since the first introduction of carbon price in 1991 the EU ETS phases have been used to guide the period definition. While the EU ETS only include a few Norwegian companies it can be considered as likely that the introduction of this type of regulation so close to home could affect the investors perception of the risk of increased regulation also in Norway. Table 3.5 show how the analysis is conducted across the different portfolio-scopes and time-scopes.

Table 3.5: Structure of analysis

This table outlines the how the analysis is structured across the different time periods and scopes. The top row are the four different time-periods under which the analysis is done. While the left column are the different scopes, the remaing rows and columns are the different portfolios which the analysis are done on.

	Whole period	**Period 1**	**Period 2**	**Period 3**
Scope 1	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio
Scope 2	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio

4. Methodology

The aim of this section is to introduce the theoretical background for pricing risk factors and the applications used in this report. I start by introducing the basics of Asset Pricing Models and the Fama and French Factor Models before moving on to methods used to evaluate such models. The application on our data and results can be found in subsequent sections.

4.1 Asset Pricing Models

A number of different approaches to asset pricing has been developed, and the insights from can be powerful tools for investors. In this report asset pricing models will be used to establish whether excess return in our CRE-portfolios can be explained by well known risk factors. The aim of such models is to estimate the expected returns for a portfolio by using a set of factors. A good model will typically have high explanatory power (R^2) and low pricing errors (α). We will now take a closer look at the different models applied in this report.

4.1.1 Capital Asset Pricing Model

The aim of this report is to investigate if the excess return of a CRE portfolio can be explained by established models, we therefor start by looking at the CAPM. The CAPM is an attempt to understand the determination of risk premium on financial securities by measuring the systematic risk, β. This is done by regressing the excess return of a portfolio on the excess return of the market. If the market is efficient the intercept, α,should be zero. The theoretical CAPM is expressed as a simple linear model

$$E(R_j) = R_f + [E(R_m) - R_f]\beta_j \tag{4.1}$$

Where $E(R_j)$ is the expected return on portfolio j, $E(R_m)$ is the expected return of the market, R_f is the risk free rate and β_j is the risk premium of the portfolio j to the market. When the CAPM is used for empirics the theoretical CAPM is transformed from expectation (ex ante) form into an ex post form that uses observed data. This is done by assuming that on average the expected rate of return is equal to the realised rate of return (Copeland & Shastri, 2013). The resulting formula is as follows

$$R_{jt} - R_{ft} = (R_{mt} - R_{ft})\beta_j + \varepsilon_{jt} \tag{4.2}$$

Where $(R_{jt} - R_{ft})$ is the excess return on portfolio j at time t, $(R_{mt} - R_{ft})$ is the excess return of the market at time t, β_j is the risk premium of portfolio to the market at time t and ε_{jt} is the random-error term. When the empirical testing is done the result is presented on the following form

$$R'_{pt} = \gamma_0 + \gamma_1\beta_p + \varepsilon_{pt} \tag{4.3}$$

Where R'_{pt} is the excess return of the portfolio p, γ_1 is the excess return of the market and γ_0 is the intercept or the alpha (α) and should not be significantly different from zero. If the alpha is significantly different from zero this means that the risk premium cannot be explained by the excess return of the market and it leaves the possibility open for additional explanatory factors.

4.1.2 Fama and French Factor Models

In addition to investigate if the excess return in the CRE portfolios can be explained by the excess return of the market this report tests if excess return can be explained by the factors defined by Fama and French. Similar to how the CAPM attempts to explain risk premiums with the excess return of the market, the fama-french models attempt to do the same with observed anomalies in the market. As with the CAPM this is done by regressing the excess return of a portfolio on a number of factors. If the portfolio is efficient the intercept, α,should be zero. The first model we consider is the three factor model which was presented by Fama & French (1993) and is expressed as a simple linear model

$$R_{it} - R_{Ft} = \alpha_i + b_i(R_{Mt} - R_{Ft}) + s_iSMB_t + h_iHML_t + \varepsilon_{it} \tag{4.4}$$

Where $(R_{it} - R_{Ft})$ is the excess return of the portfolio, $(R_{Mt} - R_{Ft})$ is the excess return of the market, SMB_t is the return of a diversified portfolio of small stocks minus the return of a diversified portfolio of big stocks. HML_t is the difference between the diversified portfolios of high and low B/M stocks and ε_{it} is a zero mean residual. b_i, s_i and h_i are the factor exposures of the portfolio i.

The five factor model (Fama & French, 2015) is an expansion of this model and considers the evidence from Novy-Marx (2013), Titman et al. (2004) and a number of others which indicates that the three factor model is incomplete. The new version of the model includes a measure of profitability and investment and is expressed as follows

$$R_{it} - R_{Ft} = \alpha_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + \varepsilon_{it} \tag{4.5}$$

RMW_t is defined as the difference between the returns on diversified portfolios of stocks with robust and weak profitability and CMA_t is defined as the difference between the returns of portfolios of the stocks of low and high investment firms (conservative or agressive firms). As for the CAPM we can see if al the variation in expected returns is captured by these risk factors if the intercept (α_i) is equal to 0 for all portfolios. If the intercept is significantly different from zero this indicates that there are risk factors that are not included in the model.

For our analysis we will, as described in section 3.3.1, use the factors calculated by Odegaard (2017) for the Norwegian market. The size factor (SMB) and book-to-market factor (HML) are constructed in the same way as the Fama and French factors described above. In addition to these factors we use Carharts momentum factor (PR1YR) and a liquidity factor based on the relative spread of the bid and ask price at the close to the midpoint price (LIQ).

4.1.3 Definition of Models

As described in the above section we will use the Capital Asset Pricing Model as well as Fama and French factor models to asses the portfolios exposure to common risk factors. We will also include a variable for oil price as discussed in section 3.3.3. In the tables below you can find the specification of the models we use as well as the variable definition.

Table 4.1: Model Definition

This table contains the final specification of the model used for the analysis in this thesis.

Model Name	Definition
CAPM+OIL	$R_{it} = \alpha_i + \beta_m R_{mt} + \beta_o OIL_t + \varepsilon_{it}$
FF3 + OIL	$R_{it} = \alpha_i + \beta_m R_{mt} + \beta_o OIL_t + \beta_s SMB_t + \beta_h HML_t + \varepsilon_{it}$
FF5 + OIL	$R_{it} = \alpha_i + \beta_m R_{mt} + \beta_o OIL_t + \beta_s SMB_t + \beta_h HML_t + \beta_p PR1YR_t + \beta_l LIQ_t + \varepsilon_{it}$

Table 4.2: Variable Definitions

This table contains the definitions of variables used in our regressions.

Variable	Definition
R_{it}	Excess return of CRE portfolio i at time t
R_{mt}	Excess return of the market at time t
OIL_t	ln[$oilprice_t$ / $oilprice_{t-1}$]
SMB_t	Size Factor (Small-Minus-Big)
HML_t	Ratio of Book/Market (High-Minus-Low)
$PR1YR_t$	Carharts Momentum Factor
LIQ_t	Liquidity Factor

4.2 Further Analysis of the Intercept

4.2.1 Evaluating the Models

We wish to evaluate the ability of the factor models to estimate the exposure to known risk factors by assessing whether the alphas of all the portfolios are jointly significantly different from zero. If not stated otherwise the following text is based on Cochrane (2005) chapter 12.

To compare the asset pricing models and check if we have significant αs across all test portfolios we will use the test developed by Gibbon, Ross & Schanken (1989), from now reffered to as the GRS-test. GRS is a modified F-test to evaluate model performance. This model estimates the regression on the full set of test portfolios (i) and tests if all intercepts ($\alpha_i, i = 0, ...N$) jointly equal zero. GRS tests the hypothesis (H_0 :) that $\alpha_i = 0\forall_i$. In addition to this it checks if some linear combination of the factor portfolios is on the minimum variance boundary and that each factor portfolio is multifactor minimum variance (Diether, 2001). For the specification that $\alpha = 0$ the GRS-test is represented on the following form

$$\frac{T}{N} \times \frac{T-N-L}{T-L-1} \times \frac{\hat{\alpha}'\hat{\Sigma}^{-1}\hat{\alpha}}{1+\bar{\mu}'\hat{\Omega}^{-1}\bar{\mu}} \sim F(N, T-N-L) \tag{4.6}$$

where N is the number of test portfolios in the dataset, L is the number of factor portfolios used and T is the number of timeperiods. $\hat{\alpha}$ is an $N \times 1$ vector of the estimated intercepts,$\hat{\Sigma}$ is an unbiased estimate of the residual covariance matrix, $\bar{\mu}$ is a $L \times 1$ vector of the portfolios' sample means, $\hat{\Omega}$ is an unbiased estimate of the factor portfolios' covariance matrix. The resulting GRS-statistic is equal to zero if $\alpha_i = 0\forall_i$, the GRS statistic will grow with the value of the αs

The GRS-statistic is calculated using the method found in Diether (2001) lecture slides and the R-code is inspired by the code used in Hoel & Mix (2016) and can be found in Appendix F

4.2.2 Pricing the Risk Factors

The final part of the analysis is testing what, and if, risk factors are priced in the market. I do this by studying the cross-sectional variance in returns for the portfolios with regards to our risk factors in questions. I attempt to identify a priced alpha risk which can be attributed to the definition of Climate Change Risk for the respective portfolio. The approach I have chosen to use for this is the Fama and Macbeth (1973) two step regression. Fama and Macbeths procedure starts with finding the beta estimates with a time series regression. The second step is to run a cross-sectional regression at each time period as can be seen below for a one factor model

$$R_t^{ei} = \beta_i' \lambda_t + \alpha_{it} \quad i = 1,2,....,\text{N for each } t \tag{4.7}$$

following this λ and α_i are estimated as the average of the cross sectional estimates

$$\hat{\lambda} = \frac{1}{T}\sum_{t=1}^{T}\hat{\lambda}_t \tag{4.8}$$

$$\hat{\alpha}_i = \frac{1}{T}\sum_{t=1}^{T}\hat{\alpha}_{it} \tag{4.9}$$

and use standard deviations of the cross sectional regression estimates to generate sampling errors for these estimates

$$\sigma^2(\hat{\lambda}) = \frac{1}{T^2}\sum_{t=1}^{T}(\hat{\lambda}_t - \hat{\lambda})^2 \tag{4.10}$$

$$\sigma^2(\hat{\alpha}_i) = \frac{1}{T^2}\sum_{t=1}^{T}(\hat{\alpha}_{it} - \hat{\alpha}_i)^2 \tag{4.11}$$

$1/T^2$ is used as we are finding standard errors of sample means, σ^2/T. This procedure is quite intuitive as sampling error is simply put the how a statistic would vary from one sample to the next. If there was only one sample this would not work, but by allowing for a split in the sample it is possible to estimate variation across samples using the variation in $\hat{\lambda}_t$.

While I will run the regressions with full sample betas the regression can be run using a rolling time window with a GMM-estimation (as done by Naes et al. (2008)). The risk of running the regression on full sample betas is that we carry on the estimation risks from the first step Fama-Macbeth estimation and could potentially end up with more significantly priced risks. Cochrane (2005) does however state that an analysis of the full period betas gives good results and for simplicity this is the method I will use in this thesis. R-code for the Fama-Macbeth regression can be found on page 115, we have used a clustering function developed by Arai (2015) for parts of the analysis, link to documentation can be found in references.

5. Results

In this section we apply the methodology presented in section 4 and discuss the results of the analysis. We will consider both the hypothesis that are outlined earlier in the thesis and answer our research questions. A number of analysis has been done during the investigation, to make the reading experience better the majority of the output from these have been added to the Appendix which starts on page 61.

5.1 Efficient and Inefficient Portfolios

We start our analysis by looking briefly at how the efficient and inefficient portfolios behave. Investigating this is a good way of establishing in what way the two types of portfolio that are combined to make the CRE-portfolios are exposed to the different risk factors we consider in our models.

5.1.1 Return and Factor Exposures of Efficient and Inefficient Portfolios

Our analysis begins with a consideration of the means and factor exposures of the efficient and inefficient portfolios, by doing this we hope to establish if the portfolios capture the wanted risks. All results discussed in this section can be found in Appendix B which begins on page 65. First we take a look at the mean daily returns, this is calculated as the average daily returns of each portfolio across all years. The mean daily returns for the efficient and inefficient portfolios can be found in table B.1. We observe that the mean return of both inefficient and efficient portfolios are slightly higher than the market average daily returns of 0.02%. Under scope 1 the efficient portfolios does, on average, outperform the inefficient portfolios (0.02916% average daily returns for efficient portfolios and 0.02905% for inefficient portfolios), while for scope 2 inefficient portfolios outperform efficient (0.02819% for efficient and 0.03463% for inefficient).

We assess the factor exposures by looking at the results of the CAPM, FF3 and FF5 regressions. We start by looking at **scope 1**, tables B.5, B.13 and B.21 show the results of the CAPM, FF3 and FF5 respectively. The models have reasonable explanatory power for the excess return of the efficient and inefficient portfolios with an R^2 of 35% for efficient portfolios and 33% for inefficent portfolios, R^2 increases slightly from CAPM to FF5 as more variables are added. Both of the portfolio types seem to have a high co-variation with the market with coefficients close to 1 for all models, indicating that when the excess return of the equally weighted market portfolio change by x% the excess return of our efficient and inefficient portfolio will change similarly (cet. par.). The market is also significant at a 1% level for all portfolios under scope 1. The other variables have a varying degree of significance for the excess return of the efficient and inefficient portfolios under scope 1. The log change in oil price (OIL) is negative and significant, although reasonably small (between -0.01 and -0.03) for all efficient portfolios, which means that even though they are less dependant on oil as an input than inefficient firms an increase in the price of oil adversely affect the excess return of the stocks, this could be a reflection of the general exposure to oil price of the Norwegian stock market. For the inefficient portfolio oil price change is a less significant variable, and the portfolios that have significant coefficients for for the oil variable have show positive values, thus some of the inefficient firms under scope 1, which we define as carbon inefficient, seem to benefit from an increase in oil price. The oil price dependence of the excess return is a good way to establish how a portfolio is exposed to carbon, we can for example see from the above that it is likely that scope 1 inefficient portfolios contain a significant number of firms with output exposure to oil price as the price increase in oil leads to an increase in stock returns. Finally, as can be expected from observing the average returns being higher than the return of the market the alphas are positive and quite small, with a varying degree of significance.

Looking at the factor exposures of the portfolios under **scope 2** we observe that it is quite similar to that under scope 1. Tables B.6, B.14 and B.22 show the returns of the CAPM, FF3 and FF5 for scope 2. R^2 is slightly higher for the portfolios under this scope, this is particularly the case for the inefficient portfolios. The inefficient portfolios under this scope have higher market betas, and as the market increase my x% the excess return of the inefficient portfolios increase by more than the market. Under scope 2 the inefficient portfolio have higher, and more significant, oil betas which highlight how this portfolio capture firms with exposure to oil/carbon in their output. To investigate the Carbon Risk premium we will now move on to look at the CRE-portfolio.

5.2 Climate Risk Exposure Across All Years

In this section we address our first hypothesis as outlined in section 2.3. We investigate the returns of the CRE- portfolios and if there is a detectable, statistically significant, alpha across the years which can be identified as a Climate Change Risk Premium. Finally we check if this is a priced risk factor across all years in question.

5.2.1 Return of the CRE portfolios

As discussed in the Literature Review an increased threat of emissions regulation could translate into an increased return for carbon intensive firms as compensation for the additional risk. For our portfolios this would show as a decrease in excess return. We will interpret this as the as the Carbon Risk Premium and expect that as the cost of carbon increases this premium will become smaller as the costs increase for the firms and impact profitability and returns. The portfolios under **scope 1** are developed to capture carbon pricing risk, the average return of these portfolios can be found in table C.1 on page 87. On average scope 1 portfolios have a mean return of -0.0001 across the 22 years. From figure 8, which show the cumulative returns over the 22 years, we see that Scope 1 (red line) perform better than the market until January 2004, where we see a downturn.After this the cumulative returns of the scope 1 portfolio are below the market cumulative returns. **Scope 2** returns are found in the same table as the means for scope 1 (Appendix C). The distinction between scope 1 and scope 2 portfolios is what type of firms they go short in, scope 2 goes short in carbon inefficient firms that can also be exposed to stranded assets risk as they are upstream/downsteam stranded assets. As we can see from the cumulative returns plot in figure 8 scope 2 performs similarly to scope 1 until the end of 2003, after which we observe consistent negative returns for a number of years. The observed returns open for the possibility of a risk premium being present in the market. To further investigate this we will test the portfolio against known risk factors to see if these explain the excess returns or if we have significant alphas across the portfolios.

Figure 8: Cumulative Returns of Portfolios (all years)

This figure shows the cumulative returns of the equally weighted market portfolio (blue) as well as the cumulative returns of a equally weighted portfolio of all portfolios under scope 1 (red) and scope 2 (green) across all the years we have investigated in this thesis.

5.2.2 Factor Exposures

The factor exposures of the portfolios are investigated by regressing the excess returns against three different models with known risk factors. We are mainly concerned with the significance and value of the intercepts. The results of the regressions can be found in appendix D and show the coefficients for each of the risk factors with the level of significance shown by the number of stars. All regressions are run on daily data and the result should be interpreted with this in mind. For the regressions run on portfolios under **scope 1** we find no significant intercepts, and a varying degree of significance of other variables. For **scope 2** we find a couple of intercepts that are significant, all of these are negative, which show negative abnormal return of the CRE-portfolios under scope 2. This could be interpreted as a risk premium associated with investing in stranded assets. Table 5.1 show the R^2 of the models under the different scopes, as we can see all of the models fail to explain most of the variation in the portfolios. We will now move on to investigate whether the intercepts are jointly significantly different from zero across the portfolios.

5.2.3 Investigating the Intercepts

In the above section we established that the alphas for the majority of the portfolios and models were not significant. As discussed in section 4.2.1 establishing a significant alpha across portfolios and comparing the models is key to understanding pricing errors, we do this by conducting a GRS-test for our three models across all portfolios. The GRS-test checks if the intercepts are jointly significantly different from zero. Table 5.1 show the results of estimated regressions as well as the average absolute value of the intercepts and the R^2 for all three models under both scopes. A models ability to explain the excess return of a portfolio is indicated by a low GRS-value, a high p-value would indicate that we could not reject the null hypothesis that the intercepts are jointly zero. As we can see from the GRS-scores in table 5.1 for both **scope 1 and scope 2** we can reject the null hypothesis that the intercepts are jointly zero. This means that the excess return in all models are not satisfactory explained by the risk factors included in the model. This is consistent with (In et al., 2017) who found a significant alpha for their EMI-portfolios in the American Market. Although a significant alphas does indicate abnormal returns it does not necessarily mean a significantly priced risk premium in the market, we will investigate if this is the case with a Fama-Macbeth regression.

Table 5.1: GRS-test Results (All years)

This table shows the results of the GRS-test run on all three models under both scopes. We regret the null hypothesis that the intercepts are jointly zero if the p-value is higher than 0.1. The table also shows the average absolute value of the intercepts as well as the R^2 of the models.

	GRS	**p-val**	**A|α_i|**	R^2
Scope 1				
CAPM + OIL	3.00389	1.3074e-17	0.00015	0.00515
FF3 + OIL	3.05868	3.0756e-18	0.00014	0.01171
FF5 + OIL	3.08069	1.7149e-18	0.00012	0.01492
Scope 2				
CAPM + OIL	2.80094	2.52068e-15	0.00012	0.04066
FF3 + OIL	2.82770	1.27237e-15	0.00013	0.04751
FF5 + OIL	2.82958	1.21289e-15	0.00013	0.04909

5.2.4 Pricing the Risk Factors

Section 4.2.2 outlines why risk factors for cross-sectional and time-series data are not accurately priced by normal regressions. We have therefore used a Fama-Macbeth regression to attempt to price the risk factors, the results for the whole period can be found in table E.1 on page 111. As we can see from these results there are no priced risk factors for our portfolio across the 22 years. There are a number of different explanation for this, firstly, as was discussed in the Literature Review anomalies in the markets that can potentially lead to abnormal returns have a way of correcting themselves as soon as participants become aware of their existence. Oil price risk not being priced is consistent with Naes et al. (2008) who found that oil price was not a priced risk factor in the Norwegian market. We will now move on to consider if climate change risk is something we can identify for shorter time periods.

5.3 Change in Climate Risk Exposure Over Time

In this section we address our second hypothesis as outlined in section 2.3. We investigate the returns and risk premiums over three different periods. The first going from 1997 til 2004 (Period 1), the second from 2005 til 2012 (Period 2) and the final from 2013 til 2018 (Period 3). Our main objective is to establish whether there has been a change over time.

5.3.1 Return and factor exposures of the CRE portfolios

Our hypothesis is that there has been an increased risk premium for Climate change risk over time as regulations have become more present, and increased regulation more plausible. Table 5.2 show the average daily returns for all the portfolios under the two scopes. As we can see there was a decrease in returns for the portfolios between period 1 and period 2, while we see and increase in return for both types of portfolios from period 2 to period 3. These changes are larger for portfolios under scope 2 than under scope 1. In figure 9 we see how the cumulative returns under the three periods differ. While we for period 1 see that portfolios for scope 1 and scope 2 periodically outperform the marked but that they both drop towards the end of the period, we see them perform consistently worse than the market in period 2. For period 3 we observe the two CRE-average portfolios underperform the market until approximately October 2014, from October 2014 we observe a large increase in cumulative returns for the Scope 2 portfolio. This increase in returns for a portfolio going short in stranded assets, which are in the case of the Norwegian market heavily dominated by firms in oil exploration and production. As such it is unsurprising as it coincides with the substantial decrease in oil price that we have seen since the summer of 2014 (NRK, 2016).

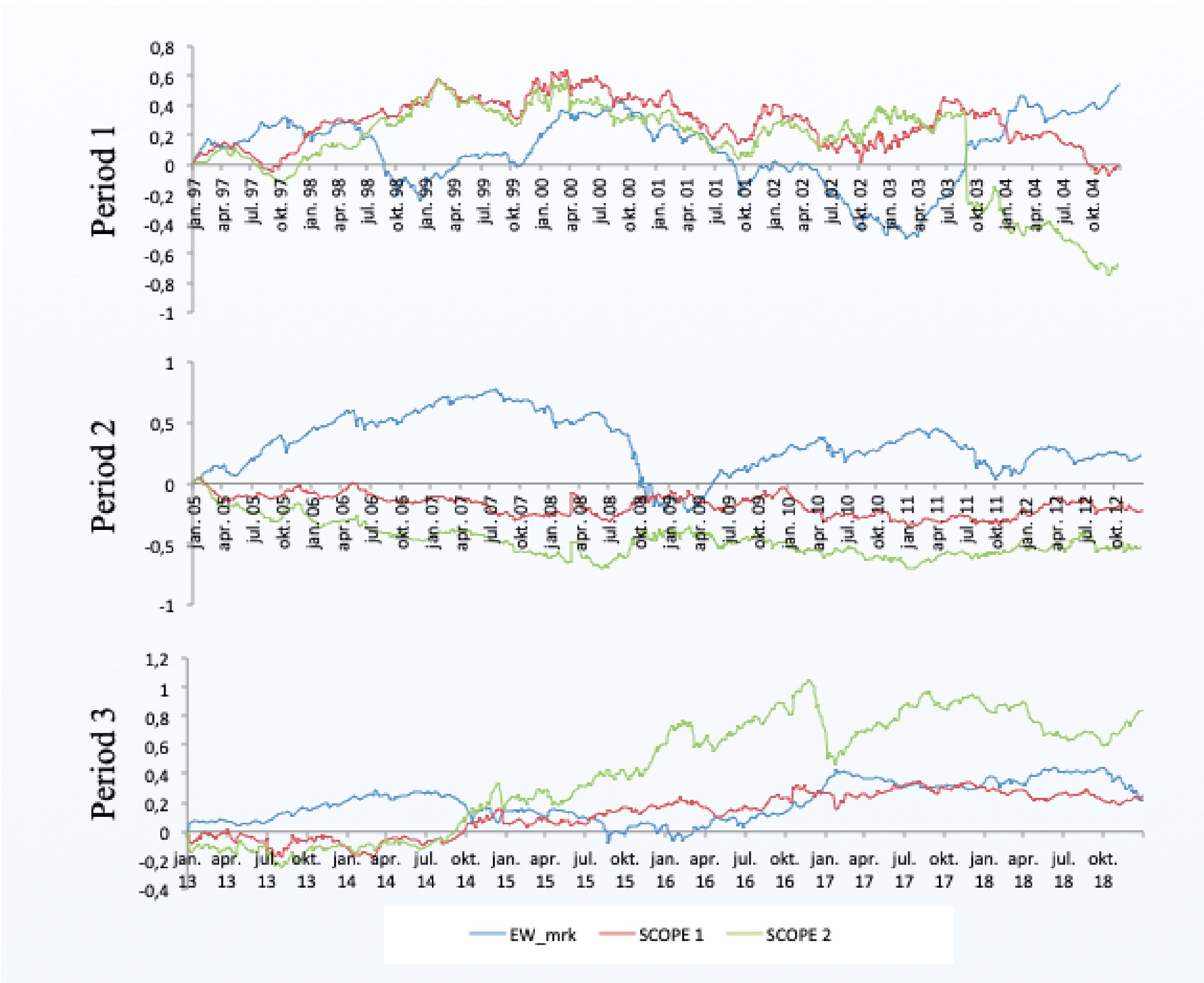
Table 5.2: Mean returns all portfolios (P1-P3)

This table show the mean returns of the portfolios under scope 1 and 2 across the three periods. The returns are expressed as rates.

	Period 1	**Period 2**	**Period 3**
Scope 1	-0.00006	-0.00009	0.00018
Scope 2	-0.00016	-0.00031	0.00067

Figure 9: Cumulative Returns of Porfolios (Period 1-3)

This figure shows the cumulative returns of the equally weighted market portfolio (blue) as well as the cumulative returns of a equally weighted portfolio of all portfolios under scope 1 (red) and scope 2 (green) across the three periods we have investigated in this thesis.



We will now consider the factor exposures for our model under the different scopes (tables can be found in Appendix D). We start by observing the factor exposures of the portfolios under **scope 1** across the three periods. For *period 1* we observe a small number of significant intercepts, which are all negative. As factors are added into the model we get fewer significant intercepts, but a number of the Fama-French factors are significant. The portfolios have a number of significant market betas, most of which are positive. We find some significant oil price coefficients, most of which are negative. For *period 2* we find a similar number of significant, and negative alphas. For the CAPM the market beta is mostly negative but becomes positive as more factors are added to the model, in addition to this we find that a number of the portfolios have significant coefficient for the Fama-French factors. We find negative oil price coefficients in this period. In the final period (*period 3*) we observe that there are a couple of significant alphas but that they are now positive, reflecting the increase in excess return of the portfolio we observed in the cumulative returns plot. As for the whole period we observe that there are a number of factors that are significant and thus explain some of the excess return for the portfolios under scope 1. We do however know, that as for the whole period, the models for the sub-periods only explain a few percent of the variation in excess return (table 5.3 on page 50).

For **scope 2** the picture is quite similar to that of scope 1 for the two first periods. We have small numbers of significant alphas which are negative and very small. The market beta is positive in period 1 but negative for periods 2 and 3. The market betas are significantly higher for the portfolios during period 3 indicating that more of the excess returns can be explained by the market. For period 3 the alphas are positive, as for scope 1 this was expected as we know the portfolio outperform the market for large parts of this period. We do, as for scope 1 observe a number of significant variables across the models. We see from table 5.3 on page 50 that our models only explain some of the variation in excess returns. The returns of scope 2 are however best explained by the models during period 3. We will now move on to investigate the intercepts further.

5.3.2 Investigating the Intercepts

As for the whole period we have run a GRS-test on the intercepts of each period to establish whether it is significantly different from zero across all portfolios. The results of the test for the three periods can be found in table 5.3. We find that the intercepts are significantly different from zero for **scope 1** during period 1 and period 2 at the 1% level, and reject the null that the intercepts are jointly 0. For period 3 the we can reject the null at the 5% level for the CAPM + OIL model, while the FF3 and FF5 are rejected at the 10% level. For **scope 2** the we reject the null that all alphas are jointly zero at the 1% level for Period 1 and 3 and at the 5% level for period 2. We have now established that alphas are significantly different from 0 across all periods and both scopes, this could indicate that there is a climate risk premium present in the market. We will now look at whether this premium is priced in any of the three periods.

Table 5.3: GRS-test Results (P1-P3)

This table shows the results of the GRS-test run on all three models under both scopes for each of the three different time periods we are considering. We reject the null hypothesis that the intercepts are jointly zero if the p-value is higher than 0.1. The table also shows the average absolute value of the intercepts as well as the R^2 of the models.

	Scope 1				Scope 2			
	GRS	***p-val***	***A***$\lvert\alpha_i\rvert$	R^2	***GRS***	***p-val***	***A***$\lvert\alpha_i\rvert$	R^2
Period 1								
CAPM + OIL	1.7292	8.2891e-05	0.00034	0.0314	1.7831	3.2547e-05	0.00039	0.0189
FF3 + OIL	1.7388	7.0381e-05	0.00031	0.0484	1.7343	7.6125e-05	0.00037	0.0379
FF5 + OIL	1.7145	0.00011	0.00026	0.0551	1.6986	0.00014	0.00033	0.0432
Period 2								
CAPM + OIL	1.7583	5.0011e-05	0.0003	0.0291	1.5605	0.0013	0.0004	0.0769
FF3 + OIL	1.7789	3.4885e-05	0.0003	0.0361	1.5736	0.001	0.0004	0.0819
FF5 + OIL	1.7660	4.3816e-05	0.0003	0.0394	1.5608	0.0013	0.00038	0.0865
Period 3								
CAPM + OIL	1.2834	0.0495	0.0002	0.0239	1.6555	0.0003	0.0007	0.1249
FF3 + OIL	1.2801	0.0513	0.0003	0.0279	1.6245	0.0005	0.0008	0.1298
FF5 + OIL	1.2169	0.0971	0.0003	0.0307	1.6270	0.0005	0.0006	0.1444

5.3.3 Pricing the Risk Factors

As we remember from our hypothesis we expect to see a priced risk premium as regulation becomes more likely. For the whole period we remember that a significant climate risk premium could not be confirmed. We will now investigate if the alpha, or what we interpret as climate change risk premium, is priced in the different time periods. We do this by running a Fama-Macbeth cross-sectional regression on all of the portfolios for each period. The results of these tests can be found in tables E.2 to E.4. By looking at the results of these cross-sectional regressions we see that climate risk has not been priced for either of the portfolio scopes across the three periods we have investigated. This implies that none of the regulations put in place, or threat of regulations, have been enough for the market to add a priced risk premium across the periods we are considering. Leaving us with the possibility that to correct for the market failure of pricing the carbon externalities we need more intrusive regulations or alternative approaches to correcting the externalities.

6. Conclusion and Discussion

6.1 Answering the Research Questions

In this thesis we investigate the presence of Carbon Risk, a type of Climate Change Risk, in the Norwegian Stock Market. We attempt to capture Carbon Pricing Risk and Stranded asset Risk by going long in efficient and short in inefficient firms based on sector averages of emission from SSB (2018) and Caldecott (2014) definition of Stranded Assets. Through our analysis we find small, but significant, alphas which we interpret as a sign of a small risk premium for exposure to Carbon risk. The results of the further analysis does however show that this premium is not priced. We interpret this as there not being a perceived risk among investors related to pricing of carbon or the possibility of fossil fuels becoming obsolete.

We address three main questions in the thesis. Firstly we look at whether, by basing a trading strategy on the publicly available information on emissions, you can earn abnormal returns. We find that that when looking at the period as a whole both of the CRE-portfolios perform worse than the market. If we isolate different periods we do however observe that both during the first and the final period this is not the case. The portfolios designed to capture Carbon Pricing Risk (scope 1) performs on par with the market for most of period 1 and period 3, but performs consistently worse during period 2. Our scope 2 portfolios, which go short in firms that are exposed to stranded asset risks perform on par with the market during period 1, and from mid-2014 exhibits large positive cumulative returns beating the market portfolio by a substantial amount. This is consistent with the findings of In et al. (2017) who found the same for the American market after 2009. It is however worth noting that this increase in returns of the CRE scope 2 portfolios coincides with the drastic drop in oil price we have observed since the summer of 2014 and as such is likely caused by this rather than any government, or otherwise imposed, regulation.

Secondly we consider whether any excess return can be explained by known risk factors. We find that although a number of the known risk factors are significant they fail to explain the majority of variation in returns of our portfolios. We do however find a number of significant intercepts for our portfolios. Finally we investigate the significance of these intercept, which we based on the constructed portfolios identify as Carbon pricing risk premium (scope 1) and Stranded asset risk premium (scope 2). We conduct a GRS-test and find that the alphas are significantly different from zero for both scope 1 portfolios and scope 2 portfolios. Our interpretation of this is that there is a small, but significant, risk premium for both carbon pricing risk and stranded asset risk. Further to this we investigate the pricing of this risk using the Fama-Macbeth cross-sectional regression and find that there is no priced risk premium for what we interpret as Carbon Risk.

Initially we developed two hypothesis based on the findings of Oestreich & Tsiakas (2015) who conducted a somewhat similar analysis on the German and UK markets. The first one was that we would observe a considerable, and statistically significant Carbon Risk Premium in the Norwegian Market, our second hypothesis was that we would see this premium decrease as pricing of carbon increased. Based on the above we reject both of these hypothesis. Even though the Norwegian government attempts to correct the market failure of pricing carbon we are not able to detect a significantly priced risk premium in the Norwegian market for any of the periods.

6.2 Final Remarks and Further Research

The results found in this thesis highlight some interesting shortcomings when it comes to both investor risk perception and regulations imposed to correct the market failure. We do however have to consider that the results are entirely defined by, and a result of, the initial choices made during the portfolio construction. As we saw from section 5.1 it is likely that scope 1, designed to capture Carbon Pricing Risk on the input side, does also have some degree of exposure to stranded asset risk and as such we can question its ability to capture the wanted risk. This could possibly have been corrected by using actual emissions per firm rather than sector averages. However, as of May 2019 (the time of writing) there are no requirements, or even official guidelines, for reporting of emissions in Norway and this made sorting the firms according to actual emissions impossible. Arguably, using the sector averages does not impact the validity of this study if one defines market efficiency as it being able to reflect *publicly available information* (semistrong-form efficient market, Malkiel & Fama (1970)) and our conclusion that the market does not accurately price carbon risk holds under this assumption.

There are, however, a number of different approaches one could take to defining efficient and inefficient firms from carbon efficiency. A number of firms publish their emissions per income or profit in their annual report, future research could thus be conducted on a smaller sample containing the firms that do publish this. If research is conducted in a similar manner to that of this thesis, one could expand the analysis by creating a risk factor from the CRE-portfolios (equally weighted portfolio) and running it as a right hand side variable alongside the Fama-French factors against industry or otherwise constructed portfolios as is done in Oestreich & Tsiakas (2015).

References

Andersson, M., Bolton, P. & Samama, F. (2016). Hedging climate risk. *Financial Analysts Journal*, *72*(3), 13–32.

Arai, M. (2015). *Cluster-robust standard errors using r.* Retrieved from http://www.ne.su.se/polopoly_fs/1.216115.1426234213!/menu/standard/file/clustering1.pdf (Last accessed 18. May 2019)

Banz, R. W. (1981). The relationship between return and market value of common stocks. *Journal of financial economics*, *9*(1), 3–18.

Bhattacharya, U. & Galpin, N. (2011). The global rise of the value-weighted portfolio. *Journal of Financial and Quantitative Analysis*, *46*(3), 737–756.

Black, F., Jensen, M. C., Scholes, M. et al. (1972). The capital asset pricing model: Some empirical tests. *Studies in the theory of capital markets*, *81*(3), 79–121.

Brundtland, G. H., Khalid, M., Agnelli, S. & Al-Athel, S. (1987). Our common future. *New York*.

Bruvoll, A. & Larsen, B. M. (2004). Greenhouse gas emissions in norway: do carbon taxes work? *Energy policy*, *32*(4), 493–505.

Caldecott, C., Tilbury. (2014). *Stranded assets and scenarios discussion paper.* Retrieved from https://www.smithschool.ox.ac.uk/research/sustainable-finance/publications/Stranded-Assets-and-Scenarios-Discussion-Paper.pdf (Last accessed 1. April 2019)

Carbon Tracker. (2017). *Stranded assets.* Retrieved from https://www.carbontracker.org/terms/stranded-assets/ (Last accessed 1. April 2019)

CICERO. (2017). *Shades of climate risk, categorizing climate risk for investors.* Retrieved from https://cicero.oslo.no/en/publications/internal/2858 (Last accessed 15. April 2019)

Cline, W. (2004). *In global crises, global solutions, edited by bjorn lomborg*. Cambridge University Press.

Cochrane, J. H. (2005). *Asset pricing*. Princeton university press.

Copeland, J. F. W., Thomas E. & Shastri, K. (2013). *Financial theory and corporate policy*. Pearson Addison-Wesley.

Diether, K. (2001). *Grs review.* Retrieved from http://faculty.chicagobooth.edu/eugene.fama/teaching/Reading%20List%20and%20Notes/GRS.pdf (Last accessed 15. April 2019)

European Commission. (2019). *Eu emissions trading system.* Retrieved from https://ec.europa.eu/clima/policies/ets_en (Last accessed 9. May 2019)

Fama, E. F. & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of financial economics*, *33*(1), 3–56.

Fama, E. F. & French, K. R. (2015). A five-factor asset pricing model. *Journal of financial economics*, *116*(1), 1–22.

Ferson, W. E. (2003). Tests of multifactor pricing models, volatility bounds and portfolio performance. *Handbook of the Economics of Finance*, *1*, 743–802.

FTSE Russell. (2019). *Industry classification benchmark (equity); v2.6.* Retrieved from https://www.ftse.com/products/downloads/ICB_Rules.pdf (Last accessed 15. March 2019)

Heston, S. L., Rouwenhorst, K. G. & Wessels, R. E. (1995). The structure of international stock returns and the integration of capital markets. *Journal of empirical finance*, *2*(3), 173–197.

Hoel, A. & Mix, F. (2016). *Oljeprisfallet et sjokk for norsk økonomi.* Retrieved from https://openaccess.nhh.no/nhh-xmlui/bitstream/handle/11250/2407462/masterthesis.PDF?sequence=1&isAllowed=y (Last accessed 18. May 2019)

In, S. Y., Park, K. Y. & Monk, A. (2017). Is "being green" rewarded in the market? an empirical investigation of decarbonization risk and stock returns. *International Association for Energy Economics*.

Klassekampen. (2019). *Karbonfella.* Retrieved from https://dagens.klassekampen.no/2019-03-02/karbonfella (Last accessed 1. May 2019)

Krueger, P., Sautner, Z. & Starks, L. T. (2018). The importance of climate risks for institutional investors.

Litterman, R. (2013). *The other reason for divestment.* Retrieved from https://ensia.com/voices/the-other-reason-for-divestment/ (Last accessed 1. May 2019)

Malkiel, B. G. & Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The journal of Finance*, *25*(2), 383–417.

Manescu, C. (2011). Stock returns in relation to environmental, social and governance performance: Mispricing or compensation for risk? *Sustainable development*, *19*(2), 95–118.

Markowitz, H. (1952). Portfolio selection. *The journal of finance*, *7*(1), 77–91.

Naes, R., Skjeltorp, J. A. & Odegaard, B. A. (2008). *Hvilke faktorer driver kursutviklingen paa oslo bors?* Norsk Okonomisk Tidsskrift.

Næs, R., Skjeltorp, J. A. & Ødegaard, B. A. (2009). What factors affect the oslo stock exchange?

Nordhaus, W. D. & Boyer, J. (2000). *Warming the world: economic models of global warming*. MIT press.

Norges Bank. (2019). *Valutakurser.* Retrieved from https://www.norges-bank.no/tema/Statistikk/Valutakurser/ (Last accessed 15. April 2019)

Norwegian Ministry of Finance. (1996). Policies for a better environment and high employment. *Norwegian Ministry of Finance and Customs, Oslo*.

Norwegian Ministry of Finance. (2019). *Tar oppstrømsselskaper ut av statens pensjonsfond utland.* Retrieved from https://www.regjeringen.no/no/aktuelt/tar-oppstromsselskaper-ut-av-statens-pensjonsfond-utland/id2631707/ (Last accessed 9. May 2019)

NOU. (2018). *Klimarisiko og norsk økonomi.* Retrieved from https://www.regjeringen.no/contentassets/c5119502a03145278c33b72d9060fbc9/no/pdfs/nou201820180017000dddpdfs.pdf (Last accessed 1. May 2019)

Novy-Marx, R. (2013). The other side of value: The gross profitability premium. *Journal of Financial Economics*, *108*(1), 1–28.

NRK. (2016). *How suitable is the fama-french five-factor model for describing german and norwegian stock returns?* Retrieved from https://www.nrk.no/norge/oljeprisfallet-et-sjokk-for-norsk-okonomi-1.12737440 (Last accessed 18. May 2019)

Odegaard, B. A. (2017). Empirics of the oslo stock exchange. basic, descriptive, results 1980-2018.

Odegaard, B. A. (2019). *Risk free rates.* Retrieved from http://finance.bi.no/~bernt/financial_data/ose_asset_pricing_data/index.html (Last accessed 15. April 2019)

Oestreich, A. M. & Tsiakas, I. (2015). Carbon emissions and stock returns: Evidence from the eu emissions trading scheme. *Journal of Banking & Finance*, *58*, 294–308.

Orlitzky, M., Schmidt, F. L. & Rynes, S. L. (2003). Corporate social and financial performance: A meta-analysis. *Organization studies*, *24*(3), 403–441.

Oslo Stock Exchange. (2019). *List changes oslo børs 1996-2019.* Retrieved from https://www.oslobors.no/ob_eng/Oslo-Boers/Statistics (Last accessed 15. March 2019)

Pástor, L. & Stambaugh, R. F. (2000). Comparing asset pricing models: an investment perspective. *Journal of Financial Economics*, *56*(3), 335–381.

Pigou, A. (1920). *The economics of welfare*. Routledge (2017).

Plyakha, Y., Uppal, R. & Vilkov, G. (2012). Why does an equal-weighted portfolio outperform value-and price-weighted portfolios? *Available at SSRN 2724535*.

Reinganum, M. R. (1981). Misspecification of capital asset pricing: Empirical anomalies based on earnings' yields and market values. *Journal of financial Economics*, *9*(1), 19–46.

Sandsmark, M. & Vennemo, H. (2007). A portfolio approach to climate investments: Capm and endogenous risk. *Environmental and Resource Economics*, *37*(4), 681–695.

Sneddon, C., Howarth, R. B. & Norgaard, R. B. (2006). Sustainable development in a post-brundtland world. *Ecological economics*, *57*(2), 253–268.

Soppe, A. (2004). Sustainable corporate finance. *Journal of Business Ethics*, *53*(1-2), 213–224.

SSB. (2018a). *09298: Utslippsintensitet for klimagasser, etter næring og komponent 1990 - 2017.* Retrieved from `https://www.ssb.no/statbank/table/09298` (Last accessed 18. May 2019)

SSB. (2018b). *Energiregnskap og -balanse; dokumentasjon av statistikkproduksjonen fra statistikkår 1990 og fremover.* Retrieved from `https://www.ssb.no/energi-og-industri/artikler-og-publikasjoner/_attachment/369610?_ts=1673ff3e218` (Last accessed 15. March 2019)

Stern, N. H. (2007). *The economics of climate change: the stern review.* cambridge University press.

Titman, S., Wei, K. J. & Xie, F. (2004). Capital investments and stock returns. *Journal of financial and Quantitative Analysis*, *39*(4), 677–700.

Weitzman, M. L. (1998). Why the far-distant future should be discounted at its lowest possible rate. *Journal of environmental economics and management*, *36*(3), 201–208.

World Economic Forum . (2019). *The global risks report 2019, 14th edition.* Retrieved from `http://www3.weforum.org/docs/WEF_Global_Risks_Report_2019.pdf` (Last accessed 15. April 2019)

Appendix

A. Table Guide

To make reading the thesis as easy as possible I have decided to add the majority of my tables as an appendix. There has been a number of different analysis done and on different portfolios under different scopes and as such the following is a short explanation of the layout of the appendices to this thesis aimed at making the reading experience better. A list of the tables in the Appendix can be found between Appendix A and Appendix B.

Layout

The following appendices are structured as follows. First we have all analysis done on the efficient and inefficient portfolios in part B. Parts C, D and E split the analysis of the CRE-portfolio into three sections by which analysis is done, first we have the portfolio means, secondly the regression results and finally the results of the Fama-Macbeth regression. The results of the GRS-tests can be found in the main body of the results.

Time-periods and scopes structure

The analysis is also, as explained in the data section, split by time-period and scope. The table below outlines how this is structured

Structure of analysis

This table outlines the how the analysis is structured across the different time periods and scopes. The top row are the four different time-periods under which the analysis is done. While the left column are the different scopes, the remaing rows and columns are the different portfolios which the analysis are done on.

	Whole period	**Period 1**	**Period 2**	**Period 3**
Scope 1	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio
Scope 2	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio	Efficient Portfolio Inefficient Portfolio CRE-portfolio

Analysis done on **Scope 1** is done to capture Carbon Pricing Risk, while analysis done on **Scope 2** also captures Stranded Asset Risk. For more on this split please look at section 3.

The three different time periods are split as follows (for more in-depth information on this split please look at section 3):

- **Period 1** goes from the beginning of 1997 til the end of 2004
- **Period 2** goes from the beginning of 2005 til the end of 2012
- **Period 3** goes from the beginning of 2013 til the end of 2018

The numbers

All analysis is done on daily returns data in absolute sizes, if follows that this is also the case for all numbers included in the tables. This will be explained with examples for each section.

List of Tables in Appendix

B. Efficient and Inefficient Portfolio Outputs

This section contains the means and regression results for the efficient and inefficient portfolios. It is structured by type of analysis (Mean Returns. CAPM-regression. FF3-regression and FF5-regression). Under each analysis you will find the results for all time periods starting with the results for the whole period. and after the three sub periods from the first to the last.

Mean Returns of Portfolios

These tables contains the average returns of the efficient and inefficient portfolios across the different time periods investigated in this paper. The tables are organised by the effectiveness of the included big efficient (inefficient) portfolio (horisontally) and the effectiveness of the included small efficient (inefficient) portfolio (vertically). The letter E (I) indicates the most efficient (inefficient) end of the scale. and LE (LI) the least efficient (inefficient) end. If we take a look at table B.1 the most efficient portfolio (top left corner) has an average daily return across the 22 years of 0.00025 or 0.025%.

Table B.1: Mean Returns Efficient and Inefficient Portfolios (all years)

		Efficient Firms			**Inefficient Firms**				
		Big firm efficiency			*Big firm inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
Scope 1									
Small firm efficiency	**E**	0.00025	0.00019	0.00017	0.00029	0.00024	0.00025	**LI**	*Small firm inefficiency*
	2	0.00031	0.00024	0.00021	0.00032	0.00029	0.00029	**2**	
	LE	0.00047	0.00039	0.00039	0.00035	0.00031	0.00029	**I**	
Scope 2									
Small firm efficiency	**E**	0.00025	0.00021	0.00013	0.00029	0.00029	0.00032	**LI**	*Small firm inefficiency*
	2	0.00031	0.00026	0.00017	0.00047	0.00043	0.00047	**2**	
	LE	0.00047	0.00040	0.00034	0.00028	0.00025	0.00031	**I**	

Table B.2: Mean Returns Efficient and Inefficient Portfolios (Period 1)

		Efficient Firms			**Inefficient Firms**				
		Big firm efficiency			*Big firm inefficiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
Scope 1									
Small firm efficiency	**E**	0.00028	0.00011	0.00004	0.00028	0.00038	0.00048	**LI**	*Small firm inefficiency*
	2	0.00038	0.00021	0.00014	-0.00010	-0.000002	0.00009	**2**	
	LE	0.00064	0.00042	0.00043	0.00030	0.00035	0.00050	**I**	
Scope 2									
Small firm efficiency	**E**	0.00028	0.00011	0.00004	0.00038	0.00028	0.00040	**LI**	*Small firm inefficiency*
	2	0.00038	0.00021	0.00014	0.00131	0.00104	0.00119	**2**	
	LE	0.00067	0.00045	0.00046	0.00048	0.00030	0.00046	**I**	

Table B.3: Mean Returns Efficient and Inefficient Portfolios (Period 2)

		Efficient Firms			Inefficient Firms				
		Big firm efficiency			*Big firm inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
Scope 1									
Small firm efficiency	**E**	0.00004	0.00005	0.00013	0.00046	0.00041	0.00019	**LI**	*Small firm inefficiency*
	2	0.00008	0.00007	0.00014	0.00074	0.00070	0.00049	**2**	
	LE	0.00033	0.00035	0.00042	0.00005	0.00003	-0.00025	**I**	
Scope 2									
Small firm efficiency	**E**	0.00004	0.00010	0.00000	0.00035	0.00067	0.00059	**LI**	*Small firm inefficiency*
	2	0.00008	0.00012	0.00001	-0.00001	0.00032	0.00026	**2**	
	LE	0.00033	0.00040	0.00028	0.00034	0.00066	0.00062	**I**	

Table B.4: Mean Returns Efficient and Inefficient Portfolios (Period 3)

		Efficient Firms			Inefficient Firms				
		Big firm efficiency			*Big firm inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
Scope 1									
Small firm efficiency	**E**	0.00061	0.00053	0.00050	0.00009	-0.00015	0.00001	**LI**	*Small firm inefficiency*
	2	0.00066	0.00057	0.00053	0.00045	0.00025	0.00036	**2**	
	LE	0.00063	0.00053	0.00050	0.00091	0.00070	0.00080	**I**	
Scope 2									
Small firm efficiency	**E**	0.00061	0.00053	0.00052	0.00014	-0.00004	0.00000	**LI**	*Small firm inefficiency*
	2	0.00066	0.00057	0.00056	0.00022	0.00009	0.00007	**2**	
	LE	0.00057	0.00047	0.00046	0.00001	-0.00015	-0.00014	**I**	

CAPM regressions results of Portfolios

These tables contains the regression results of the regression run on the efficient and inefficient portfolio with the following model (CAPM)

$$R_{it} = \alpha_i + b_i R_{mt} + p_i OIL_i$$

The tables are organised by the effectiveness of the included big efficient (inefficient) portfolio (horisontally) and the effectiveness of the included small efficient (inefficient) portfolio (vertically). The letter E (I) indicates the most efficient (inefficient) end of the scale. and LE (LI) the least efficient (inefficient) end.

Table B.5: CAPM Regression Results Efficient/Inefficient Portfolios (Scope 1, all years)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		1	**2**	**3**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	0.0001 (.)	0.0000	0.0000	0.0001	0.0000	0.0000	**LI**	*Small firm inefficiency*
	2	0.0001 **	0.0002 ***	0.0000	0.0002 *	0.0001 (.)	0.0001 (.)	**2**	
	LE	0.0003 ***	0.0002 ***	0.0002 ***	0.0002 **	0.0001 *	0.0001 (.)	**I**	
		Marked							
Small firm efficiency	**E**	0.7966 ***	0.7731 ***	0.8682 ***	0.9718 ***	1.0088 ***	0.9237 ***	**LI**	*Small firm inefficiency*
	2	0.9766 ***	0.9414 ***	1.0468 ***	0.9448 ***	0.9816 ***	0.8965 ***	**2**	
	LE	0.9692 ***	0.9414 ***	1.0363 ***	0.9535 ***	0.9932 ***	0.9021 ***	**I**	
		OIL							
Small firm efficiency	**E**	-0.0073 ***	-0.0174 ***	-0.0226 ***	0.0125 ***	0.0169 ***	0.0085 ***	**LI**	*Small firm inefficiency*
	2	-0.0100 ***	-0.0235 ***	-0.0269 ***	0.0085 **	0.0114 ***	0.0037	**2**	
	LE	-0.0130 ***	-0.0235 ***	-0.0298 ***	-0.0029	0.0016	-0.0061 *	**I**	
	avg R^2	0.34798			avg R^2	0.32323			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.6: CAPM Regression Results Efficient/Inefficient Portfolios (Scope 2, all years)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	0.0001 (.)	0.0000	0.0000	0.0001 (.)	0.0001 (.)	0.0001 *	**LI**	*Small firm inefficiency*
	2	0.0001 **	0.0003 ***	0.0000	0.0003 *	0.0003 *	0.0003 **	**2**	
	LE	0.0003 ***	0.0003 ***	0.0002 **	0.0001	0.0001	0.0001	**I**	
		Marked							
Small firm efficiency	**E**	0.7966 ***	0.7623 ***	0.8475 ***	0.9522 ***	1.1116 ***	1.0893 ***	**LI**	*Small firm inefficiency*
	2	0.9766 ***	0.9234 ***	1.0216 ***	1.5646 ***	1.6603 ***	1.6423 ***	**2**	
	LE	0.9632 ***	0.9234 ***	1.0084 ***	1.2446 ***	1.4059 ***	1.3959 ***	**I**	
		OIL							
Small firm efficiency	**E**	-0.0073 ***	-0.0192 ***	-0.0230 ***	0.0129 ***	0.0572 ***	0.0460 ***	**LI**	*Small firm inefficiency*
	2	-0.0100 ***	-0.0235 ***	-0.0273 ***	-0.0362 ***	0.0155 ***	0.0045	**2**	
	LE	-0.0112 ***	-0.0235 ***	-0.0281 ***	0.0118 ***	0.0578 ***	0.0464 ***	**I**	
	avg. R^2	0.347978			**avg. R^2**	0.323235			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.7: CAPM Regression Results Efficient/Inefficient Portfolios (Scope 1, Period 1)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		LI	**2**	**E**	**LI**	**2**	**E**		
		Alpha							
Small firm efficiency	**E**	0,0000	-0,0002 (.)	-0,0003 **	0,0000	0,0001	0,0002 *	**LI**	*Small firm inefficiency*
	2	0,0001	0,0002	-0,0002 (.)	-0,0004 **	-0,0003 *	-0,0002	**2**	
	LE	0,0003 ***	0,0002	0,0001	0,0000	0,0001	0,0002 (.)	**I**	
		Marked							
Small firm efficiency	**E**	0,6669 ***	0,9177 ***	1,0973 ***	0,7413 ***	0,6474 ***	0,5796 ***	**LI**	*Small firm inefficiency*
	2	0,9551 ***	1,0658 ***	1,3885 ***	0,8951 ***	0,7888 ***	0,7259 ***	**2**	
	LE	0,8169 ***	1,0658 ***	1,2537 ***	0,9252 ***	0,8202 ***	0,7578 ***	**I**	
		OIL							
Small firm efficiency	**E**	-0,0126 ***	-0,0182 ***	-0,0185 ***	0,0208 ***	-0,0005	0,0076 *	**LI**	*Small firm inefficiency*
	2	-0,0086 *	-0,0235 ***	-0,0154 ***	0,0216 ***	-0,0033	0,0056	**2**	
	LE	-0,0165 ***	-0,0235 ***	-0,0242 ***	0,0305 ***	0,0077 *	0,0181 ***	**I**	
	avg. R^2	0.3394858			**avg.** R^2	0.2109161			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.8: CAPM Regression Results Efficient/Inefficient Portfolios (Scope 2, Period 1)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	0,0000	-0,0002 (.)	-0,0003 **	0,0001	0,0000	0,0001	**LI**	*Small firm inefficiency*
	2	0,0001	0,0002 (.)	-0,0002 (.)	0,0009 **	0,0006 **	0,0008 **	**2**	
	LE	0,0004 ***	0,0002 (.)	0,0001	0,0002	0,0000	0,0001	**I**	
		Marked							
Small firm efficiency	**E**	0,6669 ***	0,9177 ***	1,0973 ***	0,7324 ***	0,8315 ***	0,9463 ***	**LI**	*Small firm inefficiency*
	2	0,9551 ***	1,0529 ***	1,3885 ***	2,1034 ***	2,0265 ***	2,1414 ***	**2**	
	LE	0,8050 ***	1,0529 ***	1,2408 ***	1,0525 ***	1,1482 ***	1,2740 ***	**I**	
		OIL							
Small firm efficiency	**E**	-0,0126 ***	-0,0182 ***	-0,0185 ***	-0,0059	0,0188 ***	0,0370 ***	**LI**	*Small firm inefficiency*
	2	-0,0086 *	-0,0238 ***	-0,0154 ***	-0,0335 **	-0,0034	0,0155 (.)	**2**	
	LE	-0,0168 ***	-0,0238 ***	-0,0245 ***	-0,0103 *	0,0141 ***	0,0338 ***	**I**	
	AVG R^2	0.3378644			AVG R^2	0.2887735			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.9: CAPM Regression Results Efficient/Inefficient Portfolios (Scope 1, Period 2)

		Efficient Portfolio			Inefficient Portfolio				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	-0,0001	-0,0001	0,0000	0,0003 ***	0,0003 **	0,0001	**LI**	*Small firm inefficiency*
	2	-0,0001	0,0002 *	0,0000	0,0006 ***	0,0005 ***	0,0003 ***	**2**	
	LE	0,0002 (.)	0,0002 *	0,0003 **	-0,0001	-0,0001	-0,0004 ***	**I**	
		Marked							
Small firm efficiency	**E**	0,8906 ***	0,6845 ***	0,7507 ***	1,1513 ***	1,2283 ***	1,1704 ***	**LI**	*Small firm inefficiency*
	2	1,0661 ***	0,9349 ***	0,9280 ***	1,0076 ***	1,0822 ***	1,0240 ***	**2**	
	LE	1,1462 ***	0,9349 ***	0,9968 ***	0,9876 ***	1,0657 ***	0,9991 ***	**I**	
		OIL							
Small firm efficiency	**E**	-0,0197 ***	-0,0098 **	-0,0141 ***	-0,0008	0,0150 ***	0,0153 ***	**LI**	*Small firm inefficiency*
	2	-0,0078 *	-0,0167 **	-0,0033	-0,0066	0,0082 (.)	0,0114 **	**2**	
	LE	-0,0281 ***	-0,0167 **	-0,0221 ***	-0,0272 ***	-0,0124 **	-0,0106 *	**I**	
	avg. R^2	0.4282227			**avg. R^2**	0.5056575			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.10: CAPM Regression Results Efficient/Inefficient Portfolios (Scope 2, Period 2)

		Efficient Portfolio			Inefficient Portfolio				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	-0,0001	0,0000	-0,0001 (.)	0,0002 *	0,0005 ***	0,0004 ***	**LI**	*Small firm inefficiency*
	2	-0,0001	0,0003 *	-0,0001	-0,0001	0,0002 *	0,0001	**2**	
	LE	0,0002 (.)	0,0003 *	0,0001	0,0002 (.)	0,0005 ***	0,0005 ***	**I**	
		Marked							
Small firm efficiency	**E**	0,8906 ***	0,6628 ***	0,7155 ***	1,0743 ***	1,1953 ***	1,1711 ***	**LI**	*Small firm inefficiency*
	2	1,0661 ***	0,9118 ***	0,8839 ***	1,1183 ***	1,2436 ***	1,2225 ***	**2**	
	LE	1,1462 ***	0,9118 ***	0,9603 ***	1,2879 ***	1,4167 ***	1,4040 ***	**I**	
		OIL							
Small firm efficiency	**E**	-0,0197 ***	-0,0151 ***	-0,0145 ***	0,0227 ***	0,0598 ***	0,0494 ***	**LI**	*Small firm inefficiency*
	2	-0,0078 *	-0,0220 ***	-0,0032	0,0050	0,0452 ***	0,0328 ***	**2**	
	LE	-0,0281 ***	-0,0220 ***	-0,0220 ***	0,0131 *	0,0549 ***	0,0414 ***	**I**	
	avg. R^2	0.4190186			**avg. R^2**	0.5520112			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.11: CAPM Regression Results Efficient/Inefficient Portfolios (Scope 1, Period 3)

		Efficient Portfolio			Inefficient Portfolio				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	0,0005 ***	0,0004 ***	0,0004 ***	-0,0001	-0,0003 **	-0,0002	**LI**	*Small firm inefficiency*
	2	0,0005 ***	0,0004 ***	0,0004 ***	0,0003 *	0,0001	0,0002 (.)	**2**	
	LE	0,0005 ***	0,0004 ***	0,0004 ***	0,0007 ***	0,0005 ***	0,0006 ***	**I**	
		Marked							
Small firm efficiency	**E**	0,8164 ***	0,6988 ***	0,7025 ***	1,0023 ***	1,1573 ***	0,9881 ***	**LI**	*Small firm inefficiency*
	2	0,7882 ***	0,6973 ***	0,6567 ***	0,9148 ***	1,0958 ***	0,9171 ***	**2**	
	LE	0,8241 ***	0,6973 ***	0,6948 ***	0,9905 ***	1,1785 ***	0,9891 ***	**I**	
		OIL							
Small firm efficiency	**E**	0,0060	-0,0032	-0,0079	-0,0238 ***	0,0077	-0,0509 ***	**LI**	*Small firm inefficiency*
	2	-0,0147 ***	-0,0097 *	-0,0321 ***	-0,0097	0,0227 ***	-0,0381 ***	**2**	
	LE	0,0005	-0,0097 *	-0,0155 ***	-0,0566 ***	-0,0220 **	-0,0834 ***	**I**	
	avg. R^2	0.2521319			**avg. R^2**	0.2494601			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.12: CAPM Regression Results Efficient/Inefficient Portfolios (Scope 2, Period 3)

		Efficient Portfolio			Inefficient Portfolio				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	0,0005 ***	0,0004 ***	0,0004 ***	0,0000	-0,0002 (.)	-0,0002	**LI**	*Small firm inefficiency*
	2	0,0005 ***	0,0003 ***	0,0004 ***	0,0000	-0,0002	-0,0002	**2**	
	LE	0,0004 ***	0,0003 ***	0,0003 ***	-0,0002	-0,0004 *	-0,0004 *	**I**	
		Marked							
Small firm efficiency	**E**	0,8164 ***	0,6988 ***	0,6770 ***	1,0522 ***	1,4078 ***	1,1559 ***	**LI**	*Small firm inefficiency*
	2	0,7882 ***	0,6842 ***	0,6287 ***	1,5961 ***	1,9419 ***	1,7083 ***	**2**	
	LE	0,8121 ***	0,6842 ***	0,6555 ***	1,4916 ***	1,8401 ***	1,6099 ***	**I**	
		OIL							
Small firm efficiency	**E**	0,0060	-0,0032	-0,0061	0,0122 *	0,1033 ***	0,0411 ***	**LI**	*Small firm inefficiency*
	2	-0,0147 ***	-0,0002	-0,0301 ***	-0,0268 **	0,0656 ***	0,0046	**2**	
	LE	0,0092 **	-0,0002	-0,0041	0,0325 ***	0,1254 ***	0,0627 ***	**I**	
	avg. R^2	0.2498634			**avg. R^2**	0.3735903			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

FF3 regressions results of Portfolios

These tables contains the regression results of the regression run on the efficient and inefficient portfolio with the following model (FF3 + OIL)

$$R_{it} = \alpha_i + b_i R_{mt} + s_i SMB_t + h_i HML_t + p_i OIL_i$$

The tables are organised by the effectiveness of the included big efficient (inefficient) portfolio (horisontally) and the effectiveness of the included small efficient (inefficient) portfolio (vertically). The letter E (I) indicates the most efficient (inefficient) end of the scale. and LE (LI) the least efficient (inefficient) end.

Table B.13: FF3 Regression Results Efficient/Inefficient Portfolios (Scope 1, All years)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	0,0001 **	0,0000	0,0000	0,0001 *	0,0001 (.)	0,0001	**LI**	*Small firm inefficiency*
	2	0,0002 ***	0,0002 ***	0,0001	0,0002 *	0,0001 *	0,0001 (.)	**2**	
	LE	0,0004 ***	0,0002 ***	0,0003 ***	0,0002 *	0,0001 *	0,0001	**I**	
		Marked							
Small firm efficiency	**E**	0,7599 ***	0,7695 ***	0,8420 ***	0,9414 ***	0,9566 ***	0,8928 ***	**LI**	*Small firm inefficiency*
	2	0,9287 ***	0,9351 ***	1,0092 ***	0,9518 ***	0,9673 ***	0,9038 ***	**2**	
	LE	0,9294 ***	0,9351 ***	1,0067 ***	0,9660 ***	0,9839 ***	0,9163 ***	**I**	
		SMB							
Small firm efficiency	**E**	-0,1053 ***	0,0028	-0,0192 ***	-0,0947 ***	-0,1588 ***	-0,1090 ***	**LI**	*Small firm inefficiency*
	2	-0,1061 ***	0,0177 **	-0,0179 **	0,0036	-0,0580 ***	-0,0082	**2**	
	LE	-0,0931 ***	0,0177 **	-0,0038	0,0044	-0,0565 ***	-0,0039	**I**	
		HML							
Small firm efficiency	**E**	0,0312 ***	-0,0210 ***	-0,0802 ***	0,0396 ***	0,0605 ***	0,0638 ***	**LI**	*Small firm inefficiency*
	2	-0,0167 ***	-0,0600 ***	-0,1329 ***	0,0240 ***	0,0432 ***	0,0471 ***	**2**	
	LE	-0,0048	-0,0600 ***	-0,1229 ***	0,0470 ***	0,0625 ***	0,0695 ***	**I**	
		OIL							
Small firm efficiency	**E**	-0,0116 ***	-0,0170 ***	-0,0222 ***	0,0085 ***	0,0103 ***	0,0037	**LI**	*Small firm inefficiency*
	2	-0,0136 ***	-0,0221 ***	-0,0258 ***	0,0083 **	0,0087 **	0,0027	**2**	
	LE	-0,0163 ***	-0,0221 ***	-0,0282 ***	-0,0034	-0,0013	-0,0072 **	**I**	
	avg. R^2	0.3521928			avg. R^2	0.3264251			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.14: FF3 Regression Results Efficient/Inefficient Portfolios (Scope 2, All years)

		Efficient Portfolio			**Inefficient Portfolio**				
			Big firm efficiency			*Big firm Inefficeiency*			
		E	**2**	**LE**	**LI**	**2**	**I**		
					Alpha				
Small firm	**E**	0,0001 **	0,0000	0,0000	0,0001 (.)	0,0002 *	0,0002 ***	**LI**	*Small firm*
efficiency	**2**	0,0002 ***	0,0003 ***	0,0000	0,0002	0,0002 *	0,0003 *	**2**	*inefficiency*
	LE	0,0004 ***	0,0003 ***	0,0002 ***	0,0001	0,0001	0,0002 *	**I**	
					Marked				
Small firm	**E**	0,7599 ***	0,7615 ***	0,8279 ***	0,9514 ***	1,0831 ***	1,0455 ***	**LI**	*Small firm*
efficiency	**2**	0,9287 ***	0,9198 ***	0,9910 ***	1,6546 ***	1,7097 ***	1,6770 ***	**2**	*inefficiency*
	LE	0,9232 ***	0,9198 ***	0,9859 ***	1,2603 ***	1,3922 ***	1,3675 ***	**I**	
					SMB				
Small firm	**E**	-0,1053 ***	0,0086 (.)	-0,0049	-0,0365 ***	-0,1155 ***	-0,1215 ***	**LI**	*Small firm*
efficiency	**2**	-0,1061 ***	0,0239 ***	-0,0029	0,1173 ***	0,0154	0,0104	**2**	*inefficiency*
	LE	-0,0929 ***	0,0239 ***	0,0117 *	-0,0072	-0,0918 ***	-0,0959 ***	**I**	
					HML				
Small firm	**E**	0,0312 ***	-0,0192 ***	-0,0769 ***	0,0632 ***	0,0860 ***	0,0298 ***	**LI**	*Small firm*
efficiency	**2**	-0,0167 ***	-0,0591 ***	-0,1295 ***	0,1812 ***	0,1891 ***	0,1337 ***	**2**	*inefficiency*
	LE	-0,0058	-0,0591 ***	-0,1202 ***	0,0825 ***	0,1075 ***	0,0500 ***	**I**	
					OIL				
Small firm	**E**	-0,0116 ***	-0,0186 ***	-0,0221 ***	0,0107 ***	0,0518 ***	0,0412 ***	**LI**	*Small firm*
efficiency	**2**	-0,0136 ***	-0,0218 ***	-0,0256 ***	-0,0344 ***	0,0134 **	0,0030	**2**	*inefficiency*
	LE	-0,0145 ***	-0,0218 ***	-0,0260 ***	0,0104 ***	0,0530 ***	0,0423 ***	**I**	
	avg. R^2	0.3465172			**avg. R^2**	0.3802675			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.15: FF3 Regression Results Efficient/Inefficient Portfolios (Scope 1, Period 1)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency **E**	**2**	**LE**	*Big firm Inefficeiency* **LI**	**2**	**I**		
					Alpha				
Small firm efficiency	**E**	0,0001	-0,0001	-0,0002	0,0000	0,0002 (.)	0,0002 **	**LI**	*Small firm inefficiency*
	2	0,0001	0,0002 (.)	-0,0001	-0,0004 **	-0,0003 *	-0,0002	**2**	
	LE	0,0004 ***	0,0002 (.)	0,0002 *	0,0000	0,0001	0,0002 *	**I**	
					Marked				
Small firm efficiency	**E**	0,6500 ***	0,8978 ***	1,0467 ***	0,7420 ***	0,6488 ***	0,5797 ***	**LI**	*Small firm inefficiency*
	2	0,9220 ***	1,0412 ***	1,3212 ***	0,9184 ***	0,8126 ***	0,7491 ***	**2**	
	LE	0,7953 ***	1,0412 ***	1,1968 ***	0,9415 ***	0,8375 ***	0,7742 ***	**I**	
					SMB				
Small firm efficiency	**E**	-0,0570 ***	-0,0356 ***	-0,0513 ***	-0,0768 ***	-0,0856 ***	-0,0781 ***	**LI**	*Small firm inefficiency*
	2	-0,0277 **	0,0004	-0,0179 (.)	-0,0254 *	-0,0341 **	-0,0296 **	**2**	
	LE	-0,0297 **	0,0004	-0,0168	-0,0572 ***	-0,0629 ***	-0,0563 ***	**I**	
					HML				
Small firm efficiency	**E**	-0,0194 **	-0,0455 ***	-0,1436 ***	0,0571 ***	0,0661 ***	0,0562 ***	**LI**	*Small firm inefficiency*
	2	-0,0978 ***	-0,0880 ***	-0,2267 ***	0,1012 ***	0,1092 ***	0,1034 ***	**2**	
	LE	-0,0556 ***	-0,0880 ***	-0,1908 ***	0,0988 ***	0,1066 ***	0,0986 ***	**I**	
					OIL				
Small firm efficiency	**E**	-0,0133 ***	-0,0187 ***	-0,0192 ***	0,0198 ***	-0,0015	0,0066 *	**LI**	*Small firm inefficiency*
	2	-0,0090 *	-0,0235 ***	-0,0157 ***	0,0213 ***	-0,0037	0,0053	**2**	
	LE	-0,0169 ***	-0,0235 ***	-0,0245 ***	0,0298 ***	0,0069 (.)	0,0175 ***	**I**	
	avg R^2	0.3481925			**avg R^2**	0.2166844			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.16: FF3 Regression Results Efficient/Inefficient Portfolios (Scope 2, Period 1)

		Efficient Portfolio			Inefficient Portfolio				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm	**E**	0,0001	-0,0001	-0,0002	0,0000	0,0000	0,0002 (.)	**LI**	*Small firm*
efficiency	**2**	0,0001	0,0002 *	-0,0001	0,0007 *	0,0005 *	0,0007 **	**2**	*inefficiency*
	LE	0,0004 ***	0,0002 *	0,0003 *	0,0002	0,0000	0,0003 *	**I**	
		Marked							
Small firm	**E**	0,6500 ***	0,8978 ***	1,0467 ***	0,7689 ***	0,8562 ***	0,9508 ***	**LI**	*Small firm*
efficiency	**2**	0,9220 ***	1,0277 ***	1,3212 ***	2,2041 ***	2,1004 ***	2,1961 ***	**2**	*inefficiency*
	LE	0,7830 ***	1,0277 ***	1,1833 ***	1,0812 ***	1,1637 ***	1,2696 ***	**I**	
		SMB							
Small firm	**E**	-0,0570 ***	-0,0356 ***	-0,0513 ***	-0,0032	-0,0556 ***	-0,1016 ***	**LI**	*Small firm*
efficiency	**2**	-0,0277 **	-0,0018	-0,0179 (.)	0,0582 *	-0,0160	-0,0618 **	**2**	*inefficiency*
	LE	-0,0317 ***	-0,0018	-0,0190 (.)	-0,0424 ***	-0,0971 ***	-0,1470 ***	**I**	
		HML							
Small firm	**E**	-0,0194 **	-0,0455 ***	-0,1436 ***	0,1322 ***	0,1274 ***	0,0886 ***	**LI**	*Small firm*
efficiency	**2**	-0,0978 ***	-0,0884 ***	-0,2267 ***	0,3171 ***	0,2745 ***	0,2389 ***	**2**	*inefficiency*
	LE	-0,0559 ***	-0,0884 ***	-0,1911 ***	0,1323 ***	0,1243 ***	0,0893 ***	**I**	
		OIL							
Small firm	**E**	-0,0133 ***	-0,0187 ***	-0,0192 ***	-0,0059	0,0182 ***	0,0358 ***	**LI**	*Small firm*
efficiency	**2**	-0,0090 *	-0,0238 ***	-0,0157 ***	-0,0326 **	-0,0035	0,0147 (.)	**2**	*inefficiency*
	LE	-0,0172 ***	-0,0238 ***	-0,0248 ***	-0,0108 **	0,0129 **	0,0319 ***	**I**	
	avg R^2	0.346631			**avg R^2**	0.2974787			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.17: FF3 Regression Results Efficient/Inefficient Portfolios (Scope 1, Period 2)

		Efficient Portfolio			Inefficient Portfolio				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	-0,0001	-0,0001	0,0000	0,0003 ***	0,0003 ***	0,0001	**LI**	*Small firm inefficiency*
	2	0,0000	0,0002 (.)	0,0000	0,0006 ***	0,0005 ***	0,0003 ***	**2**	
	LE	0,0002 *	0,0002 (.)	0,0003 **	-0,0001	-0,0001	-0,0004 ***	**I**	
		Marked							
Small firm efficiency	**E**	0,8311 ***	0,6883 ***	0,7340 ***	1,1208 ***	1,1286 ***	1,1260 ***	**LI**	*Small firm inefficiency*
	2	0,9968 ***	0,9660 ***	0,9027 ***	1,0316 ***	1,0402 ***	1,0377 ***	**2**	
	LE	1,1144 ***	0,9660 ***	1,0082 ***	1,0345 ***	1,0431 ***	1,0368 ***	**I**	
		SMB							
Small firm efficiency	**E**	-0,1325 ***	-0,0087	-0,0380 ***	-0,0642 ***	-0,1678 ***	-0,0982 ***	**LI**	*Small firm inefficiency*
	2	-0,1450 ***	0,0499 ***	-0,0469 ***	0,0570 ***	-0,0397 ***	0,0314 ***	**2**	
	LE	-0,0724 ***	0,0499 ***	0,0225 *	0,0761 ***	-0,0242 **	0,0507 ***	**I**	
		HML							
Small firm efficiency	**E**	0,1048 ***	0,0410 ***	0,0318 ***	0,0433 ***	0,0255 **	0,0764 ***	**LI**	*Small firm inefficiency*
	2	0,0961 ***	-0,0013	0,0183 *	-0,0518 ***	-0,0752 ***	-0,0263 **	**2**	
	LE	0,0605 ***	-0,0013	-0,0122	-0,0040	-0,0323 ***	0,0254 **	**I**	
		OIL							
Small firm efficiency	**E**	-0,0275 ***	-0,0109 **	-0,0164 ***	-0,0045	0,0071 (.)	0,0096 *	**LI**	*Small firm inefficiency*
	2	-0,0160 ***	-0,0144 **	-0,0057	-0,0031	0,0078 (.)	0,0133 **	**2**	
	LE	-0,0325 ***	-0,0144 **	-0,0209 ***	-0,0237 ***	-0,0129 **	-0,0088 (.)	**I**	
	avg R^2	0.4322013			**avg R^2**	0.5089029			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.18: FF3 Regression Results Efficient/Inefficient Portfolios (Scope 2, Period 2)

		Efficient Portfolio			Inefficient Portfolio				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	-0,0001	0,0000	-0,0001 (.)	0,0002 *	0,0005 ***	0,0004 ***	**LI**	*Small firm inefficiency*
	2	0,0000	0,0003 *	-0,0001	-0,0001 (.)	0,0002 *	0,0001	**2**	
	LE	0,0002 *	0,0003 *	0,0001	0,0002 (.)	0,0005 ***	0,0005 ***	**I**	
		Marked							
Small firm efficiency	**E**	0,8311 ***	0,6729 ***	0,7137 ***	1,0551 ***	1,1287 ***	1,0880 ***	**LI**	*Small firm inefficiency*
	2	0,9968 ***	0,9492 ***	0,8731 ***	1,1340 ***	1,2127 ***	1,1750 ***	**2**	
	LE	1,1144 ***	0,9492 ***	0,9880 ***	1,3057 ***	1,3852 ***	1,3577 ***	**I**	
		SMB							
Small firm efficiency	**E**	-0,1325 ***	-0,0011	-0,0183 **	-0,0074	-0,0958 ***	-0,1030 ***	**LI**	*Small firm inefficiency*
	2	-0,1450 ***	0,0576 ***	-0,0280 ***	0,0295 ***	-0,0579 ***	-0,0655 ***	**2**	
	LE	-0,0724 ***	0,0576 ***	0,0440 ***	0,0319 ***	-0,0622 ***	-0,0655 ***	**I**	
		HML							
Small firm efficiency	**E**	0,1048 ***	0,0473 ***	0,0426 ***	-0,0639 ***	-0,0281 ***	-0,0803 ***	**LI**	*Small firm inefficiency*
	2	0,0961 ***	0,0054	0,0300 ***	-0,0125	0,0245 **	-0,0274 **	**2**	
	LE	0,0605 ***	0,0054	0,0000	-0,0098	0,0333 ***	-0,0225 *	**I**	
		OIL							
Small firm efficiency	**E**	-0,0275 ***	-0,0160 ***	-0,0161 ***	0,0235 ***	0,0560 ***	0,0463 ***	**LI**	*Small firm inefficiency*
	2	-0,0160 ***	-0,0196 ***	-0,0050	0,0065	0,0421 ***	0,0304 ***	**2**	
	LE	-0,0325 ***	-0,0196 ***	-0,0200 ***	0,0147 **	0,0515 ***	0,0388 ***	**I**	
	avg R^2	0.4230964			**avg R^2**	0.5542207			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.19: FF3 Regression Results Efficient/Inefficient Portfolios (Scope 1, Period 3)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
					Alpha				
Small firm efficiency	**E**	-0,0001 ***	-0,0001 ***	0,0000 ***	0,0000	-0,0003 **	-0,0002 (.)	**LI**	*Small firm inefficiency*
	2	0,0000 ***	0,0002 ***	0,0000 ***	0,0003 **	0,0001	0,0002 (.)	**2**	
	LE	0,0002 ***	0,0002 ***	0,0003 ***	0,0008 ***	0,0005 ***	0,0006 ***	**I**	
					Marked				
Small firm efficiency	**E**	0,8311 ***	0,6883 ***	0,7340 ***	0,9657 ***	1,1468 ***	1,0067 ***	**LI**	*Small firm inefficiency*
	2	0,9968 ***	0,9660 ***	0,9027 ***	0,8863 ***	1,0931 ***	0,9436 ***	**2**	
	LE	1,1144 ***	0,9660 ***	1,0082 ***	0,9689 ***	1,1816 ***	1,0226 ***	**I**	
					SMB				
Small firm efficiency	**E**	-0,1325 ***	-0,0087	-0,0380 *	-0,0865 ***	-0,0620 ***	0,0580 ***	**LI**	*Small firm inefficiency*
	2	-0,1450 ***	0,0499 ***	-0,0469 ***	-0,0528 **	-0,0290 (.)	0,0928 ***	**2**	
	LE	-0,0724 ***	0,0499 ***	0,0225 ***	-0,0689 ***	-0,0408 *	0,0791 ***	**I**	
					HML				
Small firm efficiency	**E**	0,1048	0,0410 *	0,0318 **	-0,0971 ***	0,0406 *	0,0239	**LI**	*Small firm inefficiency*
	2	0,0961	-0,0013 ***	0,0183 ***	-0,1023 ***	0,0344 *	0,0151	**2**	
	LE	0,0605 ***	-0,0013 ***	-0,0122 ***	-0,0247	0,0968 ***	0,0889 ***	**I**	
					OIL				
Small firm efficiency	**E**	-0,0275	-0,0109	-0,0164	-0,0254 ***	0,0028	-0,0485 ***	**LI**	*Small firm inefficiency*
	2	-0,0160 ***	-0,0144 *	-0,0057 ***	-0,0092	0,0198 ***	-0,0333 ***	**2**	
	LE	-0,0325 (.)	-0,0144 *	-0,0209 ***	-0,0597 ***	-0,0276 ***	-0,0820 ***	**I**	
	avg R^2	0.2568294			**avg R^2**	0.2510374			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.20: FF3 Regression Results Efficient/Inefficient Portfolios (Scope 2, Period 3)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm	**E**	-0,0001 ***	0,0000 ***	-0,0001 ***	0,0000	-0,0002 (.)	-0,0002	**LI**	*Small firm*
efficiency	**2**	0,0000 ***	0,0003 ***	-0,0001 ***	-0,0002	-0,0003 (.)	-0,0003 (.)	**2**	*inefficiency*
	LE	0,0002 ***	0,0003 ***	0,0001 ***	-0,0003 (.)	-0,0004 **	-0,0004 **	**I**	
		Marked							
Small firm	**E**	0,8311 ***	0,6729 ***	0,7137 ***	1,0506 ***	1,3708 ***	1,1265 ***	**LI**	*Small firm*
efficiency	**2**	0,9968 ***	0,9492 ***	0,8731 ***	1,6493 ***	1,9606 ***	1,7339 ***	**2**	*inefficiency*
	LE	1,1144 ***	0,9492 ***	0,9880 ***	1,5231 ***	1,8372 ***	1,6134 ***	**I**	
		SMB							
Small firm	**E**	-0,1325 ***	-0,0011	-0,0183	-0,0308 *	-0,1828 ***	-0,1348 ***	**LI**	*Small firm*
efficiency	**2**	-0,1450 ***	0,0576 ***	-0,0280 ***	0,0417 (.)	-0,1116 ***	-0,0613 **	**2**	*inefficiency*
	LE	-0,0724 ***	0,0576 ***	0,0440 ***	0,0724 ***	-0,0812 ***	-0,0294	**I**	
		HML							
Small firm	**E**	0,1048	0,0473 *	0,0426 *	0,0451 **	0,0772 ***	0,0418 **	**LI**	*Small firm*
efficiency	**2**	0,0961	0,0054 ***	0,0300 ***	0,2939 ***	0,3347 ***	0,2905 ***	**2**	*inefficiency*
	LE	0,0605 ***	0,0054 ***	0,0000 ***	0,0864 ***	0,1280 ***	0,0785 ***	**I**	
		OIL							
Small firm	**E**	-0,0275	-0,0160	-0,0161	0,0090 (.)	0,0903 ***	0,0320 ***	**LI**	*Small firm*
efficiency	**2**	-0,0160 ***	-0,0196	-0,0050 ***	-0,0345 ***	0,0479 ***	-0,0088	**2**	*inefficiency*
	LE	-0,0325	-0,0196	-0,0200	0,0337 ***	0,1164 ***	0,0584 ***	**I**	
	avg R^2	0.253889			**avg R^2**	0.3784019			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

FF5 regressions results of Portfolios

These tables contains the regression results of the regression run on the efficient and inefficient portfolio with the following model (FF5 + OIL)

$$R_{it} = \alpha_i + b_i R_{mt} + s_i SMB_t + h_i HML_t + q_i PR1YR + l_i LIQ + p_i OIL_i$$

The tables are organised by the effectiveness of the included big efficient (inefficient) portfolio (horisontally) and the effectiveness of the included small efficient (inefficient) portfolio (vertically). The letter E (I) indicates the most efficient (inefficient) end of the scale. and LE (LI) the least efficient (inefficient) end.

Table B.21: FF5 Regression Results Efficient/Inefficient Portfolios (Scope 1, All years)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	0,0001 *	0,0000	0,0001	0,0001 *	0,0001	0,0001	**LI**	*Small firm inefficiency*
	2	0,0002 ***	0,0003 ***	0,0001 *	0,0001 *	0,0001	0,0001	**2**	
	LE	0,0004 ***	0,0003 ***	0,0003 ***	0,0002 *	0,0001 (.)	0,0001	**I**	
		Marked							
Small firm efficiency	**E**	0,7759 ***	0,7604 ***	0,8130 ***	0,9416 ***	0,9879 ***	0,9152 ***	**LI**	*Small firm inefficiency*
	2	0,9114 ***	0,9314 ***	0,9465 ***	0,9589 ***	1,0067 ***	0,9354 ***	**2**	
	LE	0,9517 ***	0,9314 ***	0,9829 ***	0,9570 ***	1,0092 ***	0,9322 ***	**I**	
		SMB							
Small firm efficiency	**E**	-0,1291 ***	0,0151 *	0,0242 ***	-0,0952 ***	-0,2059 ***	-0,1427 ***	**LI**	*Small firm inefficiency*
	2	-0,0801 ***	0,0256 ***	0,0761 ***	-0,0093	-0,1197 ***	-0,0581 ***	**2**	
	LE	-0,1227 ***	0,0256 ***	0,0355 ***	0,0159 *	-0,0967 ***	-0,0299 ***	**I**	
		HML							
Small firm efficiency	**E**	0,0285 ***	-0,0191 ***	-0,0753 ***	0,0396 ***	0,0553 ***	0,0601 ***	**LI**	*Small firm inefficiency*
	2	-0,0138 **	-0,0600 ***	-0,1223 ***	0,0234 ***	0,0373 ***	0,0424 ***	**2**	
	LE	-0,0097 (.)	-0,0600 ***	-0,1198 ***	0,0491 ***	0,0588 ***	0,0674 ***	**I**	
		PR1YR							
Small firm efficiency	**E**	0,0025	0,0164 **	-0,0061	0,0018	0,0102 (.)	0,0063	**LI**	*Small firm inefficiency*
	2	-0,0057	-0,0330 ***	-0,0152 **	0,0332 ***	0,0454 ***	0,0404 ***	**2**	
	LE	-0,0488 ***	-0,0330 ***	-0,0551 ***	0,0257 ***	0,0369 ***	0,0325 ***	**I**	
		LIQ							
Small firm efficiency	**E**	0,0365 ***	-0,0205 ***	-0,0663 ***	0,0005	0,0716 ***	0,0513 ***	**LI**	*Small firm inefficiency*
	2	-0,0394 ***	-0,0091	-0,1432 ***	0,0168 *	0,0907 ***	0,0729 ***	**2**	
	LE	0,0502 ***	-0,0091	-0,0553 ***	-0,0200 **	0,0583 ***	0,0369 ***	**I**	
		OIL							
Small firm efficiency	**E**	-0,0116 ***	-0,0171 ***	-0,0221 ***	0,0085 ***	0,0102 ***	0,0036	**LI**	*Small firm inefficiency*
	2	-0,0135 ***	-0,0218 ***	-0,0255 ***	0,0080 **	0,0082 **	0,0023	**2**	
	LE	-0,0159 ***	-0,0218 ***	-0,0277 ***	-0,0036	-0,0016	-0,0075 **	**I**	
	avg. R^2	0.3539425			**avg. R^2**	0.3274968			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.22: FF5 Regression Results Efficient/Inefficient Portfolios (Scope 2, All years)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm	**E**	0,0001 *	0,0000	0,0000	0,0001	0,0002 **	0,0002 ***	**LI**	*Small firm*
efficiency	**2**	0,0002 ***	0,0003 ***	0,0001	0,0001	0,0002	0,0002 (.)	**2**	*inefficiency*
	LE	0,0004 ***	0,0003 ***	0,0003 ***	0,0000	0,0001	0,0002 *	**I**	
		Marked							
Small firm	**E**	0,7759 ***	0,7537 ***	0,8003 ***	0,9745 ***	1,0661 ***	1,0427 ***	**LI**	*Small firm*
efficiency	**2**	0,9114 ***	0,9161 ***	0,9299 ***	1,7920 ***	1,7912 ***	1,7718 ***	**2**	*inefficiency*
	LE	0,9444 ***	0,9161 ***	0,9626 ***	1,2767 ***	1,3671 ***	1,3566 ***	**I**	
		SMB							
Small firm	**E**	-0,1291 ***	0,0187 **	0,0374 ***	-0,0707 ***	-0,0879 ***	-0,1149 ***	**LI**	*Small firm*
efficiency	**2**	-0,0801 ***	0,0316 ***	0,0896 ***	-0,0889 ***	-0,1055 ***	-0,1300 ***	**2**	*inefficiency*
	LE	-0,1207 ***	0,0316 ***	0,0511 ***	-0,0323 ***	-0,0527 ***	-0,0779 ***	**I**	
		HML							
Small firm	**E**	0,0285 ***	-0,0174 ***	-0,0725 ***	0,0592 ***	0,0883 ***	0,0296 ***	**LI**	*Small firm*
efficiency	**2**	-0,0138 **	-0,0591 ***	-0,1194 ***	0,1580 ***	0,1749 ***	0,1172 ***	**2**	*inefficiency*
	LE	-0,0105 (.)	-0,0591 ***	-0,1175 ***	0,0799 ***	0,1114 ***	0,0514 ***	**I**	
		PR1YR							
Small firm	**E**	0,0025	0,0208 ***	-0,0180 ***	0,0002	-0,0340 ***	-0,0350 ***	**LI**	*Small firm*
efficiency	**2**	-0,0057	-0,0300 ***	-0,0268 ***	0,0363 **	-0,0006	-0,0014	**2**	*inefficiency*
	LE	-0,0501 ***	-0,0300 ***	-0,0678 ***	0,0114 (.)	-0,0252 ***	-0,0271 ***	**I**	
		LIQ							
Small firm	**E**	0,0365 ***	-0,0174 **	-0,0635 ***	0,0527 ***	-0,0393 ***	-0,0069	**LI**	*Small firm*
efficiency	**2**	-0,0394 ***	-0,0091	-0,1398 ***	0,3141 ***	0,1862 ***	0,2163 ***	**2**	*inefficiency*
	LE	0,0476 ***	-0,0091	-0,0543 ***	0,0376 ***	-0,0578 ***	-0,0251 **	**I**	
		OIL							
Small firm	**E**	-0,0116 ***	-0,0188 ***	-0,0219 ***	0,0107 ***	0,0521 ***	0,0415 ***	**LI**	*Small firm*
efficiency	**2**	-0,0135 ***	-0,0215 ***	-0,0253 ***	-0,0350 ***	0,0133 **	0,0029	**2**	*inefficiency*
	LE	-0,0141 ***	-0,0215 ***	-0,0254 ***	0,0103 ***	0,0533 ***	0,0425 ***	**I**	
	avg. R^2	0.3483007			**avg.** R^2	0.3823758			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.23: FF5 Regression Results Efficient/Inefficient Portfolios (Scope 1, Period 1)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
					Alpha				
Small firm efficiency	**E**	0,0000	-0,0001	-0,0001	0,0000	0,0001	0,0002 *	**LI**	*Small firm inefficiency*
	2	0,0002 (.)	0,0002 *	0,0001	-0,0004 **	-0,0003 **	-0,0002 *	**2**	
	LE	0,0004 ***	0,0002 *	0,0003 **	0,0000	0,0001	0,0002 (.)	**I**	
					Marked				
Small firm efficiency	**E**	0,6932 ***	0,8828 ***	0,9839 ***	0,7317 ***	0,6807 ***	0,6091 ***	**LI**	*Small firm inefficiency*
	2	0,9020 ***	1,0181 ***	1,1955 ***	0,9232 ***	0,8606 ***	0,7958 ***	**2**	
	LE	0,8321 ***	1,0181 ***	1,1266 ***	0,9148 ***	0,8557 ***	0,7908 ***	**I**	
					SMB				
Small firm efficiency	**E**	-0,1106 ***	-0,0170	0,0243 *	-0,0650 ***	-0,1245 ***	-0,1137 ***	**LI**	*Small firm inefficiency*
	2	-0,0006	0,0271 *	0,1383 ***	-0,0330 *	-0,0934 ***	-0,0872 ***	**2**	
	LE	-0,0776 ***	0,0271 *	0,0662 ***	-0,0252 *	-0,0848 ***	-0,0762 ***	**I**	
					HML				
Small firm efficiency	**E**	-0,0285 ***	-0,0424 ***	-0,1298 ***	0,0595 ***	0,0592 ***	0,0498 ***	**LI**	*Small firm inefficiency*
	2	-0,0941 ***	-0,0827 ***	-0,2001 ***	0,1006 ***	0,0990 ***	0,0935 ***	**2**	
	LE	-0,0629 ***	-0,0827 ***	-0,1749 ***	0,1047 ***	0,1026 ***	0,0949 ***	**I**	
					PR1YR				
Small firm efficiency	**E**	0,0117	-0,0051	-0,0643 ***	-0,0252 **	0,0223 **	0,0255 ***	**LI**	*Small firm inefficiency*
	2	0,0434 ***	-0,0456 ***	-0,0298 **	-0,0341 ***	0,0201 *	0,0189 *	**2**	
	LE	-0,0364 ***	-0,0456 ***	-0,1039 ***	-0,0315 ***	0,0197 *	0,0201 *	**I**	
					LIQ				
Small firm efficiency	**E**	0,0898 ***	-0,0311 **	-0,1264 ***	-0,0195 *	0,0651 ***	0,0596 ***	**LI**	*Small firm inefficiency*
	2	-0,0458 ***	-0,0446 ***	-0,2618 ***	0,0130	0,0992 ***	0,0966 ***	**2**	
	LE	0,0805 ***	-0,0446 ***	-0,1386 ***	-0,0533 ***	0,0365 ***	0,0333 ***	**I**	
					OIL				
Small firm efficiency	**E**	-0,0131 ***	-0,0187 ***	-0,0186 ***	0,0202 ***	-0,0016	0,0064 (.)	**LI**	*Small firm inefficiency*
	2	-0,0100 **	-0,0229 ***	-0,0163 ***	0,0219 ***	-0,0037	0,0053	**2**	
	LE	-0,0159 ***	-0,0229 ***	-0,0232 ***	0,0301 ***	0,0067 (.)	0,0172 ***	**I**	
	avg R^2	0.3542908			**avg R^2**	0.2183716			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.24: FF5 Regression Results Efficient/Inefficient Portfolios (Scope 2, Period 1)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	0,0000	-0,0001	-0,0001	0,0000	0,0000	0,0002 (.)	**LI**	*Small firm inefficiency*
	2	0,0002 (.)	0,0003 *	0,0001	0,0004	0,0003	0,0005 *	**2**	
	LE	0,0004 ***	0,0003 *	0,0003 **	0,0001	0,0000	0,0003 *	**I**	
		Marked							
Small firm efficiency	**E**	0,6932 ***	0,8828 ***	0,9839 ***	0,7964 ***	0,8535 ***	0,9394 ***	**LI**	*Small firm inefficiency*
	2	0,9020 ***	1,0035 ***	1,1955 ***	2,4505 ***	2,2796 ***	2,3647 ***	**2**	
	LE	0,8187 ***	1,0035 ***	1,1120 ***	1,1080 ***	1,1580 ***	1,2542 ***	**I**	
		SMB							
Small firm efficiency	**E**	-0,1106 ***	-0,0170	0,0243 *	-0,0378 **	-0,0532 ***	-0,0905 ***	**LI**	*Small firm inefficiency*
	2	-0,0006	0,0263 *	0,1383 ***	-0,2472 ***	-0,2383 ***	-0,2733 ***	**2**	
	LE	-0,0784 ***	0,0263 *	0,0653 ***	-0,0755 ***	-0,0899 ***	-0,1303 ***	**I**	
		HML							
Small firm efficiency	**E**	-0,0285 ***	-0,0424 ***	-0,1298 ***	0,1265 ***	0,1281 ***	0,0918 ***	**LI**	*Small firm inefficiency*
	2	-0,0941 ***	-0,0827 ***	-0,2001 ***	0,2649 ***	0,2365 ***	0,2037 ***	**2**	
	LE	-0,0629 ***	-0,0827 ***	-0,1750 ***	0,1265 ***	0,1255 ***	0,0931 ***	**I**	
		PR1YR							
Small firm efficiency	**E**	0,0117	-0,0051	-0,0643 ***	-0,0038	-0,0179 *	-0,0685 ***	**LI**	*Small firm inefficiency*
	2	0,0434 ***	-0,0492 ***	-0,0298 **	0,0695 **	0,0488 *	-0,0033	**2**	
	LE	-0,0396 ***	-0,0492 ***	-0,1075 ***	0,0126	0,0013	-0,0542 ***	**I**	
		LIQ							
Small firm efficiency	**E**	0,0898 ***	-0,0311 **	-0,1264 ***	0,0581 ***	-0,0040	-0,0182 (.)	**LI**	*Small firm inefficiency*
	2	-0,0458 ***	-0,0467 ***	-0,2618 ***	0,5121 ***	0,3727 ***	0,3550 ***	**2**	
	LE	0,0785 ***	-0,0467 ***	-0,1407 ***	0,0554 ***	-0,0121	-0,0276 *	**I**	
		OIL							
Small firm efficiency	**E**	-0,0131 ***	-0,0187 ***	-0,0186 ***	-0,0055	0,0185 ***	0,0369 ***	**LI**	*Small firm inefficiency*
	2	-0,0100 **	-0,0231 ***	-0,0163 ***	-0,0316 **	-0,0028	0,0164 (.)	**2**	
	LE	-0,0162 ***	-0,0231 ***	-0,0234 ***	-0,0108 **	0,0128 **	0,0328 ***	**I**	
	avg R^2	0.3528187			**avg R^2**	0.3020738			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.25: FF5 Regression Results Efficient/Inefficient Portfolios (Scope 1, Period 2)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm	**E**	0,0000	-0,0001	0,0000	0,0004 ***	0,0003 ***	0,0001	**LI**	*Small firm*
efficiency	**2**	0,0000	0,0002 *	0,0000	0,0006 ***	0,0005 ***	0,0003 ***	**2**	*inefficiency*
	LE	0,0003 *	0,0002 *	0,0003 **	-0,0001	-0,0001	-0,0004 ***	**I**	
		Marked							
Small firm	**E**	0,8114 ***	0,6650 ***	0,7077 ***	1,1082 ***	1,1496 ***	1,1236 ***	**LI**	*Small firm*
efficiency	**2**	1,0030 ***	0,9817 ***	0,9035 ***	1,0300 ***	1,0714 ***	1,0469 ***	**2**	*inefficiency*
	LE	1,1332 ***	0,9817 ***	1,0194 ***	1,0361 ***	1,0803 ***	1,0493 ***	**I**	
		SMB							
Small firm	**E**	-0,0906 ***	0,0236 **	-0,0109	-0,0366 ***	-0,1974 ***	-0,0765 ***	**LI**	*Small firm*
efficiency	**2**	-0,1264 ***	0,0434 **	-0,0431 ***	0,0531 ***	-0,1009 ***	0,0190 (.)	**2**	*inefficiency*
	LE	-0,0697 ***	0,0434 **	0,0120	0,0604 ***	-0,1023 ***	0,0252 *	**I**	
		HML							
Small firm	**E**	0,1041 ***	0,0432 ***	0,0359 ***	0,0427 ***	0,0236 **	0,0735 ***	**LI**	*Small firm*
efficiency	**2**	0,0909 ***	-0,0054	0,0174 *	-0,0505 ***	-0,0750 ***	-0,0273 **	**2**	*inefficiency*
	LE	0,0537 ***	-0,0054	-0,0141	-0,0018	-0,0312 ***	0,0256 **	**I**	
		PR1YR							
Small firm	**E**	-0,0357 ***	0,0125 (.)	0,0439 ***	-0,0255 **	-0,0098	-0,0571 ***	**LI**	*Small firm*
efficiency	**2**	-0,0894 ***	-0,0568 ***	-0,0160 *	0,0203 *	0,0404 ***	-0,0063	**2**	*inefficiency*
	LE	-0,1014 ***	-0,0568 ***	-0,0221 *	0,0421 ***	0,0646 ***	0,0193 *	**I**	
		LIQ							
Small firm	**E**	-0,0539 ***	-0,0502 ***	-0,0490 ***	-0,0351 ***	0,0456 ***	-0,0198 (.)	**LI**	*Small firm*
efficiency	**2**	-0,0085	0,0215	-0,0022	0,0015	0,0815 ***	0,0195 (.)	**2**	*inefficiency*
	LE	0,0174	0,0215	0,0201	0,0142	0,1012 ***	0,0334 **	**I**	
		OIL							
Small firm	**E**	-0,0260 ***	-0,0099 **	-0,0157 ***	-0,0034	0,0061	0,0105 *	**LI**	*Small firm*
efficiency	**2**	-0,0150 ***	-0,0144 **	-0,0055	-0,0033	0,0056	0,0129 **	**2**	*inefficiency*
	LE	-0,0319 ***	-0,0144 **	-0,0211 ***	-0,0244 ***	-0,0158 ***	-0,0097 *	**I**	
	avg R^2	0.4338831			**avg R^2**	0.5099108			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.26: FF5 Regression Results Efficient/Inefficient Portfolios (Scope 2, Period 2)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
				Alpha					
Small firm	**E**	0,0000	0,0000	-0,0001 (.)	0,0002 *	0,0005 ***	0,0004 ***	**LI**	*Small firm*
efficiency	**2**	0,0000	0,0003 *	-0,0001	-0,0002 (.)	0,0002 (.)	0,0001	**2**	*inefficiency*
	LE	0,0003 *	0,0003 *	0,0002	0,0002 (.)	0,0005 ***	0,0005 ***	**I**	
				Marked					
Small firm	**E**	0,8114 ***	0,6528 ***	0,6926 ***	1,0800 ***	1,1207 ***	1,1073 ***	**LI**	*Small firm*
efficiency	**2**	1,0030 ***	0,9679 ***	0,8796 ***	1,1392 ***	1,1863 ***	1,1749 ***	**2**	*inefficiency*
	LE	1,1332 ***	0,9679 ***	1,0055 ***	1,3211 ***	1,3680 ***	1,3690 ***	**I**	
				SMB					
Small firm	**E**	-0,0906 ***	0,0219 *	0,0094	-0,0567 ***	-0,0995 ***	-0,1496 ***	**LI**	*Small firm*
efficiency	**2**	-0,1264 ***	0,0421 **	-0,0249 *	0,0028	-0,0377 ***	-0,0874 ***	**2**	*inefficiency*
	LE	-0,0697 ***	0,0421 **	0,0322 *	-0,0056	-0,0508 ***	-0,0992 ***	**I**	
				HML					
Small firm	**E**	0,1041 ***	0,0500 ***	0,0448 ***	-0,0637 ***	-0,0248 **	-0,0787 ***	**LI**	*Small firm*
efficiency	**2**	0,0909 ***	0,0018	0,0273 ***	-0,0096	0,0298 ***	-0,0236 **	**2**	*inefficiency*
	LE	0,0537 ***	0,0018	-0,0038	-0,0085	0,0371 ***	-0,0205 (.)	**I**	
				PR1YR					
Small firm	**E**	-0,0357 ***	0,0260 ***	0,0159 *	0,0335 ***	0,0511 ***	0,0530 ***	**LI**	*Small firm*
efficiency	**2**	-0,0894 ***	-0,0431 ***	-0,0415 ***	0,0592 ***	0,0664 ***	0,0702 ***	**2**	*inefficiency*
	LE	-0,1014 ***	-0,0431 ***	-0,0486 ***	0,0429 ***	0,0484 ***	0,0510 ***	**I**	
				LIQ					
Small firm	**E**	-0,0539 ***	-0,0393 ***	-0,0441 ***	0,0654 ***	-0,0054	0,0573 ***	**LI**	*Small firm*
efficiency	**2**	-0,0085	0,0318 *	0,0043	0,0268 *	-0,0436 ***	0,0174	**2**	*inefficiency*
	LE	0,0174	0,0318 *	0,0277 *	0,0460 ***	-0,0270 *	0,0387 **	**I**	
				OIL					
Small firm	**E**	-0,0260 ***	-0,0153 ***	-0,0153 ***	0,0217 ***	0,0557 ***	0,0445 ***	**LI**	*Small firm*
efficiency	**2**	-0,0150 ***	-0,0199 ***	-0,0047	0,0054	0,0425 ***	0,0293 ***	**2**	*inefficiency*
	LE	-0,0319 ***	-0,0199 ***	-0,0202 ***	0,0132 *	0,0517 ***	0,0375 ***	**I**	
	avg R^2	0.4247092			**avg R^2**	0.5554095			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.27: FF5 Regression Results Efficient/Inefficient Portfolios (Scope 1, Period 3)

		Efficient Portfolio			**Inefficient Portfolio**				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm	**E**	0,0004 ***	0,0003 **	0,0003 **	-0,0001	-0,0003 **	-0,0002 (.)	**LI**	*Small firm*
efficiency	**2**	0,0005 ***	0,0004 ***	0,0004 ***	0,0002	0,0000	0,0000	**2**	*inefficiency*
	LE	0,0005 ***	0,0004 ***	0,0004 ***	0,0007 ***	0,0005 ***	0,0005 ***	**I**	
		Marked							
Small firm	**E**	0,8254 ***	0,7451 ***	0,7487 ***	1,0103 ***	1,1792 ***	1,0461 ***	**LI**	*Small firm*
efficiency	**2**	0,7428 ***	0,7004 ***	0,6428 ***	0,9113 ***	1,1093 ***	0,9662 ***	**2**	*inefficiency*
	LE	0,7900 ***	0,7004 ***	0,6953 ***	0,9687 ***	1,1735 ***	1,0184 ***	**I**	
		SMB							
Small firm	**E**	-0,1222 ***	-0,0641 ***	-0,1642 ***	-0,1742 ***	-0,1346 ***	-0,0251	**LI**	*Small firm*
efficiency	**2**	-0,1016 ***	-0,1286 ***	-0,1421 ***	-0,0839 ***	-0,0533 **	0,0598 **	**2**	*inefficiency*
	LE	-0,1857 ***	-0,1286 ***	-0,2347 ***	-0,0572 *	-0,0246	0,0917 ***	**I**	
		HML							
Small firm	**E**	-0,0046	-0,0372 *	-0,0619 ***	-0,1061 ***	0,0244	0,0098	**LI**	*Small firm*
efficiency	**2**	0,0014	-0,0924 ***	-0,0611 ***	-0,0878 ***	0,0392 *	0,0228	**2**	*inefficiency*
	LE	-0,0545 ***	-0,0924 ***	-0,1220 ***	-0,0125	0,0988 ***	0,0943 ***	**I**	
		PR1YR							
Small firm	**E**	0,0668 ***	0,1236 ***	0,1087 ***	0,0867 ***	-0,0243	0,0208	**LI**	*Small firm*
efficiency	**2**	0,0509 ***	0,0602 ***	0,0911 ***	0,2237 ***	0,1041 ***	0,1529 ***	**2**	*inefficiency*
	LE	0,0047	0,0602 ***	0,0383 ***	0,1091 ***	-0,0124	0,0331 (.)	**I**	
		LIQ							
Small firm	**E**	0,0709 ***	0,1152 ***	0,1707 ***	0,1190 ***	0,1003 ***	0,1137 ***	**LI**	*Small firm*
efficiency	**2**	-0,0387 **	0,0868 ***	0,0516 ***	0,0387 *	0,0315 (.)	0,0426 **	**2**	*inefficiency*
	LE	0,0409 ***	0,0868 ***	0,1425 ***	-0,0181	-0,0221	-0,0179	**I**	
		OIL							
Small firm	**E**	0,0048	0,0038	-0,0029	-0,0213 ***	0,0045	-0,0457 ***	**LI**	*Small firm*
efficiency	**2**	-0,0216 ***	-0,0075 (.)	-0,0330 ***	-0,0042	0,0224 ***	-0,0296 ***	**2**	*inefficiency*
	LE	-0,0057	-0,0075 (.)	-0,0156 ***	-0,0580 ***	-0,0283 ***	-0,0818 ***	**I**	
	avg R^2	0.261512			avg R^2	0.2546058			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table B.28: FF5 Regression Results Efficient/Inefficient Portfolios (Scope 2, Period 3)

		Efficient Portfolio			Inefficient Portfolio				
		Big firm efficiency			*Big firm Inefficeiency*				
		E	**2**	**LE**	**LI**	**2**	**I**		
		Alpha							
Small firm efficiency	**E**	0,0004 ***	0,0003 **	0,0003 **	0,0001	0,0001	0,0000	**LI**	*Small firm inefficiency*
	2	0,0005 ***	0,0003 ***	0,0004 ***	-0,0002	-0,0001	-0,0002	**2**	
	LE	0,0005 ***	0,0003 ***	0,0004 ***	-0,0002	-0,0002	-0,0003 (.)	**I**	
		Marked							
Small firm efficiency	**E**	0,8254 ***	0,7451 ***	0,7313 ***	1,0257 ***	1,2567 ***	1,0648 ***	**LI**	*Small firm inefficiency*
	2	0,7428 ***	0,6858 ***	0,6240 ***	1,7556 ***	1,9795 ***	1,8051 ***	**2**	
	LE	0,7766 ***	0,6858 ***	0,6634 ***	1,4778 ***	1,7032 ***	1,5312 ***	**I**	
		SMB							
Small firm efficiency	**E**	-0,1222 ***	-0,0641 ***	-0,1493 ***	0,0105	0,0325	-0,0187	**LI**	*Small firm inefficiency*
	2	-0,1016 ***	-0,1056 ***	-0,1258 ***	-0,1907 ***	-0,1735 ***	-0,2217 ***	**2**	
	LE	-0,1645 ***	-0,1056 ***	-0,1964 ***	0,1608 ***	0,1801 ***	0,1351 ***	**I**	
		HML							
Small firm efficiency	**E**	-0,0046	-0,0372 *	-0,0577 ***	0,0420 **	0,0905 ***	0,0487 **	**LI**	*Small firm inefficiency*
	2	0,0014	-0,0963 ***	-0,0566 ***	0,2472 ***	0,3044 ***	0,2542 ***	**2**	
	LE	-0,0581 ***	-0,0963 ***	-0,1213 ***	0,0950 ***	0,1530 ***	0,0982 ***	**I**	
		PR1YR							
Small firm efficiency	**E**	0,0668 ***	0,1236 ***	0,0972 ***	-0,1207 ***	-0,3080 ***	-0,1694 ***	**LI**	*Small firm inefficiency*
	2	0,0509 ***	0,0638 ***	0,0783 ***	-0,0210	-0,2009 ***	-0,0595 **	**2**	
	LE	0,0080	0,0638 ***	0,0313 **	-0,0927 ***	-0,2777 ***	-0,1317 ***	**I**	
		LIQ							
Small firm efficiency	**E**	0,0709 ***	0,1152 ***	0,1781 ***	-0,0546 ***	-0,2904 ***	-0,1566 ***	**LI**	*Small firm inefficiency*
	2	-0,0387 **	0,0737 ***	0,0603 ***	0,3198 ***	0,0887 ***	0,2216 ***	**2**	
	LE	0,0288 **	0,0737 ***	0,1381 ***	-0,1198 ***	-0,3542 ***	-0,2237 ***	**I**	
		OIL							
Small firm efficiency	**E**	0,0048	0,0038	-0,0002	0,0056	0,0784 ***	0,0255 ***	**LI**	*Small firm inefficiency*
	2	-0,0216 ***	0,0028	-0,0301 ***	-0,0281 ***	0,0460 ***	-0,0052	**2**	
	LE	0,0037	0,0028	-0,0025	0,0294 ***	0,1038 ***	0,0512 ***	**I**	
	avg R^2	0.2584079			**avg R^2**	0.386952			

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

C. CRE-portfolio Means

These tables contains the average returns of all the 81 portfolios under scope 1 and scope 2. The tables are organised by the effectiveness of the included "clean" portfolio (horisontally) and the ineffectiveness of the included "dirty" portfolio (vertically). The letter E (I) indicates the most efficient (inefficient) end of the scale, and LE (LI) the least efficient (inefficient) end. If we take a look at table C.1 the most efficient portfolio under Scope 1 (top left corner) has an average daily return across the 22 years of -0.00012 or 0.012%.

Table C.1: Mean Return CRE-portfolios (All Years)

	E	2	3	4	5	6	7	8	LE
Scope 1									
LI	-0,00012	-0,00015	0,00000	-0,00018	-0,00008	0,00010	-0,00012	0,00004	0,00005
2	-0,00006	-0,00008	0,00007	-0,00014	-0,00002	0,00018	-0,00009	0,00012	0,00007
3	-0,00014	-0,00020	-0,00002	-0,00023	-0,00013	0,00009	-0,00012	0,00001	-0,00001
4	0,00000	-0,00008	0,00009	-0,00010	0,00000	0,00021	-0,00003	0,00011	0,00013
5	-0,00013	-0,00019	0,00000	-0,00019	-0,00007	0,00009	-0,00012	0,00001	0,00001
6	-0,00009	-0,00016	0,00005	-0,00016	-0,00005	0,00012	-0,00009	0,00007	0,00006
7	-0,00009	-0,00015	0,00006	-0,00019	-0,00009	0,00014	-0,00008	0,00004	0,00009
8	-0,00003	-0,00007	0,00012	-0,00013	0,00004	0,00020	0,00000	0,00014	0,00015
I	0,00002	-0,00005	0,00018	-0,00008	0,00007	0,00025	0,00005	0,00021	0,00021
Scope 2									
LI	-0,00010	-0,00013	0,00004	-0,00024	0,00001	0,00015	-0,00009	0,00012	0,00004
2	-0,00013	-0,00015	0,00002	-0,00026	-0,00003	0,00014	-0,00012	0,00012	0,00004
3	0,00004	-0,00001	0,00016	-0,00009	0,00011	0,00027	0,00004	0,00023	0,00014
4	-0,00015	-0,00017	-0,00002	-0,00027	-0,00012	0,00009	-0,00017	0,00004	-0,00003
5	0,00005	-0,00005	0,00017	-0,00010	0,00011	0,00026	0,00004	0,00019	0,00017
6	0,00003	-0,00004	0,00015	-0,00011	0,00006	0,00024	-0,00001	0,00017	0,00014
7	-0,00002	-0,00005	0,00009	-0,00014	0,00002	0,00014	-0,00005	0,00015	0,00008
8	-0,00005	-0,00013	0,00009	-0,00020	0,00000	0,00020	-0,00007	0,00013	0,00007
I	-0,00008	-0,00012	0,00004	-0,00018	-0,00004	0,00013	-0,00012	0,00007	0,00002

Table C.2: Mean Return CRE-portfolios (Period 1)

	E	2	3	4	5	6	7	8	LE
Scope 1									
LI	-0,00014	-0,00029	-0,00007	-0,00039	-0,00029	0,00028	-0,00037	0,00006	0,00009
2	-0,00023	-0,00037	-0,00014	-0,00050	-0,00037	0,00024	-0,00050	0,00002	-0,00003
3	0,00024	0,00007	0,00034	-0,00004	0,00008	0,00066	0,00004	0,00042	0,00037
4	-0,00024	-0,00045	-0,00016	-0,00053	-0,00040	0,00024	-0,00046	-0,00007	-0,00002
5	0,00016	-0,00002	0,00022	-0,00009	0,00003	0,00053	-0,00009	0,00028	0,00027
6	0,00009	-0,00014	0,00017	-0,00019	-0,00005	0,00044	-0,00016	0,00026	0,00021
7	-0,00015	-0,00028	0,00000	-0,00038	-0,00026	0,00032	-0,00029	0,00008	0,00016
8	-0,00021	-0,00032	-0,00010	-0,00046	-0,00028	0,00024	-0,00038	0,00006	0,00009
I	-0,00026	-0,00044	-0,00012	-0,00053	-0,00036	0,00020	-0,00041	0,00001	0,00004
Scope 2									
LI	-0,00024	-0,00042	-0,00014	-0,00054	-0,00032	0,00023	-0,00039	0,00001	0,00000
2	-0,00017	-0,00031	-0,00005	-0,00047	-0,00023	0,00037	-0,00031	0,00019	0,00017
3	-0,00041	-0,00056	-0,00030	-0,00065	-0,00047	0,00011	-0,00055	-0,00009	-0,00014
4	-0,00022	-0,00039	-0,00012	-0,00049	-0,00038	0,00028	-0,00039	0,00004	0,00006
5	-0,00021	-0,00044	-0,00008	-0,00050	-0,00027	0,00032	-0,00035	0,00005	0,00014
6	-0,00030	-0,00048	-0,00020	-0,00055	-0,00040	0,00022	-0,00047	-0,00001	0,00005
7	-0,00017	-0,00032	-0,00009	-0,00037	-0,00029	0,00019	-0,00032	0,00006	0,00011
8	-0,00008	-0,00026	0,00005	-0,00031	-0,00016	0,00045	-0,00019	0,00021	0,00028
I	-0,00016	-0,00034	-0,00006	-0,00034	-0,00027	0,00031	-0,00029	0,00007	0,00017

Table C.3: Mean Return CRE-portfolios (Period 2)

	E	2	3	4	5	6	7	8	LE
Scope 1									
LI	-0,00034	-0,00027	-0,00023	-0,00020	-0,00020	-0,00033	-0,00019	-0,00027	-0,00023
2	-0,00026	-0,00019	-0,00016	-0,00016	-0,00014	-0,00024	-0,00017	-0,00020	-0,00020
3	-0,00056	-0,00054	-0,00046	-0,00045	-0,00051	-0,00046	-0,00040	-0,00045	-0,00042
4	-0,00004	-0,00001	0,00000	0,00005	0,00003	-0,00007	0,00003	-0,00004	0,00001
5	-0,00057	-0,00053	-0,00046	-0,00044	-0,00046	-0,00048	-0,00041	-0,00046	-0,00040
6	-0,00033	-0,00028	-0,00023	-0,00019	-0,00026	-0,00026	-0,00021	-0,00020	-0,00016
7	0,00012	0,00013	0,00020	0,00018	0,00013	0,00012	0,00021	0,00014	0,00019
8	0,00014	0,00017	0,00024	0,00021	0,00023	0,00018	0,00025	0,00020	0,00024
I	0,00040	0,00043	0,00049	0,00048	0,00046	0,00040	0,00050	0,00049	0,00050
Scope 2									
LI	-0,00025	-0,00015	-0,00015	-0,00027	-0,00006	-0,00019	-0,00021	-0,00006	-0,00021
2	-0,00057	-0,00048	-0,00048	-0,00060	-0,00043	-0,00051	-0,00055	-0,00041	-0,00056
3	0,00005	0,00012	0,00009	0,00003	0,00014	0,00007	0,00006	0,00015	0,00002
4	-0,00053	-0,00043	-0,00043	-0,00056	-0,00041	-0,00047	-0,00051	-0,00037	-0,00053
5	-0,00022	-0,00019	-0,00020	-0,00025	-0,00016	-0,00024	-0,00024	-0,00016	-0,00027
6	-0,00020	-0,00018	-0,00016	-0,00027	-0,00016	-0,00019	-0,00025	-0,00015	-0,00027
7	-0,00022	-0,00014	-0,00020	-0,00026	-0,00017	-0,00024	-0,00028	-0,00011	-0,00028
8	-0,00054	-0,00054	-0,00049	-0,00062	-0,00051	-0,00052	-0,00060	-0,00047	-0,00061
I	-0,00051	-0,00046	-0,00047	-0,00057	-0,00047	-0,00049	-0,00059	-0,00043	-0,00059

Table C.4: Mean Return CRE-portfolios (Period 3)

	E	2	3	4	5	6	7	8	LE
Scope 1									
LI	0,00022	0,00017	0,00039	0,00014	0,00032	0,00045	0,00030	0,00039	0,00039
2	0,00045	0,00042	0,00065	0,00038	0,00059	0,00066	0,00056	0,00064	0,00058
3	-0,00004	-0,00013	0,00015	-0,00013	0,00007	0,00012	0,00008	0,00006	0,00005
4	0,00036	0,00030	0,00052	0,00026	0,00046	0,00056	0,00045	0,00049	0,00049
5	0,00013	0,00005	0,00036	0,00006	0,00032	0,00029	0,00029	0,00024	0,00023
6	0,00006	-0,00004	0,00030	-0,00002	0,00023	0,00023	0,00021	0,00018	0,00017
7	-0,00025	-0,00038	-0,00003	-0,00040	-0,00016	-0,00006	-0,00015	-0,00016	-0,00012
8	0,00002	-0,00005	0,00028	-0,00011	0,00022	0,00018	0,00019	0,00013	0,00013
I	-0,00007	-0,00019	0,00018	-0,00023	0,00009	0,00011	0,00007	0,00005	0,00005
Scope 2									
LI	0,00031	0,00025	0,00055	0,00022	0,00050	0,00051	0,00046	0,00045	0,00043
2	0,00053	0,00049	0,00079	0,00048	0,00073	0,00071	0,00072	0,00068	0,00066
3	0,00065	0,00053	0,00089	0,00053	0,00082	0,00078	0,00082	0,00072	0,00069
4	0,00049	0,00044	0,00068	0,00042	0,00061	0,00062	0,00061	0,00056	0,00053
5	0,00078	0,00064	0,00104	0,00066	0,00099	0,00089	0,00097	0,00082	0,00082
6	0,00083	0,00071	0,00105	0,00073	0,00098	0,00090	0,00097	0,00082	0,00085
7	0,00047	0,00042	0,00074	0,00037	0,00065	0,00060	0,00063	0,00058	0,00055
8	0,00069	0,00058	0,00095	0,00054	0,00086	0,00085	0,00082	0,00079	0,00074
I	0,00066	0,00062	0,00088	0,00059	0,00083	0,00074	0,00078	0,00071	0,00067

D. CRE-portfolio Regressions

CAPM regressions results of CRE-Portfolios

These tables contains the regression results of the first step Fama-Macbeth Regression run on all the 81 portfolios under scope 1 and 2 with the following model

$$R_{it} = \alpha_i + b_i R_{mt} + p_i OIL_i$$

The table is organised by the effectiveness of the included "clean" portfolio (horisontally) and the ineffectiveness of the included "dirty" portfolio (vertically). The letter E (I) indicates the most efficient (inefficient) end of the scale, and LE (LI) the least efficient (inefficient) end.

Table D.1: CAPM Regression Results (Scope 1, All years)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0002	-0,0003	-0,0001	-0,0003	-0,0002	0,0000	-0,0003	-0,0001	-0,0001
2	-0,0002	-0,0002	-0,0001	-0,0003	-0,0001	0,0001	-0,0002	0,0000	-0,0001
3	-0,0003	-0,0003	-0,0002	-0,0003	-0,0003	0,0000	-0,0003	-0,0001	-0,0001
4	-0,0001	-0,0002	0,0000	-0,0002	-0,0001	0,0001	-0,0002	0,0000	0,0000
5	-0,0002	-0,0003	-0,0001	-0,0003	-0,0002	0,0000	-0,0002	-0,0001	-0,0001
6	-0,0002	-0,0003	-0,0001	-0,0003	-0,0002	0,0000	-0,0002	-0,0001	-0,0001
7	-0,0002	-0,0003	-0,0001	-0,0003	-0,0002	0,0000	-0,0002	-0,0001	0,0000
8	-0,0001	-0,0002	0,0000	-0,0003	-0,0001	0,0001	-0,0001	0,0000	0,0000
I	-0,0001	-0,0002	0,0000	-0,0002	-0,0001	0,0001	-0,0001	0,0001	0,0001
					$marked$				
LE	-0,1756 ***	-0,1991 ***	0,0047	-0,1128 ***	-0,0348	-0,0274	0,0505 *	-0,0585 *	0,0216
2	-0,2133 ***	-0,2369 ***	-0,0303	-0,1532 ***	-0,0688 **	-0,0606 **	0,0159	-0,0928 ***	-0,0111
3	-0,1463 ***	-0,1719 ***	0,0426 (.)	-0,0813 ***	0,0083	0,0177	0,0951 ***	-0,0147	0,0709 **
4	-0,1301 ***	-0,1545 ***	0,0516 *	-0,0702 **	0,0153	0,0172	0,0986 ***	-0,0110	0,0669 **
5	-0,1894 ***	-0,2124 ***	0,0015	-0,1222 ***	-0,0303	-0,0240	0,0578 *	-0,0513 *	0,0315
6	-0,1031 ***	-0,1265 ***	0,0888 ***	-0,0364	0,0587 *	0,0599 **	0,1453 ***	0,0340	0,1175 ***
7	-0,1366 ***	-0,1597 ***	0,0492 *	-0,0692 **	0,0127	0,0153	0,1009 ***	-0,0136	0,0741 **
8	-0,1801 ***	-0,2041 ***	0,0082	-0,1123 ***	-0,0248	-0,0241	0,0654 **	-0,0512 *	0,0368
I	-0,0932 ***	-0,1150 ***	0,0929 ***	-0,0262	0,0631 **	0,0575 **	0,1509 ***	0,0342	0,1191 ***
					$LNOILCH$				
LE	-0,0183 *	-0,0292 **	-0,0168 (.)	-0,0329 ***	-0,0258 **	-0,0190 *	-0,0300 **	-0,0297 **	-0,0314 **
2	-0,0199 *	-0,0308 ***	-0,0223 *	-0,0354 ***	-0,0320 **	-0,0230 *	-0,0362 ***	-0,0339 ***	-0,0368 ***
3	-0,0167 (.)	-0,0279 **	-0,0171 (.)	-0,0318 **	-0,0254 *	-0,0184 *	-0,0290 **	-0,0281 **	-0,0312 **
4	-0,0134	-0,0244 **	-0,0160 (.)	-0,0283 **	-0,0250 *	-0,0175 (.)	-0,0295 **	-0,0271 **	-0,0301 **
5	-0,0175 (.)	-0,0298 **	-0,0186 (.)	-0,0346 ***	-0,0298 **	-0,0210 *	-0,0335 **	-0,0325 ***	-0,0362 ***
6	-0,0120	-0,0238 *	-0,0136	-0,0284 **	-0,0251 *	-0,0152 (.)	-0,0286 **	-0,0264 **	-0,0302 **
7	-0,0063	-0,0175 (.)	-0,0044	-0,0229 *	-0,0132	-0,0095	-0,0175 (.)	-0,0189 *	-0,0222 *
8	-0,0105	-0,0222 *	-0,0092	-0,0272 **	-0,0213 *	-0,0148 (.)	-0,0247 *	-0,0262 **	-0,0295 **
I	-0,0038	-0,0145	-0,0031	-0,0203 *	-0,0140	-0,0082	-0,0182 (.)	-0,0183 *	-0,0221 *

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.2: CAPM Regression Results (Scope 2, All years)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0002	-0,0002	-0,0001	-0,0004	-0,0001	0,0000	-0,0002	0,0000	-0,0001
2	-0,0002	-0,0002	-0,0001	-0,0004	-0,0001	0,0000	-0,0002	0,0000	-0,0001
3	-0,0001	-0,0001	0,0000	-0,0002	0,0000	0,0002	-0,0001	0,0001	0,0000
4	-0,0003	-0,0003	-0,0001	-0,0004 (.)	-0,0002	0,0000	-0,0003	-0,0001	-0,0001
5	0,0000	-0,0001	0,0001	-0,0002	0,0000	0,0002	-0,0001	0,0001	0,0001
6	-0,0001	-0,0001	0,0000	-0,0002	0,0000	0,0001	-0,0001	0,0001	0,0000
7	-0,0001	-0,0001	0,0000	-0,0002	-0,0001	0,0000	-0,0002	0,0000	0,0000
8	-0,0001	-0,0002	0,0000	-0,0003	-0,0001	0,0001	-0,0002	0,0000	0,0000
I	-0,0002	-0,0002	-0,0001	-0,0003	-0,0001	0,0000	-0,0002	0,0000	-0,0001
					$marked$				
LE	-0,1583 ***	-0,1897 ***	0,0291	-0,1130 ***	-0,0146	-0,0066	0,0594 *	-0,0405 (.)	0,0300
2	-0,3111 ***	-0,3388 ***	-0,1251 ***	-0,2654 ***	-0,1650 ***	-0,1546 ***	-0,0940 ***	-0,1898 ***	-0,1196 ***
3	-0,3004 ***	-0,3376 ***	-0,1169 ***	-0,2626 ***	-0,1640 ***	-0,1499 ***	-0,0905 ***	-0,1902 ***	-0,1205 ***
4	-0,2845 ***	-0,3124 ***	-0,1023 ***	-0,2379 ***	-0,1395 ***	-0,1329 ***	-0,0670 **	-0,1621 ***	-0,0924 ***
5	-0,4585 ***	-0,4912 ***	-0,2764 ***	-0,4192 ***	-0,3157 ***	-0,3048 ***	-0,2461 ***	-0,3462 ***	-0,2731 ***
6	-0,4326 ***	-0,4696 ***	-0,2499 ***	-0,3954 ***	-0,2896 ***	-0,2817 ***	-0,2212 ***	-0,3222 ***	-0,2471 ***
7	-0,4358 ***	-0,4679 ***	-0,2430 ***	-0,3934 ***	-0,2883 ***	-0,2807 ***	-0,2155 ***	-0,3182 ***	-0,2452 ***
8	-0,5881 ***	-0,6198 ***	-0,4004 ***	-0,5461 ***	-0,4421 ***	-0,4314 ***	-0,3698 ***	-0,4711 ***	-0,3996 ***
I	-0,5798 ***	-0,6121 ***	-0,3912 ***	-0,5378 ***	-0,4337 ***	-0,4258 ***	-0,3595 ***	-0,4633 ***	-0,3898 ***
					$LNOILCH$				
LE	-0,0191 *	-0,0326 ***	-0,0198 *	-0,0356 ***	-0,0326 **	-0,0205 *	-0,0356 ***	-0,0334 ***	-0,0358 ***
2	-0,0645 ***	-0,0771 ***	-0,0642 ***	-0,0804 ***	-0,0768 ***	-0,0644 ***	-0,0797 ***	-0,0781 ***	-0,0801 ***
3	-0,0226 *	-0,0354 ***	-0,0227 *	-0,0383 ***	-0,0342 **	-0,0233 *	-0,0365 ***	-0,0344 ***	-0,0365 ***
4	-0,0512 ***	-0,0650 ***	-0,0517 ***	-0,0683 ***	-0,0658 ***	-0,0529 ***	-0,0684 ***	-0,0685 ***	-0,0702 ***
5	-0,0674 ***	-0,0795 ***	-0,0670 ***	-0,0837 ***	-0,0788 ***	-0,0679 ***	-0,0813 ***	-0,0800 ***	-0,0820 ***
6	-0,0570 ***	-0,0683 ***	-0,0567 ***	-0,0725 ***	-0,0693 ***	-0,0574 ***	-0,0720 ***	-0,0699 ***	-0,0724 ***
7	-0,0212 *	-0,0334 **	-0,0219 *	-0,0376 ***	-0,0341 **	-0,0220 *	-0,0376 ***	-0,0352 **	-0,0382 ***
8	-0,0680 ***	-0,0784 ***	-0,0678 ***	-0,0837 ***	-0,0794 ***	-0,0686 ***	-0,0831 ***	-0,0812 ***	-0,0844 ***
I	-0,0546 ***	-0,0656 ***	-0,0552 ***	-0,0706 ***	-0,0677 ***	-0,0557 ***	-0,0714 ***	-0,0693 ***	-0,0719 ***

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.3: CAPM Regression Results (Scope 1, Period 1)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0003	-0,0005	-0,0003	-0,0006	-0,0005	0,0001	-0,0006	-0,0001	-0,0001
2	-0,0005	-0,0006	-0,0004	-0,0008 *	-0,0006	0,0000	-0,0008 (.)	-0,0002	-0,0003
3	0,0000	-0,0001	0,0001	-0,0003	-0,0002	0,0004	-0,0002	0,0002	0,0001
4	-0,0005	-0,0007 (.)	-0,0004	-0,0008 *	-0,0006	0,0000	-0,0007 (.)	-0,0003	-0,0003
5	-0,0001	-0,0003	-0,0001	-0,0004	-0,0002	0,0003	-0,0004	0,0000	0,0000
6	-0,0002	-0,0004	-0,0001	-0,0005	-0,0003	0,0002	-0,0005	0,0000	-0,0001
7	-0,0003	-0,0005	-0,0002	-0,0006	-0,0005	0,0001	-0,0005	-0,0001	-0,0001
8	-0,0004	-0,0005	-0,0003	-0,0007 (.)	-0,0005	0,0000	-0,0006	-0,0001	-0,0001
I	-0,0005	-0,0006	-0,0003	-0,0008 (.)	-0,0006	0,0000	-0,0007	-0,0002	-0,0002
					$marked$				
LE	-0,0717 (.)	0,1708 ***	0,1976 ***	0,3418 ***	0,4155 ***	0,0665 (.)	0,5793 ***	0,2964 ***	0,4651 ***
2	0,0163	0,2604 ***	0,2923 ***	0,4280 ***	0,5101 ***	0,1575 ***	0,6730 ***	0,3892 ***	0,5575 ***
3	-0,2115 ***	0,0309	0,0682	0,2044 ***	0,2945 ***	-0,0515	0,4586 ***	0,1770 ***	0,3488 ***
4	0,0820 *	0,3227 ***	0,3524 ***	0,4907 ***	0,5748 ***	0,2180 ***	0,7322 ***	0,4492 ***	0,6143 ***
5	-0,1145 **	0,1277 **	0,1688 ***	0,3005 ***	0,3946 ***	0,0449	0,5584 ***	0,2781 ***	0,4452 ***
6	-0,0461	0,1960 ***	0,2326 ***	0,3655 ***	0,4642 ***	0,1097 **	0,6253 ***	0,3449 ***	0,5127 ***
7	-0,2402 ***	0,0038	0,0309	0,1767 ***	0,2531 ***	-0,1014 *	0,4235 ***	0,1311 **	0,3088 ***
8	-0,1485 ***	0,0974 *	0,1310 **	0,2726 ***	0,3583 ***	-0,0045	0,5311 ***	0,2345 ***	0,4127 ***
I	-0,0838 *	0,1634 ***	0,1869 ***	0,3341 ***	0,4196 ***	0,0520	0,5886 ***	0,2902 ***	0,4637 ***
					$LNOILCH$				
LE	-0,0286 *	-0,0356 **	-0,0222	-0,0340 *	-0,0253 (.)	-0,0294 *	-0,0243	-0,0357 *	-0,0305 *
2	-0,0049	-0,0135	-0,0036	-0,0115	-0,0080	-0,0093	-0,0067	-0,0165	-0,0121
3	-0,0338 *	-0,0402 **	-0,0309 *	-0,0389 *	-0,0312 (.)	-0,0364 *	-0,0290 (.)	-0,0401 **	-0,0368 *
4	-0,0134	-0,0209	-0,0129	-0,0196	-0,0169	-0,0189	-0,0171	-0,0253 (.)	-0,0215
5	-0,0088	-0,0156	-0,0060	-0,0149	-0,0104	-0,0140	-0,0085	-0,0193	-0,0166
6	-0,0192	-0,0257 (.)	-0,0181	-0,0252	-0,0235	-0,0233	-0,0215	-0,0297 *	-0,0274 (.)
7	-0,0399 **	-0,0464 **	-0,0329 *	-0,0482 **	-0,0351 *	-0,0441 **	-0,0351 *	-0,0484 **	-0,0464 **
8	-0,0177	-0,0255 (.)	-0,0101	-0,0258 (.)	-0,0181	-0,0229 (.)	-0,0168	-0,0305 *	-0,0281 (.)
I	-0,0281 *	-0,0342 *	-0,0223	-0,0363 *	-0,0290 (.)	-0,0335 *	-0,0293 (.)	-0,0404 **	-0,0387 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.4: CAPM Regression Results (Scope 2, Period 1)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0005	-0,0006	-0,0004	-0,0008 *	-0,0006	0,0000	-0,0007	-0,0002	-0,0003
2	-0,0004	-0,0005	-0,0003	-0,0007 (.)	-0,0004	0,0002	-0,0006	0,0000	-0,0001
3	-0,0006	-0,0007 (.)	-0,0005	-0,0009 *	-0,0007	-0,0001	-0,0008 (.)	-0,0003	-0,0004
4	-0,0004	-0,0006	-0,0004	-0,0007 (.)	-0,0006	0,0001	-0,0007	-0,0001	-0,0002
5	-0,0004	-0,0006	-0,0003	-0,0007	-0,0005	0,0001	-0,0006	-0,0001	-0,0001
6	-0,0005	-0,0006	-0,0004	-0,0008 (.)	-0,0006	0,0000	-0,0007	-0,0002	-0,0002
7	-0,0004	-0,0005	-0,0003	-0,0006	-0,0005	0,0000	-0,0006	-0,0001	-0,0001
8	-0,0003	-0,0004	-0,0002	-0,0005	-0,0003	0,0003	-0,0004	0,0001	0,0001
I	-0,0003	-0,0005	-0,0003	-0,0005	-0,0004	0,0001	-0,0005	-0,0001	0,0000
					$marked$				
LE	-0,0698 (.)	0,1794 ***	0,2128 ***	0,3528 ***	0,4432 ***	0,0663 (.)	0,6097 ***	0,3077 ***	0,4741 ***
2	-0,1634 ***	0,0873 *	0,1124 **	0,2588 ***	0,3519 ***	-0,0260	0,5120 ***	0,2166 ***	0,3850 ***
3	-0,2836 ***	-0,0530	-0,0230	0,1134 *	0,1923 ***	-0,1543 ***	0,3583 ***	0,0696	0,2369 ***
4	-0,2695 ***	-0,0257	0,0076	0,1478 ***	0,2449 ***	-0,1324 **	0,4107 ***	0,1084 *	0,2846 ***
5	-0,3835 ***	-0,1524 ***	-0,1206 **	0,0131	0,1036 *	-0,2476 ***	0,2631 ***	-0,0247	0,1453 **
6	-0,4918 ***	-0,2662 ***	-0,2312 ***	-0,0979 *	-0,0029	-0,3604 ***	0,1604 **	-0,1337 **	0,0391
7	-0,3706 ***	-0,1246 **	-0,0846 (.)	0,0437	0,1432 **	-0,2343 ***	0,3059 ***	0,0065	0,1769 ***
8	-0,4623 ***	-0,2195 ***	-0,1823 ***	-0,0501	0,0480	-0,3226 ***	0,2127 ***	-0,0848 (.)	0,0834 (.)
I	-0,5863 ***	-0,3440 ***	-0,3108 ***	-0,1767 ***	-0,0779	-0,4564 ***	0,0877 (.)	-0,2167 ***	-0,0464
					$LNOILCH$				
LE	-0,0030	-0,0114	0,0015	-0,0114	-0,0051	-0,0068	-0,0041	-0,0158	-0,0128
2	-0,0284 *	-0,0359 *	-0,0245 (.)	-0,0365 *	-0,0313 *	-0,0322 *	-0,0304 (.)	-0,0405 **	-0,0378 *
3	-0,0233	-0,0292 (.)	-0,0190	-0,0291 (.)	-0,0220	-0,0266 (.)	-0,0203	-0,0314 (.)	-0,0280 (.)
4	-0,0436 **	-0,0522 ***	-0,0381 *	-0,0527 ***	-0,0465 **	-0,0482 ***	-0,0451 **	-0,0594 ***	-0,0565 ***
5	-0,0461 **	-0,0512 **	-0,0434 **	-0,0515 **	-0,0462 **	-0,0513 ***	-0,0440 **	-0,0555 ***	-0,0514 **
6	-0,0641 ***	-0,0693 ***	-0,0592 ***	-0,0693 ***	-0,0648 ***	-0,0683 ***	-0,0635 ***	-0,0751 ***	-0,0718 ***
7	-0,0038	-0,0095	-0,0003	-0,0104	-0,0068	-0,0073	-0,0059	-0,0164	-0,0138
8	-0,0284 (.)	-0,0324 *	-0,0258	-0,0346 *	-0,0316 (.)	-0,0331 *	-0,0305 (.)	-0,0407 *	-0,0387 *
I	-0,0453 **	-0,0495 **	-0,0419 *	-0,0516 **	-0,0482 **	-0,0498 **	-0,0476 **	-0,0583 ***	-0,0559 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.5: CAPM Regression Results (Scope 1, Period 2)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0005	-0,0004	-0,0004	-0,0003	-0,0003	-0,0005	-0,0003	-0,0004	-0,0004
2	-0,0004	-0,0003	-0,0003	-0,0003	-0,0002	-0,0003	-0,0003	-0,0003	-0,0003
3	-0,0007 *	-0,0006 *	-0,0006 (.)	-0,0006 (.)	-0,0006 (.)	-0,0006 (.)	-0,0005	-0,0006 (.)	-0,0005
4	-0,0001	-0,0001	-0,0001	-0,0001	-0,0001	-0,0002	-0,0001	-0,0002	-0,0001
5	-0,0007 *	-0,0006 (.)	-0,0006 (.)	-0,0005 (.)	-0,0006	-0,0006 (.)	-0,0005	-0,0005 (.)	-0,0005
6	-0,0004	-0,0004	-0,0003	-0,0003	-0,0004	-0,0004	-0,0003	-0,0003	-0,0003
7	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0001	0,0000	0,0000
8	0,0000	0,0000	0,0001	0,0001	0,0001	0,0000	0,0001	0,0001	0,0001
I	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0004	0,0004
					$marked$				
LE	-0,2529 ***	-0,4501 ***	-0,0867 **	-0,3916 ***	-0,2971 ***	-0,0665 *	-0,2323 ***	-0,2686 ***	-0,2193 ***
2	-0,3253 ***	-0,5246 ***	-0,1559 ***	-0,4684 ***	-0,3636 ***	-0,1340 ***	-0,3002 ***	-0,3389 ***	-0,2876 ***
3	-0,1133 ***	-0,3130 ***	0,0630 (.)	-0,2493 ***	-0,1392 ***	0,0904 **	-0,0739 *	-0,1112 ***	-0,0538 (.)
4	-0,2659 ***	-0,4634 ***	-0,0989 **	-0,4067 ***	-0,3054 ***	-0,0814 *	-0,2418 ***	-0,2791 ***	-0,2324 ***
5	-0,1920 ***	-0,3847 ***	-0,0124	-0,3213 ***	-0,2093 ***	0,0142	-0,1410 ***	-0,1795 ***	-0,1248 ***
6	-0,1328 ***	-0,3264 ***	0,0489	-0,2612 ***	-0,1493 ***	0,0708 *	-0,0827 *	-0,1229 ***	-0,0682 *
7	-0,0877 **	-0,2861 ***	0,0874 **	-0,2208 ***	-0,1181 ***	0,1042 ***	-0,0542 (.)	-0,0949 **	-0,0365
8	-0,1647 ***	-0,3662 ***	0,0106	-0,2999 ***	-0,1936 ***	0,0318	-0,1265 ***	-0,1696 ***	-0,1104 ***
I	-0,1010 **	-0,2982 ***	0,0748 *	-0,2359 ***	-0,1275 ***	0,0887 **	-0,0635 (.)	-0,1053 **	-0,0499
					$LNOILCH$				
LE	-0,0175	-0,0089	-0,0046	-0,0103	0,0045	-0,0198	0,0011	-0,0120	-0,0129
2	-0,0274 (.)	-0,0165	-0,0182	-0,0211	-0,0101	-0,0316 *	-0,0132	-0,0232	-0,0264 (.)
3	-0,0125	-0,0064	0,0009	-0,0082	0,0075	-0,0155	0,0039	-0,0094	-0,0119
4	-0,0332 *	-0,0242	-0,0236	-0,0257	-0,0135	-0,0389 *	-0,0158	-0,0277	-0,0303 (.)
5	-0,0230	-0,0190	-0,0105	-0,0216	-0,0066	-0,0273 (.)	-0,0092	-0,0243	-0,0263
6	-0,0281 (.)	-0,0236	-0,0155	-0,0265 (.)	-0,0107	-0,0335 *	-0,0134	-0,0274 (.)	-0,0303 (.)
7	0,0059	0,0136	0,0179	0,0112	0,0266	0,0017	0,0234	0,0111	0,0086
8	-0,0075	0,0009	0,0030	-0,0025	0,0106	-0,0137	0,0089	-0,0049	-0,0076
I	-0,0128	-0,0040	-0,0019	-0,0069	0,0077	-0,0187	0,0059	-0,0073	-0,0106

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.6: CAPM Regression Results (Scope 2, Period 2)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0003	-0,0002	-0,0002	-0,0004	-0,0002	-0,0003	-0,0003	-0,0001	-0,0003
2	-0,0006 *	-0,0006 (.)	-0,0006 (.)	-0,0007 *	-0,0005	-0,0006 (.)	-0,0006 (.)	-0,0005	-0,0006 *
3	-0,0001	0,0000	0,0000	-0,0001	0,0000	-0,0001	-0,0001	0,0000	-0,0001
4	-0,0006 (.)	-0,0005	-0,0005	-0,0006 *	-0,0005	-0,0006 (.)	-0,0006 (.)	-0,0004	-0,0006 (.)
5	-0,0003	-0,0003	-0,0003	-0,0004	-0,0003	-0,0004	-0,0004	-0,0003	-0,0004
6	-0,0003	-0,0003	-0,0003	-0,0004	-0,0003	-0,0003	-0,0004	-0,0003	-0,0004
7	-0,0003	-0,0002	-0,0003	-0,0004	-0,0003	-0,0004	-0,0004	-0,0002	-0,0004
8	-0,0006 (.)	-0,0006 (.)	-0,0006	-0,0007 (.)	-0,0006	-0,0006 (.)	-0,0007 (.)	-0,0006	-0,0007 (.)
I	-0,0006	-0,0006	-0,0006	-0,0007 (.)	-0,0006	-0,0006	-0,0007 (.)	-0,0005	-0,0007 (.)
					$marked$				
LE	-0,1735 ***	-0,3908 ***	0,0000	-0,3475 ***	-0,2278 ***	0,0241	-0,1839 ***	-0,1942 ***	-0,1576 ***
2	-0,2921 ***	-0,5035 ***	-0,1191 ***	-0,4640 ***	-0,3436 ***	-0,0888 **	-0,3013 ***	-0,3094 ***	-0,2745 ***
3	-0,2190 ***	-0,4320 ***	-0,0465	-0,3895 ***	-0,2677 ***	-0,0195	-0,2247 ***	-0,2363 ***	-0,1995 ***
4	-0,2566 ***	-0,4637 ***	-0,0893 **	-0,4257 ***	-0,3083 ***	-0,0596 (.)	-0,2683 ***	-0,2679 ***	-0,2400 ***
5	-0,3438 ***	-0,5454 ***	-0,1757 ***	-0,5089 ***	-0,3860 ***	-0,1428 ***	-0,3476 ***	-0,3571 ***	-0,3200 ***
6	-0,3103 ***	-0,5200 ***	-0,1394 ***	-0,4798 ***	-0,3560 ***	-0,1123 ***	-0,3198 ***	-0,3301 ***	-0,2902 ***
7	-0,3819 ***	-0,5983 ***	-0,2045 ***	-0,5576 ***	-0,4330 ***	-0,1790 ***	-0,3896 ***	-0,4018 ***	-0,3635 ***
8	-0,5020 ***	-0,7124 ***	-0,3320 ***	-0,6752 ***	-0,5528 ***	-0,2991 ***	-0,5125 ***	-0,5232 ***	-0,4874 ***
I	-0,4848 ***	-0,6981 ***	-0,3100 ***	-0,6578 ***	-0,5343 ***	-0,2818 ***	-0,4911 ***	-0,5026 ***	-0,4646 ***
					$LNOILCH$				
LE	-0,0385 *	-0,0361 *	-0,0281 (.)	-0,0330 *	-0,0256	-0,0446 **	-0,0237	-0,0399 *	-0,0383 *
2	-0,0807 ***	-0,0762 ***	-0,0652 ***	-0,0751 ***	-0,0624 ***	-0,0816 ***	-0,0609 ***	-0,0821 ***	-0,0782 ***
3	-0,0218	-0,0217	-0,0097	-0,0190	-0,0093	-0,0270 (.)	-0,0076	-0,0230	-0,0237
4	-0,0662 ***	-0,0643 ***	-0,0564 ***	-0,0613 ***	-0,0548 **	-0,0714 ***	-0,0520 **	-0,0719 ***	-0,0669 ***
5	-0,0630 ***	-0,0621 ***	-0,0469 **	-0,0629 ***	-0,0480 **	-0,0635 ***	-0,0475 **	-0,0655 ***	-0,0646 ***
6	-0,0526 **	-0,0490 **	-0,0402 *	-0,0502 **	-0,0386 *	-0,0553 ***	-0,0376 *	-0,0532 **	-0,0536 **
7	-0,0297 (.)	-0,0269	-0,0194	-0,0259	-0,0153	-0,0342 (.)	-0,0149	-0,0295	-0,0300 (.)
8	-0,0741 ***	-0,0695 ***	-0,0602 **	-0,0698 ***	-0,0565 **	-0,0750 ***	-0,0562 **	-0,0724 ***	-0,0707 ***
I	-0,0593 **	-0,0552 **	-0,0481 *	-0,0548 **	-0,0449 *	-0,0628 ***	-0,0449 *	-0,0604 **	-0,0594 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.7: CAPM Regression Results (Scope 1, Period 3)

	E	2	3	4	5	6	7	8	LE
					α				
LE	0,0002	0,0002	0,0004	0,0002	0,0003	0,0004	0,0003	0,0004	0,0004
2	0,0005	0,0004	0,0007	0,0004	0,0006	0,0007 (.)	0,0006	0,0006 (.)	0,0006
3	-0,0001	-0,0001	0,0001	-0,0001	0,0001	0,0001	0,0001	0,0000	0,0000
4	0,0004	0,0003	0,0005	0,0003	0,0005	0,0006	0,0005	0,0005	0,0005
5	0,0001	0,0001	0,0004	0,0001	0,0003	0,0003	0,0003	0,0002	0,0002
6	0,0001	0,0000	0,0003	0,0000	0,0002	0,0002	0,0002	0,0002	0,0002
7	-0,0003	-0,0004	0,0000	-0,0004	-0,0002	-0,0001	-0,0002	-0,0002	-0,0001
8	0,0000	0,0000	0,0003	-0,0001	0,0002	0,0002	0,0002	0,0001	0,0001
I	-0,0001	-0,0002	0,0002	-0,0002	0,0001	0,0001	0,0001	0,0000	0,0000
					$marked$				
LE	-0,2081 ***	-0,3324 ***	-0,1730 **	-0,3406 ***	-0,2981 ***	-0,1391 **	-0,3134 ***	-0,2662 ***	-0,2775 ***
2	-0,3688 ***	-0,4953 ***	-0,3425 ***	-0,5024 ***	-0,4697 ***	-0,2950 ***	-0,4831 ***	-0,4266 ***	-0,4319 ***
3	-0,1298 *	-0,2567 ***	-0,0975 (.)	-0,2592 ***	-0,2270 ***	-0,0622	-0,2344 ***	-0,1912 ***	-0,1998 ***
4	-0,2058 ***	-0,3316 ***	-0,1707 ***	-0,3410 ***	-0,2995 ***	-0,1341 **	-0,3119 ***	-0,2618 ***	-0,2717 ***
5	-0,3215 ***	-0,4500 ***	-0,2926 ***	-0,4525 ***	-0,4236 ***	-0,2525 ***	-0,4312 ***	-0,3821 ***	-0,3904 ***
6	-0,1483 **	-0,2768 ***	-0,1125 *	-0,2779 ***	-0,2441 ***	-0,0772	-0,2501 ***	-0,2064 ***	-0,2119 ***
7	-0,1124 *	-0,2325 ***	-0,0718	-0,2420 ***	-0,2006 ***	-0,0393	-0,2122 ***	-0,1661 **	-0,1793 ***
8	-0,2988 ***	-0,4224 ***	-0,2596 ***	-0,4296 ***	-0,3881 ***	-0,2248 ***	-0,4017 ***	-0,3519 ***	-0,3656 ***
I	-0,1280 *	-0,2507 ***	-0,0868 (.)	-0,2575 ***	-0,2133 ***	-0,0497	-0,2263 ***	-0,1744 ***	-0,1868 ***
					$LNOILCH$				
LE	0,0236	0,0150	0,0118	0,0082	0,0004	0,0263	-0,0048	0,0172	0,0113
2	-0,0092	-0,0174	-0,0209	-0,0242	-0,0315	-0,0069	-0,0376 (.)	-0,0153	-0,0224
3	0,0121	0,0041	-0,0007	-0,0025	-0,0113	0,0164	-0,0165	0,0075	0,0019
4	0,0487 *	0,0403 *	0,0371 (.)	0,0338 (.)	0,0265	0,0515 **	0,0206	0,0424 *	0,0359 (.)
5	-0,0170	-0,0264	-0,0306	-0,0341 (.)	-0,0419 *	-0,0132	-0,0484 *	-0,0220	-0,0299
6	0,0402 *	0,0318	0,0272	0,0251	0,0162	0,0438 *	0,0102	0,0349 (.)	0,0284
7	0,0460 *	0,0357 (.)	0,0361 (.)	0,0309	0,0242	0,0472 *	0,0212	0,0370 (.)	0,0341 (.)
8	0,0109	0,0009	-0,0005	-0,0043	-0,0124	0,0121	-0,0157	0,0020	-0,0012
I	0,0737 ***	0,0635 **	0,0621 **	0,0580 **	0,0505 *	0,0740 ***	0,0471 *	0,0640 **	0,0605 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.8: CAPM Regression Results (Scope 2, Period 3)

	E	2	3	4	5	6	7	8	LE
					α				
LE	0,0003	0,0003	0,0005	0,0002	0,0005	0,0005	0,0005	0,0005	0,0004
2	0,0005	0,0005	0,0008 (.)	0,0005	0,0008 (.)	0,0007 (.)	0,0007 (.)	0,0007 (.)	0,0007 (.)
3	0,0007 (.)	0,0006	0,0009 *	0,0006	0,0009 *	0,0008 *	0,0009 *	0,0008 (.)	0,0007 (.)
4	0,0005	0,0005	0,0007 (.)	0,0004	0,0006	0,0006 (.)	0,0006	0,0006	0,0005
5	0,0008 (.)	0,0007	0,0011 *	0,0007	0,0010 *	0,0009 *	0,0010 *	0,0009 *	0,0009 *
6	0,0009 *	0,0008 (.)	0,0011 *	0,0008 (.)	0,0010 *	0,0009 *	0,0010 *	0,0009 *	0,0009 *
7	0,0005	0,0005	0,0008 (.)	0,0004	0,0007	0,0006	0,0007	0,0006	0,0006
8	0,0008	0,0007	0,0010 *	0,0006	0,0009 (.)	0,0009 (.)	0,0009 (.)	0,0009 (.)	0,0008 (.)
I	0,0007	0,0007	0,0009 *	0,0007	0,0009 (.)	0,0008 (.)	0,0008 (.)	0,0008	0,0007
					$marked$				
LE	-0,2656 ***	-0,3922 ***	-0,2356 ***	-0,4267 ***	-0,3641 ***	-0,2033 ***	-0,3991 ***	-0,3279 ***	-0,3606 ***
2	-0,5992 ***	-0,7235 ***	-0,5669 ***	-0,7630 ***	-0,7011 ***	-0,5313 ***	-0,7360 ***	-0,6552 ***	-0,6915 ***
3	-0,5501 ***	-0,6775 ***	-0,4964 ***	-0,7049 ***	-0,6239 ***	-0,4862 ***	-0,6576 ***	-0,6094 ***	-0,6471 ***
4	-0,3698 ***	-0,4919 ***	-0,3403 ***	-0,5256 ***	-0,4695 ***	-0,3099 ***	-0,5016 ***	-0,4305 ***	-0,4681 ***
5	-0,8810 ***	-1,0134 ***	-0,8338 ***	-1,0378 ***	-0,9627 ***	-0,8216 ***	-0,9915 ***	-0,9509 ***	-0,9755 ***
6	-0,6450 ***	-0,7718 ***	-0,5912 ***	-0,7984 ***	-0,7199 ***	-0,5822 ***	-0,7591 ***	-0,7106 ***	-0,7377 ***
7	-0,6783 ***	-0,8025 ***	-0,6378 ***	-0,8312 ***	-0,7685 ***	-0,6123 ***	-0,8002 ***	-0,7444 ***	-0,7752 ***
8	-1,0048 ***	-1,1355 ***	-0,9653 ***	-1,1621 ***	-1,1010 ***	-0,9408 ***	-1,1304 ***	-1,0725 ***	-1,1024 ***
I	-0,7983 ***	-0,9226 ***	-0,7528 ***	-0,9503 ***	-0,8886 ***	-0,7265 ***	-0,9177 ***	-0,8591 ***	-0,8868 ***
					$LNOILCH$				
LE	-0,0158	-0,0233	-0,0284	-0,0260	-0,0381 (.)	-0,0037	-0,0424 *	-0,0112	-0,0164
2	-0,1035 ***	-0,1117 ***	-0,1179 ***	-0,1113 ***	-0,1256 ***	-0,0924 ***	-0,1294 ***	-0,0974 ***	-0,1031 ***
3	-0,0124	-0,0213	-0,0273	-0,0247	-0,0384 (.)	-0,0007	-0,0408 (.)	-0,0101	-0,0119
4	-0,0432 *	-0,0517 *	-0,0567 **	-0,0546 **	-0,0668 **	-0,0320 (.)	-0,0712 ***	-0,0398 *	-0,0452 *
5	-0,1062 ***	-0,1148 ***	-0,1195 ***	-0,1182 ***	-0,1300 ***	-0,0946 ***	-0,1333 ***	-0,1018 ***	-0,1072 ***
6	-0,0471 *	-0,0563 *	-0,0620 **	-0,0596 **	-0,0727 **	-0,0350	-0,0746 **	-0,0433 (.)	-0,0468 *
7	-0,0371	-0,0456 (.)	-0,0472 *	-0,0503 *	-0,0569 *	-0,0261	-0,0617 **	-0,0334	-0,0379 (.)
8	-0,1306 ***	-0,1378 ***	-0,1399 ***	-0,1419 ***	-0,1474 ***	-0,1203 ***	-0,1532 ***	-0,1263 ***	-0,1333 ***
I	-0,0657 **	-0,0748 **	-0,0776 **	-0,0787 **	-0,0871 ***	-0,0560 *	-0,0915 ***	-0,0636 **	-0,0680 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

FF3 regressions results of CRE-Portfolios

These tables contains the regression results of the first step Fama-Macbeth Regression run on all the 81 portfolios under scope 1 and 2 with the following model

$$R_{it} = \alpha_i + b_i R_{mt} + s_i SMB_t + h_i HML_t + p_i OIL_i$$

The table is organised by the effectiveness of the included "clean" portfolio (horisontally) and the ineffectiveness of the included "dirty" portfolio (vertically). The letter E (I) indicates the most efficient (inefficient) end of the scale, and LE (LI) the least efficient (inefficient) end.

Table D.9: FF3 Regression Results (Scope 1, All years)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0002	-0,0003	-0,0001	-0,0003	-0,0002	0,0000	-0,0003	-0,0001	-0,0001
2	-0,0002	-0,0002	-0,0001	-0,0003	-0,0002	0,0001	-0,0002	0,0000	-0,0001
3	-0,0002	-0,0003	-0,0001	-0,0003	-0,0002	0,0000	-0,0002	-0,0001	-0,0001
4	-0,0001	-0,0002	0,0000	-0,0002	-0,0001	0,0001	-0,0002	0,0000	0,0000
5	-0,0002	-0,0003	-0,0001	-0,0003	-0,0002	0,0000	-0,0002	-0,0001	-0,0001
6	-0,0002	-0,0003	0,0000	-0,0002	-0,0002	0,0000	-0,0002	0,0000	0,0000
7	-0,0002	-0,0003	0,0000	-0,0003	-0,0002	0,0001	-0,0002	-0,0001	0,0000
8	-0,0001	-0,0002	0,0000	-0,0002	-0,0001	0,0001	-0,0001	0,0000	0,0000
I	0,0000	-0,0002	0,0001	-0,0002	0,0000	0,0002	0,0000	0,0001	0,0001
					$Market$				
LE	-0,1830 ***	-0,1781 ***	-0,0111	-0,1152 ***	-0,0233	-0,0435 (.)	0,0407	-0,0474 (.)	0,0123
2	-0,2031 ***	-0,1981 ***	-0,0289	-0,1359 ***	-0,0393	-0,0606 **	0,0256	-0,0656 **	-0,0031
3	-0,1851 ***	-0,1805 ***	-0,0074	-0,1156 ***	-0,0121	-0,0305	0,0507 (.)	-0,0346	0,0269
4	-0,1385 ***	-0,1345 ***	0,0339	-0,0729 **	0,0249	-0,0016	0,0871 ***	-0,0026	0,0557 *
5	-0,2101 ***	-0,2032 ***	-0,0303	-0,1376 ***	-0,0337	-0,0546 *	0,0324	-0,0551 *	0,0054
6	-0,1434 ***	-0,1373 ***	0,0377	-0,0718 **	0,0358	0,0103	0,0999 ***	0,0118	0,0724 **
7	-0,1791 ***	-0,1715 ***	-0,0004	-0,1045 ***	-0,0071	-0,0372	0,0598 *	-0,0362	0,0302
8	-0,2014 ***	-0,1953 ***	-0,0217	-0,1246 ***	-0,0254	-0,0572 *	0,0446 (.)	-0,0549 *	0,0126
I	-0,1384 ***	-0,1291 ***	0,0396	-0,0620 *	0,0398	0,0026	0,1069 ***	0,0084	0,0732 **
					SMB				
LE	-0,0160	0,0853 ***	-0,0144	0,0585 **	0,0861 ***	-0,0156	0,0611 **	0,0849 ***	0,0637 **
2	0,0430 *	0,1452 ***	0,0435 *	0,1220 ***	0,1445 ***	0,0407 *	0,1235 ***	0,1398 ***	0,1220 ***
3	-0,1042 ***	0,0003	-0,1075 ***	-0,0291	-0,0056	-0,1053 ***	-0,0327	-0,0041	-0,0294
4	-0,0035	0,0971 ***	-0,0035	0,0714 ***	0,0958 ***	-0,0060	0,0705 **	0,0925 ***	0,0731 ***
5	-0,0446 *	0,0590 **	-0,0497 *	0,0306	0,0505 *	-0,0478 *	0,0272	0,0501 *	0,0279
6	-0,0923 ***	0,0094	-0,0971 ***	-0,0192	0,0024	-0,0929 ***	-0,0218	0,0047	-0,0189
7	-0,0977 ***	0,0064	-0,0923 ***	-0,0192	0,0101	-0,0998 ***	-0,0123	0,0027	-0,0170
8	-0,0338 (.)	0,0692 **	-0,0319	0,0473 *	0,0701 **	-0,0398 *	0,0500 *	0,0619 **	0,0428 *
I	-0,0899 ***	0,0140	-0,0872 ***	-0,0093	0,0158	-0,0915 ***	-0,0057	0,0090	-0,0095
					HML				
LE	-0,0033	-0,0636 **	-0,0431 *	-0,1177 ***	-0,1069 ***	-0,0422 *	-0,1545 ***	-0,1063 ***	-0,1571 ***
2	-0,0340 (.)	-0,0947 ***	-0,0731 ***	-0,1469 ***	-0,1347 ***	-0,0743 ***	-0,1830 ***	-0,1358 ***	-0,1879 ***
3	0,0199	-0,0383 (.)	-0,0230	-0,0979 ***	-0,0795 ***	-0,0192	-0,1352 ***	-0,0796 ***	-0,1393 ***
4	-0,0304	-0,0897 ***	-0,0715 ***	-0,1424 ***	-0,1327 ***	-0,0716 ***	-0,1793 ***	-0,1322 ***	-0,1829 ***
5	-0,0095	-0,0674 **	-0,0491 *	-0,1237 ***	-0,1072 ***	-0,0474 *	-0,1615 ***	-0,1081 ***	-0,1658 ***
6	-0,0085	-0,0645 **	-0,0473 *	-0,1208 ***	-0,1051 ***	-0,0482 *	-0,1598 ***	-0,1063 ***	-0,1638 ***
7	-0,0080	-0,0635 **	-0,0491 *	-0,1201 ***	-0,1056 ***	-0,0481 *	-0,1580 ***	-0,1042 ***	-0,1618 ***
8	-0,0322	-0,0877 ***	-0,0736 ***	-0,1403 ***	-0,1307 ***	-0,0729 ***	-0,1830 ***	-0,1296 ***	-0,1849 ***
I	-0,0346 (.)	-0,0876 ***	-0,0749 ***	-0,1404 ***	-0,1315 ***	-0,0742 ***	-0,1830 ***	-0,1298 ***	-0,1843 ***
					$LNOILCH$				
LE	-0,0188 *	-0,0252 **	-0,0168 (.)	-0,0292 **	-0,0212 *	-0,0190 *	-0,0257 *	-0,0251 **	-0,0269 **
2	-0,0178 *	-0,0243 **	-0,0197 *	-0,0289 **	-0,0249 *	-0,0205 *	-0,0292 **	-0,0269 **	-0,0298 **
3	-0,0207 *	-0,0273 **	-0,0207 *	-0,0316 **	-0,0245 *	-0,0219 *	-0,0284 **	-0,0272 **	-0,0304 **
4	-0,0131	-0,0196 *	-0,0151	-0,0237 *	-0,0197 *	-0,0167 (.)	-0,0245 *	-0,0220 *	-0,0250 **
5	-0,0190 *	-0,0267 **	-0,0197 *	-0,0317 **	-0,0265 **	-0,0221 *	-0,0303 **	-0,0292 **	-0,0329 **
6	-0,0152 (.)	-0,0225 *	-0,0165 (.)	-0,0274 **	-0,0236 *	-0,0179 (.)	-0,0272 **	-0,0248 **	-0,0286 **
7	-0,0098	-0,0164 (.)	-0,0071	-0,0220 *	-0,0114	-0,0125	-0,0158	-0,0174 (.)	-0,0206 *
8	-0,0113	-0,0185 *	-0,0094	-0,0236 *	-0,0170 (.)	-0,0153 (.)	-0,0204 *	-0,0222 *	-0,0254 **
I	-0,0066	-0,0128	-0,0053	-0,0187 (.)	-0,0116	-0,0105	-0,0159	-0,0162 (.)	-0,0199 *

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.10: FF3 Regression Results (Scope 2, All years)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0002	-0,0002	0,0000	-0,0003	-0,0001	0,0001	-0,0002	0,0000	-0,0001
2	-0,0002	-0,0003	-0,0001	-0,0004 (.)	-0,0002	0,0001	-0,0002	0,0000	-0,0001
3	0,0000	-0,0001	0,0001	-0,0002	0,0000	0,0002	0,0000	0,0001	0,0001
4	-0,0003	-0,0003	-0,0001	-0,0004 (.)	-0,0003	0,0000	-0,0003	-0,0001	-0,0002
5	0,0000	-0,0002	0,0001	-0,0002	0,0000	0,0002	-0,0001	0,0001	0,0001
6	-0,0001	-0,0002	0,0000	-0,0002	-0,0001	0,0002	-0,0001	0,0000	0,0000
7	-0,0001	-0,0001	0,0001	-0,0002	-0,0001	0,0001	-0,0001	0,0001	0,0000
8	-0,0001	-0,0002	0,0000	-0,0003	-0,0001	0,0001	-0,0002	0,0000	0,0000
I	-0,0001	-0,0002	0,0000	-0,0003	-0,0002	0,0001	-0,0002	0,0000	-0,0001
					$Market$				
LE	-0,1939 ***	-0,1932 ***	-0,0151	-0,1351 ***	-0,0266	-0,0516 *	0,0310	-0,0545 *	-0,0004
2	-0,3160 ***	-0,3127 ***	-0,1413 ***	-0,2575 ***	-0,1491 ***	-0,1725 ***	-0,0954 ***	-0,1764 ***	-0,1223 ***
3	-0,3393 ***	-0,3444 ***	-0,1657 ***	-0,2887 ***	-0,1810 ***	-0,1997 ***	-0,1250 ***	-0,2085 ***	-0,1562 ***
4	-0,2780 ***	-0,2751 ***	-0,1048 ***	-0,2184 ***	-0,1094 ***	-0,1362 ***	-0,0543 *	-0,1363 ***	-0,0821 **
5	-0,4684 ***	-0,4705 ***	-0,2974 ***	-0,4172 ***	-0,3060 ***	-0,3279 ***	-0,2539 ***	-0,3389 ***	-0,2826 ***
6	-0,4290 ***	-0,4343 ***	-0,2569 ***	-0,3792 ***	-0,2645 ***	-0,2900 ***	-0,2141 ***	-0,2993 ***	-0,2415 ***
7	-0,4873 ***	-0,4855 ***	-0,3008 ***	-0,4285 ***	-0,3129 ***	-0,3399 ***	-0,2573 ***	-0,3451 ***	-0,2878 ***
8	-0,6102 ***	-0,6096 ***	-0,4300 ***	-0,5526 ***	-0,4391 ***	-0,4635 ***	-0,3829 ***	-0,4713 ***	-0,4146 ***
I	-0,5890 ***	-0,5870 ***	-0,4068 ***	-0,5304 ***	-0,4150 ***	-0,4431 ***	-0,3577 ***	-0,4478 ***	-0,3899 ***
					SMB				
LE	-0,0721 ***	0,0353 (.)	-0,0711 ***	0,0192	0,0369	-0,0727 ***	0,0245	0,0331	0,0218
2	0,0113	0,1167 ***	0,0077	0,1022 ***	0,1164 ***	0,0031	0,1031 ***	0,1089 ***	0,1002 ***
3	-0,0729 ***	0,0335	-0,0733 ***	0,0174	0,0328	-0,0767 ***	0,0188	0,0276	0,0171
4	0,0114	0,1158 ***	0,0143	0,1028 ***	0,1231 ***	0,0113	0,1089 ***	0,1122 ***	0,1057 ***
5	0,0075	0,1117 ***	0,0056	0,0969 ***	0,1102 ***	-0,0013	0,0967 ***	0,1013 ***	0,0928 ***
6	0,0121	0,1176 ***	0,0115	0,1038 ***	0,1198 ***	0,0069	0,1062 ***	0,1116 ***	0,1027 ***
7	-0,0973 ***	0,0122	-0,0892 ***	-0,0002	0,0208	-0,0946 ***	0,0071	0,0136	0,0051
8	-0,0149	0,0922 ***	-0,0076	0,0816 **	0,1011 ***	-0,0171	0,0907 ***	0,0906 ***	0,0852 ***
I	-0,0107	0,0985 ***	-0,0037	0,0877 ***	0,1084 ***	-0,0105	0,0966 ***	0,0985 ***	0,0922 ***
					HML				
LE	-0,0247	-0,0802 ***	-0,0644 **	-0,1322 ***	-0,1203 ***	-0,0651 ***	-0,1698 ***	-0,1223 ***	-0,1736 ***
2	-0,0419 *	-0,0987 ***	-0,0852 ***	-0,1521 ***	-0,1429 ***	-0,0844 ***	-0,1946 ***	-0,1403 ***	-0,1951 ***
3	-0,0376 (.)	-0,0911 ***	-0,0805 ***	-0,1465 ***	-0,1350 ***	-0,0784 ***	-0,1859 ***	-0,1307 ***	-0,1883 ***
4	0,0078	-0,0477 *	-0,0370 (.)	-0,1021 ***	-0,0929 ***	-0,0351 (.)	-0,1433 ***	-0,0920 ***	-0,1481 ***
5	-0,0570 **	-0,1133 ***	-0,1022 ***	-0,1685 ***	-0,1590 ***	-0,0993 ***	-0,2107 ***	-0,1528 ***	-0,2114 ***
6	-0,0061	-0,0602 **	-0,0518 *	-0,1188 ***	-0,1085 ***	-0,0492 *	-0,1629 ***	-0,1035 ***	-0,1632 ***
7	-0,0488 *	-0,0996 ***	-0,0908 ***	-0,1538 ***	-0,1464 ***	-0,0871 ***	-0,1966 ***	-0,1432 ***	-0,1964 ***
8	-0,0699 **	-0,1240 ***	-0,1162 ***	-0,1777 ***	-0,1714 ***	-0,1097 ***	-0,2235 ***	-0,1667 ***	-0,2214 ***
I	-0,0208	-0,0701 **	-0,0616 *	-0,1276 ***	-0,1163 ***	-0,0572 *	-0,1685 ***	-0,1121 ***	-0,1692 ***
					$LNOILCH$				
LE	-0,0214 *	-0,0303 **	-0,0215 *	-0,0331 ***	-0,0296 **	-0,0222 *	-0,0324 **	-0,0306 **	-0,0326 ***
2	-0,0635 ***	-0,0715 ***	-0,0628 ***	-0,0746 ***	-0,0706 ***	-0,0632 ***	-0,0733 ***	-0,0722 ***	-0,0738 ***
3	-0,0247 *	-0,0329 **	-0,0242 *	-0,0357 ***	-0,0311 **	-0,0250 *	-0,0332 **	-0,0316 **	-0,0333 **
4	-0,0509 ***	-0,0601 ***	-0,0507 ***	-0,0632 ***	-0,0601 ***	-0,0520 ***	-0,0624 ***	-0,0631 ***	-0,0643 ***
5	-0,0664 ***	-0,0739 ***	-0,0654 ***	-0,0778 ***	-0,0726 ***	-0,0666 ***	-0,0749 ***	-0,0742 ***	-0,0757 ***
6	-0,0565 ***	-0,0632 ***	-0,0556 ***	-0,0671 ***	-0,0634 ***	-0,0564 ***	-0,0659 ***	-0,0644 ***	-0,0664 ***
7	-0,0241 *	-0,0315 **	-0,0239 *	-0,0355 ***	-0,0314 **	-0,0243 *	-0,0346 **	-0,0327 **	-0,0353 **
8	-0,0675 ***	-0,0733 ***	-0,0665 ***	-0,0782 ***	-0,0734 ***	-0,0677 ***	-0,0767 ***	-0,0756 ***	-0,0782 ***
I	-0,0547 ***	-0,0611 ***	-0,0544 ***	-0,0656 ***	-0,0621 ***	-0,0553 ***	-0,0655 ***	-0,0642 ***	-0,0662 ***

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.11: FF3 Regression Results (Scope 1, Period 1)

	E	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**LE**
					α				
LE	-0,0003	-0,0005	-0,0003	-0,0006	-0,0005	0,0001	-0,0006	-0,0001	-0,0001
2	-0,0005	-0,0006	-0,0004	-0,0007 (.)	-0,0006	0,0000	-0,0007 (.)	-0,0002	-0,0003
3	0,0001	-0,0001	0,0002	-0,0002	-0,0001	0,0005	-0,0001	0,0003	0,0002
4	-0,0005	-0,0007 (.)	-0,0004	-0,0007 (.)	-0,0006	0,0000	-0,0007	-0,0003	-0,0002
5	0,0000	-0,0002	0,0000	-0,0003	-0,0002	0,0003	-0,0003	0,0001	0,0001
6	-0,0001	-0,0003	0,0000	-0,0003	-0,0002	0,0002	-0,0003	0,0001	0,0000
7	-0,0003	-0,0004	-0,0002	-0,0005	-0,0004	0,0002	-0,0004	-0,0001	0,0000
8	-0,0004	-0,0005	-0,0003	-0,0006	-0,0005	0,0001	-0,0006	-0,0001	-0,0001
I	-0,0004	-0,0006	-0,0003	-0,0007 (.)	-0,0005	0,0000	-0,0006	-0,0001	-0,0001
					$Market$				
LE	-0,0827 *	0,1526 ***	0,1724 ***	0,2937 ***	0,3820 ***	0,0498	0,5190 ***	0,2719 ***	0,4143 ***
2	0,0016	0,2391 ***	0,2611 ***	0,3780 ***	0,4715 ***	0,1359 ***	0,6077 ***	0,3602 ***	0,5019 ***
3	-0,2418 ***	-0,0048	0,0214	0,1358 **	0,2422 ***	-0,0863 *	0,3767 ***	0,1355 **	0,2756 ***
4	0,0699 (.)	0,3035 ***	0,3226 ***	0,4427 ***	0,5374 ***	0,1980 ***	0,6686 ***	0,4216 ***	0,5611 ***
5	-0,1509 ***	0,0870 *	0,1164 *	0,2278 ***	0,3369 ***	0,0047	0,4721 ***	0,2312 ***	0,3679 ***
6	-0,0782 (.)	0,1595 ***	0,1843 ***	0,2972 ***	0,4095 ***	0,0732 (.)	0,5413 ***	0,3022 ***	0,4395 ***
7	-0,2671 ***	-0,0269	-0,0097	0,1158 **	0,2077 ***	-0,1348 **	0,3509 ***	0,0942 *	0,2432 ***
8	-0,1787 ***	0,0629	0,0861 *	0,2108 ***	0,3087 ***	-0,0411	0,4545 ***	0,1932 ***	0,3440 ***
I	-0,1117 **	0,1321 **	0,1440 ***	0,2750 ***	0,3720 ***	0,0185	0,5136 ***	0,2521 ***	0,3985 ***
					SMB				
LE	0,0203	0,0390	0,0566	0,0251	0,0663 (.)	0,0505	0,0561	0,0690 (.)	0,0619
2	0,0359	0,0537	0,0630 (.)	0,0422	0,0718 (.)	0,0602 (.)	0,0644	0,0761 *	0,0702 (.)
3	-0,0265	-0,0047	0,0005	-0,0246	0,0097	0,0101	-0,0001	0,0283	0,0109
4	0,0268	0,0430	0,0528	0,0296	0,0609	0,0477	0,0500	0,0647 (.)	0,0606
5	-0,0214	0,0023	0,0008	-0,0207	0,0138	0,0131	0,0076	0,0303	0,0154
6	-0,0226	-0,0034	0,0013	-0,0239	0,0093	0,0145	0,0025	0,0315	0,0157
7	-0,0004	0,0221	0,0350	0,0052	0,0472	0,0240	0,0416	0,0481	0,0375
8	0,0101	0,0296	0,0396	0,0181	0,0542	0,0313	0,0494	0,0522	0,0430
I	0,0020	0,0226	0,0329	0,0081	0,0467	0,0259	0,0384	0,0490	0,0383
					HML				
LE	-0,0538 (.)	-0,0925 **	-0,1299 ***	-0,1891 ***	-0,1665 ***	-0,0954 **	-0,2546 ***	-0,1366 ***	-0,2251 ***
2	-0,0783 **	-0,1141 ***	-0,1563 ***	-0,2082 ***	-0,1886 ***	-0,1200 ***	-0,2786 ***	-0,1575 ***	-0,2479 ***
3	-0,0892 **	-0,1238 ***	-0,1670 ***	-0,2266 ***	-0,1929 ***	-0,1309 ***	-0,2914 ***	-0,1681 ***	-0,2684 ***
4	-0,0622 *	-0,0991 ***	-0,1440 ***	-0,1924 ***	-0,1768 ***	-0,1051 ***	-0,2622 ***	-0,1442 ***	-0,2327 ***
5	-0,1143 ***	-0,1466 ***	-0,1869 ***	-0,2443 ***	-0,2155 ***	-0,1523 ***	-0,3124 ***	-0,1886 ***	-0,2863 ***
6	-0,0980 **	-0,1276 ***	-0,1730 ***	-0,2262 ***	-0,2017 ***	-0,1404 ***	-0,3007 ***	-0,1746 ***	-0,2719 ***
7	-0,0956 **	-0,1253 ***	-0,1694 ***	-0,2207 ***	-0,1955 ***	-0,1358 ***	-0,2883 ***	-0,1659 ***	-0,2604 ***
8	-0,1147 ***	-0,1442 ***	-0,1882 ***	-0,2329 ***	-0,2155 ***	-0,1525 ***	-0,3080 ***	-0,1843 ***	-0,2753 ***
I	-0,1008 ***	-0,1275 ***	-0,1761 ***	-0,2164 ***	-0,2028 ***	-0,1378 ***	-0,2945 ***	-0,1708 ***	-0,2597 ***
					$LNOILCH$				
LE	-0,0283 *	-0,0352 *	-0,0215	-0,0337 *	-0,0245 (.)	-0,0288 *	-0,0236	-0,0349 *	-0,0298 *
2	-0,0045	-0,0129	-0,0028	-0,0111	-0,0071	-0,0085	-0,0060	-0,0156	-0,0113
3	-0,0342 *	-0,0403 **	-0,0309 *	-0,0393 *	-0,0311 (.)	-0,0363 *	-0,0291 (.)	-0,0398 **	-0,0367 *
4	-0,0130	-0,0204	-0,0123	-0,0193	-0,0162	-0,0184	-0,0165	-0,0245 (.)	-0,0208
5	-0,0091	-0,0156	-0,0060	-0,0153	-0,0103	-0,0139	-0,0085	-0,0189	-0,0165
6	-0,0195	-0,0258 (.)	-0,0181	-0,0256 (.)	-0,0235	-0,0232	-0,0216	-0,0294 *	-0,0273 (.)
7	-0,0399 **	-0,0461 **	-0,0326 *	-0,0482 **	-0,0346 *	-0,0439 **	-0,0346 *	-0,0478 **	-0,0460 **
8	-0,0176	-0,0251 (.)	-0,0097	-0,0256 (.)	-0,0174	-0,0225	-0,0163	-0,0299 *	-0,0277 (.)
I	-0,0281 *	-0,0339 *	-0,0219	-0,0363 *	-0,0285 (.)	-0,0332 *	-0,0289 (.)	-0,0398 **	-0,0383 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.12: FF3 Regression Results (Scope 2, Period 1)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0004	-0,0005	-0,0003	-0,0006	-0,0005	0,0001	-0,0005	-0,0001	-0,0001
2	-0,0003	-0,0005	-0,0002	-0,0006	-0,0004	0,0002	-0,0005	0,0000	0,0000
3	-0,0006	-0,0007 (.)	-0,0005	-0,0008 (.)	-0,0006	-0,0001	-0,0007	-0,0003	-0,0003
4	-0,0005	-0,0006	-0,0004	-0,0007 (.)	-0,0006	0,0000	-0,0006	-0,0002	-0,0002
5	-0,0004	-0,0006	-0,0003	-0,0007	-0,0005	0,0001	-0,0006	-0,0002	-0,0001
6	-0,0006	-0,0008 (.)	-0,0005	-0,0008 (.)	-0,0007	-0,0001	-0,0007	-0,0003	-0,0002
7	-0,0003	-0,0004	-0,0002	-0,0005	-0,0004	0,0000	-0,0005	-0,0001	0,0000
8	-0,0002	-0,0004	-0,0001	-0,0005	-0,0003	0,0003	-0,0004	0,0000	0,0001
I	-0,0004	-0,0006	-0,0003	-0,0006	-0,0005	0,0001	-0,0005	-0,0002	-0,0001
					$Market$				
LE	-0,1152 **	0,1294 **	0,1524 ***	0,2731 ***	0,3778 ***	0,0146	0,5175 ***	0,2512 ***	0,3892 ***
2	-0,1955 ***	0,0502	0,0629	0,1909 ***	0,2965 ***	-0,0654	0,4290 ***	0,1715 ***	0,3105 ***
3	-0,3110 ***	-0,0845 (.)	-0,0678	0,0511	0,1437 **	-0,1876 ***	0,2825 ***	0,0326	0,1696 ***
4	-0,2823 ***	-0,0427	-0,0242	0,1002 *	0,2082 ***	-0,1536 ***	0,3472 ***	0,0824 (.)	0,2286 ***
5	-0,3971 ***	-0,1710 ***	-0,1539 ***	-0,0364	0,0651	-0,2690 ***	0,1975 ***	-0,0506	0,0892 (.)
6	-0,4866 ***	-0,2655 ***	-0,2462 ***	-0,1290 **	-0,0230	-0,3640 ***	0,1120 *	-0,1416 **	0,0007
7	-0,4114 ***	-0,1684 ***	-0,1397 **	-0,0294	0,0836 (.)	-0,2782 ***	0,2193 ***	-0,0427	0,1002 *
8	-0,4899 ***	-0,2509 ***	-0,2257 ***	-0,1110 *	-0,0003	-0,3543 ***	0,1376 **	-0,1230 *	0,0181
I	-0,5958 ***	-0,3557 ***	-0,3350 ***	-0,2186 ***	-0,1060 *	-0,4694 ***	0,0330	-0,2352 ***	-0,0922 (.)
					SMB				
LE	-0,0485	-0,0281	-0,0192	-0,0470	-0,0060	-0,0183	-0,0110	0,0034	-0,0091
2	0,0136	0,0339	0,0310	0,0144	0,0430	0,0348	0,0389	0,0555	0,0423
3	0,0276	0,0477	0,0482	0,0296	0,0631	0,0516	0,0571	0,0716 (.)	0,0592
4	0,0554	0,0783 *	0,0775 *	0,0585	0,0894 *	0,0800 *	0,0840 (.)	0,1017 **	0,0880 *
5	0,0858 *	0,1030 *	0,0957 *	0,0855 *	0,1074 *	0,0987 *	0,1027 *	0,1186 **	0,1054 *
6	0,1291 **	0,1489 ***	0,1413 ***	0,1301 **	0,1570 ***	0,1440 ***	0,1493 **	0,1676 ***	0,1519 ***
7	-0,0141	0,0078	0,0214	-0,0071	0,0371	0,0202	0,0321	0,0411	0,0331
8	0,0398	0,0630	0,0724 (.)	0,0474	0,0866 *	0,0656	0,0848 (.)	0,0893 *	0,0828 (.)
I	0,0919 *	0,1145 **	0,1197 **	0,0995 *	0,1401 **	0,1165 **	0,1344 **	0,1396 **	0,1327 **
					HML				
LE	-0,1273 ***	-0,1580 ***	-0,2014 ***	-0,2504 ***	-0,2287 ***	-0,1713 ***	-0,3208 ***	-0,2036 ***	-0,2957 ***
2	-0,1242 ***	-0,1562 ***	-0,1987 ***	-0,2519 ***	-0,2280 ***	-0,1649 ***	-0,3234 ***	-0,2003 ***	-0,2954 ***
3	-0,1171 ***	-0,1461 ***	-0,1938 ***	-0,2430 ***	-0,2182 ***	-0,1555 ***	-0,3107 ***	-0,1827 ***	-0,2818 ***
4	-0,0850 **	-0,1164 ***	-0,1686 ***	-0,2111 ***	-0,1945 ***	-0,1325 ***	-0,2859 ***	-0,1650 ***	-0,2623 ***
5	-0,1097 ***	-0,1398 ***	-0,1868 ***	-0,2374 ***	-0,2136 ***	-0,1468 ***	-0,3069 ***	-0,1769 ***	-0,2750 ***
6	-0,0737 *	-0,1036 **	-0,1541 ***	-0,2036 ***	-0,1835 ***	-0,1157 ***	-0,2790 ***	-0,1477 ***	-0,2454 ***
7	-0,1352 ***	-0,1614 ***	-0,2115 ***	-0,2553 ***	-0,2390 ***	-0,1707 ***	-0,3313 ***	-0,2045 ***	-0,2970 ***
8	-0,1267 ***	-0,1568 ***	-0,2060 ***	-0,2506 ***	-0,2337 ***	-0,1597 ***	-0,3283 ***	-0,1998 ***	-0,2913 ***
I	-0,0996 **	-0,1233 ***	-0,1717 ***	-0,2201 ***	-0,2000 ***	-0,1296 ***	-0,2908 ***	-0,1655 ***	-0,2578 ***
					$LNOILCH$				
LE	-0,0037	-0,0118	0,0012	-0,0121	-0,0052	-0,0071	-0,0044	-0,0158	-0,0130
2	-0,0282 *	-0,0356 *	-0,0242 (.)	-0,0364 *	-0,0308 *	-0,0319 *	-0,0300 (.)	-0,0399 **	-0,0374 *
3	-0,0230	-0,0287 (.)	-0,0184	-0,0288 (.)	-0,0213	-0,0260 (.)	-0,0197	-0,0306 (.)	-0,0273
4	-0,0429 **	-0,0513 ***	-0,0371 *	-0,0521 ***	-0,0454 **	-0,0472 ***	-0,0441 **	-0,0582 ***	-0,0554 ***
5	-0,0450 **	-0,0499 **	-0,0423 **	-0,0505 **	-0,0449 **	-0,0501 **	-0,0428 *	-0,0540 ***	-0,0502 **
6	-0,0625 ***	-0,0674 ***	-0,0574 ***	-0,0677 ***	-0,0628 ***	-0,0665 ***	-0,0616 ***	-0,0730 ***	-0,0699 ***
7	-0,0040	-0,0094	-0,0001	-0,0105	-0,0064	-0,0071	-0,0056	-0,0159	-0,0135
8	-0,0279 (.)	-0,0316 *	-0,0249	-0,0340 *	-0,0305 (.)	-0,0323 *	-0,0295 (.)	-0,0396 *	-0,0377 *
I	-0,0441 **	-0,0480 **	-0,0404 *	-0,0504 **	-0,0465 **	-0,0483 **	-0,0460 *	-0,0566 ***	-0,0543 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.13: FF3 Regression Results (Scope 1, Period 2)

	E	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**LE**
					α				
LE	-0,0004	-0,0004	-0,0003	-0,0003	-0,0003	-0,0004	-0,0003	-0,0004	-0,0004
2	-0,0004	-0,0003	-0,0003	-0,0003	-0,0003	-0,0004	-0,0003	-0,0003	-0,0003
3	-0,0006 *	-0,0006 (.)	-0,0005	-0,0005 (.)	-0,0006 (.)	-0,0005	-0,0005	-0,0005	-0,0005
4	-0,0001	-0,0001	-0,0001	-0,0001	-0,0001	-0,0002	-0,0001	-0,0002	-0,0001
5	-0,0006 *	-0,0006 (.)	-0,0005	-0,0005 (.)	-0,0005	-0,0005 (.)	-0,0005	-0,0006 (.)	-0,0005
6	-0,0004	-0,0004	-0,0003	-0,0003	-0,0003	-0,0003	-0,0003	-0,0003	-0,0002
7	0,0000	0,0000	0,0001	0,0001	0,0000	0,0000	0,0001	0,0000	0,0001
8	0,0000	0,0000	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
I	0,0003	0,0003	0,0004	0,0004	0,0003	0,0003	0,0004	0,0004	0,0004
					$Market$				
LE	-0,2834 ***	-0,4233 ***	-0,1321 ***	-0,3894 ***	-0,2839 ***	-0,1058 **	-0,2407 ***	-0,2524 ***	-0,2258 ***
2	-0,2985 ***	-0,4397 ***	-0,1381 ***	-0,4048 ***	-0,2857 ***	-0,1173 **	-0,2397 ***	-0,2668 ***	-0,2345 ***
3	-0,1946 ***	-0,3340 ***	-0,0348	-0,2955 ***	-0,1750 ***	-0,0048	-0,1354 ***	-0,1487 ***	-0,1139 **
4	-0,2868 ***	-0,4260 ***	-0,1294 **	-0,3932 ***	-0,2774 ***	-0,1111 **	-0,2354 ***	-0,2528 ***	-0,2281 ***
5	-0,2064 ***	-0,3409 ***	-0,0421	-0,2999 ***	-0,1806 ***	-0,0158	-0,1343 ***	-0,1559 ***	-0,1206 **
6	-0,2029 ***	-0,3382 ***	-0,0354	-0,2960 ***	-0,1738 ***	-0,0130	-0,1291 **	-0,1526 ***	-0,1184 **
7	-0,1854 ***	-0,3247 ***	-0,0217	-0,2821 ***	-0,1662 ***	-0,0029	-0,1248 ***	-0,1453 ***	-0,1072 **
8	-0,1912 ***	-0,3342 ***	-0,0291	-0,2880 ***	-0,1744 ***	-0,0094	-0,1263 ***	-0,1541 ***	-0,1149 **
I	-0,1907 ***	-0,3274 ***	-0,0257	-0,2863 ***	-0,1672 ***	-0,0106	-0,1223 **	-0,1486 ***	-0,1119 **
					SMB				
LE	-0,0691 *	0,0465	-0,0946 **	0,0065	0,0268	-0,0649 *	-0,0099	0,0493	0,0135
2	0,0181	0,1371 ***	-0,0001	0,1019 ***	0,1237 ***	0,0207	0,0940 **	0,1345 ***	0,1047 ***
3	-0,1848 ***	-0,0640 *	-0,2100 ***	-0,1036 ***	-0,0847 **	-0,1883 ***	-0,1260 ***	-0,0714 *	-0,1056 ***
4	-0,0417	0,0753 *	-0,0607 (.)	0,0368	0,0597 (.)	-0,0368	0,0239	0,0761 *	0,0414
5	-0,0875 **	0,0310	-0,1107 ***	-0,0044	0,0095	-0,0926 **	-0,0261	0,0184	-0,0109
6	-0,1559 ***	-0,0381	-0,1799 ***	-0,0751 **	-0,0580 (.)	-0,1587 ***	-0,0941 **	-0,0482	-0,0796 **
7	-0,1935 ***	-0,0745 *	-0,2097 ***	-0,1088 ***	-0,0858 **	-0,1885 ***	-0,1224 ***	-0,0737 *	-0,1029 ***
8	-0,0906 **	0,0277	-0,1099 ***	-0,0032	0,0114	-0,0924 **	-0,0194	0,0222	-0,0067
I	-0,1690 ***	-0,0488	-0,1865 ***	-0,0812 **	-0,0629 (.)	-0,1633 ***	-0,0941 **	-0,0516 (.)	-0,0783 **
					HML				
LE	0,0564 (.)	-0,0111	0,0618 (.)	-0,0081	-0,0156	0,0068	-0,0095	-0,0651 *	-0,0657 *
2	0,0676 *	-0,0058	0,0783 *	-0,0021	0,0000	0,0160	0,0060	-0,0550 (.)	-0,0560 (.)
3	0,1534 ***	0,0844 **	0,1502 ***	0,0832 **	0,0766 *	0,1021 **	0,0779 *	0,0325	0,0276
4	0,0235	-0,0436	0,0338	-0,0423	-0,0421	-0,0287	-0,0377	-0,0946 **	-0,0955 **
5	0,1782 ***	0,1064 ***	0,1754 ***	0,1061 ***	0,0997 **	0,1242 ***	0,1014 **	0,0528 (.)	0,0487
6	0,1231 ***	0,0536 (.)	0,1262 ***	0,0545 (.)	0,0523	0,0702 *	0,0559	0,0030	-0,0008
7	0,1051 ***	0,0362	0,1004 **	0,0312	0,0257	0,0503	0,0279	-0,0179	-0,0261
8	0,1339 ***	0,0641 *	0,1289 ***	0,0608 (.)	0,0529	0,0742 *	0,0546 (.)	0,0066	-0,0010
I	0,0728 *	0,0068	0,0738 *	0,0028	-0,0008	0,0151	0,0016	-0,0477	-0,0558 (.)
					$LNOILCH$				
LE	-0,0216	-0,0066	-0,0099	-0,0099	0,0060	-0,0228	0,0008	-0,0087	-0,0111
2	-0,0278 (.)	-0,0103	-0,0196	-0,0165	-0,0046	-0,0310 *	-0,0091	-0,0162	-0,0207
3	-0,0235	-0,0108	-0,0112	-0,0143	0,0023	-0,0258	-0,0032	-0,0131	-0,0171
4	-0,0355 *	-0,0201	-0,0269	-0,0233	-0,0101	-0,0400 *	-0,0141	-0,0226	-0,0267
5	-0,0302 *	-0,0195	-0,0186	-0,0237	-0,0080	-0,0337 *	-0,0122	-0,0244	-0,0277 (.)
6	-0,0373 *	-0,0263 (.)	-0,0258	-0,0308 (.)	-0,0143	-0,0419 **	-0,0186	-0,0296 (.)	-0,0339 *
7	-0,0047	0,0096	0,0067	0,0058	0,0222	-0,0077	0,0174	0,0081	0,0045
8	-0,0140	0,0010	-0,0043	-0,0037	0,0102	-0,0192	0,0071	-0,0040	-0,0078
I	-0,0217	-0,0063	-0,0116	-0,0106	0,0049	-0,0263 (.)	0,0016	-0,0088	-0,0131

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.14: FF3 Regression Results (Scope 2, Period 2)

	E	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**LE**
					α				
LE	-0,0003	-0,0002	-0,0002	-0,0003	-0,0001	-0,0002	-0,0003	-0,0001	-0,0003
2	-0,0006 *	-0,0006 (.)	-0,0005	-0,0007 *	-0,0005	-0,0006 (.)	-0,0006 (.)	-0,0005	-0,0007 *
3	0,0000	0,0000	0,0000	-0,0001	0,0000	0,0000	-0,0001	0,0000	-0,0001
4	-0,0006 (.)	-0,0005 (.)	-0,0005	-0,0007 *	-0,0005	-0,0005 (.)	-0,0006 (.)	-0,0005	-0,0006 (.)
5	-0,0003	-0,0003	-0,0003	-0,0004	-0,0003	-0,0003	-0,0004	-0,0003	-0,0004
6	-0,0003	-0,0003	-0,0003	-0,0004	-0,0003	-0,0003	-0,0004	-0,0003	-0,0004
7	-0,0003	-0,0002	-0,0003	-0,0004	-0,0003	-0,0003	-0,0004	-0,0002	-0,0004
8	-0,0006 (.)	-0,0006 (.)	-0,0006	-0,0007 *	-0,0006	-0,0006	-0,0007 (.)	-0,0006	-0,0007 *
I	-0,0006	-0,0006	-0,0006	-0,0007 (.)	-0,0006	-0,0006	-0,0007 (.)	-0,0005	-0,0007 (.)
					$Market$				
LE	-0,2177 ***	-0,3721 ***	-0,0575	-0,3410 ***	-0,2189 ***	-0,0314	-0,1879 ***	-0,1899 ***	-0,1629 ***
2	-0,2854 ***	-0,4359 ***	-0,1256 ***	-0,4064 ***	-0,2822 ***	-0,0996 **	-0,2553 ***	-0,2582 ***	-0,2312 ***
3	-0,2850 ***	-0,4347 ***	-0,1214 **	-0,4042 ***	-0,2790 ***	-0,0984 **	-0,2511 ***	-0,2545 ***	-0,2274 ***
4	-0,2412 ***	-0,3896 ***	-0,0817 *	-0,3600 ***	-0,2329 ***	-0,0534	-0,2092 ***	-0,2084 ***	-0,1843 ***
5	-0,3649 ***	-0,5039 ***	-0,2028 ***	-0,4790 ***	-0,3494 ***	-0,1791 ***	-0,3266 ***	-0,3340 ***	-0,3054 ***
6	-0,3147 ***	-0,4609 ***	-0,1503 ***	-0,4307 ***	-0,3005 ***	-0,1287 ***	-0,2790 ***	-0,2873 ***	-0,2549 ***
7	-0,4600 ***	-0,6100 ***	-0,2904 ***	-0,5792 ***	-0,4508 ***	-0,2666 ***	-0,4224 ***	-0,4249 ***	-0,3963 ***
8	-0,5312 ***	-0,6776 ***	-0,3699 ***	-0,6490 ***	-0,5210 ***	-0,3412 ***	-0,4959 ***	-0,5001 ***	-0,4733 ***
I	-0,4995 ***	-0,6466 ***	-0,3308 ***	-0,6149 ***	-0,4860 ***	-0,3060 ***	-0,4567 ***	-0,4611 ***	-0,4326 ***
					SMB				
LE	-0,1265 ***	-0,0030	-0,1484 ***	-0,0243	-0,0180	-0,1279 ***	-0,0415	-0,0090	-0,0263
2	-0,0373	0,0837 **	-0,0563 (.)	0,0660 *	0,0771 *	-0,0449	0,0504 (.)	0,0747 **	0,0621 *
3	-0,1460 ***	-0,0230	-0,1579 ***	-0,0422	-0,0316	-0,1461 ***	-0,0573 (.)	-0,0283	-0,0428
4	-0,0374	0,0795 **	-0,0511 (.)	0,0655 *	0,0825 **	-0,0350	0,0548 (.)	0,0735 *	0,0671 *
5	-0,0644 *	0,0596 (.)	-0,0702 *	0,0405	0,0571 (.)	-0,0667 *	0,0314	0,0489	0,0376
6	-0,0527 (.)	0,0709 *	-0,0603 *	0,0564 (.)	0,0701 *	-0,0513 (.)	0,0466	0,0637 *	0,0554 (.)
7	-0,1646 ***	-0,0376	-0,1756 ***	-0,0531	-0,0421	-0,1593 ***	-0,0683 (.)	-0,0350	-0,0505
8	-0,0743 *	0,0501	-0,0843 *	0,0361	0,0512	-0,0720 *	0,0257	0,0511	0,0392
I	-0,0675 *	0,0591 (.)	-0,0751 *	0,0477	0,0588	-0,0616 (.)	0,0371	0,0624 (.)	0,0519
					HML				
LE	0,1554 ***	0,0904 **	0,1578 ***	0,0954 **	0,0882 **	0,1096 ***	0,0970 **	0,0437	0,0496
2	0,1325 ***	0,0659 *	0,1270 ***	0,0709 *	0,0566 (.)	0,0763 *	0,0628 (.)	0,0186	0,0186
3	0,1132 ***	0,0517	0,1069 **	0,0516	0,0374	0,0569 (.)	0,0422	-0,0019	-0,0040
4	0,1709 ***	0,1059 ***	0,1744 ***	0,1075 ***	0,1031 **	0,1240 ***	0,1083 **	0,0583 (.)	0,0591 (.)
5	0,0851 **	0,0177	0,0749 *	0,0195	0,0029	0,0249	0,0055	-0,0334	-0,0395
6	0,1266 ***	0,0638 (.)	0,1188 ***	0,0596 (.)	0,0502	0,0697 *	0,0504	0,0121	0,0021
7	0,1117 **	0,0523	0,1076 **	0,0516	0,0382	0,0556	0,0445	-0,0046	-0,0047
8	0,0768 *	0,0144	0,0666 (.)	0,0152	-0,0018	0,0140	0,0020	-0,0396	-0,0465
I	0,1221 ***	0,0630 (.)	0,1159 **	0,0569	0,0498	0,0639 (.)	0,0486	0,0099	-0,0024
					$LNOILCH$				
LE	-0,0470 **	-0,0379 *	-0,0377 *	-0,0358 *	-0,0280 (.)	-0,0523 ***	-0,0273	-0,0411 *	-0,0404 *
2	-0,0847 ***	-0,0737 ***	-0,0701 ***	-0,0734 ***	-0,0600 ***	-0,0850 ***	-0,0598 ***	-0,0791 ***	-0,0757 ***
3	-0,0304 (.)	-0,0236	-0,0187	-0,0219	-0,0114	-0,0345 *	-0,0110	-0,0242	-0,0255
4	-0,0710 ***	-0,0627 ***	-0,0618 ***	-0,0603 ***	-0,0530 **	-0,0752 ***	-0,0516 **	-0,0697 ***	-0,0650 ***
5	-0,0674 ***	-0,0598 ***	-0,0514 **	-0,0614 ***	-0,0455 *	-0,0670 ***	-0,0461 **	-0,0627 ***	-0,0622 ***
6	-0,0573 ***	-0,0470 **	-0,0451 **	-0,0488 **	-0,0364 *	-0,0589 ***	-0,0365 *	-0,0505 **	-0,0511 **
7	-0,0391 *	-0,0295	-0,0292	-0,0292 (.)	-0,0179	-0,0423 *	-0,0188	-0,0310 (.)	-0,0322 (.)
8	-0,0788 ***	-0,0675 ***	-0,0652 ***	-0,0685 ***	-0,0542 **	-0,0784 ***	-0,0551 **	-0,0694 ***	-0,0681 ***
I	-0,0646 ***	-0,0537 **	-0,0535 **	-0,0537 **	-0,0432 *	-0,0667 ***	-0,0441 *	-0,0578 **	-0,0571 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.15: FF3 Regression Results (Scope 1, Period 3)

	E	2	3	4	5	6	7	8	LE
					α				
LE	0,0002	0,0002	0,0004	0,0002	0,0003	0,0004	0,0003	0,0004	0,0004
2	0,0005	0,0005	0,0007 (.)	0,0005	0,0006	0,0007 (.)	0,0006	0,0007 (.)	0,0007 (.)
3	-0,0001	-0,0002	0,0001	-0,0001	0,0000	0,0001	0,0001	0,0000	0,0000
4	0,0004	0,0004	0,0006	0,0003	0,0005	0,0006 (.)	0,0005	0,0006	0,0006
5	0,0002	0,0001	0,0004	0,0001	0,0004	0,0003	0,0003	0,0003	0,0003
6	0,0001	0,0000	0,0003	0,0001	0,0003	0,0003	0,0003	0,0002	0,0002
7	-0,0003	-0,0004	-0,0001	-0,0004	-0,0002	-0,0001	-0,0001	-0,0002	-0,0001
8	0,0001	0,0000	0,0003	0,0000	0,0003	0,0003	0,0003	0,0002	0,0002
I	0,0000	-0,0001	0,0002	-0,0001	0,0002	0,0002	0,0002	0,0001	0,0002
					$Market$				
LE	-0,2092 ***	-0,3153 ***	-0,1795 **	-0,3430 ***	-0,2867 ***	-0,1560 **	-0,3214 ***	-0,2655 ***	-0,2966 ***
2	-0,3923 ***	-0,5006 ***	-0,3726 ***	-0,5264 ***	-0,4815 ***	-0,3343 ***	-0,5138 ***	-0,4486 ***	-0,4730 ***
3	-0,1224 *	-0,2319 ***	-0,0949 (.)	-0,2551 ***	-0,2068 ***	-0,0701	-0,2354 ***	-0,1818 ***	-0,2112 ***
4	-0,2580 ***	-0,3658 ***	-0,2286 ***	-0,3940 ***	-0,3391 ***	-0,2025 ***	-0,3709 ***	-0,3128 ***	-0,3421 ***
5	-0,3429 ***	-0,4539 ***	-0,3193 ***	-0,4762 ***	-0,4326 ***	-0,2895 ***	-0,4601 ***	-0,4017 ***	-0,4301 ***
6	-0,1975 ***	-0,3086 ***	-0,1665 ***	-0,3303 ***	-0,2805 ***	-0,1408 **	-0,3077 ***	-0,2526 ***	-0,2795 ***
7	-0,1053 (.)	-0,2082 ***	-0,0671	-0,2369 ***	-0,1775 **	-0,0487	-0,2093 ***	-0,1581 **	-0,1915 ***
8	-0,3196 ***	-0,4251 ***	-0,2836 ***	-0,4523 ***	-0,3933 ***	-0,2610 ***	-0,4274 ***	-0,3705 ***	-0,4043 ***
I	-0,1779 ***	-0,2836 ***	-0,1404 **	-0,3092 ***	-0,2479 ***	-0,1159 *	-0,2813 ***	-0,2229 ***	-0,2554 ***
					SMB				
LE	-0,0302	0,0579	-0,0544	-0,0077	0,0365	-0,0767	-0,0303	0,0132	-0,0533
2	-0,0438	0,0437	-0,0731	-0,0195	0,0187	-0,0886 (.)	-0,0477	-0,0009	-0,0645
3	-0,0191	0,0650	-0,0464	-0,0023	0,0420	-0,0668	-0,0275	0,0198	-0,0473
4	-0,1671 **	-0,0791	-0,1929 ***	-0,1428 **	-0,1017 (.)	-0,2129 ***	-0,1683 **	-0,1244 *	-0,1899 ***
5	-0,0452	0,0390	-0,0766	-0,0264	0,0102	-0,0943 (.)	-0,0556	-0,0077	-0,0733
6	-0,1685 **	-0,0844	-0,1971 ***	-0,1517 **	-0,1102 *	-0,2136 ***	-0,1799 ***	-0,1272 *	-0,1958 ***
7	0,0209	0,1046 (.)	0,0036	0,0419	0,0936 (.)	-0,0273	0,0279	0,0592	-0,0050
8	-0,0033	0,0817	-0,0244	0,0173	0,0657	-0,0491	-0,0015	0,0380	-0,0270
I	-0,1307 *	-0,0483	-0,1516 **	-0,1089 *	-0,0608	-0,1780 ***	-0,1276 *	-0,0907 (.)	-0,1548 **
					HML				
LE	0,0478	0,0126	0,0546	-0,0029	0,0128	0,0229	0,0001	-0,0197	-0,0354
2	-0,0832	-0,1173 *	-0,0755	-0,1315 *	-0,1166 (.)	-0,1115 *	-0,1270 *	-0,1514 **	-0,1685 **
3	0,0863	0,0537	0,1024 (.)	0,0322	0,0643	0,0671	0,0437	0,0294	0,0070
4	-0,0576	-0,0928 (.)	-0,0497	-0,1072 (.)	-0,0898	-0,0866	-0,1028 (.)	-0,1274 *	-0,1427 **
5	-0,0661	-0,0985 (.)	-0,0453	-0,1167 *	-0,0813	-0,0851	-0,0996 (.)	-0,1222 *	-0,1428 *
6	-0,0340	-0,0671	-0,0154	-0,0875	-0,0519	-0,0518	-0,0715	-0,0890 (.)	-0,1122 *
7	0,0106	-0,0219	0,0260	-0,0417	-0,0099	-0,0153	-0,0311	-0,0525	-0,0759
8	-0,1389 *	-0,1682 **	-0,1225 *	-0,1898 **	-0,1566 **	-0,1624 **	-0,1764 **	-0,1989 ***	-0,2202 ***
I	-0,1077 (.)	-0,1406 *	-0,0955 (.)	-0,1601 **	-0,1299 *	-0,1352 *	-0,1496 **	-0,1718 **	-0,1945 ***
					$LNOILCH$				
LE	0,0202	0,0179	0,0068	0,0079	0,0021	0,0212	-0,0065	0,0186	0,0095
2	-0,0089	-0,0109	-0,0225	-0,0209	-0,0264	-0,0081	-0,0360 (.)	-0,0102	-0,0203
3	0,0081	0,0060	-0,0068	-0,0037	-0,0111	0,0103	-0,0196	0,0076	-0,0011
4	0,0412 *	0,0390 (.)	0,0279	0,0293	0,0238	0,0424 *	0,0146	0,0397 *	0,0300
5	-0,0173	-0,0208	-0,0334 (.)	-0,0316	-0,0385 (.)	-0,0156	-0,0481 *	-0,0183	-0,0292
6	0,0318	0,0293	0,0165	0,0195	0,0117	0,0335 (.)	0,0024	0,0307	0,0211
7	0,0469 *	0,0424 *	0,0354 (.)	0,0347	0,0298	0,0461 *	0,0239	0,0422 *	0,0364 (.)
8	0,0154	0,0113	0,0023	0,0032	-0,0034	0,0148	-0,0098	0,0110	0,0048
I	0,0699 ***	0,0655 **	0,0568 **	0,0573 **	0,0515 *	0,0686 ***	0,0449 *	0,0648 **	0,0583 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.16: FF3 Regression Results (Scope 2, Period 3)

	E	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**LE**
					α				
LE	0,0003	0,0003	0,0006	0,0003	0,0005	0,0006	0,0005	0,0005	0,0005
2	0,0006	0,0005	0,0008 *	0,0005	0,0008 (.)	0,0008 (.)	0,0008 (.)	0,0007 (.)	0,0007 (.)
3	0,0007 (.)	0,0006	0,0010 *	0,0007	0,0009 *	0,0009 *	0,0009 *	0,0008 *	0,0008 *
4	0,0005	0,0005	0,0007 (.)	0,0005	0,0006	0,0006 (.)	0,0006	0,0006	0,0006
5	0,0009 *	0,0008 (.)	0,0011 **	0,0008 (.)	0,0011 *	0,0010 *	0,0011 *	0,0010 *	0,0010 *
6	0,0009 *	0,0008 (.)	0,0011 **	0,0008 (.)	0,0011 *	0,0010 *	0,0011 *	0,0009 *	0,0010 *
7	0,0006	0,0005	0,0008 (.)	0,0005	0,0008 (.)	0,0007 (.)	0,0008 (.)	0,0007	0,0007
8	0,0008 (.)	0,0007	0,0011 *	0,0007	0,0010 *	0,0010 *	0,0010 (.)	0,0009 (.)	0,0009 (.)
I	0,0008 (.)	0,0007	0,0010 *	0,0007	0,0009 (.)	0,0009 (.)	0,0009 (.)	0,0008 (.)	0,0008 (.)
					$Market$				
LE	-0,2894 ***	-0,3994 ***	-0,2627 ***	-0,4461 ***	-0,3744 ***	-0,2403 ***	-0,4215 ***	-0,3482 ***	-0,3933 ***
2	-0,5869 ***	-0,6957 ***	-0,5595 ***	-0,7459 ***	-0,6783 ***	-0,5339 ***	-0,7232 ***	-0,6429 ***	-0,6889 ***
3	-0,5906 ***	-0,7012 ***	-0,5416 ***	-0,7415 ***	-0,6523 ***	-0,5413 ***	-0,6985 ***	-0,6480 ***	-0,6981 ***
4	-0,3675 ***	-0,4727 ***	-0,3397 ***	-0,5187 ***	-0,4512 ***	-0,3183 ***	-0,4959 ***	-0,4213 ***	-0,4724 ***
5	-0,8867 ***	-1,0029 ***	-0,8454 ***	-1,0398 ***	-0,9578 ***	-0,8417 ***	-0,9990 ***	-0,9554 ***	-0,9918 ***
6	-0,6612 ***	-0,7712 ***	-0,6097 ***	-0,8109 ***	-0,7212 ***	-0,6092 ***	-0,7734 ***	-0,7206 ***	-0,7607 ***
7	-0,7343 ***	-0,8419 ***	-0,6957 ***	-0,8830 ***	-0,8095 ***	-0,6810 ***	-0,8529 ***	-0,7967 ***	-0,8396 ***
8	-1,0261 ***	-1,1423 ***	-0,9893 ***	-1,1793 ***	-1,1102 ***	-0,9758 ***	-1,1484 ***	-1,0937 ***	-1,1324 ***
I	-0,8299 ***	-0,9373 ***	-0,7852 ***	-0,9776 ***	-0,9031 ***	-0,7683 ***	-0,9447 ***	-0,8839 ***	-0,9238 ***
					SMB				
LE	-0,0606	0,0221	-0,0808	-0,0177	0,0052	-0,0915 (.)	-0,0362	-0,0053	-0,0460
2	0,0887	0,1681 **	0,0653	0,1322 *	0,1476 *	0,0522	0,1120 (.)	0,1321 *	0,0997 (.)
3	-0,0804	0,0044	-0,1074 (.)	-0,0391	-0,0201	-0,1174 *	-0,0632	-0,0304	-0,0715
4	0,0377	0,1212 *	0,0239	0,0810	0,1122 *	0,0146	0,0693	0,1029 (.)	0,0587
5	0,0729	0,1565 *	0,0437	0,1143 (.)	0,1298 *	0,0380	0,0863	0,1214 *	0,0825
6	0,0147	0,0993	-0,0045	0,0550	0,0836	-0,0104	0,0395	0,0776	0,0352
7	-0,1446 *	-0,0627	-0,1622 **	-0,1043 (.)	-0,0767	-0,1775 **	-0,1171 (.)	-0,0923	-0,1323 *
8	0,0078	0,0836	-0,0100	0,0490	0,0681	-0,0280	0,0366	0,0489	0,0183
I	-0,0548	0,0279	-0,0678	-0,0139	0,0204	-0,0791	-0,0220	0,0076	-0,0330
					HML				
LE	-0,0550	-0,0905	-0,0409	-0,1028 (.)	-0,0811	-0,0902 (.)	-0,0900	-0,1316 *	-0,1436 **
2	-0,0770	-0,1142 (.)	-0,0681	-0,1229 (.)	-0,1114 (.)	-0,1141 *	-0,1158 (.)	-0,1559 **	-0,1643 **
3	-0,1349 *	-0,1732 **	-0,1183 *	-0,1830 **	-0,1610 **	-0,1692 **	-0,1694 **	-0,2129 ***	-0,2247 ***
4	-0,0527	-0,0884	-0,0390	-0,1005 (.)	-0,0780	-0,0852	-0,0878	-0,1248 *	-0,1374 *
5	-0,1730 **	-0,2134 **	-0,1610 *	-0,2230 ***	-0,2037 **	-0,2093 ***	-0,2099 **	-0,2537 ***	-0,2645 ***
6	-0,1393 *	-0,1775 **	-0,1210 (.)	-0,1876 **	-0,1621 *	-0,1689 **	-0,1718 **	-0,2123 ***	-0,2244 ***
7	-0,1253 (.)	-0,1590 *	-0,1066 (.)	-0,1697 *	-0,1450 *	-0,1537 *	-0,1527 *	-0,1955 **	-0,2062 **
8	-0,1629 *	-0,2003 **	-0,1491 *	-0,2097 **	-0,1889 *	-0,1930 **	-0,1926 **	-0,2370 ***	-0,2424 ***
I	-0,1195 (.)	-0,1536 *	-0,1015	-0,1649 *	-0,1384 (.)	-0,1465 *	-0,1475 *	-0,1869 **	-0,1973 **
					$LNOILCH$				
LE	-0,0173	-0,0190	-0,0315	-0,0235	-0,0350 (.)	-0,0058	-0,0414 *	-0,0070	-0,0141
2	-0,0958 ***	-0,0982 ***	-0,1119 ***	-0,0996 ***	-0,1135 ***	-0,0856 ***	-0,1190 ***	-0,0846 ***	-0,0919 ***
3	-0,0124	-0,0151	-0,0294	-0,0207	-0,0340	-0,0016	-0,0386 (.)	-0,0045	-0,0083
4	-0,0392 (.)	-0,0418 *	-0,0540 **	-0,0466 *	-0,0578 **	-0,0282	-0,0643 **	-0,0297	-0,0372 (.)
5	-0,0961 ***	-0,0987 ***	-0,1116 ***	-0,1041 ***	-0,1156 ***	-0,0853 ***	-0,1213 ***	-0,0862 ***	-0,0935 ***
6	-0,0415 (.)	-0,0446 (.)	-0,0582 **	-0,0501 *	-0,0624 **	-0,0298	-0,0665 **	-0,0317	-0,0371
7	-0,0411 (.)	-0,0437 (.)	-0,0528 *	-0,0504 *	-0,0563 *	-0,0309	-0,0632 **	-0,0320	-0,0383 (.)
8	-0,1246 ***	-0,1262 ***	-0,1354 ***	-0,1319 ***	-0,1371 ***	-0,1153 ***	-0,1445 ***	-0,1154 ***	-0,1240 ***
I	-0,0647 **	-0,0679 **	-0,0779 **	-0,0739 **	-0,0812 **	-0,0555 *	-0,0877 ***	-0,0568 *	-0,0632 *

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

FF5 regressions results of CRE-Portfolios

These tables contain the regression results of the first step Fama-Macbeth Regression run on all the 81 portfolios under scope 1 and 2 with the following model

$$R_{it} = \alpha_i + b_i R_{mt} + s_i SMB_t + h_i HML_t + q_i PR1YR + l_i LIQ + p_i OIL_i$$

The table is organised by the effectiveness of the included "clean" portfolio (horisontally) and the ineffectiveness of the included "dirty" portfolio (vertically). The letter E (I) indicates the most efficient (inefficient) end of the scale, and LE (LI) the least efficient (inefficient) end.

Table D.17: FF5 Regression Results (Scope 1, All years)

	E	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**LE**
					α				
LE	-0,0002	-0,0003	-0,0001	-0,0003	-0,0002	0,0000	-0,0002	-0,0001	0,0000
2	-0,0002	-0,0002	0,0000	-0,0002	-0,0001	0,0001	-0,0002	0,0000	0,0000
3	-0,0002	-0,0003	-0,0001	-0,0003	-0,0002	0,0000	-0,0002	-0,0001	-0,0001
4	-0,0001	-0,0002	0,0000	-0,0002	-0,0001	0,0001	-0,0001	0,0000	0,0001
5	-0,0002	-0,0003	-0,0001	-0,0002	-0,0001	0,0000	-0,0002	-0,0001	0,0000
6	-0,0001	-0,0002	0,0000	-0,0002	-0,0001	0,0001	-0,0001	0,0000	0,0000
7	-0,0002	-0,0002	0,0000	-0,0002	-0,0002	0,0001	-0,0001	0,0000	0,0000
8	-0,0001	-0,0002	0,0001	-0,0002	0,0000	0,0001	-0,0001	0,0000	0,0001
I	0,0000	-0,0001	0,0001	-0,0001	0,0000	0,0002	0,0000	0,0001	0,0002
					$Market$				
LE	-0,1655 ***	-0,1843 ***	-0,0272	-0,1427 ***	-0,0583 *	-0,0259	-0,0159	-0,0505 (.)	-0,0158
2	-0,2121 ***	-0,2306 ***	-0,0733 **	-0,1908 ***	-0,1035 ***	-0,0707 **	-0,0601 *	-0,0960 ***	-0,0600 *
3	-0,1789 ***	-0,1960 ***	-0,0302	-0,1516 ***	-0,0523 (.)	-0,0224	-0,0109	-0,0457 (.)	-0,0068
4	-0,1459 ***	-0,1657 ***	-0,0069	-0,1250 ***	-0,0352	-0,0097	0,0062	-0,0312	0,0023
5	-0,2308 ***	-0,2455 ***	-0,0807 **	-0,2012 ***	-0,1024 ***	-0,0730 **	-0,0577 (.)	-0,0922 ***	-0,0570 *
6	-0,1618 ***	-0,1785 ***	-0,0096	-0,1328 ***	-0,0298	-0,0066	0,0130	-0,0249	0,0138
7	-0,1563 ***	-0,1700 ***	-0,0051	-0,1241 ***	-0,0296	-0,0122	0,0143	-0,0304	0,0139
8	-0,2084 ***	-0,2247 ***	-0,0585 *	-0,1749 ***	-0,0810 **	-0,0636 *	-0,0323	-0,0810 **	-0,0367
I	-0,1430 ***	-0,1561 ***	0,0061	-0,1094 ***	-0,0118	-0,0008	0,0328	-0,0147	0,0286
					SMB				
LE	-0,0412	0,0944 ***	0,0097	0,1001 ***	0,1374 ***	-0,0380	0,1454 ***	0,0921 ***	0,1084 ***
2	0,0571 *	0,1932 ***	0,1098 ***	0,2043 ***	0,2393 ***	0,0594 *	0,2511 ***	0,1877 ***	0,2099 ***
3	-0,1109 ***	0,0251	-0,0712 **	0,0272	0,0555 (.)	-0,1115 ***	0,0611 *	0,0170	0,0260
4	0,0083	0,1431 ***	0,0571 *	0,1496 ***	0,1843 ***	0,0098	0,1908 ***	0,1374 ***	0,1554 ***
5	-0,0107	0,1242 ***	0,0280	0,1286 ***	0,1546 ***	-0,0141	0,1641 ***	0,1104 ***	0,1269 ***
6	-0,0619 *	0,0729 **	-0,0240	0,0746 **	0,1016 ***	-0,0615 *	0,1102 ***	0,0642 *	0,0745 **
7	-0,1289 ***	0,0060	-0,0829 **	0,0126	0,0449	-0,1314 ***	0,0577 *	-0,0016	0,0124
8	-0,0205	0,1149 ***	0,0256	0,1251 ***	0,1547 ***	-0,0243	0,1671 ***	0,1057 ***	0,1219 ***
I	-0,0804 **	0,0560 *	-0,0350	0,0639 *	0,0939 ***	-0,0809 **	0,1069 ***	0,0478 (.)	0,0622 *
					HML				
LE	-0,0065	-0,0624 **	-0,0404 *	-0,1131 ***	-0,1006 ***	-0,0463 *	-0,1447 ***	-0,1064 ***	-0,1531 ***
2	-0,0326 (.)	-0,0890 ***	-0,0655 **	-0,1376 ***	-0,1234 ***	-0,0736 ***	-0,1682 ***	-0,1313 ***	-0,1790 ***
3	0,0181	-0,0361 (.)	-0,0197	-0,0924 ***	-0,0729 ***	-0,0222	-0,1251 ***	-0,0790 ***	-0,1349 ***
4	-0,0294	-0,0843 ***	-0,0645 **	-0,1336 ***	-0,1220 ***	-0,0712 ***	-0,1653 ***	-0,1279 ***	-0,1746 ***
5	-0,0068	-0,0608 **	-0,0412 (.)	-0,1137 ***	-0,0959 ***	-0,0460 *	-0,1468 ***	-0,1032 ***	-0,1567 ***
6	-0,0062	-0,0579 **	-0,0398 (.)	-0,1112 ***	-0,0943 ***	-0,0471 *	-0,1456 ***	-0,1014 ***	-0,1554 ***
7	-0,0127	-0,0642 **	-0,0490 *	-0,1175 ***	-0,1021 ***	-0,0540 **	-0,1508 ***	-0,1064 ***	-0,1605 ***
8	-0,0318	-0,0832 ***	-0,0680 ***	-0,1325 ***	-0,1216 ***	-0,0735 ***	-0,1705 ***	-0,1265 ***	-0,1781 ***
I	-0,0345 (.)	-0,0834 ***	-0,0698 ***	-0,1330 ***	-0,1229 ***	-0,0751 ***	-0,1709 ***	-0,1270 ***	-0,1780 ***
					$PR1YR$				
LE	-0,0100	0,0019	-0,0028	-0,0116	0,0089	-0,0504 *	-0,0032	-0,0349 (.)	-0,0423 *
2	-0,0108	0,0014	-0,0060	-0,0126	0,0064	-0,0526 **	-0,0074	-0,0374 (.)	-0,0478 *
3	-0,0355 (.)	-0,0247	-0,0335	-0,0399 (.)	-0,0213	-0,0799 ***	-0,0344	-0,0639 **	-0,0760 ***
4	-0,0121	0,0018	-0,0029	-0,0123	0,0097	-0,0518 **	-0,0059	-0,0343	-0,0445 *
5	-0,0451 *	-0,0347 (.)	-0,0430 *	-0,0514 *	-0,0329	-0,0897 ***	-0,0472 *	-0,0753 ***	-0,0893 ***
6	-0,0427 *	-0,0319	-0,0388 (.)	-0,0489 *	-0,0284	-0,0876 ***	-0,0446 *	-0,0732 ***	-0,0882 ***
7	-0,0360 (.)	-0,0245	-0,0350 (.)	-0,0387 (.)	-0,0205	-0,0756 ***	-0,0340	-0,0600 **	-0,0731 ***
8	-0,0415 *	-0,0288	-0,0402 (.)	-0,0456 *	-0,0287	-0,0844 ***	-0,0421 (.)	-0,0708 ***	-0,0845 ***
I	-0,0374 (.)	-0,0256	-0,0337	-0,0404 (.)	-0,0215	-0,0776 ***	-0,0380 (.)	-0,0626 **	-0,0766 ***
					LIQ				
LE	0,0398 (.)	-0,0142	-0,0368	-0,0630 *	-0,0799 **	0,0394	-0,1294 ***	-0,0077	-0,0648 *
2	-0,0207	-0,0740 **	-0,1015 ***	-0,1255 ***	-0,1465 ***	-0,0239	-0,1957 ***	-0,0702 **	-0,1307 ***
3	0,0136	-0,0358	-0,0527 *	-0,0828 **	-0,0920 ***	0,0171	-0,1411 ***	-0,0265	-0,0782 **
4	-0,0171	-0,0710 **	-0,0930 ***	-0,1191 ***	-0,1372 ***	-0,0194	-0,1847 ***	-0,0659 **	-0,1225 ***
5	-0,0479 *	-0,0970 ***	-0,1156 ***	-0,1460 ***	-0,1573 ***	-0,0433 (.)	-0,2063 ***	-0,0858 ***	-0,1439 ***
6	-0,0427 (.)	-0,0947 ***	-0,1087 ***	-0,1398 ***	-0,1500 ***	-0,0401 (.)	-0,1990 ***	-0,0848 ***	-0,1354 ***
7	0,0514 *	0,0029	-0,0112	-0,0454 (.)	-0,0517 *	0,0558 *	-0,1045 ***	0,0123	-0,0384
8	-0,0165	-0,0676 **	-0,0846 ***	-0,1155 ***	-0,1275 ***	-0,0159	-0,1762 ***	-0,0607 *	-0,1139 ***
I	-0,0110	-0,0622 *	-0,0771 **	-0,1088 ***	-0,1182 ***	-0,0089	-0,1697 ***	-0,0538 *	-0,1032 ***
					$LNOILCH$				
LE	-0,0188 *	-0,0252 **	-0,0167 (.)	-0,0290 **	-0,0212 *	-0,0186 *	-0,0256 *	-0,0248 **	-0,0265 **
2	-0,0177 *	-0,0242 **	-0,0196 *	-0,0287 **	-0,0248 *	-0,0200 *	-0,0289 **	-0,0266 **	-0,0293 **
3	-0,0204 *	-0,0271 **	-0,0204 *	-0,0311 **	-0,0243 *	-0,0213 *	-0,0280 **	-0,0266 **	-0,0297 **
4	-0,0130	-0,0196 *	-0,0150	-0,0236 *	-0,0197 *	-0,0162 (.)	-0,0243 *	-0,0216 *	-0,0245 *
5	-0,0186 *	-0,0263 **	-0,0193 *	-0,0312 **	-0,0261 *	-0,0213 *	-0,0297 **	-0,0285 **	-0,0320 **
6	-0,0148	-0,0222 *	-0,0160 (.)	-0,0269 **	-0,0233 *	-0,0171 (.)	-0,0267 **	-0,0241 *	-0,0278 **
7	-0,0095	-0,0162 (.)	-0,0068	-0,0216 *	-0,0112	-0,0119	-0,0154	-0,0169 (.)	-0,0199 *
8	-0,0109	-0,0182 (.)	-0,0090	-0,0231 *	-0,0166 (.)	-0,0145	-0,0199 *	-0,0215 *	-0,0246 *
I	-0,0063	-0,0125	-0,0049	-0,0183 (.)	-0,0114	-0,0098	-0,0154	-0,0156 (.)	-0,0192 *

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.18: FF5 Regression Results (Scope 2, All years)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0002	-0,0002	0,0000	-0,0003	-0,0001	0,0001	-0,0001	0,0000	0,0000
2	-0,0002	-0,0003	-0,0001	-0,0004	-0,0002	0,0000	-0,0002	0,0000	-0,0001
3	0,0000	-0,0001	0,0001	-0,0001	0,0000	0,0002	0,0000	0,0002	0,0001
4	-0,0003	-0,0003	-0,0001	-0,0004 (.)	-0,0003	0,0000	-0,0003	-0,0001	-0,0001
5	0,0000	-0,0002	0,0001	-0,0002	0,0000	0,0002	0,0000	0,0001	0,0001
6	-0,0001	-0,0002	0,0001	-0,0002	-0,0001	0,0001	-0,0001	0,0000	0,0000
7	0,0000	-0,0001	0,0001	-0,0002	0,0000	0,0001	-0,0001	0,0001	0,0001
8	-0,0001	-0,0002	0,0000	-0,0003	-0,0001	0,0001	-0,0001	0,0000	0,0000
I	-0,0002	-0,0002	0,0000	-0,0003	-0,0002	0,0000	-0,0002	0,0000	-0,0001
					$Market$				
LE	-0,2030 ***	-0,2246 ***	-0,0556 *	-0,1869 ***	-0,0831 **	-0,0604 *	-0,0494 (.)	-0,0821 **	-0,0502 (.)
2	-0,2910 ***	-0,3092 ***	-0,1469 ***	-0,2740 ***	-0,1708 ***	-0,1476 ***	-0,1393 ***	-0,1699 ***	-0,1375 ***
3	-0,3559 ***	-0,3854 ***	-0,2091 ***	-0,3486 ***	-0,2446 ***	-0,2135 ***	-0,2100 ***	-0,2444 ***	-0,2125 ***
4	-0,2656 ***	-0,2830 ***	-0,1243 ***	-0,2467 ***	-0,1437 ***	-0,1240 ***	-0,1113 ***	-0,1414 ***	-0,1098 ***
5	-0,4486 ***	-0,4732 ***	-0,3042 ***	-0,4394 ***	-0,3320 ***	-0,3047 ***	-0,3012 ***	-0,3373 ***	-0,3011 ***
6	-0,4185 ***	-0,4463 ***	-0,2736 ***	-0,4105 ***	-0,3012 ***	-0,2768 ***	-0,2718 ***	-0,3071 ***	-0,2697 ***
7	-0,4844 ***	-0,5053 ***	-0,3297 ***	-0,4698 ***	-0,3587 ***	-0,3372 ***	-0,3263 ***	-0,3619 ***	-0,3281 ***
8	-0,5687 ***	-0,5912 ***	-0,4192 ***	-0,5558 ***	-0,4463 ***	-0,4208 ***	-0,4122 ***	-0,4491 ***	-0,4159 ***
I	-0,5600 ***	-0,5801 ***	-0,4072 ***	-0,5443 ***	-0,4340 ***	-0,4131 ***	-0,3982 ***	-0,4384 ***	-0,4032 ***
					SMB				
LE	-0,0578 *	0,0815 **	-0,0107	0,0979 ***	0,1201 ***	-0,0560 *	0,1453 ***	0,0767 **	0,1004 ***
2	-0,0272	0,1090 ***	0,0144	0,1264 ***	0,1459 ***	-0,0322	0,1678 ***	0,0998 ***	0,1253 ***
3	-0,0471 (.)	0,0943 ***	-0,0075	0,1088 ***	0,1274 ***	-0,0522 (.)	0,1474 ***	0,0838 **	0,1057 ***
4	-0,0086	0,1248 ***	0,0413	0,1442 ***	0,1709 ***	-0,0052	0,1928 ***	0,1202 ***	0,1492 ***
5	-0,0231	0,1135 ***	0,0146	0,1301 ***	0,1467 ***	-0,0341	0,1670 ***	0,0995 ***	0,1230 ***
6	-0,0048	0,1329 ***	0,0353	0,1502 ***	0,1724 ***	-0,0111	0,1921 ***	0,1237 ***	0,1473 ***
7	-0,1006 ***	0,0416	-0,0454	0,0636 *	0,0885 **	-0,0940 **	0,1116 ***	0,0420	0,0704 *
8	-0,0778 **	0,0625 *	-0,0250	0,0864 **	0,1093 ***	-0,0782 **	0,1339 ***	0,0588 (.)	0,0902 **
I	-0,0552 (.)	0,0857 **	-0,0047	0,1083 ***	0,1339 ***	-0,0530 (.)	0,1562 ***	0,0854 **	0,1150 ***
					HML				
LE	-0,0233	-0,0746 ***	-0,0574 **	-0,1237 ***	-0,1103 ***	-0,0646 **	-0,1562 ***	-0,1182 ***	-0,1662 ***
2	-0,0458 *	-0,0986 ***	-0,0837 ***	-0,1492 ***	-0,1384 ***	-0,0892 ***	-0,1868 ***	-0,1416 ***	-0,1932 ***
3	-0,0351 (.)	-0,0840 ***	-0,0733 ***	-0,1369 ***	-0,1240 ***	-0,0771 ***	-0,1719 ***	-0,1253 ***	-0,1800 ***
4	0,0061	-0,0456 *	-0,0331	-0,0970 ***	-0,0861 ***	-0,0376 (.)	-0,1332 ***	-0,0913 ***	-0,1439 ***
5	-0,0601 **	-0,1122 ***	-0,1007 ***	-0,1647 ***	-0,1539 ***	-0,1038 ***	-0,2026 ***	-0,1532 ***	-0,2089 ***
6	-0,0075	-0,0575 *	-0,0486 *	-0,1133 ***	-0,1016 ***	-0,0520 *	-0,1529 ***	-0,1023 ***	-0,1591 ***
7	-0,0497 *	-0,0962 ***	-0,0860 ***	-0,1473 ***	-0,1384 ***	-0,0889 ***	-0,1852 ***	-0,1413 ***	-0,1910 ***
8	-0,0768 ***	-0,1265 ***	-0,1177 ***	-0,1771 ***	-0,1695 ***	-0,1178 ***	-0,2184 ***	-0,1708 ***	-0,2220 ***
I	-0,0254	-0,0706 **	-0,0611 *	-0,1251 ***	-0,1122 ***	-0,0630 **	-0,1613 ***	-0,1140 ***	-0,1678 ***
					$PR1YR$				
LE	-0,0100	0,0060	-0,0052	-0,0258	0,0086	-0,0512 **	-0,0217	-0,0365 (.)	-0,0651 **
2	0,0200	0,0334	0,0241	0,0025	0,0380 (.)	-0,0227	0,0051	-0,0069	-0,0364 (.)
3	-0,0158	-0,0009	-0,0189	-0,0361	-0,0033	-0,0571 **	-0,0345	-0,0417 (.)	-0,0722 **
4	0,0242	0,0370 (.)	0,0272	0,0085	0,0407 (.)	-0,0198	0,0086	-0,0070	-0,0337
5	0,0175	0,0314	0,0149	-0,0036	0,0292	-0,0229	-0,0023	-0,0064	-0,0381
6	0,0206	0,0346	0,0141	0,0000	0,0269	-0,0225	-0,0042	-0,0088	-0,0402 (.)
7	-0,0162	-0,0007	-0,0140	-0,0344	0,0016	-0,0649 **	-0,0292	-0,0479 *	-0,0779 **
8	0,0184	0,0337	0,0188	-0,0003	0,0355	-0,0316	0,0030	-0,0136	-0,0425 (.)
I	0,0200	0,0351	0,0231	0,0017	0,0379	-0,0276	0,0065	-0,0116	-0,0416 (.)
					LIQ				
LE	-0,0210	-0,0716 **	-0,0925 ***	-0,1187 ***	-0,1289 ***	-0,0208	-0,1839 ***	-0,0637 *	-0,1149 ***
2	0,0573 *	0,0086	-0,0125	-0,0375	-0,0490 (.)	0,0565 *	-0,1001 ***	0,0147	-0,0352
3	-0,0382	-0,0935 ***	-0,0995 ***	-0,1372 ***	-0,1452 ***	-0,0324	-0,1947 ***	-0,0826 **	-0,1296 ***
4	0,0286	-0,0173	-0,0441 (.)	-0,0645 *	-0,0774 **	0,0274	-0,1300 ***	-0,0117	-0,0639 *
5	0,0454 (.)	-0,0057	-0,0153	-0,0506 (.)	-0,0588 *	0,0527 *	-0,1080 ***	0,0034	-0,0430
6	0,0241	-0,0267	-0,0380	-0,0714 **	-0,0834 **	0,0299	-0,1318 ***	-0,0179	-0,0649 *
7	0,0065	-0,0452	-0,0662 *	-0,0949 ***	-0,1045 ***	0,0052	-0,1580 ***	-0,0392	-0,0932 **
8	0,0950 ***	0,0426	0,0251	-0,0073	-0,0159	0,0970 ***	-0,0668 *	0,0503 (.)	-0,0037
I	0,0666 *	0,0164	-0,0007	-0,0319	-0,0428	0,0682 *	-0,0923 **	0,0213	-0,0310
					$LNOILCH$				
LE	-0,0213 *	-0,0303 **	-0,0214 *	-0,0328 ***	-0,0296 **	-0,0218 *	-0,0321 **	-0,0302 **	-0,0319 ***
2	-0,0637 ***	-0,0718 ***	-0,0630 ***	-0,0745 ***	-0,0709 ***	-0,0630 ***	-0,0733 ***	-0,0722 ***	-0,0734 ***
3	-0,0246 *	-0,0329 **	-0,0240 *	-0,0353 ***	-0,0310 **	-0,0245 *	-0,0328 **	-0,0311 **	-0,0326 **
4	-0,0512 ***	-0,0604 ***	-0,0509 ***	-0,0632 ***	-0,0604 ***	-0,0518 ***	-0,0624 ***	-0,0630 ***	-0,0640 ***
5	-0,0665 ***	-0,0741 ***	-0,0655 ***	-0,0778 ***	-0,0728 ***	-0,0664 ***	-0,0748 ***	-0,0742 ***	-0,0754 ***
6	-0,0567 ***	-0,0635 ***	-0,0557 ***	-0,0671 ***	-0,0636 ***	-0,0563 ***	-0,0657 ***	-0,0644 ***	-0,0660 ***
7	-0,0239 *	-0,0315 **	-0,0237 *	-0,0352 ***	-0,0313 **	-0,0237 *	-0,0343 **	-0,0322 **	-0,0346 **
8	-0,0678 ***	-0,0737 ***	-0,0667 ***	-0,0782 ***	-0,0737 ***	-0,0675 ***	-0,0767 ***	-0,0756 ***	-0,0779 ***
I	-0,0549 ***	-0,0614 ***	-0,0546 ***	-0,0656 ***	-0,0624 ***	-0,0551 ***	-0,0655 ***	-0,0641 ***	-0,0658 ***

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.19: FF5 Regression Results (Scope 1, Period 1)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0004	-0,0005	-0,0003	-0,0005	-0,0004	0,0000	-0,0004	-0,0002	-0,0001
2	-0,0005	-0,0006	-0,0003	-0,0006	-0,0005	0,0000	-0,0005	-0,0002	-0,0001
3	0,0000	-0,0001	0,0002	-0,0001	0,0000	0,0004	0,0000	0,0003	0,0003
4	-0,0005	-0,0006 (.)	-0,0003	-0,0006	-0,0005	0,0000	-0,0005	-0,0002	-0,0001
5	0,0000	-0,0001	0,0001	-0,0001	0,0000	0,0003	-0,0001	0,0002	0,0002
6	-0,0001	-0,0002	0,0001	-0,0002	-0,0001	0,0003	-0,0001	0,0001	0,0002
7	-0,0004	-0,0004	-0,0002	-0,0005	-0,0004	0,0001	-0,0003	-0,0001	0,0001
8	-0,0004	-0,0005	-0,0002	-0,0005	-0,0004	0,0000	-0,0004	-0,0001	0,0000
I	-0,0004	-0,0006	-0,0002	-0,0006	-0,0004	0,0000	-0,0004	-0,0001	0,0000
					$Market$				
LE	-0,0262	0,1583 ***	0,1661 ***	0,2506 ***	0,3282 ***	0,0994 *	0,4176 ***	0,2735 ***	0,3592 ***
2	0,0240	0,2106 ***	0,2163 ***	0,2981 ***	0,3782 ***	0,1478 ***	0,4664 ***	0,3255 ***	0,4086 ***
3	-0,2026 ***	-0,0143	0,0036	0,0784	0,1798 ***	-0,0543	0,2666 ***	0,1212 *	0,2099 ***
4	0,0830 *	0,2648 ***	0,2710 ***	0,3545 ***	0,4365 ***	0,2001 ***	0,5224 ***	0,3746 ***	0,4591 ***
5	-0,1455 **	0,0427	0,0621	0,1341 **	0,2357 ***	0,0027	0,3233 ***	0,1822 ***	0,2641 ***
6	-0,0821 (.)	0,1039 *	0,1231 **	0,1946 ***	0,3020 ***	0,0596	0,3856 ***	0,2398 ***	0,3280 ***
7	-0,2046 ***	-0,0112	-0,0025	0,0824 (.)	0,1704 ***	-0,0789 (.)	0,2627 ***	0,1049 *	0,2016 ***
8	-0,1548 ***	0,0372	0,0492	0,1359 **	0,2249 ***	-0,0270	0,3232 ***	0,1602 ***	0,2583 ***
I	-0,0961 *	0,0985 *	0,1005 *	0,1928 ***	0,2836 ***	0,0232	0,3741 ***	0,2096 ***	0,3049 ***
					SMB				
LE	-0,0495	0,0324	0,0675	0,0773 (.)	0,1359 **	-0,0122	0,1829 ***	0,0662	0,1281 **
2	0,0077	0,0886 *	0,1204 **	0,1391 ***	0,1892 ***	0,0433	0,2395 ***	0,1175 **	0,1828 ***
3	-0,0740 (.)	0,0081	0,0263	0,0459	0,0904 (.)	-0,0301	0,1380 **	0,0458	0,0907 (.)
4	0,0099	0,0903 *	0,1186 **	0,1366 **	0,1876 ***	0,0426	0,2309 ***	0,1210 **	0,1838 ***
5	-0,0288	0,0564	0,0699	0,0929 (.)	0,1407 **	0,0134	0,1919 ***	0,0891 (.)	0,1405 **
6	-0,0184	0,0649	0,0790 (.)	0,1008 *	0,1442 **	0,0289	0,1953 ***	0,1067 *	0,1500 **
7	-0,0776 (.)	0,0029	0,0289	0,0453	0,0963 *	-0,0462	0,1521 **	0,0344	0,0868 (.)
8	-0,0203	0,0606	0,0868 *	0,1084 *	0,1595 ***	0,0114	0,2121 ***	0,0910 *	0,1455 **
I	-0,0181	0,0635	0,0885 *	0,1075 *	0,1580 ***	0,0178	0,2112 ***	0,1000 *	0,1507 ***
					HML				
LE	-0,0659 *	-0,0938 **	-0,1293 ***	-0,1797 ***	-0,1558 ***	-0,1056 ***	-0,2334 ***	-0,1367 ***	-0,2129 ***
2	-0,0829 **	-0,1080 ***	-0,1473 ***	-0,1907 ***	-0,1693 ***	-0,1220 ***	-0,2486 ***	-0,1497 ***	-0,2274 ***
3	-0,0979 **	-0,1221 ***	-0,1641 ***	-0,2142 ***	-0,1805 ***	-0,1376 ***	-0,2685 ***	-0,1650 ***	-0,2540 ***
4	-0,0648 *	-0,0908 **	-0,1335 ***	-0,1731 ***	-0,1559 ***	-0,1050 ***	-0,2312 ***	-0,1338 ***	-0,2102 ***
5	-0,1153 ***	-0,1371 ***	-0,1759 ***	-0,2238 ***	-0,1944 ***	-0,1513 ***	-0,2808 ***	-0,1778 ***	-0,2634 ***
6	-0,0970 **	-0,1156 ***	-0,1605 ***	-0,2038 ***	-0,1793 ***	-0,1370 ***	-0,2677 ***	-0,1609 ***	-0,2474 ***
7	-0,1090 ***	-0,1288 ***	-0,1715 ***	-0,2133 ***	-0,1882 ***	-0,1475 ***	-0,2699 ***	-0,1681 ***	-0,2511 ***
8	-0,1196 ***	-0,1385 ***	-0,1807 ***	-0,2164 ***	-0,1981 ***	-0,1549 ***	-0,2801 ***	-0,1768 ***	-0,2562 ***
I	-0,1039 ***	-0,1202 ***	-0,1673 ***	-0,1984 ***	-0,1844 ***	-0,1383 ***	-0,2648 ***	-0,1614 ***	-0,2389 ***
					$PR1YR$				
LE	0,0238	0,0111	0,0606 (.)	-0,0375	0,0454	-0,0121	-0,0038	-0,0178	-0,0607 (.)
2	-0,0034	-0,0169	0,0281	-0,0684 *	0,0133	-0,0409	-0,0389	-0,0471	-0,0930 **
3	0,0365	0,0192	0,0713 *	-0,0316	0,0547	-0,0024	0,0048	-0,0073	-0,0548
4	-0,0135	-0,0246	0,0230	-0,0748 *	0,0078	-0,0522 (.)	-0,0469	-0,0551 (.)	-0,1004 **
5	-0,0107	-0,0276	0,0224	-0,0803 *	0,0022	-0,0500	-0,0460	-0,0555	-0,1049 **
6	-0,0136	-0,0294	0,0229	-0,0823 *	0,0039	-0,0549 (.)	-0,0481	-0,0610 (.)	-0,1145 **
7	0,0259	0,0118	0,0600 (.)	-0,0359	0,0501	-0,0033	-0,0002	-0,0076	-0,0586 (.)
8	-0,0109	-0,0244	0,0222	-0,0768 *	0,0069	-0,0473	-0,0411	-0,0530	-0,1037 **
I	-0,0123	-0,0252	0,0238	-0,0752 *	0,0108	-0,0466	-0,0444	-0,0498	-0,1041 **
					LIQ				
LE	0,1169 ***	0,0110	-0,0186	-0,0874 *	-0,1170 **	0,1052 **	-0,2129 ***	0,0049	-0,1106 **
2	0,0475	-0,0584 (.)	-0,0965 **	-0,1622 ***	-0,1972 ***	0,0286	-0,2938 ***	-0,0690 (.)	-0,1883 ***
3	0,0795 *	-0,0217	-0,0437	-0,1181 **	-0,1359 **	0,0675 (.)	-0,2319 ***	-0,0295	-0,1336 **
4	0,0285	-0,0792 *	-0,1105 **	-0,1790 ***	-0,2127 ***	0,0090	-0,3034 ***	-0,0942 *	-0,2059 ***
5	0,0124	-0,0907 *	-0,1161 **	-0,1902 ***	-0,2130 ***	0,0000	-0,3091 ***	-0,0983 *	-0,2092 ***
6	-0,0070	-0,1145 **	-0,1307 ***	-0,2087 ***	-0,2264 ***	-0,0237	-0,3233 ***	-0,1259 **	-0,2246 ***
7	0,1293 ***	0,0321	0,0099	-0,0671 (.)	-0,0828 *	0,1178 **	-0,1855 ***	0,0232	-0,0823 *
8	0,0511	-0,0519	-0,0794 *	-0,1510 ***	-0,1768 ***	0,0337	-0,2727 ***	-0,0648 (.)	-0,1713 ***
I	0,0339	-0,0685 (.)	-0,0935 *	-0,1663 ***	-0,1869 ***	0,0140	-0,2897 ***	-0,0851 *	-0,1879 ***
					$LNOILCH$				
LE	-0,0282 *	-0,0353 *	-0,0227	-0,0334 *	-0,0258 (.)	-0,0281 *	-0,0245 (.)	-0,0346 *	-0,0291 *
2	-0,0042	-0,0128	-0,0038	-0,0105	-0,0082	-0,0077	-0,0065	-0,0150	-0,0104
3	-0,0345 *	-0,0408 **	-0,0324 *	-0,0393 *	-0,0328 *	-0,0360 *	-0,0302 (.)	-0,0397 **	-0,0363 *
4	-0,0127	-0,0203	-0,0132	-0,0187	-0,0173	-0,0174	-0,0170	-0,0239 (.)	-0,0198
5	-0,0088	-0,0155	-0,0070	-0,0147	-0,0113	-0,0129	-0,0090	-0,0184	-0,0155
6	-0,0193	-0,0258 (.)	-0,0191	-0,0250	-0,0246	-0,0223	-0,0221	-0,0288 (.)	-0,0262 (.)
7	-0,0398 **	-0,0462 **	-0,0336 *	-0,0478 **	-0,0359 *	-0,0433 **	-0,0354 *	-0,0476 **	-0,0453 **
8	-0,0172	-0,0249 (.)	-0,0105	-0,0249 (.)	-0,0184	-0,0215	-0,0168	-0,0292 *	-0,0265 (.)
I	-0,0277 *	-0,0338 *	-0,0228	-0,0356 *	-0,0295 *	-0,0322 *	-0,0293 (.)	-0,0393 **	-0,0372 *

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.20: FF5 Regression Results (Scope 2, Period 1)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0004	-0,0005	-0,0002	-0,0005	-0,0003	0,0001	-0,0003	-0,0001	0,0000
2	-0,0004	-0,0005	-0,0002	-0,0005	-0,0003	0,0002	-0,0003	0,0000	0,0001
3	-0,0006	-0,0007	-0,0004	-0,0007	-0,0005	-0,0001	-0,0005	-0,0002	-0,0002
4	-0,0005	-0,0006	-0,0003	-0,0006	-0,0005	0,0000	-0,0005	-0,0002	-0,0001
5	-0,0005	-0,0006	-0,0003	-0,0006	-0,0004	0,0001	-0,0004	-0,0001	0,0000
6	-0,0007	-0,0007 (.)	-0,0005	-0,0007	-0,0006	-0,0001	-0,0006	-0,0003	-0,0001
7	-0,0003	-0,0004	-0,0002	-0,0004	-0,0003	0,0000	-0,0003	0,0000	0,0001
8	-0,0003	-0,0004	-0,0001	-0,0004	-0,0002	0,0002	-0,0002	0,0000	0,0002
I	-0,0005	-0,0006	-0,0003	-0,0005	-0,0004	0,0000	-0,0004	-0,0002	0,0000
					$Market$				
LE	-0,1001 *	0,0920 *	0,1055 *	0,1875 ***	0,2856 ***	0,0199	0,3735 ***	0,2080 ***	0,2940 ***
2	-0,1576 ***	0,0361	0,0395	0,1297 **	0,2268 ***	-0,0389	0,3111 ***	0,1498 **	0,2394 ***
3	-0,2970 ***	-0,1266 *	-0,1124 *	-0,0384	0,0468	-0,1791 ***	0,1355 *	-0,0128	0,0746
4	-0,2372 ***	-0,0478	-0,0420	0,0483	0,1464 **	-0,1199 **	0,2366 ***	0,0687	0,1645 ***
5	-0,3596 ***	-0,1879 ***	-0,1732 ***	-0,0996 (.)	-0,0052	-0,2367 ***	0,0791	-0,0716	0,0197
6	-0,4331 ***	-0,2671 ***	-0,2520 ***	-0,1763 ***	-0,0820	-0,3163 ***	0,0056	-0,1471 **	-0,0548
7	-0,3907 ***	-0,1993 ***	-0,1853 ***	-0,1118 *	-0,0086	-0,2688 ***	0,0762	-0,0817	0,0059
8	-0,4409 ***	-0,2545 ***	-0,2401 ***	-0,1648 **	-0,0638	-0,3148 ***	0,0265	-0,1333 *	-0,0462
I	-0,5383 ***	-0,3490 ***	-0,3402 ***	-0,2621 ***	-0,1597 **	-0,4207 ***	-0,0686	-0,2365 ***	-0,1473 **
					SMB				
LE	-0,0673	0,0181	0,0415	0,0572	0,1105 *	-0,0266	0,1681 ***	0,0554	0,1056 *
2	-0,0333	0,0514	0,0628	0,0885 (.)	0,1319 **	0,0004	0,1857 ***	0,0810 (.)	0,1273 **
3	0,0108	0,1005 *	0,1062 *	0,1391 **	0,1860 ***	0,0401	0,2404 ***	0,1274 *	0,1745 ***
4	0,0018	0,0868 (.)	0,1044 *	0,1234 **	0,1704 ***	0,0388	0,2238 ***	0,1193 **	0,1664 ***
5	0,0400	0,1246 **	0,1225 **	0,1624 ***	0,1974 ***	0,0578	0,2507 ***	0,1442 **	0,1893 ***
6	0,0657	0,1538 **	0,1532 **	0,1895 ***	0,2347 ***	0,0861 (.)	0,2840 ***	0,1758 ***	0,2201 ***
7	-0,0400	0,0459	0,0804 (.)	0,0929 (.)	0,1536 **	0,0063	0,2102 ***	0,0874 (.)	0,1462 **
8	-0,0211	0,0674	0,0928 (.)	0,1122 *	0,1678 **	0,0143	0,2233 ***	0,1001 *	0,1591 **
I	0,0226	0,1082 *	0,1309 **	0,1537 **	0,2111 ***	0,0562	0,2634 ***	0,1414 **	0,1996 ***
					HML				
LE	-0,1305 ***	-0,1501 ***	-0,1921 ***	-0,2317 ***	-0,2097 ***	-0,1720 ***	-0,2904 ***	-0,1940 ***	-0,2747 ***
2	-0,1323 ***	-0,1533 ***	-0,1944 ***	-0,2385 ***	-0,2138 ***	-0,1702 ***	-0,2986 ***	-0,1954 ***	-0,2796 ***
3	-0,1202 ***	-0,1373 ***	-0,1850 ***	-0,2237 ***	-0,1983 ***	-0,1570 ***	-0,2798 ***	-0,1730 ***	-0,2610 ***
4	-0,0951 **	-0,1159 ***	-0,1660 ***	-0,2002 ***	-0,1825 ***	-0,1397 ***	-0,2631 ***	-0,1622 ***	-0,2485 ***
5	-0,1178 ***	-0,1364 ***	-0,1834 ***	-0,2236 ***	-0,1994 ***	-0,1535 ***	-0,2820 ***	-0,1723 ***	-0,2597 ***
6	-0,0857 *	-0,1040 **	-0,1540 ***	-0,1937 ***	-0,1721 ***	-0,1261 ***	-0,2571 ***	-0,1469 ***	-0,2335 ***
7	-0,1395 ***	-0,1548 ***	-0,2024 ***	-0,2373 ***	-0,2200 ***	-0,1721 ***	-0,3011 ***	-0,1957 ***	-0,2761 ***
8	-0,1370 ***	-0,1561 ***	-0,2036 ***	-0,2387 ***	-0,2209 ***	-0,1675 ***	-0,3049 ***	-0,1971 ***	-0,2769 ***
I	-0,1123 **	-0,1252 ***	-0,1718 ***	-0,2109 ***	-0,1897 ***	-0,1399 ***	-0,2700 ***	-0,1653 ***	-0,2457 ***
					$PR1YR$				
LE	-0,1305	-0,1501	-0,1921	-0,2317 (.)	-0,2097	-0,1720	-0,2904	-0,1940	-0,2747 **
2	-0,1323	-0,1533	-0,1944	-0,2385 (.)	-0,2138	-0,1702	-0,2986	-0,1954	-0,2796 **
3	-0,1202	-0,1373	-0,1850	-0,2237	-0,1983	-0,1570	-0,2798	-0,1730	-0,2610 *
4	-0,0951 (.)	-0,1159	-0,1660 **	-0,2002	-0,1825 *	-0,1397	-0,2631	-0,1622	-0,2485
5	-0,1178	-0,1364	-0,1834	-0,2236	-0,1994	-0,1535	-0,2820	-0,1723	-0,2597 (.)
6	-0,0857 *	-0,1040 (.)	-0,1540 **	-0,1937	-0,1721 *	-0,1261	-0,2571	-0,1469	-0,2335
7	-0,1395	-0,1548	-0,2024	-0,2373 (.)	-0,2200	-0,1721	-0,3011	-0,1957	-0,2761 **
8	-0,1370	-0,1561	-0,2036	-0,2387	-0,2209	-0,1675	-0,3049	-0,1971	-0,2769 *
I	-0,1123 (.)	-0,1252	-0,1718 **	-0,2109	-0,1897 *	-0,1399	-0,2700	-0,1653	-0,2457
					LIQ				
LE	0,0032	-0,0137 *	0,0418 **	-0,0647 ***	0,0216 ***	-0,0352	-0,0272 ***	-0,0448 *	-0,0977 ***
2	0,0125 *	-0,0025	0,0528	-0,0553 **	0,0337 ***	-0,0254	-0,0197 ***	-0,0331	-0,0869 ***
3	0,0169	0,0014 *	0,0449 *	-0,0551 ***	0,0331 ***	-0,0175	-0,0181 ***	-0,0249 *	-0,0794 ***
4	0,0612 *	0,0462	0,0965	-0,0030 **	0,0765 **	0,0198 (.)	0,0248 ***	0,0095	-0,0408 **
5	0,0244 (.)	0,0105	0,0536	-0,0473 **	0,0410 ***	-0,0077 (.)	-0,0100 ***	-0,0147	-0,0693 **
6	0,0764 **	0,0607	0,0979	0,0034 *	0,0798 **	0,0411 *	0,0297 ***	0,0289	-0,0270 *
7	0,0017	-0,0137	0,0399 *	-0,0673 ***	0,0216 ***	-0,0458	-0,0245 ***	-0,0561 (.)	-0,1051 ***
8	0,0098 *	-0,0025	0,0495	-0,0581 *	0,0349 **	-0,0367 *	-0,0143 ***	-0,0456	-0,0920 **
I	0,0587 **	0,0430	0,0997	-0,0088 *	0,0800 **	0,0158 *	0,0332 ***	0,0025	-0,0447 *
					$LNOILCH$				
LE	0,0315	-0,0774	-0,1022	-0,1744	-0,1958	0,0142	-0,3004	-0,0869	-0,1919
2	0,0786 *	-0,0295 *	-0,0537 (.)	-0,1240 *	-0,1495 *	0,0579 *	-0,2463 (.)	-0,0427 **	-0,1420 *
3	0,0280	-0,0887 (.)	-0,0977	-0,1834 (.)	-0,2066	0,0194 (.)	-0,3075	-0,0934 (.)	-0,1930
4	0,0895 **	-0,0147 ***	-0,0458 **	-0,1090 ***	-0,1364 **	0,0691 ***	-0,2348 **	-0,0296 ***	-0,1313 ***
5	0,0767 **	-0,0365 **	-0,0453 **	-0,1288 **	-0,1513 **	0,0688 **	-0,2482 **	-0,0429 ***	-0,1403 **
6	0,1059 ***	-0,0087 ***	-0,0208 ***	-0,0998 ***	-0,1310 ***	0,0968 ***	-0,2263 ***	-0,0140 ***	-0,1144 ***
7	0,0435	-0,0639	-0,0994	-0,1674	-0,1957	0,0237	-0,2989	-0,0772	-0,1891
8	0,1022 (.)	-0,0073 *	-0,0346	-0,1083 *	-0,1365 (.)	0,0863 *	-0,2323 (.)	-0,0178 *	-0,1274 *
I	0,1159 **	0,0103 **	-0,0194 *	-0,0908 **	-0,1198 **	0,1011 **	-0,2167 **	-0,0029 ***	-0,1120 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.21: FF5 Regression Results (Scope 1, Period 2)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0004	-0,0005	-0,0003	-0,0005	-0,0004	0,0000	-0,0004	-0,0002	-0,0001
2	-0,0005	-0,0006	-0,0003	-0,0006	-0,0005	0,0000	-0,0005	-0,0002	-0,0001
3	0,0000 (.)	-0,0001 (.)	0,0002	-0,0001 (.)	0,0000 (.)	0,0004	0,0000	0,0003	0,0003
4	-0,0005	-0,0006	-0,0003	-0,0006	-0,0005	0,0000	-0,0005	-0,0002	-0,0001
5	0,0000 *	-0,0001 (.)	0,0001	-0,0001 (.)	0,0000	0,0003	-0,0001	0,0002	0,0002
6	-0,0001	-0,0002	0,0001	-0,0002	-0,0001	0,0003	-0,0001	0,0001	0,0002
7	-0,0004	-0,0004	-0,0002	-0,0005	-0,0004	0,0001	-0,0003	-0,0001	0,0001
8	-0,0004	-0,0005	-0,0002	-0,0005	-0,0004	0,0000	-0,0004	-0,0001	0,0000
I	-0,0004	-0,0006	-0,0002	-0,0006	-0,0004	0,0000	-0,0004	-0,0001	0,0000
					$Market$				
LE	-0,0262 ***	0,1583 ***	0,1661 **	0,2506 ***	0,3282 ***	0,0994 *	0,4176 ***	0,2735 ***	0,3592 ***
2	0,0240 ***	0,2106 ***	0,2163 ***	0,2981 ***	0,3782 ***	0,1478 ***	0,4664 ***	0,3255 ***	0,4086 ***
3	-0,2026 ***	-0,0143 ***	0,0036	0,0784 ***	0,1798 ***	-0,0543	0,2666 ***	0,1212 ***	0,2099 **
4	0,0830 ***	0,2648 ***	0,2710 **	0,3545 ***	0,4365 ***	0,2001 **	0,5224 ***	0,3746 ***	0,4591 ***
5	-0,1455 ***	0,0427 ***	0,0621 (.)	0,1341 ***	0,2357 ***	0,0027	0,3233 ***	0,1822 ***	0,2641 ***
6	-0,0821 ***	0,1039 ***	0,1231	0,1946 ***	0,3020 ***	0,0596	0,3856 **	0,2398 ***	0,3280 **
7	-0,2046 ***	-0,0112 ***	-0,0025	0,0824 ***	0,1704 ***	-0,0789	0,2627 **	0,1049 ***	0,2016 **
8	-0,1548 ***	0,0372 ***	0,0492	0,1359 ***	0,2249 ***	-0,0270	0,3232 ***	0,1602 ***	0,2583 ***
I	-0,0961 ***	0,0985 ***	0,1005	0,1928 ***	0,2836 ***	0,0232	0,3741 **	0,2096 ***	0,3049 **
					SMB				
LE	-0,0553	0,0591	-0,0946 *	0,0114	0,0145	-0,0525	-0,0253	0,0548	0,0120
2	0,0825 *	0,1991 ***	0,0501	0,1550 ***	0,1620 ***	0,0840 *	0,1273 **	0,1910 ***	0,1571 ***
3	-0,1403 ***	-0,0251	-0,1828 ***	-0,0717 (.)	-0,0720 (.)	-0,1515 ***	-0,1153 **	-0,0452	-0,0825 *
4	-0,0210	0,0919 *	-0,0560	0,0430	0,0490	-0,0193	0,0111	0,0815 (.)	0,0421
5	0,0081	0,1183 **	-0,0348	0,0777 *	0,0705 (.)	-0,0066	0,0331	0,0909 *	0,0645
6	-0,1076 **	0,0033	-0,1487 ***	-0,0411	-0,0410	-0,1196 **	-0,0806 (.)	-0,0221	-0,0541
7	-0,1405 ***	-0,0251	-0,1729 ***	-0,0660	-0,0615	-0,1402 ***	-0,0999 *	-0,0338	-0,0694 (.)
8	0,0170	0,1317 **	-0,0193	0,0925 *	0,0895 *	0,0113	0,0557	0,1172 **	0,0853 *
I	-0,1080 **	0,0087	-0,1427 ***	-0,0326	-0,0309	-0,1102 **	-0,0665	-0,0083	-0,0416
					HML				
LE	0,0562 (.)	-0,0089	0,0587 (.)	-0,0034	-0,0167	0,0025	-0,0077	-0,0670 *	-0,0647 *
2	0,0683 *	-0,0026	0,0762 *	0,0038	0,0000	0,0127	0,0087	-0,0561 (.)	-0,0542 (.)
3	0,1519 ***	0,0854 **	0,1451 ***	0,0865 **	0,0735 *	0,0960 **	0,0774 *	0,0286	0,0262
4	0,0251	-0,0396	0,0328	-0,0357	-0,0411	-0,0309	-0,0338	-0,0946 **	-0,0927 **
5	0,1777 ***	0,1081 ***	0,1712 ***	0,1101 ***	0,0974 **	0,1191 ***	0,1016 **	0,0494	0,0480
6	0,1234 ***	0,0562 (.)	0,1232 ***	0,0592 (.)	0,0511	0,0661 *	0,0571 (.)	0,0007	-0,0004
7	0,1021 **	0,0356	0,0936 **	0,0329	0,0208	0,0428	0,0258	-0,0232	-0,0289
8	0,1318 ***	0,0645 *	0,1231 ***	0,0634 *	0,0491	0,0677 *	0,0532	0,0021	-0,0030
I	0,0716 *	0,0079	0,0691 *	0,0063	-0,0036	0,0097	0,0013	-0,0512	-0,0567 (.)
					$PR1YR$				
LE	-0,0121	0,0244	-0,0460	0,0672 *	-0,0077	-0,0707 *	0,0373	-0,0305	0,0165
2	-0,0291	0,0090	-0,0618 (.)	0,0546 (.)	-0,0241	-0,0883 **	0,0195	-0,0503	-0,0058
3	-0,0501 (.)	-0,0095	-0,0918 **	0,0287	-0,0548	-0,1122 ***	-0,0136	-0,0731 *	-0,0344
4	0,0101	0,0496	-0,0167	0,0928 **	0,0217	-0,0427	0,0651 (.)	-0,0036	0,0419
5	-0,0669 *	-0,0289	-0,1080 ***	0,0084	-0,0710 *	-0,1290 ***	-0,0338	-0,0941 **	-0,0569 (.)
6	-0,0247	0,0127	-0,0647 (.)	0,0488	-0,0282	-0,0847 **	0,0091	-0,0495	-0,0099
7	-0,0769 *	-0,0393	-0,1232 ***	-0,0014	-0,0870 **	-0,1399 ***	-0,0445	-0,1027 **	-0,0621 *
8	-0,0983 **	-0,0578 (.)	-0,1421 ***	-0,0205	-0,1051 **	-0,1594 ***	-0,0665 *	-0,1248 ***	-0,0867 **
I	-0,0561 (.)	-0,0194	-0,0974 **	0,0212	-0,0620 (.)	-0,1136 ***	-0,0214	-0,0788 *	-0,0364
					LIQ				
LE	-0,0177	-0,0236	0,0097	-0,0214	0,0196	-0,0034	0,0148	-0,0016	-0,0012
2	-0,0885 *	-0,0931 *	-0,0608	-0,0895 *	-0,0512	-0,0744 (.)	-0,0530	-0,0726 (.)	-0,0759 (.)
3	-0,0548	-0,0551	-0,0206	-0,0529	-0,0072	-0,0305	-0,0129	-0,0230	-0,0266
4	-0,0326	-0,0349	-0,0035	-0,0287	0,0112	-0,0167	0,0050	-0,0072	-0,0098
5	-0,1264 ***	-0,1222 **	-0,0887 *	-0,1225 **	-0,0748 (.)	-0,0992 *	-0,0799 (.)	-0,0867 *	-0,0988 *
6	-0,0658 (.)	-0,0635	-0,0322	-0,0603	-0,0190	-0,0396	-0,0218	-0,0279	-0,0354
7	-0,0616	-0,0643	-0,0281	-0,0626	-0,0173	-0,0415	-0,0237	-0,0369	-0,0362
8	-0,1375 ***	-0,1407 ***	-0,1032 **	-0,1364 ***	-0,0927 *	-0,1189 **	-0,0965 *	-0,1133 **	-0,1170 **
I	-0,0778 (.)	-0,0804 (.)	-0,0439	-0,0760 (.)	-0,0340	-0,0542	-0,0361	-0,0471	-0,0463
					$LNOILCH$				
LE	-0,0211	-0,0063	-0,0097	-0,0100	0,0056	-0,0220	0,0001	-0,0083	-0,0112
2	-0,0255 (.)	-0,0082	-0,0176	-0,0150	-0,0032	-0,0285 (.)	-0,0080	-0,0141	-0,0190
3	-0,0218	-0,0095	-0,0099	-0,0134	0,0030	-0,0240	-0,0027	-0,0119	-0,0162
4	-0,0348 *	-0,0198	-0,0266	-0,0236	-0,0105	-0,0392 *	-0,0148	-0,0224	-0,0269
5	-0,0267 (.)	-0,0165	-0,0156	-0,0211	-0,0057	-0,0303 (.)	-0,0101	-0,0215	-0,0249
6	-0,0356 *	-0,0249	-0,0245	-0,0299 (.)	-0,0136	-0,0402 *	-0,0182	-0,0285 (.)	-0,0330 *
7	-0,0026	0,0114	0,0085	0,0072	0,0235	-0,0054	0,0184	0,0100	0,0059
8	-0,0099	0,0047	-0,0006	-0,0005	0,0133	-0,0149	0,0099	-0,0003	-0,0044
I	-0,0194	-0,0043	-0,0097	-0,0090	0,0063	-0,0240	0,0027	-0,0070	-0,0117

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.22: FF5 Regression Results (Scope 2, Period 2)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0003	-0,0002	-0,0002	-0,0003	-0,0001	-0,0002	-0,0003	-0,0001	-0,0003
2	-0,0006 *	-0,0006 (.)	-0,0005	-0,0007 *	-0,0005	-0,0005 (.)	-0,0006 (.)	-0,0005	-0,0006 *
3	0,0000	0,0000	0,0000	-0,0001	0,0000	0,0000	0,0000	0,0001	-0,0001
4	-0,0006 (.)	-0,0005	-0,0005	-0,0006 *	-0,0005	-0,0005	-0,0006 (.)	-0,0004	-0,0006 (.)
5	-0,0003	-0,0003	-0,0003	-0,0004	-0,0003	-0,0003	-0,0003	-0,0003	-0,0004
6	-0,0003	-0,0003	-0,0002	-0,0004	-0,0003	-0,0002	-0,0004	-0,0002	-0,0004
7	-0,0003	-0,0002	-0,0002	-0,0003	-0,0002	-0,0003	-0,0004	-0,0002	-0,0004
8	-0,0006	-0,0006 (.)	-0,0005	-0,0007 (.)	-0,0006	-0,0006	-0,0007 (.)	-0,0006	-0,0007 (.)
I	-0,0006	-0,0006	-0,0005	-0,0007 (.)	-0,0006	-0,0005	-0,0007 (.)	-0,0005	-0,0007 (.)
					$Market$				
LE	-0,2577 ***	-0,4141 ***	-0,0789 (.)	-0,3839 ***	-0,2354 ***	-0,0558	-0,2100 ***	-0,2123 ***	-0,1878 ***
2	-0,2953 ***	-0,4465 ***	-0,1169 **	-0,4178 ***	-0,2681 ***	-0,0931 *	-0,2461 ***	-0,2484 ***	-0,2256 ***
3	-0,3094 ***	-0,4615 ***	-0,1228 **	-0,4295 ***	-0,2759 ***	-0,1053 *	-0,2505 ***	-0,2608 ***	-0,2346 ***
4	-0,2762 ***	-0,4230 ***	-0,0990 *	-0,3966 ***	-0,2429 ***	-0,0722 (.)	-0,2260 ***	-0,2213 ***	-0,2031 ***
5	-0,3580 ***	-0,4958 ***	-0,1751 ***	-0,4726 ***	-0,3153 ***	-0,1544 ***	-0,2972 ***	-0,3066 ***	-0,2805 ***
6	-0,3328 ***	-0,4770 ***	-0,1458 ***	-0,4492 ***	-0,2893 ***	-0,1280 **	-0,2722 ***	-0,2832 ***	-0,2535 ***
7	-0,4908 ***	-0,6440 ***	-0,2994 ***	-0,6128 ***	-0,4550 ***	-0,2806 ***	-0,4309 ***	-0,4388 ***	-0,4115 ***
8	-0,5292 ***	-0,6794 ***	-0,3471 ***	-0,6513 ***	-0,4940 ***	-0,3218 ***	-0,4733 ***	-0,4822 ***	-0,4569 ***
I	-0,5230 ***	-0,6732 ***	-0,3326 ***	-0,6410 ***	-0,4833 ***	-0,3126 ***	-0,4591 ***	-0,4678 ***	-0,4415 ***
					SMB				
LE	-0,0425	0,0664 (.)	-0,0803 (.)	0,0480	0,0253	-0,0505	0,0118	0,0498	0,0360
2	0,0037	0,1102 **	-0,0303	0,0945 *	0,0782 (.)	-0,0104	0,0610	0,0876 *	0,0823 *
3	-0,0782 (.)	0,0318	-0,1113 **	0,0118	-0,0071	-0,0862 *	-0,0286	0,0161	0,0030
4	0,0436	0,1432 ***	0,0152	0,1338 ***	0,1209 **	0,0394	0,1049 *	0,1240 **	0,1262 **
5	-0,0446	0,0626	-0,0677	0,0478	0,0355	-0,0540	0,0184	0,0419	0,0355
6	0,0068	0,1113 **	-0,0214	0,1015 *	0,0836 (.)	-0,0005	0,0679	0,0937 *	0,0899 *
7	-0,0908 *	0,0248	-0,1204 *	0,0097	-0,0115	-0,0904 *	-0,0297	0,0170	0,0040
8	-0,0505	0,0649	-0,0766	0,0524	0,0358	-0,0536	0,0193	0,0543	0,0466
I	-0,0039	0,1113 *	-0,0298	0,1003 *	0,0803	-0,0022	0,0679	0,1049 *	0,0989 *
					HML				
LE	0,1542 ***	0,0924 **	0,1531 ***	0,0972 **	0,0862 *	0,1043 ***	0,0951 **	0,0410	0,0471
2	0,1287 ***	0,0648 *	0,1195 ***	0,0698 *	0,0517	0,0681 *	0,0579 (.)	0,0130	0,0132
3	0,1097 ***	0,0512	0,0993 **	0,0507	0,0321	0,0488	0,0370	-0,0075	-0,0095
4	0,1685 ***	0,1060 ***	0,1687 ***	0,1079 ***	0,0997 **	0,1173 ***	0,1052 **	0,0539 (.)	0,0551 (.)
5	0,0793 *	0,0145	0,0651 (.)	0,0161	-0,0047	0,0144	-0,0021	-0,0413	-0,0474
6	0,1223 ***	0,0621 (.)	0,1105 ***	0,0580 (.)	0,0441	0,0606 (.)	0,0445	0,0055	-0,0043
7	0,1091 **	0,0528	0,1010 **	0,0519	0,0343	0,0483	0,0406	-0,0090	-0,0091
8	0,0720 *	0,0125	0,0576	0,0132	-0,0082	0,0043	-0,0044	-0,0461	-0,0533
I	0,1189 **	0,0628 (.)	0,1086 **	0,0565	0,0452	0,0557	0,0441	0,0047	-0,0076
					$PR1YR$				
LE	0,1542 *	0,0924	0,1531 ***	0,0972	0,0862 (.)	0,1043 ***	0,0951 (.)	0,0410 *	0,0471 *
2	0,1287 **	0,0648	0,1195 ***	0,0698	0,0517 *	0,0681 ***	0,0579 *	0,0130 **	0,0132 **
3	0,1097 **	0,0512	0,0993 ***	0,0507	0,0321 **	0,0488 ***	0,0370 **	-0,0075 ***	-0,0095 ***
4	0,1685 **	0,1060	0,1687 ***	0,1079	0,0997 *	0,1173 ***	0,1052 *	0,0539 **	0,0551 **
5	0,0793 **	0,0145	0,0651 ***	0,0161 (.)	-0,0047 **	0,0144 ***	-0,0021 **	-0,0413 ***	-0,0474 ***
6	0,1223 **	0,0621	0,1105 ***	0,0580	0,0441 **	0,0606 ***	0,0445 **	0,0055 ***	-0,0043 ***
7	0,1091 *	0,0528	0,1010 ***	0,0519	0,0343 *	0,0483 ***	0,0406 *	-0,0090 **	-0,0091 **
8	0,0720 *	0,0125	0,0576 ***	0,0132	-0,0082 *	0,0043 ***	-0,0044 *	-0,0461 **	-0,0533 **
I	0,1189 *	0,0628	0,1086 ***	0,0565	0,0452 *	0,0557 ***	0,0441 *	0,0047 **	-0,0076 **
					LIQ				
LE	-0,0696 **	-0,0137 **	-0,1107 (.)	-0,0180 **	-0,0561	-0,1258 *	-0,0604	-0,0767 (.)	-0,0750 (.)
2	-0,0815	-0,0318	-0,1259	-0,0344	-0,0733	-0,1416	-0,0794	-0,0896	-0,0921
3	-0,0947 *	-0,0418 (.)	-0,1413	-0,0470 (.)	-0,0932	-0,1565	-0,0949	-0,1098	-0,1098
4	-0,0851 **	-0,0377 *	-0,1254 (.)	-0,0364 *	-0,0730	-0,1440 *	-0,0767	-0,0969	-0,0951 (.)
5	-0,0970	-0,0498	-0,1449	-0,0545	-0,0998	-0,1619	-0,1038	-0,1129	-0,1164
6	-0,0995 (.)	-0,0491	-0,1462	-0,0521	-0,0981	-0,1651	-0,1011	-0,1162	-0,1167
7	-0,0827 *	-0,0308 (.)	-0,1311	-0,0338 (.)	-0,0764	-0,1500	-0,0810	-0,0969	-0,0981
8	-0,0858	-0,0380	-0,1372	-0,0406	-0,0846	-0,1546	-0,0907	-0,0986	-0,1043
I	-0,0861 (.)	-0,0349	-0,1353	-0,0388	-0,0815	-0,1567	-0,0863	-0,1022	-0,1057
					$LNOILCH$				
LE	-0,1088 **	-0,0993 *	-0,0768 *	-0,1024 *	-0,0517	-0,0873 **	-0,0656	-0,0703 *	-0,0757 *
2	-0,0431 ***	-0,0322 ***	-0,0118 ***	-0,0347 ***	0,0139 ***	-0,0207 ***	0,0010 ***	0,0000 ***	-0,0103 ***
3	-0,0796 (.)	-0,0717	-0,0387	-0,0695	-0,0163	-0,0551 (.)	-0,0223	-0,0420	-0,0442
4	-0,1012 ***	-0,0857 ***	-0,0710 ***	-0,0927 ***	-0,0410 **	-0,0790 ***	-0,0575 **	-0,0538 ***	-0,0668 ***
5	-0,0087 ***	0,0060 ***	0,0270 **	0,0008 ***	0,0527 **	0,0155 ***	0,0410 **	0,0341 ***	0,0277 ***
6	-0,0664 ***	-0,0490 **	-0,0264 **	-0,0553 **	0,0008 *	-0,0399 ***	-0,0100 *	-0,0197 **	-0,0261 **
7	-0,0911 *	-0,0852	-0,0534	-0,0852	-0,0288	-0,0697 *	-0,0397	-0,0561	-0,0594
8	-0,0169 ***	-0,0137 ***	0,0176 ***	-0,0154 ***	0,0404 **	0,0055 ***	0,0286 **	0,0161 ***	0,0112 ***
I	-0,0754 ***	-0,0695 **	-0,0380 **	-0,0693 **	-0,0143 *	-0,0544 ***	-0,0270 *	-0,0410 **	-0,0469 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.23: FF5 Regression Results (Scope 1, Period 3)

	E	2	3	4	5	6	7	8	LE
					α				
LE	-0,0004	-0,0005	-0,0003	-0,0005	-0,0004	0,0000	-0,0004	-0,0002	-0,0001
2	-0,0005	-0,0006	-0,0003	-0,0006	-0,0005	0,0000 (.)	-0,0005	-0,0002	-0,0001
3	0,0000	-0,0001	0,0002	-0,0001	0,0000	0,0004	0,0000	0,0003	0,0003
4	-0,0005	-0,0006	-0,0003	-0,0006	-0,0005	0,0000 (.)	-0,0005	-0,0002	-0,0001
5	0,0000	-0,0001	0,0001	-0,0001	0,0000	0,0003	-0,0001	0,0002	0,0002
6	-0,0001	-0,0002	0,0001	-0,0002	-0,0001	0,0003	-0,0001	0,0001	0,0002
7	-0,0004	-0,0004	-0,0002	-0,0005	-0,0004	0,0001	-0,0003	-0,0001	0,0001
8	-0,0004	-0,0005	-0,0002	-0,0005	-0,0004	0,0000	-0,0004	-0,0001	0,0000
I	-0,0004	-0,0006	-0,0002	-0,0006	-0,0004	0,0000	-0,0004	-0,0001	0,0000
					$Market$				
LE	-0,0262 ***	0,1583 ***	0,1661 ***	0,2506 ***	0,3282 ***	0,0994 **	0,4176 ***	0,2735 ***	0,3592 ***
2	0,0240 ***	0,2106 ***	0,2163 ***	0,2981 ***	0,3782 ***	0,1478 ***	0,4664 ***	0,3255 ***	0,4086 ***
3	-0,2026 *	-0,0143 ***	0,0036 *	0,0784 ***	0,1798 ***	-0,0543	0,2666 ***	0,1212 **	0,2099 **
4	0,0830 ***	0,2648 ***	0,2710 ***	0,3545 ***	0,4365 ***	0,2001 ***	0,5224 ***	0,3746 ***	0,4591 ***
5	-0,1455 ***	0,0427 ***	0,0621 ***	0,1341 ***	0,2357 ***	0,0027 ***	0,3233 ***	0,1822 ***	0,2641 ***
6	-0,0821 ***	0,1039 ***	0,1231 ***	0,1946 ***	0,3020 ***	0,0596 **	0,3856 ***	0,2398 ***	0,3280 ***
7	-0,2046	-0,0112 **	-0,0025	0,0824 **	0,1704 **	-0,0789	0,2627 **	0,1049 (.)	0,2016 *
8	-0,1548 ***	0,0372 ***	0,0492 ***	0,1359 ***	0,2249 ***	-0,0270 ***	0,3232 ***	0,1602 ***	0,2583 ***
I	-0,0961 **	0,0985 ***	0,1005 *	0,1928 ***	0,2836 ***	0,0232	0,3741 ***	0,2096 **	0,3049 ***
					SMB				
LE	0,0024	0,0642	0,0331	-0,0354	0,0933	-0,0513	-0,0083	0,0047	-0,1009
2	-0,0251	0,0369	0,0002	-0,0588	0,0655	-0,0811	-0,0340	-0,0238	-0,1243 (.)
3	-0,0047	0,0516	0,0170	-0,0532	0,0773	-0,0666	-0,0324	-0,0131	-0,1232 (.)
4	-0,1321 (.)	-0,0690	-0,1119	-0,1661 *	-0,0474	-0,1910 **	-0,1461 *	-0,1342 (.)	-0,2362 ***
5	-0,0375	0,0196	-0,0208	-0,0836	0,0380	-0,1022	-0,0665	-0,0499	-0,1568 *
6	-0,1468 *	-0,0893	-0,1297 *	-0,1946 **	-0,0708	-0,2106 **	-0,1784 **	-0,1582 *	-0,2668 ***
7	-0,0364	0,0218	-0,0138	-0,0784	0,0492	-0,1041	-0,0565	-0,0500	-0,1578 *
8	-0,0705	-0,0129	-0,0521	-0,1131	0,0096	-0,1342 *	-0,0958	-0,0815	-0,1875 **
I	-0,1812 **	-0,1236 (.)	-0,1651 *	-0,2211 **	-0,1018	-0,2508 ***	-0,2067 **	-0,1970 **	-0,3032 ***
					HML				
LE	0,0489	0,0139	0,0692	-0,0094	0,0266	0,0208	0,0062	-0,0238	-0,0473
2	-0,0754	-0,1091 (.)	-0,0545	-0,1310 *	-0,0952	-0,1079 (.)	-0,1130 (.)	-0,1487 **	-0,1735 **
3	0,0725	0,0396	0,1001 (.)	0,0101	0,0623	0,0483	0,0336	0,0090	-0,0218
4	-0,0503	-0,0850	-0,0308	-0,1072 (.)	-0,0706	-0,0836	-0,0909	-0,1255 *	-0,1486 **
5	-0,0713	-0,1038 (.)	-0,0391	-0,1304 *	-0,0748	-0,0957 (.)	-0,1015 (.)	-0,1345 *	-0,1636 **
6	-0,0406	-0,0735	-0,0111	-0,1022 (.)	-0,0472	-0,0643	-0,0751	-0,1030 (.)	-0,1342 *
7	-0,0082	-0,0404	0,0173	-0,0686	-0,0184	-0,0403	-0,0480	-0,0792	-0,1109 (.)
8	-0,1497 **	-0,1792 **	-0,1234 *	-0,2089 ***	-0,1577 **	-0,1794 **	-0,1855 **	-0,2179 ***	-0,2470 ***
I	-0,1185 *	-0,1511 **	-0,0969 (.)	-0,1791 **	-0,1313 *	-0,1529 **	-0,1592 **	-0,1912 ***	-0,2221 ***
					$PR1YR$				
LE	-0,0565	0,0014	-0,0243	-0,0124	0,0315	-0,0762	0,0205	-0,0270	-0,0287
2	0,0462	0,1043 *	0,0752	0,0887 (.)	0,1343 *	0,0243	0,1238 *	0,0777	0,0705
3	-0,1806 ***	-0,1247 *	-0,1591 **	-0,1336 *	-0,0957 (.)	-0,2048 ***	-0,0994 (.)	-0,1536 **	-0,1540 **
4	0,0063	0,0640	0,0353	0,0496	0,0956 (.)	-0,0135	0,0827	0,0417	0,0329
5	-0,0736	-0,0170	-0,0503	-0,0288	0,0129	-0,0993 *	0,0028	-0,0458	-0,0503
6	-0,1170 *	-0,0601	-0,0945 *	-0,0701	-0,0318	-0,1426 **	-0,0426	-0,0880 (.)	-0,0913 (.)
7	-0,0853	-0,0281	-0,0589	-0,0408	0,0010	-0,1120 *	-0,0068	-0,0609	-0,0599
8	0,0235	0,0797	0,0487	0,0658	0,1060 *	-0,0059	0,0987 (.)	0,0441	0,0455
I	-0,0115	0,0440	0,0133	0,0286	0,0717	-0,0401	0,0621	0,0117	0,0114
					LIQ				
LE	-0,0437	-0,0086	-0,1198 (.)	0,0384	-0,0787	-0,0335	-0,0306	0,0123	0,0660
2	-0,0265	0,0075	-0,1022	0,0524	-0,0668	-0,0108	-0,0211	0,0300	0,0810
3	-0,0165	0,0208	-0,0843	0,0725	-0,0468	0,0035	0,0086	0,0480	0,1071 (.)
4	-0,0482	-0,0151	-0,1120 (.)	0,0311	-0,0764	-0,0298	-0,0320	0,0127	0,0630
5	-0,0092	0,0270	-0,0759	0,0792	-0,0384	0,0127	0,0151	0,0589	0,1158 (.)
6	-0,0277	0,0078	-0,0909	0,0602	-0,0536	-0,0015	-0,0013	0,0443	0,0994 (.)
7	0,0804	0,1143 (.)	0,0250	0,1661 *	0,0610	0,1076 (.)	0,1162 (.)	0,1512 *	0,2112 ***
8	0,0920	0,1286 *	0,0371	0,1780 **	0,0752	0,1171 *	0,1279 *	0,1634 **	0,2198 ***
I	0,0695	0,1026	0,0183	0,1537 *	0,0550	0,1008 (.)	0,1076 (.)	0,1459 *	0,2038 ***
					$LNOILCH$				
LE	0,0183	0,0177	0,0038	0,0085	0,0010	0,0191	-0,0068	0,0184	0,0104
2	-0,0086	-0,0088	-0,0233	-0,0181	-0,0253	-0,0079	-0,0341	-0,0081	-0,0173
3	0,0044	0,0041	-0,0116	-0,0046	-0,0139	0,0066	-0,0212	0,0058	-0,0016
4	0,0403 *	0,0399 *	0,0261	0,0309	0,0240	0,0415 *	0,0154	0,0408 *	0,0320
5	-0,0188	-0,0205	-0,0359 (.)	-0,0305	-0,0391 (.)	-0,0172	-0,0478 *	-0,0179	-0,0276
6	0,0291	0,0283	0,0129	0,0194	0,0100	0,0308	0,0016	0,0300	0,0215
7	0,0470 *	0,0443 *	0,0348 (.)	0,0374 (.)	0,0311	0,0463 *	0,0262	0,0443 *	0,0398 (.)
8	0,0178	0,0155	0,0040	0,0081	0,0002	0,0172	-0,0053	0,0152	0,0103
I	0,0712 ***	0,0685 ***	0,0574 **	0,0610 **	0,0540 **	0,0699 ***	0,0484 *	0,0681 ***	0,0629 **

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

Table D.24: FF5 Regression Results (Scope 2, Period 3)

	E	2	3	4	5	6	7	8	LE
					α				
LE	0,0002	0,0001	0,0004	0,0001	0,0003	0,0004	0,0003	0,0004	0,0004
2	0,0003	0,0002	0,0005	0,0002	0,0004	0,0005	0,0004	0,0004	0,0004
3	0,0007	0,0005	0,0009 *	0,0006	0,0008 (.)	0,0008 *	0,0008 *	0,0008 (.)	0,0007 (.)
4	0,0003	0,0002	0,0005	0,0003	0,0004	0,0005	0,0004	0,0004	0,0004
5	0,0007	0,0005	0,0009 *	0,0005	0,0008 (.)	0,0008 (.)	0,0008 (.)	0,0007	0,0007
6	0,0008 (.)	0,0007	0,0010 *	0,0007	0,0009 *	0,0009 *	0,0009 *	0,0008 (.)	0,0008 (.)
7	0,0005	0,0004	0,0007	0,0004	0,0006	0,0006	0,0006	0,0006	0,0006
8	0,0005	0,0004	0,0008	0,0004	0,0007	0,0007	0,0006	0,0007	0,0006
I	0,0006	0,0005	0,0008 (.)	0,0005	0,0007	0,0007	0,0007	0,0007	0,0007
					$Market$				
LE	-0,2588 ***	-0,3529 ***	-0,2505 ***	-0,3807 ***	-0,3459 ***	-0,2036 ***	-0,3739 ***	-0,2935 ***	-0,3175 ***
2	-0,4762 ***	-0,5674 ***	-0,4669 ***	-0,5992 ***	-0,5670 ***	-0,4179 ***	-0,5939 ***	-0,5089 ***	-0,5344 ***
3	-0,6176 ***	-0,7137 ***	-0,5835 ***	-0,7347 ***	-0,6797 ***	-0,5639 ***	-0,7045 ***	-0,6534 ***	-0,6813 ***
4	-0,2992 ***	-0,3884 ***	-0,2903 ***	-0,4163 ***	-0,3862 ***	-0,2452 ***	-0,4117 ***	-0,3306 ***	-0,3610 ***
5	-0,8279 ***	-0,9299 ***	-0,8017 ***	-0,9468 ***	-0,9006 ***	-0,7768 ***	-0,9202 ***	-0,8754 ***	-0,8888 ***
6	-0,6507 ***	-0,7467 ***	-0,6155 ***	-0,7668 ***	-0,7138 ***	-0,5966 ***	-0,7450 ***	-0,6922 ***	-0,7073 ***
7	-0,6640 ***	-0,7577 ***	-0,6409 ***	-0,7816 ***	-0,7393 ***	-0,6066 ***	-0,7647 ***	-0,7051 ***	-0,7272 ***
8	-0,8734 ***	-0,9727 ***	-0,8519 ***	-0,9946 ***	-0,9551 ***	-0,8186 ***	-0,9775 ***	-0,9170 ***	-0,9376 ***
I	-0,7215 ***	-0,8141 ***	-0,6905 ***	-0,8374 ***	-0,7954 ***	-0,6569 ***	-0,8166 ***	-0,7565 ***	-0,7743 ***
					SMB				
LE	-0,1131 (.)	-0,0591	-0,0909	-0,1416 *	-0,0348	-0,1593 *	-0,1192 (.)	-0,1079	-0,1948 **
2	-0,1200	-0,0740	-0,1025	-0,1508 *	-0,0552	-0,1705 *	-0,1310 (.)	-0,1258 (.)	-0,2025 **
3	-0,0130	0,0457	-0,0061	-0,0420	0,0549	-0,0619	-0,0365	-0,0078	-0,0981
4	-0,0906	-0,0367	-0,0613	-0,1181 (.)	-0,0017	-0,1265 (.)	-0,0878	-0,0725	-0,1618 *
5	-0,0277	0,0301	-0,0228	-0,0571	0,0391	-0,0776	-0,0527	-0,0228	-0,1123
6	0,0049	0,0642	0,0224	-0,0246	0,0871	-0,0267	-0,0043	0,0311	-0,0664
7	-0,2863 ***	-0,2287 **	-0,2677 ***	-0,3103 ***	-0,2098 *	-0,3297 ***	-0,2917 ***	-0,2768 ***	-0,3639 ***
8	-0,2939 ***	-0,2493 **	-0,2772 **	-0,3190 ***	-0,2318 **	-0,3422 ***	-0,2996 ***	-0,3031 ***	-0,3740 ***
I	-0,2744 **	-0,2182 *	-0,2555 **	-0,2998 ***	-0,1896 *	-0,3073 ***	-0,2791 **	-0,2503 **	-0,3410 ***
					HML				
LE	-0,0528	-0,0888	-0,0283	-0,1111 (.)	-0,0696	-0,0928 (.)	-0,0881	-0,1374 *	-0,1587 **
2	-0,0897	-0,1292 *	-0,0713	-0,1468 *	-0,1166 (.)	-0,1317 *	-0,1298 *	-0,1771 **	-0,1940 ***
3	-0,1138 (.)	-0,1528 *	-0,0893	-0,1731 **	-0,1327 *	-0,1525 **	-0,1521 *	-0,1989 ***	-0,2210 ***
4	-0,0600	-0,0971 (.)	-0,0361	-0,1186 *	-0,0760	-0,0971 (.)	-0,0957	-0,1400 *	-0,1615 **
5	-0,1687 **	-0,2097 **	-0,1487 *	-0,2296 ***	-0,1916 **	-0,2095 ***	-0,2086 **	-0,2556 ***	-0,2770 ***
6	-0,1296 *	-0,1683 **	-0,1031 (.)	-0,1890 **	-0,1440 *	-0,1624 **	-0,1646 *	-0,2079 **	-0,2317 ***
7	-0,1431 *	-0,1765 **	-0,1151 (.)	-0,1974 **	-0,1538 *	-0,1752 **	-0,1718 *	-0,2188 ***	-0,2404 ***
8	-0,1955 **	-0,2341 **	-0,1736 *	-0,2522 ***	-0,2147 **	-0,2305 ***	-0,2273 **	-0,2777 ***	-0,2919 ***
I	-0,1484 *	-0,1828 **	-0,1223 (.)	-0,2044 **	-0,1583 *	-0,1789 **	-0,1790 *	-0,2206 **	-0,2427 ***
					$PR1YR$				
LE	-0,0528 **	-0,0888 ***	-0,0283 **	-0,1111 ***	-0,0696 ***	-0,0928 *	-0,0881 ***	-0,1374 **	-0,1587 **
2	-0,0897 ***	-0,1292 ***	-0,0713 ***	-0,1468 ***	-0,1166 ***	-0,1317 ***	-0,1298 ***	-0,1771 ***	-0,1940 ***
3	-0,1138	-0,1528 *	-0,0893 *	-0,1731 *	-0,1327 **	-0,1525	-0,1521 *	-0,1989 *	-0,2210 (.)
4	-0,0600 ***	-0,0971 ***	-0,0361 ***	-0,1186 ***	-0,0760 ***	-0,0971 ***	-0,0957 ***	-0,1400 ***	-0,1615 ***
5	-0,1687 ***	-0,2097 ***	-0,1487 ***	-0,2296 ***	-0,1916 ***	-0,2095 ***	-0,2086 ***	-0,2556 ***	-0,2770 ***
6	-0,1296 *	-0,1683 **	-0,1031 *	-0,1890 **	-0,1440 ***	-0,1624 (.)	-0,1646 **	-0,2079 **	-0,2317 *
7	-0,1431 (.)	-0,1765 **	-0,1151 *	-0,1974 *	-0,1538 **	-0,1752	-0,1718 **	-0,2188 *	-0,2404 *
8	-0,1955 ***	-0,2341 ***	-0,1736 ***	-0,2522 ***	-0,2147 ***	-0,2305 ***	-0,2273 ***	-0,2777 ***	-0,2919 ***
I	-0,1484 *	-0,1828 **	-0,1223 **	-0,2044 **	-0,1583 ***	-0,1789 *	-0,1790 **	-0,2206 **	-0,2427 *
					LIQ				
LE	0,1344	0,1893 (.)	0,1594	0,1704 **	0,2100	0,1143	0,1954 (.)	0,1535 *	0,1482 ***
2	0,2999 ***	0,3460 ***	0,3185 ***	0,3353 ***	0,3700 ***	0,2761 ***	0,3585 ***	0,3114 ***	0,3123 ***
3	0,0883	0,1367	0,1037 *	0,1146	0,1513	0,0658	0,1331	0,1056	0,0964
4	0,1898 **	0,2382 ***	0,2114 (.)	0,2210 ***	0,2620 *	0,1677 **	0,2445 ***	0,2034 ***	0,2012 ***
5	0,2592 (.)	0,3055 *	0,2740	0,2890 **	0,3223 (.)	0,2418 *	0,3062 **	0,2827 **	0,2737 ***
6	0,1267	0,1744	0,1391	0,1529	0,1899	0,1049	0,1711	0,1459	0,1347 *
7	0,1035 **	0,1588 **	0,1293 *	0,1314 ***	0,1846 *	0,0864 **	0,1596 ***	0,1333 ***	0,1138 ***
8	0,2792 ***	0,3321 ***	0,2950 ***	0,3103 ***	0,3496 ***	0,2528 ***	0,3282 ***	0,2963 ***	0,2854 ***
I	0,1463 ***	0,1995 ***	0,1679 ***	0,1709 ***	0,2256 ***	0,1276 ***	0,1978 ***	0,1748 ***	0,1536 ***
					$LNOILCH$				
LE	0,0697	0,1082	0,0110	0,1673	0,0512	0,0911	0,1105 (.)	0,1382	0,2018
2	0,2814 ***	0,3266 ***	0,2248 ***	0,3830 ***	0,2720 ***	0,3012 ***	0,3275 ***	0,3489 ***	0,4098 ***
3	-0,0943	-0,0593	-0,1411	0,0019	-0,1059	-0,0776	-0,0392 (.)	-0,0330	0,0348
4	0,1730	0,2128	0,1132 *	0,2696 (.)	0,1517 *	0,1908	0,2115 **	0,2375	0,2994
5	0,1335 ***	0,1682 ***	0,0863 ***	0,2305 ***	0,1188 ***	0,1545 ***	0,1855 ***	0,1930 ***	0,2628 ***
6	0,0111 (.)	0,0450 (.)	-0,0395 *	0,1067 (.)	-0,0082 **	0,0206	0,0571 **	0,0613	0,1372
7	0,1929	0,2253	0,1426 *	0,2808 (.)	0,1796 *	0,2077	0,2371 *	0,2513	0,3163
8	0,4098 ***	0,4516 ***	0,3620 ***	0,5003 ***	0,4058 ***	0,4275 ***	0,4561 ***	0,4785 ***	0,5341 ***
I	0,2992 *	0,3347 *	0,2550 **	0,3900 *	0,2845 **	0,3113 *	0,3498 **	0,3514 (.)	0,4206 *

Significance codes: *** < 0.001, ** < 0.01, * < 0.05, . < 0.1

E. CRE-portfolios Fama-Macbeth Regressions

Table E.1: Fama-Macbeth Regression Results (All years)

	CAPM + OIL	**FF3 + OIL**	**FF5 + OIL**
Panel A: CRE Portfolios Scope 1			
Alpha	-0.00003	0.000114	0.00014
	(0.00028)	(0.00061)	(0.00072)
Market	0.00059	0.00095	0.00114
	(0.00096)	(0.00253)	(0.00312)
SMB		0.00043	0.00171
		(0.00332)	(0.00424)
HML		0.00058	0.00136
		(0.00478)	(0.00661)
PR1YR			-0.00333
			(0.008132)
LIQ			0.001016
			(0.00472)
OILNOK	0.00429	0.00755	0.01088
	(0.00992)	(0.02767)	(0.03363)
Panel B: CRE Portfolios Scope 2			
Alpha	-0.00005	-0.00021	-0.00008
	(0.00027)	(0.00055)	(0.00104)
Market	0.00001	0.00016	0.00021
	(0.00082)	(0.00125)	(0.00170)
SMB		-0.00140	-0.00051
		(0.00245)	(0.00405)
HML		-0.00043	-0.00036
		(0.00248)	(0.00646)
PR1YR			-0.00162
			(0.00962)
LIQ			0.00043
			(0.00710)
OILNOK	0.00079	-0.00259	-0.00043
	(0.00410)	(0.00860)	(0.02098)

Table E.2: Fama-Macbeth Regression Results (Period 1)

	CAPM + OIL	**FF3 + OIL**	**FF5 + OIL**
Panel A: CRE Portfolios Scope 1			
Alpha	-0.00023	-0.00037	-0.00049
	(0.00047)	(0.00108)	(0.001303)
Market	-0.00041	-0.00079	0.00140
	(0.00075)	(0.00191)	(0.00621)
SMB		0.00120	-0.00582
		(0.01322)	(0.02403)
HML		-0.00115	-0.00411
		(0.00568)	(0.00871)
PR1YR			-0.000002
			(0.00821)
LIQ			0.00085
			(0.01035)
OILNOK	-0.00220	-0.00089	0.00647
	(0.01270)	(0.01735)	(0.02804)
Panel B: CRE Portfolios Scope 2			
Alpha	-0.00037	-0.00041	-0.00050
	(0.00044)	(0.00138)	(0.00218)
Market	-0.00023	-0.00028	0.00139
	(0.00077)	(0.00205)	(0.00327)
SMB		0.00101	0.00952
		(0.01207)	(0.01932)
HML		-0.00022	-0.00394
		(0.00621)	(0.01293)
PR1YR			-0.00161
			(0.00953)
LIQ			0.01093
			(0.01555)
OILNOK	0.00013	0.00242	0.02133
	(0.00814)	(0.02999)	(0.04470)

Table E.3: Fama-Macbeth Regression Results (Period 2)

	CAPM + OIL	**FF3 + OIL**	**FF5 + OIL**
Panel A: CRE Portfolios Scope 1			
Alpha	-0.00011	-0.00004	-0.00024
	(0.00035)	(0.00007)	(0.00127)
Market	0.00015	0.00018	0.00031
	(0.00101)	(0.00225)	(0.00392)
SMB		-0.00133	-0.00264
		(0.00301)	(0.00500)
HML		-0.00265	-0.00496
		(0.00365)	(0.00655)
PR1YR			0.00066
			(0.00731)
LIQ			-0.00705
			(0.01109)
OILNOK	0.00786	0.00769	0.00804
	(0.01015)	(0.00147)	(0.01945)
Panel B: CRE Portfolios Scope 2			
Alpha	0.00004	0.00015	0.00038
	(0.00067)	(0.00098)	(0.00200)
Market	0.00030	0.00044	0.00069
	(0.00143)	(0.00189)	(0.00327)
SMB		-0.00042	-0.00098
		(0.00324)	(0.00414)
HML		-0.00071	-0.00123
		(0.00473)	(0.00775)
PR1YR			0.00188
			(0.01173)
LIQ			-0.00046
			(0.01026)
OILNOK	0.00769	0.00801	0.00690
	(0.00927)	(0.01005)	(0.01649)

Table E.4: Fama-Macbeth Regression Results (Period 3)

	CAPM + OIL	**FF3 + OIL**	**FF5 + OIL**
Panel A: CRE Portfolios Scope 1			
Alpha	0.00008	-0.00009	0.00037
	(0.00069)	(0.00132)	(0.00191)
Market	-0.00033	-0.00073	0.00067
	(0.00193)	(0.00482)	(0.00618)
SMB		-0.00170	-0.00124
		(0.00295)	(0.00417)
HML		0.000402	-0.00055
		(0.00609)	(0.00898)
PR1YR			0.00174
			(0.00876)
LIQ			-0.00236
			(0.00445)
OILNOK	-0.00198	-0.00330	-0.00505
	(0.00786)	(0.01342)	(0.01766)
Panel B: CRE Portfolios Scope 2			
Alpha	0.00042	0.00038	0.00103
	(0.00069)	(0.00098)	(0.00164)
Market	-0.00022	0.00038	0.00084
	(0.00146)	(0.00307)	(0.00381)
SMB		-0.00046	0.00090
		(0.00349)	(0.00564)
HML		-0.00215	-0.00242
		(0.00942)	(0.01154)
PR1YR			-0.00385
			(0.00958)
LIQ			-0.00030
			(0.00527)
OILNOK	-0.00089	-0.00331	-0.01318
	(0.00650)	(0.01196)	(0.02189)

F. R-Code

1. Setting up R-Studio

```
## Librarys to import ##
library(tidyr)
library(readxl)
library(car)
library(data.table)
library(datasets)
library(dplyr)
library(graphics)
library(grDevices)
library(GLDEX)
library(methods)
library(plyr)
library(PerformanceAnalytics)
library(reshape2)
library(stats)
library(TTR)
library(utils)
library(MASS)
library(gvlma)
library(xlsx)
library(quantmod)
library(repmis)
library(zoo)
library(sandwich)
library(lmtest)
library(foreign)
library(plm)
library(tseries)
library(SciViews)
```

2. Importing and formatting returns data

```
#Importing returns file (Repeat procedure for scope 2)
```

```
Returns_uf <- read.delim("returns_file")

#making data long
Returns_uf_long<-gather(Returns_uf, firm, return, ("Firm1":"FirmN"))

#adding colums for year
Returns_uf_long$Year <- as.numeric(format(Returns_uf_long$Date,
format= "%Y"))

#Importing MV/Y file
MV_y <- read.delim("MV_file.xlsx")

#making data long
MV_y_long<-gather(MV_y, firm, MV, ("Firm1":"FirmN"))

#Importing Co2/y file
co2_y <- read.delim("Co2_y_file.xlsx")

#making data long
co2_y_long<-gather(co2_y, firm, co2year, ("FIRM1":"FIRMN"))
```

3. Making CRE-Portfolios

```
#concatenating co2/y and MV/y
Size_co2 <- merge(co2_y_long, MV_y_long, by=c("Year", "firm"))

#adding columns that show which third the observation belongs to
#Size - 3 is largest firms, 1 is smallest
Size_co2 <- ddply(Size_co2, .(Year), transform, size_gr = ntile(MV, 3))
#co2 - 3 is inefficient firms, 1 is efficient
Size_co2 <- ddply(Size_co2, .(Year, size_gr), transform, co2_gr = ntile(co2year, 9))

#adding colums for size_co2_gr
Size_co2<- within(Size_co2, Size_co2_gr<-paste0(size_gr, co2_gr ))

#adding back into the returns data
Returns_uf_long<- merge(Returns_uf_long,Size_co2, by=c("Year", "firm"))
```

```
#Can make 81 different portfolios based on this granulation
small_eff <- c(11, 12, 13)
big_eff <- c(31, 32, 33)
small_ineff <- c(17, 18, 19)
big_ineff <-c(37, 38, 39)

  #efficient portfolio creation
  #1) defining included in portfolio
  #2) merge in returns file
  #3) sum returns if 1 in column x for all portfolios

#1)
#efficient portfolio
for (i in small_eff){
  for (y in big_eff) {
    Size_co2[[paste0("eff_", i, y)]] <-
ifelse (Size_co2$Size_co2_gr==i, 1, ifelse(Size_co2$Size_co2_gr==y, 1, 0)) }}

#inefficient portfolio
for (j in small_ineff){
  for (x in big_ineff) {
    Size_co2[[paste0("ineff_", j, x)]] <-
    ifelse (Size_co2$Size_co2_gr==j, 1, ifelse(Size_co2$Size_co2_gr==x, 1, 0)) }}

#2)
#getting on daily data form
Returns_portfoliodef <- merge(Returns_uf_long,
Size_co2, by=c("Year", "firm"))
#making na 0
#Returns_portfoliodef$return[is.na(Returns_portfoliodef$return)] <-0



#3) daily returns by portfolio
# getting the dates into new sheet
Portfolio_returns <- Returns_uf[,1, drop=FALSE]
```

4. Making CRE-Portfolios part 2

```
#### Example for 1 efficient portfolio, repeated for all 9 efficient
and 9 inefficient
#eff_1132
port_1131 <- Returns_portfoliodef[, 3, drop=FALSE]
port_1131$return <- as.numeric(unlist(Returns_portfoliodef[,
    4, drop=FALSE]))
port_1131$eff_1131 <- Returns_portfoliodef[,15 ]
port_1131 <- port_1131[!(port_1131$eff_1131== 0),]
port_1131 <-ddply(port_1131, .(Date), transform,
    port_1131=mean(return, na.rm = T))
port_1131 <- port_1131[!duplicated(port_1131$Date),]
port_1131$eff_1131<-NULL
port_1131$return <- NULL
Portfolio_returns<- merge(Portfolio_returns, port_1131,
    by=c("Date"))
```

5. Winsorising

```
### Changing date formatting ###
Portfolio_returns$Date <- format(as.Date(Portfolio_returns$Date,
    format="%m/%d/%Y"),"%d/%m/%Y")
Portfolio_returns$Date <-
    format(as.Date(Portfolio_returns$Date,
    format="%d/%m/%Y"),"%Y-%m-%d")
Portfolio_returns$Date <- as.Date(Portfolio_returns$Date)
class(Portfolio_returns$Date)



#### Winsorizing 1% and 99% ####
portnames <- c( "P1" , "P2" , "P3",
"P4" , "P5", "P6", "P7","P8", "P9" , "P10","P11","P12","P13", "P14", "P15" ,
                    "P16", "P17","P18","P19","P20" ,"P21","P22","P23","P24", "P25","P26","P
                    "P34", "P35" ,"P36","P37","P38" ,"P39", "P40","P41","P42","P43","P44","
                    "P51","P52","P53","P54","P55","P56","P57","P58","P59","P60","P61","P62"
                    "P69", "P70" ,"P71","P72","P73","P74", "P75" , "P76" ,"P77","P78", "P79
```

```
for (p in portnames){
  Portfolio_returns[[p]] <-
  as.numeric(unlist(Portfolio_returns[[p]]))
  qnt_up <- quantile(Portfolio_returns[[p]], .99, na.rm=T)
  qnt_down <-quantile(Portfolio_returns[[p]], .01, na.rm =T)
  Portfolio_returns[[p]] <-
  ifelse(Portfolio_returns[[p]]>=qnt_down,
  ifelse(Portfolio_returns[[p]]<=qnt_up,
  Portfolio_returns[[p]], qnt_up), qnt_down )
}
```

6. Getting ready for analysis

```
##IMPORITING & CALCULATING##
#FFC5
FFC5 <- read_excel("FFC5.xlsx")

#Importing Rf
RF <- read_excel("RF.xlsx")
RF$...1<- NULL

#Importing Oil Price
OIL_USD <- read_excel("OILPRICEUSD.xlsx")
USD_NOK <- read_excel("NOKprUSD.xlsx")
OIL_USD <- merge(OIL_USD, USD_NOK, by =c("Date"))
USD_NOK <- NULL
#Changing oil price to NOK
OIL_USD$OILNOK<- OIL_USD["Crude Oil Dated Brent U$/BBL"]*OIL_USD["1 USD"]
#Deleting unwanted columns
OIL_USD["Crude Oil Dated Brent U$/BBL"]<- NULL
OIL_USD["1 USD"] <- NULL
OIL_USD["Crude Oil WTI Cushing U$/BBL"] <- NULL

#Importing Market Portfolios
Mrkt <- read_excel("Mrkt.xlsx")


##Merging into one file by Date##
```

```
Data_analysis <- FFC5[,1, drop=FALSE]
Data_analysis <- merge(Data_analysis, FFC5, by= "Date")
Data_analysis <- merge(Data_analysis, RF, by="Date")
Data_analysis <- merge(Data_analysis, OIL_USD, by = "Date")
Data_analysis <- merge(Data_analysis, Mrkt, by = "Date")
Data_analysis <- merge(Data_analysis, Portfolio_returns, by="Date")

#need to change all portfolios and market portfolios to excess return
  ##making list of returns columns
returnscol <- c( "EW_mrk"  , "MW_mrk"  , "P1" ,  "P2" , "P3",
"P4" , "P5", "P6", "P7","P8", "P9" , "P10","P11","P12","P13", "P14", "P15" ,
"P16", "P17","P18","P19","P20","P21","P22","P23","P24", "P25","P26","P27",
"P28","P29" ,"P30", "P31", "P32", "P33","P34", "P35" ,"P36","P37","P38",
"P39", "P40","P41","P42","P43","P44","P45","P46","P47","P48","P49","P50",
"P51","P52","P53","P54","P55","P56","P57","P58","P59","P60","P61","P62",
"P63" ,"P64", "P65","P66","P67","P68" ,"P69", "P70" ,"P71","P72","P73",
"P74", "P75" , "P76" ,"P77","P78", "P79" ,"P80","P81")

#making excess return portfolios
xx=1
Data_analysis$`Rf(1d)` <-as.numeric(unlist(Data_analysis$`Rf(1d)`))
for (r in returnscol){
  Data_analysis[r] <-as.numeric(unlist(Data_analysis[r]))
  Data_analysis[[paste0("X", r)]] <-
    (Data_analysis[r]-Data_analysis$`Rf(1d)`)
  Data_analysis[r]<- NULL
  Data_analysis[[paste0("X", r)]] <-
    as.numeric(unlist(Data_analysis[[paste0("X", r)]]))
  xx=xx+1}

#MAKE ln(p_t/p_(t-1)) for OILPRICE
changelist<-c(2:length(Data_analysis$OILNOK))
for (b in changelist){
  Data_analysis$LNOILCH[b] <-
    ln(Data_analysis$OILNOK[b]/Data_analysis$OILNOK[b-1])
  }

#format data long for all portfolios
```

```
Data_analysis_long<-gather(Data_analysis, PF, return_PF, ("XP1":"XP81"))
```

7. GRS-test

```
### G R S test FF5 + OIL (repeat for other models) ###
# Parameters:
# L = number of factors in the model
# t = number of time periods in the sample
# N = number of CRE portfolios
L <- 6
t <- nrow(Data_analysis)
N <- 81

#1st step regression
Data_analysis_long$LNOILCH <- as.numeric(Data_analysis_long$LNOILCH )
# Fit the specified model to each CRE portfolio
Data_analysis_long$return_PF<-
    as.numeric(unlist(Data_analysis_long$return_PF))
models <- dlply( Data_analysis_long,
    "PF",function(Data_analysis_long)
  lm(return_PF ~ XEW_mrk + SMB + HML + PR1YR + LIQ + LNOILCH,
     na.action=na.exclude, data =Data_analysis_long) )

#Calculate intercept vector
betas<-ldply(models,coef)
alpha_hat<- as.vector(betas[ ,"(Intercept)" ])

#Calculate residulals matrix
residuals <-ldply(models,residuals)
residuals[is.na(residuals)] <- 0
epsilon_hat<-as.matrix(residuals[ ,2: ncol(residuals)])
epsilon_hat_t <- t(epsilon_hat)


#Calculte the estimation of the covariance matrix of residuals:
sigma_hat1 <-(epsilon_hat %*% epsilon_hat_t)
sigma_hat <- sigma_hat1/(t-L-1)
```

```
#Calculate vector of factor means
Data_analysis_long<- data.frame(Data_analysis_long)
mju_bar<- as.vector(apply(Data_analysis_long[
c("XEW_mrk","SMB","HML","PR1YR","LIQ", "LNOILCH")],2,mean,na.rm=T))

#Calculate factor matrix
factormatrix<-as.matrix(Data_analysis[
,c("XEW_mrk","SMB","HML","PR1YR","LIQ", "LNOILCH")])
factormatrix[is.na(factormatrix)] <-0

#Calculate estimate of the covariance matrix of the factors
F_bar <- matrix(rep(t(mju_bar),each=t),nrow=t)
omega_hat<-(t(factormatrix-F_bar) %*% (factormatrix-F_bar))/(t-1)

#Compute the GRS statistic
W_u<-(t(alpha_hat) %*% solve(sigma_hat,alpha_hat, tol = 1e-22))/
  (1+(t(mju_bar) %*% solve(omega_hat, mju_bar)))
print(W_u)
GRSstat <- (t/N)*(t-N-L)/(t-N-1)*W_u

###Content of the GRS table ###
# GRS statistic
GRSstat

#p-value of the GRS-statistic
pf(GRSstat,N, t-N-L ,lower.tail=F)

#average absolute value of the PF intercepts
mean(abs(alpha_hat))

#average adjusted R-squared
T5_R2<-laply(models,function(mod) summary(mod)$r.squared) #adj.r.squared
mean(T5_R2)
```

8. Fama-Macbeth

```
#First step regression (example CAPM)
```

```
reg_1st <- dlply( Data_analysis_long, "PF",function(Data_analysis_long)
  lm(return_PF ~ XEW_mrk ,
     na.action=na.exclude, data =Data_analysis_long) )

#getting the factors into matrix
factors<-ldply(reg_1st,coef)
names(factors) <- c("PF","intercept", "Mrkt_beta")

#make file for wanted model
factorloadings <- merge(Data_analysis_long, factors, by = c('PF'))

# Use custom clustering functions by Stockholm University's Mahmood Arai
#source("http://people.su.se/~ma/clmcl.R")
#Find function in Code 8

#Fit the model
fm <- lm(return_PF ~ Mrkt_beta , data= factorloadings)

# Using Arais clusteringfunction to analyse by date
clx(fm,1, Data_analysis_long$PF, Data_analysis_long$Date)
```

9. Arai's Clustering function

```
# Arais clustering functions
clx <-
  function(fm, dfcw, cluster){
    library(sandwich)
    library(lmtest)
    M <- length(unique(cluster))
    N <- length(cluster)
    dfc <- (M/(M-1))*((N-1)/(N-fm$rank))
    u  <- apply(estfun(fm),2,
              function(x) tapply(x, cluster, sum))
    vcovCL <- dfc*sandwich(fm, meat=crossprod(u)/N)*dfcw
    coeftest(fm, vcovCL) }
```