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Performance of Nordic Public Family Firms

A comparable analysis of Nordic public family firm's performance against the Fama and French five-factor model

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Abstract

This thesis examines the stock market performance of family firms in the Nordic region. Specifically, we investigate whether an investor would have earned higher returns by investing in Nordic family firms than being passively invested in the five factors of Fama and French during the last 20 years. Furthermore, we attempt to find if there are any differences with respect to abnormal return between the four included countries: Denmark, Finland, Norway, and Sweden.

We have defined a family firm as a firm where the founder, or individuals related to the founder either by blood or marriage, has at least 20% ownership. Active participation by the family is not necessary, but rather a right. We create a portfolio of 291 family firms, in total, and use the Fama and French five-factor model to see if the family firm portfolio has achieved an abnormal return during the period January 1, 2000, to December 31, 2019.

We find that our value-weighted Nordic family firm portfolio generates an average monthly abnormal return of 2.19%, and the result is significant at a 0.1% level. This suggests that during the last 20 years an investor would have been better off investing in Nordic family firms compared to being passively invested in the five factors of Fama and French. This finding is robust to Nordic market performance and stricter definitions of family firms. Moreover, family firms in Denmark show the highest abnormal performance, and there is one large danish firm that greatly impacts our results.

Despite our positive findings for family firm performance, our results are ex-post and thus only show historical performance and is consequently not an indicator for future performance for family firms in the Nordic region.

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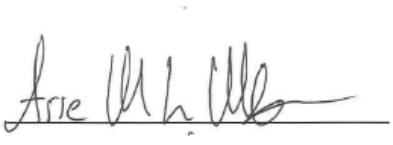

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1. Introduction

This section provides a brief introduction to our motivation for this thesis (1.1), our aim of the thesis (1.2), and next, the outline of this thesis (1.3).

1.1 Motivational background for the thesis

The topic of family firms has historically not been the most popular subject in the field of academia, but researchers have in the last couple of decades intensified the investigation on the topic. Seeing family firms in Europe being the most dominant type of firm, accounting for half of the employment and contributing to a large share of GDP (Mandl, 2008), it is about time that the focus tilts towards the engine of the economy, the family firm. This makes research on family firms important as it can give extensive information to policymakers deciding on new policies. Moreover, as family firms tend to be more profitable than non-family firms (Berzins & Bøhren, 2013), it might give direction to entrepreneurs, business leaders, and investors.

Most studies conducted on family firms focus on the area of performance, whether they provide better performance than non-family firms or not (Amit & Villalonga, 2006; Anderson & Reeb, 2003; La Porta, Lopez-De-Silanes, & Shleifer, 1999; Lee, 2006; Maury, 2006). Even though many scholars find that family firms perform better than non-family firms, there is no consensus among the society of academic scholars, as some studies also suggest this kind of firms underperform compared to non-family firms (Carney, 2005; Pérez-González, 2006; Schulze, Lubatkin, Dino, & Buchholtz, 2001). This makes the subject of family firms interesting because of the various conclusions across the research field. Moreover, only a small part of family firm studies focuses on firms in Europe, as public firms listed in the U.S. are the most common foundation for research. As such, other geographical regions are often neglected, especially the Nordic region, and there is little empirical research as to whether public family firms outperform or not.

Furthermore, another motivational aspect of this thesis is the lack of studies investigating family firms' mispricing and the creation of abnormal returns. Studies aforementioned are based on operational measures (ROA) or market valuation (Tobin´s q), while few seek to emphasize the investor's perspective concerning family firms. Admittedly, there are some studies on this topic in Europe, such as Cella (2009) and Corstjens et al. (2006) giving ambivalent conclusions whether public family firms create abnormal returns, but none having a focus on the Nordic

region. Considering that managers and owners on average care about whether their stock is mispriced or not, we believe this branch of the family firm research field is important. We will test for abnormal return by using the Fama and French five-factor model as a benchmark to our family firm portfolio. This model captures all systematic risk priced by the market, but do not capture idiosyncratic risk. As we seek to identify a firm-specific characteristic concerning family firm performance, the model is applicable.

1.2 Aim of the thesis

The goal of this master thesis is to extend the research on public family firms in the Nordic region. Particularly, we seek to find if family firms in the Nordic region have been mispriced in the time period of 2000-2019 and thereby created an abnormal return. Furthermore, we attempt to find if there are any differences concerning the abnormal return between the four included countries: Denmark, Finland, Norway, and Sweden. Indeed, we find a positive monthly abnormal return for a value-weighted portfolio of family firms of 2.19%, where the Danish family firms account for most of the abnormal return.

1.3 Thesis outline

This thesis is split into six parts and proceed as follows. In the first part (Section 2), we introduce the theoretical framework needed to understand the rich literature involving the various definitions for family firms. Moreover, we describe the Efficient Market Hypothesis which is central to discussing mispricing, and present the difference between systematic and idiosyncratic risk. Section 3 consists of an extensive review of the relevant literature regarding family firms and performance, and its purpose is to give the reader an introduction to the topic and a foundation for further discussion. Following this section, Section 4 explains how we gathered our data and created our portfolio of family firms. Section 5 explains the theoretical framework of the Fama and French five-factor model and presents the methodological approach used in this thesis. Section 6 shows and discusses the findings from the data analysis and section 7 elaborates on the limitations of this thesis. Lastly, we present our conclusion and suggestions for further research.

2. Theoretical Framework

2.1 Family firms

To reach a broadly accepted definition of a family firm is a tedious process that is yet to be agreed upon. To illustrate, currently, more than 90 family firm definitions exist and are being applied throughout academia (European Commission, 2009). Consequently, it is difficult to establish significant results that are conclusive in terms of family firm performance while being independent of how a family firm initially was defined. We will thus in this section describe some of the various definitions, and why we think that an applicable definition of a family firm is a firm where the founder, or individuals related to the founder either by blood or marriage, has at least 20% ownership.

2.1.1 Various definitions

The issue of defining a family firm starts already when debating whether the founder must be a CEO or if it is enough that a relative to the founder is CEO (McConaughy, Matthews, & Fialko, 2001). Other definitions, such as La Porta et al. (1999) try to incorporate how much the founder can control the firm by defining a set percentage of ownership (in this case 20%). A higher percentage of ownership increases the founder's ability to influence decision-making and corporate governance. Anderson and Reeb (2003) address this problem as their results show that firm performance is nonmonotonic, meaning that performance increases as family ownership rises but then decreases as ownership exceeds an optimal level at 32%. Berzins, Bøhren, and Stacescu (2018) define meaningful ownership as that a group of owners should hold more than half of the voting rights, but these definitions apply to private and not public firms. If implied, the data sample for most public family firm research would be too small to find any meaningful results. On the other hand, a small ownership threshold such as 10% (Maury, 2006) seems too small as that classifies too many as family firms and the family effect would be neglectable and non-conclusive.

To address the social dimension in a family firm, Arosa et al. (2010) define a family firm as where there is a founder or family owner who participates actively in monitoring the firm. At first glance, this definition seems logical and applicable. However, Berzins, Bøhren, and Stacescu (2018) explain that it is the opposite. With Arosa et al.'s (2010) definition of a family firm, a family or founder that holds neither a board seat nor the CEO position yet owns the firm,

will not be classified as a family firm. Conversely, a family that holds a board seat, but does not own the firm, will be classified as a family firm. We thus tend to favor Berzins, Bøhren, and Stacescu's (2018) definition which focuses on the right to participate in corporate governance, not the actual participation. Hence, what matters is a high level of ownership which produces the right to govern.

Table 1: Shows the various definitions being used in literature.

Author(s)	Year	Family Firm Definition
(Arosa, Iturralde, & Maseda, 2010)	2010	A large body of common stock is held by the founder or family members and family members participate actively in monitoring the firm (p. 239)
(Astrachan, Klein, & Smyrnios, 2002)	2002	The F-PEC scale measures the family influence as continuous variable (p. 51)
(Chua, Christman, & Sharma, 1999)	1999	A firm governed and/or managed with the intention to shape and pursue the vision of the firm held by a dominant coalition controlled by members of the same family or a small number of families in a manner that is potentially sustainable across generations of the family or families (p. 25)
(Donckels & Fröhlish, 1991)	1991	Family members own 60 percent or more of the equity. (p. 152)
(Klein, 2000)	2000	Sum of the ownership of the family ownership, management, and/or governance is at least 1 or more to classify a business a family firm. Sum of (percentage of family stock ownership) + (percentage of family members in management board) + (percentage of family members in supervisory board) > 1 (p. 158)
(La Porta et al., 1999)	1999	A person controls 20 percent or more of the voting rights. (p. 478)
(McConaughy, Matthews, & Fialko, 2001)	2001	The firm's chief executive officer (CEO) is either the founder or a member of the founder's family. (p. 37)
(Miller et al., 2007)	2007	Multiple family members are either insiders (officers or directors) or large owners (5 percent or more of the firm's equity) at the same time or over the life of the company as descendants. (p. 837)
(Shanker & Astrachan, 1996)	1996	Broad definition: Effective control of strategic direction, intended to remain in family. Middle definition: Founder/descendants run company, legal control of voting stock. Narrow definition: Multiple generations, family directly involved in running and owning, more than one member of owning family having significant management responsibility. (p. 109)
(Berzins, Bøhren, & Stacescu, 2018)	2018	Majority-owned by individuals related by blood or marriage. Require that a group of owners holds more than half the voting rights. Only considers firms where the group of controlling owners consists of individuals who are particularly coherent entity. The group must be tied together by blood or marriage up to fourth degree of kinship.
(Anderson & Reeb, 2003)	2003	The founder or a member of his or her family by either blood or marriage is an officer, director, or blockholder, either individually or as a group.

Note. Adapted from "A strategic fit perspective on family firm performance" (Doctoral dissertation) (p.11), by Corinna Lindow, 2013, Leipzig, Leipzig Graduate School of Management

2.1.2 Our definition

By combining Anderson and Reeb (2003), La Porta et al. (1999) and Berzins, Bøhren, and Stacescu (2018), we define a family firm as a firm where the founder, or individuals related to the founder either by blood or marriage, has at least 20% ownership. Active participation by the family is not necessary, but rather a right.

2.2 The Efficient Market Hypothesis

As explained in section 1.3, our aim of the thesis is to analyze potential stock mispricing among family firms, and thereby the possibility of creating abnormal returns, in the Nordic region in the time period of 2000-2019. Hence, we will in this section describe the efficient market hypothesis and how mispricing might occur.

The Efficient Market Hypothesis (EMH) states that the capital market is said to be efficient if it fully reflects all relevant information in determining security prices (Fama, 1970). Efficiency in these terms means that it "does not allow investors to earn an above-average return without accepting above-average risks" (Malkiel B. G., 2003, p. 62). More specifically:

> The market is said to be efficient with respect to some information set, ¢, if security prices would be unaffected by revealing that information to all participants. Moreover, efficiency with respect to an information set, ¢, implies that it is impossible to make economic profits by trading on the basis of ¢ (Malkiel B. G., 1989, p. 127).

In 1967, Harry Roberts (1967) formulated the distinction between weak and strong market efficiency which is still the taxonomy used today. The weak form of the EMH states that current stock prices only reflect historical price information. This means that using investment methods such as technical analysis where one base the strategy on past patterns should not yield abnormal return. The semi-strong form of the EMH states that the current stock price reflects historical price information as well as publicly available company information. This means that an investor should not be able to achieve an abnormal return by analyzing financial statements and other public information that is relevant to the stock. The strong form of the EMH states that the current stock price reflects all information, specifically historical prices, public information, and insider information. This means that not even insiders in the firm should be

able to achieve an abnormal return despite being closest to the information source, and there is a perfect revelation of all private information in market prices (Malkiel B. G., 1989).

2.3 Systematic versus Idiosyncratic risk

As systematic- and idiosyncratic risk is an important part of the Fama and French factor models and a part of our methodology section, we want to explain the difference between the two concepts. The Dodd-Frank Act and the Financial Stability Oversight Council describe systematic risk as risk related to the financial system or market as a whole, as opposed to the risk facing individual financial institutions or market participants (Financial Stability Oversight Council, 2012). This implies that systematic risk is not diversifiable and it affects the entire market. On the other hand, idiosyncratic risk is "defined as the risk that is unique to a specific firm, … also called firm-specific risk…. (and) is independent of the common movement of the market" (Fu, 2009, p. 26).

3. Literature Review

In the following section, we will examine the existing literature on family firm performance and draw a picture of the various understandings of different scholars on family firms.

Governance research is a common and well-investigated research field. Countless studies are trying to find a relationship between how a firm is governed and its performance. A small branch of this research field is the topic of family firm performance. Relatively, this subject has been neglected as a heavily investigated topic despite it being the most common form of corporate ownership (La Porta, Lopez-De-Silanes, & Shleifer, 1999). This may be due to the difficulty in obtaining reliable data on these firms (Amit & Villalonga, 2006).

Most studies on the relationship between family ownership and firm performance have been conducted in the U.S. Anderson and Reeb (2003) studies the performance of family firms in the S&P 500 and find a positive relationship between public family firms and firm performance. Further evidence of family firm performance is presented by Lee (2006), who also studies firms in the S&P 500, arguing that family firms exceed non-family firms in relation to revenue growth and profitability. Amit and Villalonga (2006) show that family ownership creates value in excess of non-family firms, but their study only finds significant results when the founder serves as a CEO or as Chairman. In other words, passive family ownership does not lead to family firms outperforming firms with dispersed ownership. Furthermore, evidence from Amit and Villalonga (2006) suggests that descendants serving as CEOs destroy firm value, meaning the firm is better off hiring an outside CEO when the founder resigns.

Anderson and Reeb (2003) have also another interesting finding in their study of family firms. They find that the relationship between the level of ownership and the performance of family firms has an inverted U-shape curve. The non-linear relationship has an optimal ownership concentration of 32 percent which suggests that firm performance decreases with ownership levels exceeding this turning point. This result may explain a weakness in studies of family firms. The definition of a family firm and choice of ownership threshold may have a substantial impact on a study's final conclusion of family firm performance and may explain the various conclusions of academic scholars. Research by Miller, Breton-Miller, Lester, and Canella (2007) supports these findings by suggesting that only public family firms in the U.S. with a lone founder outperform non-family firms. Moreover, they conclude that the outperformance of family businesses was a result of how these businesses were defined. It is important to stress

the fact that findings are highly sensitive to the definition of family firms and to the nature of the sample.

Even though there are American studies that show family firm outperformance, the general portrayal of family firms is inconclusive as to whether family ownership leads to better performance or not. Often these kinds of firms suffer from nepotism, inter-generational problems, and too much altruism, which all may hold back a firm's performance (Pérez-González, 2006; Schulze, Lubatkin, Dino, & Buchholtz, 2001). Altruism is a problem because the firm may stick with a family-manager since the manager is family and not because the manager contributes something special. This is an agency cost problem that may deter performance in family firms. This quote of a senior family manager in the study by Rosenblatt et al. perfectly exemplifies the problem with altruism: "If my sons or my wife make mistakes, I let it go, because it's not worth fighting over. You have to live with your family. A non-family member, you can fire him." (1985, p. 112). Carney (2005) argues that these characteristics are constraining the family businesses from experiencing growth and longevity, and thereby causing a negative relationship between family ownership and firm performance.

On the other hand, by looking at how employee assessments predict performance, Huang, Li, Meschke, and Guthrie (2015) find that family firms exhibit a human-capital enhancing culture that improves firm performance. They see that, in firms where the founder takes an active role in the business, employees are more satisfied with their employer than in non-family firms. Interestingly, they also find that this culture reverses when the firm is controlled by a descendant. McConaughy et al. (1998) further argue that because of the alignment of owner-manager goals and incentives, family-owner monitoring of family managers encourages high performance and reduces shareholder and manager conflicts. Lower agency costs are enhancing the performance of family firms.

The majority of family firm studies use roughly the same methods to investigate the performance. The accounting-based performance indicators Tobin's q (which is the market value of total assets divided by the replacement costs of assets) and return on assets (ROA) are used by several academic scholars, such as Anderson and Reeb (2003), Amit and Villalonga (2006) and Miller et al. (2007). Evaluating performance based on accounting measures is found to face a limitation due to "not fully recognize the family firm factors in the book value of the firm or the implications for long-run persistence of earnings" (Duncan & Hasso, 2013). The

authors argue that performance studies based on accounting information do not fully reflect the intrinsic value of family firms.

A less common approach uses the stock performance of family firms to evaluate whether they outperform or not. Cella (2009) finds that family firms in Europe generate higher returns compared to non-family firms. The study concludes that the differences in the performance between the two are not perfectly captured by the Fama and French two-factor model. She finds that family firm stocks trade at a discount and further argues that agency costs between family owners and minority shareholders affect the price and required return on family stocks. The evidence of Morck et al. and Ali et al. (2003; 2007) find that family ownership tends to have less internal corporate governance. This makes minority shareholders more exposed to expropriation by the controlling block holders, and therefore want to be compensated for that extra risk. A second study on family firm stock returns by Corstjens, Peyer, and Heyden (2006) suggest that family firms in France, Germany, UK, and the US do not perform better or worse than non-family firms in terms of stock returns, except for French family firms who perform better than non-family firms. The stock returns are well explained by the four-factor Fama-French-Cahart valuation model.

This leads us to our main aim of this thesis. Based on a data sample of family firms in the Nordic region, we want to investigate if investing in a portfolio of Nordic family firms would make an investor better off than passively investing in the factors of the Fama and French. Further, we want to investigate whether there are differences between the countries in the Nordic region with respect to performance.

4. Data

To analyze public Nordic family firms, we gather data from several databases. In the subsections below, we will explain how the data is gathered, filtered, and matched (4.1), and how we created our different portfolios (4.2). Lastly, we take a look at the statistics of our main variables (4.3).

4.1 Sample selection

4.1.1 Data sample

Our data is primarily extracted from two separate databases. To find firm ownership, which is essential as we aim to create a database with firms run by founders or descendants with more than 20% ownership, we use Bureau van Dijk (BvD). BvD is a specialist provider of public and private company information. We specifically use the database Amadeus to extract information regarding Nordic public company names, shareholder names, and their ownership within the firm. This process is done incrementally for each Nordic country. Then, after finding the companies with at least one shareholder owning more than 20% which was more than 900 firms, we solve a difficult question: “How can we find out if the information displays a founder or a descendant of the founder?”. To solve this, we manually check the investor relation page and selectively read financial reports for each firm and check if the largest owner is either the founder or a descendant of the founder. This tedious task also has room for error as our main source is the firm's web page which could include mistakes and errors. Moreover, this is especially an issue for smaller firms that operates without a professional webpage or detailed corporate information in their reports. Firms with too much historical uncertainty are neglected from the sample.

Another issue is if there is more than one stockholder with ownership exceeding 20%. In these cases, we decide to only include firms in the sample where the largest owner is a founder or related to the founder by blood or marriage. We argue that we cannot explicitly say that any firm performance is due to the firm being family-driven if there is a large non-family owner who could potentially have the most influence over the firm’s performance. We thus find it more reasonable to exclude such instances and rather only work with occurrences where the largest owner is a founder or a descendant.

4.1.2 Selection criteria

Selection criteria 1: Time period

Which time-period one chooses can greatly affect the results of performance. As an example, the yearly compounded average return from the S&P500 including dividends and splits from 1928 to 2019 was 9 % while it was 12 % from 1941 to 2019 (Damodaran, 2019). We argue that a long time period is better than a short one as the sensitivity to macroeconomic shocks and events gets less magnitude when the time period is substantial. We thus opt for the longest downloadable period from BvD, which is 2000 to 2019.

Selection criteria 2: Countries

As mentioned previously, there is little research on family firms in the Nordic region, and especially little research looking at the Nordic region as a whole. The Nordic region includes the countries Denmark, Finland, Iceland, Norway, and Sweden. However, there are no firms from Iceland in our data sample. This is due to the fact that there are no firms meeting our criteria for being a family firm during our time period. Hence, the term "Nordic region" in this thesis refers to the four countries Denmark, Finland, Norway, and Sweden.

Selection criteria 3: National ownership

Firms traded on one of the Nordic exchanges but not registered as a company in any of the Nordic countries, such as the "Norwegian companies" Golden Ocean and Frontline, are excluded from the data sample as they are not Nordic firms per definition. Neglecting these kinds of firms is also necessary due to a lack of historical- and ownership information on such companies. Furthermore, firms where the government is the founder and largest owner are excluded from our sample as governments cannot be defined as a family as per our definition in section 2.1.2.

Selection criteria 4: Ownership

We define a family firm as a firm where the founder, or individuals related to the founder either by blood or marriage, has at least 20% ownership. Active participation by the family is not necessary, but rather a right. We look at the percentage of voting rights a family has and not the percentage of cash flow rights. This means that firms where families have above 20% of voting rights but less than 20% of cash flow rights are still included in the portfolio. Our base year for

family ownership is 2019, meaning that firms that today are still owned by their founder family are included in our portfolio. Lastly, firms that are family founded, but the family is no longer a substantial owner with at least 20% of the shares, are not included in the sample.

Once the ownership filtering is done, we end up with a family firm database for each country where each family firm is run by a founder or a descendant of the founder where they own 20% or more of the firm. In total, we have a data sample of 291 firms.

4.1.3 Stock prices and market capitalization

We use Datastream from Thomson Reuters to find monthly adjusted stock prices (adjusted for splits and dividends) and market capitalization ($stock\ price\ x\ number\ of\ shares\ outstanding$) which is needed to create a portfolio with monthly performance. We also gather currency information and transform all prices in Danish kroner (DKK), Norwegian kroner (NOK), and Swedish kroner (SEK) to a common currency, namely euros (EUR). This is done because we need market capitalization in the same currency across all countries to create a family firm portfolio where we can analyze performance. Consequently, for these three countries, the fluctuations in market capitalization and prices will be affected by movements in the exchange rates.

4.2 Portfolio construction

4.2.1 Value-weighted portfolio

A value-weighted portfolio or a capitalizing-weighted portfolio is a portfolio where the included securities get a weight based on their market capitalization. First, one finds the weight per security by taking the market capitalization for that security and dividing it by the total market capitalization of the portfolio. In a value-weighted portfolio, the stocks with the largest market capitalizations get the largest weights in the portfolio. The formula looks like this:

$$Weight_i = \frac{Market\ Value_i}{Total\ Market\ Value\ of\ All\ Securities}$$

Once we find each firm's weighting in the portfolio based on market capitalization, we sum the

market capitalization for each month and multiply that weight with the firm's stock price to find the *weighted stock price.*

$$Weighted\ Stock\ Price_i = Weight_i \times Stock\ Price_i$$

We then sum the weighted stock price for all securities per month which enables us to establish a weighted price per month that can be interpreted as an index price. Note that this index price is rebalanced per month as market capitalization changes. Finally, we repeat this process per month and calculate the weighted monthly return (WMR) for the value-weighted portfolio as such:

$$WMR_i = \frac{Weighted\ Monthly\ Price_t - Weighted\ Monthly\ Price_{t-1}}{Weighted\ Monthly\ Price_{t-1}}$$

By gathering the market capitalization for Denmark, Finland, Norway, and Sweden as described in section 4.1.3 and then proceed with the procedure from section 4.2.1, we construct the Nordic value-weighted portfolio. To construct the value-weighted portfolio for Sweden, Denmark, Finland, and Norway, we follow the same procedure but only using stocks in the respective country.

4.2.2 Equal-weighted portfolio

An equal-weighted portfolio is a portfolio where each firm's monthly return gets equal weight in the portfolio, regardless of its market capitalization. The formula for constructing the weight looks like this:

$$Weight_i = \frac{1}{Total\ number\ of\ securities}$$

First, the equal-weighted portfolio is constructed by finding the monthly return for each firm by using its monthly adjusted prices. Secondly, each firm gets a weight equal to one divided by the number of firms in the portfolio. Lastly, the monthly return (EMR) of the equal-weighted portfolio is found by multiplying the firms' monthly returns with their weight. Thereafter, we add together each firm's weighted return to find the portfolio's monthly return. The portfolio is rebalanced every month as new family firms get publicly listed and added to the portfolio. The formula looks like this:

$$EMR_i = \sum_{i}^{N} r_{it} \frac{1}{N}$$

As we did for the value-weighted portfolio, we also construct a Nordic equal-weighted portfolio as well as a portfolio for Denmark, Finland, Norway, and Sweden.

4.3 Descriptive Statistics

Table 2 reports the summary statistics of the main variables for our sample of family firms. The table reports the mean, median, minimum, and maximum value, and the standard error for all variables. To illustrate, when referring to the mean of a portfolio, e.g., the Swedish value-weighted portfolio, the mean, in this case, shows the monthly average return in that portfolio and this mean-performance can be compared across portfolios.

Further, at the lowest, there are 83 family firms in the sample and a maximum of 291 family firms in the sample. The number of firms increases as more firms get added to the portfolio each year. We note that the Nordic value-weighted return is more extreme in both directions, returning -29% against -15% for the equal-weighted portfolio. The worst return for the value-weighted portfolio is also far worse than for the market, 19% respectively. The opposite applies for the upside, and we note too that the standard deviation is above the market's standard deviation. This shows that the value-weighted portfolio, while showing stronger mean and median performance, is far more volatile than the market.

The market capitalization of family firms in the portfolio varies tremendously across firms. The smallest firm within the period has 40,000 euro in market capitalization while the largest one (Novo Nordisk) has 113 billion euro in market capitalization. We note though that while the mean firm has 1.28 billion euro, the median firm within the sample is a small firm, with only 78 million euros in market capitalization. As such, we are mostly dealing with small firms and a few larger firms within the sample.

We note that the Nordic value-weighted portfolio has a higher upside and downside with respect to both performance and standard deviation than both the equal-weighted portfolio and the market portfolio. The equal-weighted portfolio, on the other hand, has a lower downside, but a larger upside than the market portfolio, but has a larger standard deviation.

Table 2: Summary statistics of main variables

Statistic	N	Min	Mean	Median	Max	St. Dev.
Family firms	291[(1)]	83	152.3	139	291	57.65
Mcap	36640[(2)]	0.04	1281.54	78.29	113194.82	4391.78
Nordic return value-weighted	240[(3)]	-29.34	1.97	1.17	43.81	9.40
Nordic return equally-weighted	240[(3)]	-15.08	1.36	1.65	18.07	4.87
Mkt return	240[(3)]	-19.43	0.54	1.1	11.42	4.36
Excess return value-weighted	240[(3)]	-29.49	1.83	1.11	43.67	9.93
Excess return equally-weighted	240[(3)]	-15.16	1.23	1.54	18.00	4.89

1) Number of family firms within the sample. 2) Number of market capitalization observations within the data sample. Each firm will have a maximum of 240 (number of months) observations. Market capitalization is affected by changes in price and number of stocks per month and thus changes from month to month. 3) Number of months in the data sample as the time-period is 01.2000 to 12.2019.

From Table 2 and Table 3 we note that our data, which consists of 291 family firms, is highly skewed towards Sweden which has 191 family firms while Denmark has 13%, Finland 11%, and Norway 11% of the total family firm sample. Looking at the market capitalization in Table 3, we note that the mean family firm is largest in Denmark (skewed due to the global diabetes firm Novo Nordisk) while the mean firm is smallest in Norway. On the other hand, we note that the median firm in Denmark is the smallest and the median firm is the largest in Norway, meaning that the family firms in Norway are generally larger than in the other Nordic countries.

Furthermore, looking at the value-weighted portfolio returns in Table 3, Denmark and Norway have more extreme monthly returns in both directions than Finland and Sweden, which could imply that the two former countries' value-weighted portfolios move more than the two latter countries. This is confirmed by the standard deviations of Denmark and Norway, showing the highest values. Even though these two value-weighted portfolios have more extreme values in both directions, there are signs that the monthly returns are more extreme on the upside. This is suggested by the fact that the mean return is higher than the median return. In the case of Finland's and Sweden's value-weighted portfolios, these portfolios suffer from the opposite relationship between mean and median return, which suggests that there is more magnitude to the negative returns than the positive returns.

Overall, looking at the mean returns of the four countries, Denmark's value-weighted portfolio performs on average the best, with Finland closely behind. Finland, having a monthly average return of 1.92% compared to Denmark's 1.97% while experiencing substantially lower volatility, may show the best risk-reward ratio of the four portfolios. On the contrary, Norway's value-weighted portfolio, having the far lowest monthly average return and the second-highest standard deviation, stands out with the worst risk-reward ratio.

The equal-weighted portfolios show a somewhat different picture of the four countries' performances. In this context, Norway and Sweden have the highest monthly average return, respectively, while Finland's portfolio performing the worst. On the contrary to the value-weighted portfolios, the equal-weighted portfolios move lesser in both directions, which is also verifiable by the lower standard deviations.

Table 3: Summary statistics of main variables from the country-specific portfolios

Statistic	N	Min	Mean	Median	Max	St. Dev.
Family firms in Denmark	37(1)	17	23.82	25	37	4.52
Family firms in Sweden	191(1)	45	87.30	74	191	41.57
Family firms in Finland	32(1)	14	21.16	20	32	4.37
Family firms in Norway	31(1)	7	19.18	20	31	7.98
Mcap in Denmark	5755(2)	0.04	3595	95	113195	11313
Mcap in Sweden	21142(2)	0.11	891.02	46.17	31647.34	2525.85
Mcap in Finland	5110(2)	1.63	858.97	126.07	26411.73	2539.78
Mcap in Norway	4633(2)	1.24	761.07	238.86	13153.92	1247.31
Denmark return value-weighted	240(3)	-31.22	1.97	1.03	45.97	9.98
Denmark return equally-weighted	240(3)	-14.35	1.38	1.42	46.05	5.96
Sweden return value-weighted	240(3)	-14.66	1.59	1.81	25.17	6.20
Sweden return equally-weighted	240(3)	-14.21	1.46	1.70	23.98	5.23
Finland return value-weighted	240(3)	-18.44	1.92	2.08	34.98	6.94
Finland return equally-weighted	240(3)	-14.35	0.82	0.26	23.20	6.20
Norway return value-weighted	240(3)	-24.66	0.78	0.40	63.75	8.21
Norway return equally-weighted	240(3)	-22.12	1.58	1.63	35.50	6.55

1) Number of family firms within the sample. 2) Number of market capitalization observations within the data sample. Each firm will have a maximum of 240 (number of months) observations. Market capitalization is affected by changes in price and number of stocks per month and thus changes from month to month. 3) Number of months in the data sample as the time period is from 01.01.2000 to 01.01.2020.

5. Methodology

In this section, we present the theoretical background of the methodology used in the thesis. Section 5.2.1 goes further into the Fama and French three-factor model, and section 5.2.2 presents the Fama and French five-factor model. Section 5.2.3 explains our motivation for using the Fama and French five-factor model, while section 5.2.4 presents how we apply the model.

5.1 Performance measurement

Tobin's q and return on assets (ROA), as described in section 3, are commonly used as performance measurements, but since the scope of this thesis is family firms' stock performance, our dependent variable or performance measurement is family firm stock return, in excess of the risk-free rate. This dependent variable allows us to use the Fama and French five-factor model to analyze whether our family firm portfolio creates an abnormal return, which is the return an investor could have achieved in excess of being passively invested in the five factors.

5.2 Fama and French

A widely used asset-pricing model is the capital asset pricing model (CAPM) – a model well known for being able to estimate the cost of capital of firms and evaluate the performance of managed portfolios. The idea behind CAPM is that the return for an asset is a linear function of its systematic risk. This implies that the market only prices systematic risk and not idiosyncratic risk. However, despite the model's well-known reputation and being a mandatory curriculum in most MBA programs, its critics are many, often seeing the model failing to explain the cross-section of average returns on common stocks (Fama & French, 1993; 2004). Trying to improve this model, Fama and French (1993) developed a three-factor model that builds upon the CAPM. Later they introduced the five-factor model which enhanced the first three-factor model. We will in this section explain the models and why we use the Fama and French five-factor model in this thesis.

5.2.1 Fama and French three-factor model

Introduced in 1993, Fama and French (1993) added the two explanatory variables size (SMB) and book-to-market (HML) to the time series regression approach of Black, Jensen, and Scholes

(1972). Essentially, the work of Fama and French was to explain the average stock returns by controlling for the relation between size and average return, and the relation between average return and book-to-market.

The first factor in the model, an overall market factor (Mkt_RF), is the return on the value-weighted market portfolio in excess of a one-month U.S. T-bill.

To construct the two factors, SMB and HML, Fama and French form six portfolios based on market capitalization and book-to-market. First, they split the stocks into small (S) and big (B) based on whether stocks are below or above the median firm's market capitalization. Second, they rank the firms on book-to-market ratio and break the stocks into three book-to-market groups. The lowest 30% in one group (L), the middle 40% in another group (M), and the third group consisting of the 30% highest book-to-market firms (H). Lastly, they form six portfolios by grouping the small and the big stocks with the three classifications of book-to-market ratio (S/L, S/M, S/H, B/L, B/M, and B/H) (Fama & French, 1993).

The SMB factor is constructed by taking "the difference between the average returns on the three small-stock portfolios (S/L, S/M, and S/H) and the average return on the big-stock portfolios (B/L, B/M, and B/H)" (Fama & French, 1993, p. 9). Hence, the SMB factor should exclude any effect from the book-to-market ratio. The SMB factor represents the difference between the returns on a diversified portfolio of small stocks and a diversified portfolio of big stocks.

The HML factor is constructed by taking "the difference between the average on the two high-book-to-market portfolios (S/H and B/H) and the average of the returns on the two low-book-to-market portfolios (S/L and B/L)" (Fama & French, 1993, p. 9). As such, the HML factor should exclude the size effect in returns. The HML factor represents the difference between a diversified portfolio of stocks with a high book-to-market ratio and a diversified portfolio of stocks with a low-book-to-market ratio (Fama & French, 2015).

In their paper from 1993, Fama and French (1993) argue that the two latter (SMB and HML) factors are proxies for common risk factors or more-fundamental variables. In other words, they may capture sensitivity to macroeconomic risk which the beta in CAPM does not. The main rationale behind the SMB and HML factors are that, in the long run, small companies overperform large companies and value stocks tend to see higher returns than growth stocks (Fama & French, 1993).

5.2.2 Fama and French five-factor model

For many years, the three-factor model was seen as a powerful model to explain the variation in returns of stocks and portfolios. However, evidence later suggested the model to be incomplete. The model lacked the ability to capture the variation in average returns related to how profitable firms are and firms' investment activity (Fama & French, 2015). To capture these relationships, Fama and French (2015) extended the three-factor model to a five-factor model with the two factors RMW and CMA.

When introducing the RMW and CMA factors, Fama and French (2015) had to control for these two factors when constructing the SMB factor, and therefore changed the way the SMB factor was constructed. In the five-factor model, they split the SMB factor into $SMB_{B/M}$, SMB_{OP}, and SMB_{Inv}. The three new size factors control for book-to-market, profitability, and investment, respectively. Similar to the HML factor, the RMW and CMA factors are split into three groups each: low (W and C), medium (M_{RMW} and $M_{CMA)}$, and high (R and A) with the same percentiles. Then, they form twelve new portfolios combining size with profitability and size with investments. Each of the three SMB factors is constructed by taking the difference between the average returns on the three small portfolios (e.g. S/W, S/M_{RMW}, S/R) and the average return on the three large portfolios (e.g. B/W, B/M_{RMW}, B/R). Lastly, the overall SMB factor is the average of the returns on the three SMB factors: $SMB_{B/M}$, SMB_{OP}, and SMB_{Inv} (Fama & French, 2015).

To construct the RMW factor, Fama and French (2015) define the firms below the 30^{th} percentile as firms with weak profitability and firms above the 70^{th} percentile as firms with robust profitability. Profitability is defined as "revenues minus cost of goods sold, minus selling, general and administrative expenses, minus interest expense all divided by book equity" (Fama & French, 2015, p. 3). Then, the RMW factor is constructed by taking the difference between the average on the two robust portfolios (S/R and B/R) and the average of the returns on the two weak portfolios (S/W and B/W). As such, the RMW factor should exclude the size effect in returns. The RMW factor represents the difference between the returns on a diversified portfolio of stocks with robust profitability to a diversified portfolio including stocks with weak profitability (Fama & French, 2015).

The construction of the CMA factor follows a similar procedure. Fama and French (2015) define the firms below the 30^{th} percentile as conservative firms with respect to investment and

firms above the 70th percentile as aggressive firms. The grouping of investment is based on the change in assets from one year to another. The CMA factor is then found by taking the difference between the returns on two diversified portfolios of conservative (S/C and B/C) and aggressive firms (S/A and B/A). As such, the CMA factor should exclude the size effect in returns. The CMA factor represents the difference between the returns on a diversified portfolio of conservative stocks to a diversified portfolio of aggressive firms, here with respect to investment activity (Fama & French, 2015).

These two additional factors give us a model that outperforms the three-factor model in explaining the variation in returns of stocks (Fama & French, 2015). Seen below, is the equation representing the five-factor model:

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$$

The alpha is the intercept and the coefficients b_i, s_i, h_i, r_i, and c_i are the respective factor exposure or betas to the five risk factors. In other words, they can be interpreted as a measure of the sensitivity of a portfolio or asset to the factors. Furthermore, they represent how to mimic the return achieved in a portfolio.

Descriptive statistics for the five factors of Fama and French

Table 4 shows the descriptive statistics for the five-factor Fama French model. When looking at the mean performance, we note that the HML, RMW, and CMA portfolios, on average, perform approximately the same. The HML portfolio has the highest standard deviation among the three, while the RMW portfolio is the least volatile. The SMB portfolio performs, on average, the worst as the mean performance is the lowest among the five factors. Lastly, the market minus risk-free portfolio has the highest mean performance but also the highest standard deviation.

Table 4: Descriptive statistics of the five-factors

Statistic	N	Min	Mean	Median	Max	St. Dev.
Mkt-rf	240[3]	-19.51	0.41	0.93	11.41	4.38
SMB	240[3]	-8.68	0.19	0.10	8.36	1.86
HML	240[3]	-10.08	0.38	0.16	12.20	2.40
RMW	240[3]	-5.74	0.36	0.39	6.17	1.54
CMA	240[3]	-5.03	0.34	0.07	9.55	1.89
RF	240[3]	0.00	0.14	0.09	0.56	0.15

3) Number of months in the data sample as the time-period is 01.2000 to 12.2019.

5.2.3 Motivation for using the Fama and French five-factor model

As introduced in section 5.2, CAPM explains that the market only prices systematic risk and not idiosyncratic risk. Specifically, the model explains an asset's sensitivity to market risk, but do not differentiate between the various systematic risk factors coherent in the market. To solve this, Fama and French attempt to capture these specific systematic risk factors by first introducing size-risk and value-risk, and later adding profitability and investment as risk factors. With the five-factor model, it is assumed that the model captures the expected return explained by all five systematic risk factors. Any alpha, as measured by the intercept, is thus attributable to idiosyncratic risk which is not explained by the model. This depends on the assumption that the five-factor model does indeed capture all possible systematic risk and performance above and beyond that priced by the market. Consequently, any significant alpha could be interpreted as firm-specific risk. Lastly, this allows us to isolate the family effect on firms' performance, and therefore the five-factor model is appropriate for this thesis.

5.2.4 Application of the Fama and French five-factor model

The five factors are retrieved from the website of Ken French. By using the Fama and French five-factor model on our value-weighted and equal-weighted portfolios described in section 4.1.1, we seek to explain the returns of our family firm portfolios. Particularly, we are interested in the intercept, as a statistically significant result here suggests an abnormal return for family firms. Moreover, this suggests that an investor could have earned excess return by investing in family firms instead of passively investing in the five factors.

Moreover, we choose to use the Fama and French factors of the developed world, including companies from 23 different countries around the globe, such as Norway, Sweden, Finland, Denmark, USA, Japan, Australia, and more. The reason for choosing factors from the developed

markets are two folded. First, the factors should represent the investing option an investor has when deciding to invest in the world market. As there are no factors representing the entire world market on the Ken French website, the developed market factors are those factors that most closely represent the world market. Second, the factors considering the developed market include the countries in the Nordic region, which is important as this is the region of concern. We further argue that factors from the developed markets are reasonable to use to represent the investment opportunities for an investor having the world as a market. This is because world indexes, such as the MSCI World Index, also base their world index on companies across the same 23 developed markets as our factors are based on.

To answer our research question concerning the stock market performance of family firms, we use a time-series analysis. We perform a joint test of abnormal performance and test if the five-factor model captures all systematic risks that are priced by the market. The five-factor model is estimated by linear regression.

6. Empirical Results and Analysis

We will in this section present our findings and analyze the results. Section 6.1 looks at the performance of the Nordic equal-weighted portfolio. In section 6.2 we examine the results of our regression on the Nordic value-weighted portfolio. In section 6.3 we analyze the country- and year-specific results with respect to performance. In section 6.4 we perform a robustness test.

6.1 Performance of the Nordic equally-weighted portfolio

Following the method described in 5.2.4, Table 5 presents the coefficient estimates for the Nordic equal-weighted portfolio (1). We note that the intercept is positive, meaning that there is a positive abnormal return for family firms in excess of the five factors, and the monthly alpha is 1.04%. This result is statistically significant at a 0.1% level. Moreover, we note that the portfolio is positively correlated with the market. However, the portfolio moves less than the market (the coefficient for Mkt_RF < 1) and this result is statistically significant at a 0.1% level.

Further, when we employ the Fama and French five-factor model to estimate portfolio-risk adjusted returns and risk exposures, we observe that family firms display a high exposure to size risk (SMB). Specifically, we note that the family firm portfolio would gain 0.43% if the SMB portfolio were to gain 1%. This is to be expected for two reasons: Family firms tend to be small as shown in the descriptive statistics where the mean firm has a market capitalization of 1.3 billion and a median at 780 million euro in market capitulation. These levels are to be considered small as various investment professionals define a small firm as less than 5 billion euro (Ludvigsen, 2019), less than 2.5 billion euro (Klerk, Kersley, Bhatti, & Vair, 2018), and less than 2 billion euro (S&P Global, 2020). Consequently, our sample consists of many small firms. Further, as an equal-weighted portfolio gives more weight to smaller firms, it is to be expected that our portfolio has high exposure to size risk.

Table 5: Performance of the equal-weighted portfolio (1) and the value-weighted portfolio (2).

	Dependent variable:	
	$R_{it} - R_{Ft}$	
	(1)	(2)
Intercept	1.04***	2.19**
	(4.57)	(3.30)
Mkt_RF	0.72***	−0.02
	(10.74)	(-0.09)
SMB	0.43**	−0.90*
	(2.77)	(-2.34)
HML	0.02	−0.42
	(0.11)	(-0.90)
RMW	−0.24	−0.37
	(-1.11)	(-0.76)
CMA	−0.32	0.33
	(-1.23)	(0.59)
Observations	240	240
R^2	0.59	0.03
Adjusted R^2	0.58	0.01
Note:	*p<0.05; **p<0.01; ***p<0.001	

Our results are stationary and robust to autocorrelation and heteroscedasticity. To check for autocorrelation, we perform the Breusch-Godfrey test, and to check for heteroskedasticity we performed the Breusch-Pagan test. We use robust standard errors to confront the issues of heteroskedasticity and autocorrelation.

One could expect that the CMA factor, which is a proxy for whether firms invest conservatively or aggressively, to be significant in either direction. On the one hand, family firms are often said to be conservative both with respect to debt levels and investment activity (Klerk, Kersley, Bhatti, & Vair, 2018). On the other hand, as we are dealing with small-cap firms that assumingly are expected to grow and take market share, one would assume that they need to invest in an aggressive way to accomplish such features. Neither relationship shows in the results. Different firms may load differently on the CMA factor and hence the results are offset.

Any results from an equal-weighted portfolio consisting of small caps and large caps can be questioned due to the difficulty to replicate the portfolio and the return in real life. An equal-weighted portfolio takes for granted that one can increase/decrease the weighting in the small caps without any issue. It may be difficult to perform transactions in small caps with low liquidity and even if one were able to do transactions in an illiquid stock, one would most likely

affect the price. Additionally, since the Fama and French portfolios are value-weighted, one can also run a value-weighted portfolio in the model.

6.2 Performance of the Nordic value-weighted portfolio

Regression (2) in Table 5 reports the coefficient estimates for the Nordic value-weighted family portfolio. We notice that the intercept again is positive and shows an abnormal return for family firms, with an average monthly alpha of 2.19%. This result is statistically significant at the 1% level. Contrary to the equal-weighted portfolio, however, the value-weighted portfolio is not statistically significant with respect to how the market moves (Mkt_RF), but only to how the size factor (SMB) fluctuates. This is rather interesting as one expects that independently of whether the family firms are equal- or value-weighted that they would be somewhat correlated with the general market. This result is therefore surprising.

The portfolio is negatively exposed to the size factor, meaning that the portfolio tilts towards larger family firms. This is to be expected in a value-weighted portfolio as it consistently rebalances the portfolio with respect to market capitalization for the family firms in the sample. If large firms, which gets a higher weight in a value-weighted portfolio than smaller firms, perform well, the value-weighted portfolio will outperform an equal-weighted portfolio, even if the smaller firms outperform the larger firms. This is a mathematical consequence of a value-weighted portfolio. Since our value-weighted portfolio does indeed outperform the equal-weighted portfolio by 1.15 percentage points, this suggests that our portfolio does consist of high performing large-cap firms.

To check for this, we investigate which firms in the value-weighted portfolio that has a large weighting based on market capitalization. We find that ten firms account for 59% of our portfolio in terms of market capitalization as of 31.12.2019 and that our three largest firms Novo Nordisk (Denmark), Atlas Copco (Sweden), and Kone (Finland) account for 21%, 7%, and 6%, respectively. We then create a value-weighted portfolio of these ten large well-performing firms and run a regression to see if the abnormal return is similar or not to the Nordic value-weighted portfolio. The results are shown in Table 6 regression (1). We observe that the average monthly alpha of this portfolio is 2.09 % and is similar to the 2.19% of the Nordic value-weighted portfolio. This suggests that these firms account for a large portion of the Nordic value-weighted portfolio's return. Lastly, the two portfolios have approximately the same weight in the size factor (SMB).

Table 6 shows the coefficients estimates of three regressions: A portfolio of the ten largest firms (1), the Nordic value-weighted portfolio without Novo Nordisk (2), and a regression of only Novo Nordisk (3). These will be discussed in numerical order.

Table 6: Performance of the ten largest firms (1), full portfolio without Novo Nordisk (2), and Novo Nordisk alone (3).

	Dependent variable:		
	$R_{it} - R_{Ft}$		
	(1)	(2)	(3)
Intercept	2.09***	0.81*	1.68***
	(3.38)	(2.19)	(3.66)
Mkt_RF	0.07	0.84***	0.31*
	(0.36)	(7.69)	(2.16)
SMB	−0.83*	0.24	−0.61*
	(-2.17)	(1.07)	(-2.15)
HML	-0.26	−0.28	−0.29
	(-0.57)	(-0.96)	(-0.93)
RMW	−0.21	0.76**	−0.25
	(-0.46)	(2.61)	(-0.75)
CMA	0.29	−0.21	0.20
	(0.52)	(-0.47)	(0.46)
Observations	240	240	240
R^2	0.59	0.26	0.07
Adjusted R^2	0.58	0.24	0.05
Note:		*p<0.05; **p<0.01; ***p<0.001	

Our results are stationary and robust to autocorrelation and heteroscedasticity. To check for autocorrelation, we performed the Breusch-Godfrey test, and to check for heteroskedasticity we performed the Breusch-Pagan test. We use robust standard errors to confront the issues of heteroskedasticity and autocorrelation.

As a side note, considering transaction cost, an investor might have been better off investing in the ten large firms rather than investing in the full Nordic value-weighted portfolio. Note though that this argument is highly sensitive to ex-post performance and is not an indicator of future returns.

Why has Novo Nordisk been wrongly priced

To further investigate our results, we exclude Novo Nordisk from the Nordic value-weighted portfolio. This is due to Novo Nordisk accounting for 21% of the full Nordic value-weighted

portfolio discussed above, which is three times more than the second-largest firm. Consequently, the firm has the potential to skew the data and the outcome of the analysis.

To assess how much Novo Nordisk's performance impacted our Nordic value-weighted portfolio we performed a regression (regression (2) in Table 6) without Novo Nordisk. The results were quite surprising as the alpha fell to 0.81% from 2.19%, meaning that our Nordic value-weighted portfolio is highly sensitive to Novo Nordisk. To validate this, we created a portfolio with Novo Nordisk alone and observed that the monthly average return was 1.68% and significant at a 0.1% level. This confirms our finding in regression (2). Indeed, the Nordic value-weighted portfolio is highly driven by Novo Nordisk's performance. We will in the following explain how any potential mispricing could have happened for such a long time.

The efficient market hypothesis (EMH) got widely accepted by academia after Eugene Fama's influential survey article "Efficient Capital Markets: A Review of Theory and Empirical Work" (Fama, 1970). The general view was that "securities markets were extremely efficient in reflecting information…(and) when information arises, the news spreads very quickly and is incorporated into the prices of securities without delay" (Malkiel B. G., 2003, p. 59). To further understand EMH, one should define the term efficiency. Here, we use the definition that an efficient financial market is one that does not allow investors to earn an above-average return without accepting above-average risks (Malkiel B. G., 2003).

To understand how Novo Nordisk could have been mispriced for such a long time, we first must look at the arguments regarding short-term momentum and underreaction to new information. Lo and MacKinlay (1999) find that there seems to be some momentum in the short run and that there are too many successive movements in the same rejection. According to behavioral economists, this is due to the "bandwagon effect" which states that individuals see a stock price rising and are drawn into the market (Malkiel B. G., 2003). While there might be possible to earn an excess return by following a momentum strategy, once you include transaction costs, several studies, such as Lesmond, Schill, and Zhou (2004), show that such strategies fail to be profitable anyhow.

Moreover, there is substantial research that shows that, in the long run, the market reverts to the mean. This is because when a firm can earn an above-average return on capital, the competitors will observe this and want a piece of the pie. This causes increased competition and the deterioration of economic profit. Consequently, there is a mean-reversion to earning above-

average returns. (Poterba & Summers, 1988). As a result, it should be highly difficult for Novo Nordisk to operate with an above-average return over two decades.

Interestingly, Malkiel (2003) finds that the mean reversion is weaker in some periods than others. This could imply that our time period is indeed one where this is the case, and could explain why the market did not manage to efficiently price Novo Nordisk. Yet, this is not an indication that it should continue in the future. This argument could be true as the time period includes both the internet bubble of the early 2000s and the financial crisis. However, it seems rather weak, as while stock prices might at times be irregularly priced, the market is quick to efficiently price securities.

One explanation for Novo Nordisk's extensive outperformance is that family firms, in general, tend to trade at a discount as high family ownership gives minority shareholders less ability to control corporate governance such as active investments and dividend policies. Minority investors are also more exposed to the risk of expropriation by controlling block-holders (Cella, 2009). The controlling owner of Novo Nordisk has over time held close to 75% of its voting shares. This could suggest that investors might have discounted Novo Nordisk throughout the whole time period to compensate for the risk of possible expropriation by the dominant owner and a conservative corporate governance policy.

However, we argue that the main reason for Novo Nordisk's outperformance, as a world-leading provider of diabetes-care products with a market share of more than 50%, is that the forecasts were too conservative at the beginning of 2000 and 2005. In the article "Global Prevalence of Diabetes: Estimates for the year 2000 and 2030", researchers tried to forecast the prevalence of diabetes and the number of people of all ages with diabetes for the year 2000 and 2030 (Wild, Green, Sicree, & King, 2004). They found that the prevalence of diabetes for all age-groups worldwide was to reach 4.4% within 2030 and rise from 171 million in 2000 to 366 million in 2030. Shaw, Sicree, and Zimmet (2010) wrote another article in 2010 where they estimated that by 2010, diabetes prevalence for all age-groups worldwide would have grown to 6.4% or 285 million, and 7.7% or 439 million by 2030.

When we look at the actual numbers, we note that obesity and diabetes have become far more common than initially anticipated. Already by 2019, the prevalence of diabetes reached 9.3% or 463 million which is 10 years ahead of the previous forecasts and is now expected to reach 10.2 % or 578 million by 2030 (Saeedi, Petersohn, Salpea, Bright, & Williams, 2019).

In retrospect, we know now that the diabetes forecasts were too low at the beginning of 2000 and these estimates have gradually been increased year by year as the actual numbers have been above the pre-estimations. Consequently, we argue that investors likely priced Novo Nordisk correctly with respect to the available information regarding diabetes, but the continuous increase in diabetes forecasts worldwide also lead to an incrementally improved trajectory for Novo Nordisk as a firm. This was something investors could not price ex-ante and thus, this has to be the source of the continued mispricing which we have observed in our data.

6.3 Country- and year-specific results

We are also interested in whether there are any differences in results among the Nordic countries. To investigate this, we create four portfolios, one for each country, only including family firms from the respective country. Even if the four countries of concern have mainly similar characteristics to their firm population, there are also some differences in characteristics that may be pivotal with regards to the return of the firms. Some country-specific characteristics that may influence performance are that Norway is heavily oil-dependent while Finland and Sweden have a more differentiated industrial focus, and Denmark has more pharmaceutical companies.

Table 7: Country-specific results

Statistic	Denmark	Finland	Norway	Sweden
Intercept	2.28***	1.27**	0.87	1.27***
	(3.68)	(2.80)	(1.73)	(4.85)
Mkt_RF	0.09	0.66***	0.54***	0.93
	(0.43)	(5.45)	(3.92)	(13.79)
SMB	−1.08**	0.39	0.78	0.21
	(-2.83)	(1.67)	(1.50)	(0.97)
HML	−0.42	−0.27	−0.99*	−0.43
	(-0.91)	(-1.00)	(-2,01)	(-1.74)
RMW	−0.70	0.94**	−0.71	−0.37
	(-1.41)	(2.92)	(-1.38)	(-1.18)
CMA	0.36	−0.17	0.12	0.17
	(0.65)	(-0.46)	(0.28)	(0.53)
Observations	240	240	240	240
R^2	0.05	0.17	0.29	0.60
Adjusted R^2	0.03	0.15	0.28	0.59
Note:		*p<0.05; **p<0.01; ***p<0.001		

Our results are stationary and robust to autocorrelation and heteroscedasticity. To check for autocorrelation, we performed the Breusch-Godfrey test, and to check for heteroskedasticity we performed the Breusch-Pagan test. We use robust standard errors to confront the issues of heteroskedasticity and autocorrelation.

The results of the four countries' value-weighted portfolios are reported in Table 7. We find that Denmark has the overall highest monthly abnormal return, compared to the other countries, with an alpha of 2.28%. Finland and Sweden follow with both having an alpha of 1.27%. Norway has achieved an alpha of 0.87% but the coefficient is not significant at a 5% level. This suggests that the Norwegian family firm portfolio has not generated higher returns than being passively invested in the five factors of Fama and French during our sample period. The return of the Norwegian family firm portfolio seems to be explained by exposure to market risk and low book-to-market firms. The results in Table 7 are particularly interesting, showing us that most of the Nordic family firm portfolio's overperformance compared to the five factors is due to family firms in Denmark, as this portfolio achieves an even higher alpha than the whole region. Moreover, these results also support the discussion about Novo Nordisk's importance in the Nordic family firm portfolio as Novo Nordisk is a substantial part of the Danish portfolio.

Furthermore, we examine whether there have been any differences in when the Nordic family firm portfolio achieved its alpha. To do this we split our portfolio into four five-year periods,

2000-2004, 2005-2009, 2010-2014, and 2015-2019. Interestingly, there are no significant results in the first and last five-year period. That is, the overperformance of family firms was obtained in the period 2005-2015. Between the years 2010-2014 the family firm portfolio achieved an astonishing alpha of 3.69%, making up most of the portfolio's abnormal return in our 20-year time period.

We note that the price of Novo Nordisk has more or less been flat during the last five years of our sample period and, considering how important Novo Nordisk is in our portfolio, this may be the reason why our portfolio does not show any significant alpha in the last period. This suggests that the pricing of Novo Nordisk was more correct during the last five-year period and that the number of diabetes cases was more aligned with the forecast. Furthermore, in the same period, the family firm portfolio excluding Novo Nordisk does not show any significant alpha as well, giving more magnitude to the fact that family firms generally did not create an abnormal return during the last 5 years.

6.4 Robustness tests

Empirical model uncertainty is something that cannot be avoided in analytical science, and there are several reasons why measurement uncertainty occurs. Human error is one of these causes, and bias towards input variables can cause a researcher to alter the outcome of an empirical study without purposely doing so. In this paper, one source of human bias could be that even though our findings show that family firms generate higher returns than passively investing in the five factors, this performance may not necessarily be a consequence of being a family firm but rather stem from a country's market performance.

To account for this country-specific performance, we download the total return for the "All Index" for each country (e.g., Copenhagen All Index), representing most of the firms publicly listed in the respective countries. These indexes are value-weighted and consist of both family and non-family firms. As we do with our family firm portfolio, we regress the four different indexes against the Fama and French five-factor model. The results are presented in Table 8. Any significance concerning the intercept will indicate that the market, in general, has created an abnormal return for the last 20 years compared to passively being invested in the five factors. Moreover, this will mean that the general performance of the market in one or more of the Nordic countries at least partially accounted for the family firm's performance and one could not fully suggest that family firms indeed are better at generating higher returns.

Table 8: Regressions of the Nordic Indexes

Statistic	Denmark	Finland	Norway	Sweden
Intercept	0.48	0.32	0.37	0.40
	(1.95)	(0.83)	(1.47)	(1.69)
Mkt_RF	0.75***	0.93***	0.95***	0.98
	(10.07)	(8.59)	(11.54)	(15.19)
SMB	0.18	−0.51	0.27	−0.04
	(1.28)	(-2.13)	(1.75)	(-0.23)
HML	0.07	−0.18	0.24	−0.34
	(0.43)	(-0.65)	(1.27)	(-1.77)
RMW	0.21	−0.59	0.01	−0.35
	(1.22)	(-1.92)	(0.06)	(-1.34)
CMA	-0.36	−0.19	−0.44	−0.11
	−1.50	(-0.40)	(-1.64)	(-0.42)
Observations	240	240	240	240
R^2	0.52	0.47	0.62	0.67
Adjusted R^2	0.51	0.46	0.62	0.66
Note:		*p<0.05; **p<0.01; ***p<0.001		

Our results are stationary and robust to autocorrelation and heteroscedasticity. To check for autocorrelation, we performed the Breusch-Godfrey test, and to check for heteroskedasticity we performed the Breusch-Pagan test. We use robust standard errors to confront the issues of heteroskedasticity and autocorrelation.

However, our findings indicate that none of the Nordic indexes had an abnormal return with respect to the Fama and French five-factor model at a significance level of five percent. This suggests that there is *something else* than the general performance of the Nordic markets that explains the abnormal return of the family firm portfolio. Consequently, this supports that it is the family firms themselves that are the reason behind the family firm portfolio's outperformance, that causes this abnormal return. This finding is consistent with research done by Anderson and Reeb (2003) which shows a positive relationship between public family firms and family ownership in the US. One could argue that the same relationship applies to Nordic countries as well.

Note that the t-value for the Danish market is close to the acceptance limit of 1.96, suggesting that the Danish family firm portfolio's alpha could potentially be somewhat explained by the Danish market performance. Yet, the intercept is not significant at a 5% level and thus the null hypothesis that the intercept is equal to zero is not rejected.

7. Limitation of research

In this section, we discuss relevant limitations to our study. More specifically, we discuss the problems involving survivorship bias, endogeneity, and the sensitivity of our results to the family definition.

7.1 Survivorship bias

A caveat with our sample is that we fail to include firms that stop being a family firm during our sample period. That is, all family firms that for various reasons cease being a family firm by 2020 are eliminated from the sample. Firms may disappear because of closure, reduction of shares leading to less than 20% ownership, or that the firm has been delisted. We have chosen 2019 as our base year with regard to ownership. In other words, we have looked at the firms' ownership situation at the end of 2019 and selected the firms that meet our definition of a family firm. As a consequence, our family portfolio consists only of firms that have survived since being listed until today, which may cause a positive bias to our results. This is a bias that a normal stock index would not suffer from as such an index would include firms going in and out of the index.

To avoid such survivorship bias, we would have to screen family ownership for each year in the sample period and allow firms to enter and exit the portfolio. This would, however, take more time than is possible for a master thesis since the ownership data is collected manually. There might not be any clear answer to what would have been the best solution regarding the choice of the base year, but the main takeaway is to be aware of the potential positive survivorship bias in our results.

7.2 Endogeneity

One important limitation which our research might suffer from is the endogeneity problem. Endogeneity means that the regressor is correlated with the error term (Wooldridge, 2009), and endogeneity leads to the causality problem which is "does X cause Y or does Y cause X". In our analysis, the question is whether family ownership improves performance, or if strong performance causes families to hold on to their ownership. As family firms, commonly defined as run by a founder or close relative to the founder, often have good information about the

firm's future trajectory, one could logically assume that founders will only hold on to the ownership if the prospects look bright and promising. Alternatively, one could expect family firms with a negative trajectory to decrease their ownership as they are exposed to this decrease in wealth creation, and this leads to a sample with only those businesses with positive outlooks. However, Anderson and Reeb (2003) argue that while it could be logical for family firms to decrease their holdings if the firms perform unsatisfyingly, it will require tremendous foresight for family firms to do this in advance as they on average hold their stakes for 75.9 years. Anderson and Reeb (2003) go further and argue that this implies that family firms have better information than institutional investors. It also suggests that they are better at estimating the future path of their own businesses than institutional and professional investors. This is contradictory as the efficient market hypothesis suggests that prices should incorporate all available information.

In sum, it is plausible that our regressor indeed is correlated with the error term, and that our findings cannot conclude that an investor would be better off holding a portfolio of family firms than passively owning the whole market.

7.3 Family firm definition issue

We want to elaborate on section 2.1 and section 3 about family firm definitions and how this can impact our results. As we saw in section 2.1, there are several ways to define a family firm and these definitions can lead to various outcomes. As an example, Amit and Villalonga (2006) who researched the relationship between family firms and performance found that the result was insignificant, positive, or negative, all depending on how they defined family firms. This illustrates the coherent problem when researching family firms. However, we use a stricter definition than applied by Anderson and Reeb (2003) and Amit and Villalonga (2006), as they do not require an ownership threshold to define a family firm, while we use 20%.

On the other hand, Berzins and Bøhren (2013) argue that the ownership threshold should be at least 50%, but they look at private firms where there are more incidents of ownership-levels above 50%. Looking at public firms, our threshold of 20% ownership gives us a larger data sample to examine.

To check whether only including those firms where the family owns 50% or more would change our results, we made a value-weighted portfolio only consisting of such firms. We use the same

definition as described in section 2.1.2 except changing the ownership threshold from 20% to 50%. Strengthening our main findings, this portfolio does not show any different result, achieving a monthly alpha of 2.24%. Since we get the same positive results with firms having a family majority owner, it leads to the same finding that family firms have generated higher returns in the last 20 years. Interestingly, removing Novo Nordisk from this portfolio also has an impact. The monthly alpha drops from 2.24% to 0.92% and is only statistically significant at a 10%-level. This implies that the performance of Novo Nordisk heavily influences this portfolio's performance too. These results suggest that we can continue with the same conclusion drawn from the portfolio with an ownership threshold at 20%. We emphasize the uncertainty family firm definitions may bring upon the results of family firm studies.

8. Conclusion

This study examined the effect family ownership have on stock market firm performance in 2000 - 2019. We define a family firm as a firm where the founder, or individuals related to the founder either by blood or marriage, has at least 20% ownership. Active participation by the family is not necessary, but rather a right. Furthermore, we have used a linear regression of the Fama and French five-factor model to test whether a portfolio of Nordic family firms has generated higher returns than being passively invested in the five factors over the last 20 years.

Overall, the results show that the value-weighted Nordic family firm portfolio has generated an average monthly abnormal return of 2.19%. This result is statistically significant. It suggests that, during the last 20 years, an investor would have been better off investing in Nordic family firms than the five factors of Fama and French. Moreover, this is in line with prior research on public family firms in the U.S. (Amit & Villalonga, 2006; Anderson & Reeb, 2003), and several European countries (Cella, 2009). We have ruled out the possibility of general market overperformance in the Nordic countries as a reason why our family firm portfolio shows such great performance, which suggests that there may indeed be a family effect on these firms. Moreover, our equal-weighted portfolio also suggests that our family firm portfolio creates a monthly abnormal return, as it generated an average monthly abnormal return of 1.04%. However, it might be difficult to replicate such a portfolio due to liquidity issues.

We further investigate the economic rationale as to why our Nordic family firm portfolio has performed so well and find that our value-weighted portfolio is highly affected by the performance of the ten largest companies, which account for 59% of our portfolio's market capitalization. There is specifically one company, namely Novo Nordisk – the danish diabetes market leader, that does extraordinary well. Due to its substantial market capitalization, the firm dominates both the Danish portfolio but also the Nordic value-weighted portfolio and has a severe influence on how our portfolio performs. Thus, our findings are also economically significant.

We note that our portfolio might suffer from a survivorship bias and an endogeneity problem. This may cause a positive bias to our results, meaning that our portfolio shows better performance than what might be the actual case. As such, we encourage further research by either using different definitions of family firms than what has been applied in this thesis or by controlling for specific industry effects.

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