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A study of long-term stock performance and firm age-at-IPO
in the Nordic countries

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A study of long-term stock performance and firm age-at-IPO in the Nordic countries

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By

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ABSTRACT

We study 117 IPOs in the Nordic countries from 2000 to 2015, investigating whether there is an age-effect on firm performance, and the relationship between long-term stock performance and firm age-at-IPO. We define long-term stock performance as the firm's five-year CAPM abnormal return relative to a portfolio of peers. We find that there is a negative relationship between sales growth and aging. Moreover, cash flow volatility and net profit margin seems to be somewhat related to firm age-at-IPO. However, the results are not statistically significant at a sufficient level. We also find no statistically significant relationship between abnormal return and firm age at-IPO. Thus, we conclude that there is no evidence of a relationship between long-term stock performance and firm age-at-IPO in the Nordic countries in our sample.

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1. Introduction

An initial public offering (IPO) is a public transaction where the company sells shares of a subsidiary to new shareholders in the stock market (Koller et al., 2015). Generally, IPOs are used as a way for companies to raise equity capital and create a public market for founders and shareholders (Ritter & Welch, 2002). However, previous literature finds that the motivation for going public differs across firms based on firm characteristics. Bancel & Mittoo (2009) argues that the motivation for performing an IPO is dependent on ownership structure, size, and age. They found that larger firms valued external monitoring strongly, while smaller firms considered the ability to raise equity capital as most valuable. In addition, the study found that older firms value stock liquidity to a greater extent than younger firms.

Previous research has found that there is a monotone relationship between long term stock performance and firm age with evidence from the US (Ritter, 1991; Clark, 2002). This study aims to find out if the same relationship applies in the Nordic countries. Thus, the research question is defined as: Is there a relationship between long-term stock performance and firm age-at-IPO in the Nordic countries?

We investigate IPOs performed in the Nordic countries in the period 2000-2015. We exclude Iceland due to the illiquidity of the Icelandic stock market and limited data availability. Thus, the Nordic countries are defined as Denmark, Finland, Norway, and Sweden. First off, this study will try to establish if there is an age-effect on firm performance based on findings from previous literature.

The research on firm age as a variable in measuring impact on firm performance is limited. According to Coad et al. (2013) firm age is often used interchangeably with firm size due to the high correlation among the two. Furthermore, they argued that even though firm age and firm size are highly correlated, there are some significant differences between the two. This paper investigates if age affects firm performance by testing several performance indicators with reference to existing literature. This will include testing the relationship between age and the four different performance indicators: Net profit margin (NPM), research and development expenditures (R&D), sales growth (SG), and cash flow volatility (CFV). To test this, we will conduct four different simple ordinary least square

(OLS) regressions and perform mean difference t-tests. The hypotheses that are being tested:

Hypothesis 1: Firm's net profit margin are related to the age of the firm.

Hypothesis 2: Firm's level of R&D expenditures are related to the age of the firm

Hypothesis 3: Firm's sales growth are related on the age of the firm.

Hypothesis 4: Firm's cash flow volatility are related to the age of the firm

Moreover, to address our research question, we will estimate the five-year abnormal returns of 117 Nordic IPO firms. The abnormal returns will be estimated by comparing each individual IPO-firm's expected return, with manually constructed portfolios of matching firms, based on geography, sector, and size. The expected return will be calculated with the use of a market equilibrium model, specifically, the Capital Asset Pricing Model (CAPM). To address our research question, we present the following hypothesis:

Hypothesis 5: There is a relationship between abnormal return and firm age-at-IPO.

In contrast to similar IPO studies, we will not be focusing on underpricing in this study. Loughran & Ritter (2004) argues that one of the reasons that underpricing occur is due to asymmetric information between the issuer, the underwriter, and the investor, and find that IPOs tend to yield high aftermarket stock return the first trading day. This paper does not consider the underpricing phenomenon. Hence, the first-day returns are excluded from our study.

2. Literature review

In previous research it is not uncommon to include firm age as a variable when investigating what drives long-term stock performance. However, empirical evidence concerning the relationship between the two variables exclusively is scarce. We found two studies with satisfactory data samples and credibility. This chapter will review relevant evidence from the two studies and literature regarding the relevance of using firm age as a variable in our research.

Moreover, we will review the existing relevant literature on the relationship between long-term stock performance and firm age-at-IPO, and present evidence from the literature as to why other variables are taken into consideration.

2.1. Firm age as a variable

Coad et al. (2013) find that existing literature tends to use firm age and firm size as interchangeable variables. They argue that that even though the variables are closely related, there are significant differences between the two. The study was composed of 62,259 Spanish manufacturing firms during the period from 1998 to 2006. Interestingly, the study found evidence that firms both improve and deteriorate with aging. Firms improve in terms of increased productivity, profits, increased size, and decreasing leverage, but deteriorates in terms of the lower expected growth of sales, profits, and profitability. The aging of firms also tends to decrease the capability of converting employment growth into the growth of sales, profits, and productivity. Aligned with these findings, Cowling et al. (2018) presented evidence of a similar tendency in the United Kingdom, based on a study of 4580 small and medium-sized enterprises (SMEs) from 2010 to 2012. The results showed that young firms have high growth of sales and employment in the first years of existence, but as they age the growth declines. Both of the aforementioned studies are consistent with previous findings from Evans (1987), who found evidence from the US in the period 1976-1980, that there exists an inverse relationship between firm growth and firm age with size held constant.

The study from Coad et al. (2013) also presents three theories as to why productivity levels are affected by aging. The three different theories are selection effects, learning-by-doing effects, and inertia effects. These theories will be briefly explained in the following sections.

2.1.1. Selection effects

According to Coad et al. (2013) selection effects increase the average productivity levels of surviving firms regardless of whether the productivity level remain consistent with firm age. This is due to the fact that low productivity firms will exit the market. Based on the general conception that nonprofitable firms will fail while profitable firms will survive, firms with low profitability will be eliminated. As competition from the market is eliminated, the older remaining firms tend to have higher productivity and profitability.

2.1.2. Learning-by-doing effects

A theory from Arrow (1962) further examined by Coed et al. (2013), is the learning-by-doing effect. As firms grow older, they tend to be more efficient and more experienced in dealing with the production processes. Besides, they have an established reputation, a customer base, and are more prone to deal with unexpected events as they have dealt with similar events in the past. This indicates that older firms have a steadier growth and less volatile cash flows.

The learning-by-doing effect is strongly in favor of growth for older firms. Storey et al. (1987) argue that for a whole cohort of newly-established firms, under five percent manage to grow steadily and rapidly enough to become a major player in their industry. However, according to Baldwin (1995), the firms that manage to survive may grow enough to capture additional market shares. The young firms that eventually have managed to become major players have gained benefits from their way of solving problems such as better processes and increased performance (Garnsey, 1998).

2.1.3. Inertia effects

The inertia effect is another theory presented by Coed et al. (2013). The theory explains that older firms tend to be more rigid and “stuck in their ways” as they age, which affects the way they cope with changes in the market, such as, adjusting to new trends or expand to new markets. Older firms suffering from the inertia effect can partly be explained by the Schumpeterian economic theory on innovation which suggests that firms gain market shares by innovating (Andersen, 2009). Furthermore, Czarnitzki & Kraft (2004) found that entrants to markets tend to invest more in R&D than incumbents. These findings support the theory of the inertia effect by showing that incumbents invest less in research and development than entrants which reflects older firms' rigidity.

2.2. Innovation

Cucculelli (2018) conducted a study to explain the relationship between the probability of product innovation and firm age. The study comprised 2163 Italian manufacturing firms in the period from 2000 to 2010. The empirical analysis questioned previous findings from Huergo & Jaumendreu (2004), that there is a negative correlation between firm age and product innovation. The study found evidence that, when controlling for product age and CEO tenure, the relationship ends up positive. A common way to measure a firm's ability to innovate is by studying the number of funds invested in research and development (R&D).

Previous literature has found that R&D expenditures can be a risky investment. Coad et al. (2016) found that younger firms with high growth rates were positively affected by investments in R&D, while younger firms with low growth rates were affected negatively. In addition, the authors argue that older firms' investments in R&D are less risky than for a younger firm.

Regardless of whether the relations discussed above are positively or negatively related to firm age, the research conducted on the subject has found evidence that there is in fact a relationship between the variables. These findings lay the foundation for our motivation to examine whether long-term stock performance is affected by firm age-at-IPO.

2.3. Abnormal return and firm age-at-IPO

Ritter (1991) documents a strong monotonic relationship between long-term stock performance and firm age-at-IPO in the US market. The study comprised 1526 IPOs in the period from 1975 to 1984. The evidence from Ritter shows that IPOs tend to underperform relative to matching firms and that the underperformance is more notable for young firms and firms going public in heavy volume years. The performance indicator Wealth Relative (WR) was used to measure the average three-year total return of IPOs against the average three-year total return of comparable firms. A WR greater than 1 indicates IPOs outperforming comparable firms contrary to a WR less than 1 which indicates IPOs underperforming. The study found that on average the WR of all IPOs included was 0.83. That is, a strategy where you invest in all the 1526 IPOs and hold for the three years, would return 0.83 cents on every dollar invested compared to investing the same amount in a group of matching firms.

Similar to Ritter (1991), Clark (2002) found that there is a monotone relationship between firm age-at-IPO and long-term stock performance. The study found that a 100% increase in firm age, results in a 3.16% increase in three-year holding period excess return. The study included 1234 firms that had U.S. common stock IPOs between January 1, 1991, and December 31, 1997. Further, the study examined the differences between technology IPOs and non-technology IPOs. Interestingly, the results showed that, while there is a positive monotonic relationship between firm age-at-IPO and stock performance for non-technology firms, the technology firms have a negative relationship between performance and age. The findings provide further support to the initial claim of Ritter (1991), that the performance may be enhanced by industry factors. Further evidence is also presented, that IPOs tend to underperform compared to the market with an average and median excess return of -46.60% and -69.69%, respectively. Clark (2002) calculated the excess holding period excess return relative to a value-weighted stock market index.

Hence, Both Ritter and Clark find that IPOs underperform in the long run and that younger firms underperform more severely than older firms, relative to the market.

3. Research question and hypothesis

The following chapter will present the main research question of this thesis, followed by several hypothesis based on existing literature that will be tested.

3.1.1. Research question

The objective of this thesis is to examine whether there is a relationship between long-term stock performances in the Nordic countries. Hence, the research question is:

Is there a relationship between long-term stock performance and firm age-at-IPO in the Nordic countries?

3.2. Net profit margin

Previous literature suggests that there is a relationship between firm age profitability. Both Baldwin (1995) and Garnsey (1998) suggest that there is a relationship between aging and increased performance coming from better processes and firm survival. Moreover, Coad et al. (2013) argue that older firms tend to have higher productivity and profitability. Non-profitable firms are eliminated, and profitable firms survive. To find out whether there is a relationship or not, we have constructed the following hypothesis:

Hypothesis 1: Firm's net profit margin are related to the age of the firm.

3.3. Research & development expenditures

Another factor that could contribute to explain a possible age effect on firm performance is product innovation. Existing literature disagrees whether it is a negative or positive relationship. Huergo & Jaumendreu (2004) argues that there is a negative relationship, while Cucculelli (2018) argues that when you control for relevant variables, the relationship is strictly positive. Czarnitzki & Kraft (2004) suggest that product innovation is usually connected to the level of R&D expenditures, and we would like to examine if there is any evidence of a positive or negative relationship between R&D expenditures and firm age. Hence, our second hypothesis is:

Hypothesis 2: Firm's level of R&D expenditures are related to the age of the firm.

3.4. Sales growth

Previous research identifies several variables that tend to increase with firm age. Coad et al. (2013) argue that firms improve in terms of increased productivity, profits, and profitability as they grow older. However, the opposite effect is shown on the expected growth of sales, profits, and profitability. We would like to further examine if there is a statistically significant relationship between firm age-at-IPO and sales growth in the Nordic countries. Therefore, our third hypothesis is:

3: Firm's sales growth are related on the age of the firm.

3.5. Cash flow volatility

The volatility of cash flow is often a good indication of the risk associated with a firm's earnings. Chi & Su (2017) found evidence in the US that the cash flow volatility decreases with firm age. We would like to test this relationship in our sample. Hence, our fourth hypothesis is:

4: Firm's cash flow volatility are related to the age of the firm.

3.6. Abnormal return

Existing literature has found that there is a relationship between long-term stock performance and firm age-at-IPO. Both Ritter (1991) and Clark (2002) argue that there is a monotone positive relationship between the two factors. Both studies present evidence from the U.S. We would like to test if there is a similar relationship in the Nordic countries. Hence, our fifth hypothesis is:

5: There exists a relationship between abnormal return and firm age-at-IPO.

4. Methodology

In this chapter, we will outline the methodological approach we use to answer our research question and test our hypotheses at a five percent significance level.

4.1. The age-effect

The firm age data have a high kurtosis and are highly skewed; hence, firm age-at-IPO are log-transformed using the natural logarithm. The equation for the log transformation is provided below:

$$Firm\ age_{at\ IPO} = \ln(1 + Firm\ age_{at\ IPO})$$

Further, testing our four variables of interest related to the age-effect is performed using four separate and simple OLS regressions. The variables of interest are net profit margin (NPM), Research and Development expenditures, Sales growth (SG), and Volatility of cash flows (CFV). Each regression is visualized below:

$$1: \quad NPM_i = \beta_0 + \beta_1 \ln(1 + Firm\ age_{at\ IPO})_i + \varepsilon_i$$

$$2: \quad R\&D_i = \beta_0 + \beta_1 \ln(1 + Firm\ age_{at\ IPO})_i + \varepsilon_i$$

$$3: \quad SG_i = \beta_0 + \beta_1 \ln(1 + Firm\ age_{at\ IPO}) + \varepsilon_i$$

$$4: \quad CFV_i = \beta_0 + \beta_1 \ln(1 + Firm\ age_{at\ IPO})_i + \varepsilon_i$$

For all the hypotheses trying to examine whether an age-effect exists, mean difference t-tests were used, additionally, all the t-tests are one-sampled and two-sided. The four different tests are outlined in table 4.1.

Hypothesis	Testing
1	<i>If the relationship between firm's net profit margin and firm age-at-IPO is statistically significantly different from zero.</i>
2	<i>If the relationship between firm's level of R&D expenditures and firm age-at-IPO is statistically significantly different from zero.</i>
3	<i>If the relationship between firm's sales growth and firm age-at-IPO is statistically significantly different from zero.</i>
4	<i>If the relationship between firm's cash flow volatility and firm age-at-IPO is statistically significantly different from zero.</i>

Table 4.1 List of Hypotheses testing an age-effect on firm performance.

4.2. Long-term stock performance and age

Existing literature presents several ways on how to calculate abnormal returns when measuring long-run performance. Barber & Lyon (1997) and Ritter (1991) all present arguments that cumulative abnormal return (CAR) and Buy-and-Hold abnormal returns (BHAR) are good at capturing true abnormal returns. However, this paper relies on the Capital Asset Pricing Model to estimate abnormal returns in accordance with Ibbotson (1975). The CAPM is a market equilibrium model and can be defined as:

$$ER_i = R_f + \beta_i(ER_m - R_f)$$

Where,

ER_i = Expected Return of the stock

R_f = Risk – Free rate

β = Systematic risk

ER_m = Expected market return

However, the CAPM itself does not capture any abnormal returns. It is simply a useful tool to evaluate the relationship between the systematic risk of a stock and

the expected return (Koller et al., 2015). We will capture the abnormal return of the 117 IPO firms by comparing them to the respective market return. We have constructed 117 portfolios, consisting of two matching firms, which are tailored to be a proxy of the expected return for the sector. If the IPO firm has a higher or lower return than their respective portfolio of firms, it is categorized as an abnormal return.

All inputs in the CAPM equals a period of five years. The risk-free rate was initially retrieved with monthly observations and is transformed to a five-year annually compounded rate. The two remaining inputs, the beta and the expected return on market are also calculated and estimated for a five-year period.

4.2.1. Beta

The beta of each IPO firm is found by estimating the systematic risk for each of the two portfolio firms. We regress the portfolio firm's stock return against the return of the MSCI Europe Index. Next, the levered betas are unlevered by using the portfolio firm's five-year average debt-to-equity ratios and yearly tax rates. The formula is:

$$\beta_{unlevered} = \frac{\beta_{levered}}{1 + (1 - tax\ rate) * \frac{D}{E}}$$

Further, using the unlevered betas and calculating the equally-weighted average, to serve as the IPO-firm's unlevered beta. This unlevered beta is then re-levered using the IPO-firm's debt-to-equity-ratio and the country-specific tax rate and is now the measure of the IPO-firms systematic risk for the next five-years. The beta was re-levered using the following formula:

$$\beta_{levered} = \beta_{unlevered} * (1 + (1 - taxrate) * \frac{D}{E})$$

4.2.2. Market return

We use a European index as the market return in the beta estimation, mainly because investors would not generally limit themselves to only invest in the Nordic countries, and especially not, just in either one of the four Nordic countries. The respective Nordic countries are not provided with enough liquidity compared to the broader European market. In addition, the markets are more prone to shocks. For example, the Norwegian stock market (OSEBX) is highly correlated to shocks in the oil price (Bjørnland, 2009). The market return that is

applied in the CAPM calculations is the five-year average return, matching the five years of the IPO firm.

4.2.3. *Abnormal return and firm age-at-IPO*

To find out if there is a relationship between long-term stock performance and firm age-at-IPO, the last hypothesis (hypothesis 5) will be tested. Similar to the approach used to test hypotheses 1-4 seeking to explain an age-effect, we also conduct a mean difference t-test on the following regression:

$$AR_i = \beta_0 + \ln (1 + \beta_1 Firm\ age_{at\ IPO}) + \varepsilon_i$$

The test aims to check if the relationship between long-term abnormal return and firm age at-IPO is statistically different from zero (table 4.2).

Hypothesis	Testing
5	<i>If the relationship between firm's abnormal return and firm age-at-IPO is statistically significantly different from zero.</i>

Table 4.2 Hypothesis testing the relationship between long-term stock performance and firm age-at-IPO.

5. Data

This chapter will contain information on how we gathered the data used in the thesis.

5.1. Collection of firm specifics

The sample used in this study comprises 117 selected firms that have gone public in the Nordics (excl. Iceland) between 1st of January 2000 and 31st of December 2015. Our sample of Initial Public Offerings represents the Nordic countries and is retrieved from Denmark, Finland, Norway, and Sweden. The sample firms had to meet the following criteria to be included in the study: 1) The firm was not delisted within the first five years after the IPO, 2) Bloomberg Terminal had to have an accurate daily closing price of the firms in our sample period. The sample consists of firms in 11 different sectors: 1) Basic Materials, 2) Communication Services, 3) Consumer Cyclical, 4) Consumer Defensive, 5) Energy, 6) Financial Services, 7) Healthcare, 8) Industrials, 9) Real Estate, 10) Technology and 11) Utilities. Table 5.1 presents the distribution of firms across countries and sectors.

	BM	CS	CC	CD	NRG	FS	H	IND	RE	TECH	UTIL	Total
Denmark	2	-	1	-	-	2	1	3	3	2	-	14
Finland	-	-	2	-	1	4	2	5	1	4	-	19
Norway	-	2	2	6	9	4	4	9	4	3	2	45
Sweden	-	1	3	-	-	3	13	8	4	6	1	39
Total	2	3	8	6	10	13	20	25	12	15	3	117

Table 5.1 Distribution of the sample firms across country and sector. Basic Materials (BM), Communication Services (CS), Consumer Cyclical(CC), Consumer Defensive(CD), Energy(NRG), Financial Services(FS), Healthcare(H), Industrials(IND), Real Estate(RE), Technology(TECH) and Utilities(UTIL).

All information regarding the sample firms was retrieved from the Securities Data Corporation (SDC) Platinum. Given the importance of the year of issuance, the sample data are controlled by using Bloomberg Terminal. This paper defines an economic year as 253 trading days, making five years equal to 1265 trading days.

5.2. Collection of peers

As mentioned in the methodology section, the asset beta of our portfolio firms is found by calculating the average of two matching firms' unlevered raw beta. The asset beta is then re-levered with the sample firms' debt-to-equity ratio and tax rate, the specifics regarding the approach are explained in detail in the methodology section. The debt-to-equity ratio and the different tax rates for the Nordic countries are retrieved from Bloomberg Terminal at annual observations. The selection of matching firms is based on geography, sector, and size. The firms are gathered using Bloomberg Terminal and Refinitiv. There are in total 117 portfolios of matching firms, whereas 153 of the firms are unique. Appendix 1 provides a visualization of the matching firms.

5.3. CAPM

All of the inputs required for the estimation of the expected returns using the Capital Asset Pricing Model are retrieved from Bloomberg Terminal and Refinitiv. The stock prices of the portfolio firms are retrieved as daily observations. The stock prices in this paper are defined as the closing price adjusted for stock splits and dividends. Adjusted closing prices will give a better representation of the development of the stock price as abnormal events are controlled for. This paper uses the MSCI Europe Index (MXEU) as a proxy for the market. Further, the generic eurozone 10-year government bond (GTEUR10Y Govt) serves as the risk-free rates and are gathered with monthly observations. In the retrieval of our data all values are obtained concerning local currencies (i.e., Norwegian stock prices are denominated in NOK, Swedish stock prices are denominated in SEK, etc.), to avoid exchange rate effects on day-to-day return.

5.4. Age

Firm age-at-IPO is in this paper defined as:

$$Firm\ age_{t=at\ IPO} = Year\ when\ firm\ is\ issued - Year\ when\ firm\ is\ founded$$

Both the year of issuance and the year when the firm was founded have been retrieved from the SDC Platinum database. This paper is heavily reliant upon correct firm age. Thus, the firm's issue year and founding year have been controlled by using each firm's website and Bloomberg Terminal. Table 5.2 presents the range of firm age-at-IPO and the average age when firms in the

Nordic countries initiate an IPO. Table 5.2 is denoted in years and shows the average firm age-at-IPO for the Nordic countries during the period 2000 – 2015.

	<i>Nr of IPOs</i>	<i>Average Age</i>	<i>Median</i>	<i>Min</i>	<i>Max</i>
Denmark	14	28,93	12,5	0	167
Finland	19	21,42	15	0	110
Norway	45	16,09	10	0	78
Sweden	39	20,72	14	1	119
Total	117	20,03	13	0	167

Table 5.2 Distribution of firm age-at-IPO across the Nordic countries, and descriptive statistics.

The range of age in the study is substantial with variations from 0 to 167 years. Due to some of the firms being “very old”, that is, exceeding 100 years, they are considered extreme values. Thus, it makes sense to use the median as a measure of average years of firms going public in the Nordic countries in the period 2000 – 2015. The sample data shows that the average age when firms initiate an IPO is at the age of 20 and the median age is 13.

5.4.1. Log-transformation

As previously mentioned, the firm age data have high kurtosis and are highly skewed. For the data to fit a linear regression model we transform the age variable using the natural logarithm. Figure 5.1 and 5.2 presents the distribution of firm age before and after the log-transformation.

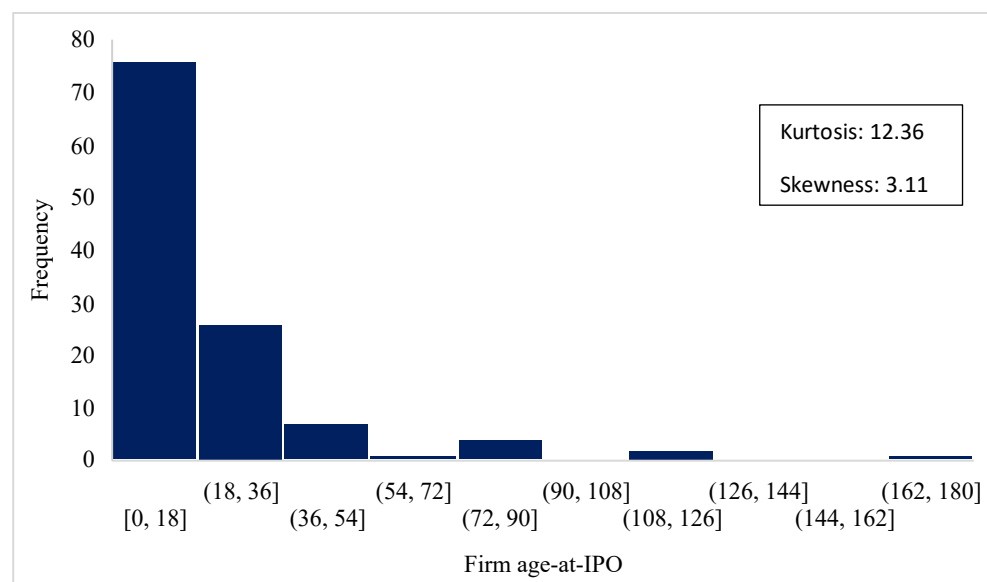


Figure 5.1 Distribution of firm age-at-IPO

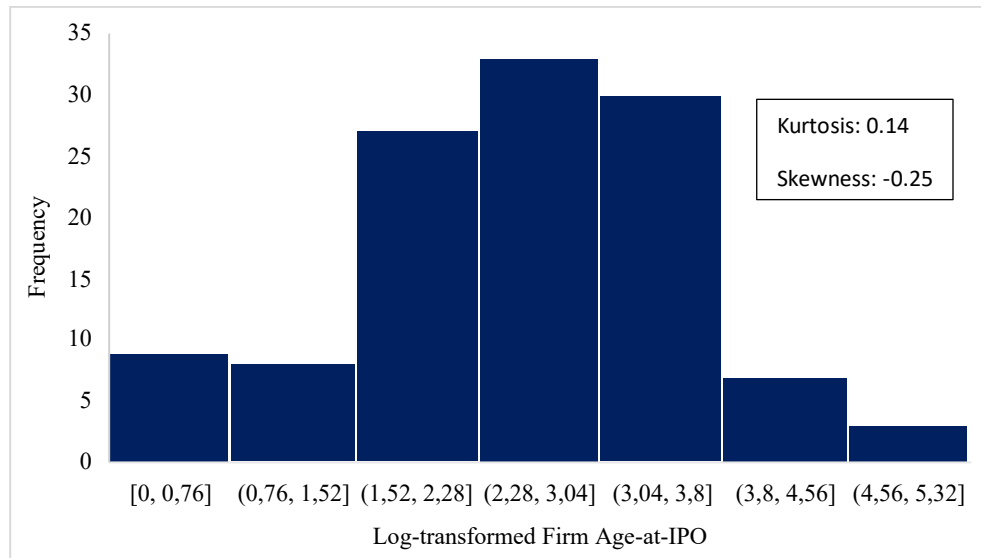


Figure 5.2 Distribution of the natural logarithm of firm age-at-IPO.

5.5. Performance indicators

As mentioned in previous sections, this paper examines the relationship between age and four other variables: NPM, R&D, SG, and CFV. All the data needed to calculate the variables are retrieved from Bloomberg Terminal. Furthermore, all the performance indicators are estimated over the corresponding first five years after the IPO.

Net profit margin: Net profit margin in our study is defined as the net income over revenue. The NPM sample set has been adjusted for outliers. The outliers are defined as values exceeding +/- 1000%.

$$NPM = \frac{Net\ income_t}{Revenues_t} * 100$$

Research and development expenditures: The variable is measured as the R&D expenditure in the percentage of sales revenue.

$$R\&D = \frac{R\&D\ expenditures_t}{Revenues_t} * 100$$

Sales growth: Computed as the year-to-year change in sales revenue. Giving the percentage growth/decline each fiscal year.

$$SG = \frac{Revenues_t}{Revenues_{t-1}} * 100$$

Cash flow: We use the cash flow per share and define the volatility as the relative standard deviation of the cash flow.

$$CFV = \frac{\sigma_{t,t+5}}{Cash\ flow_{t,t+5}} * 100$$

6. Results and analysis

The following section presents and analyzes the age-effect and the relationship between long-term stock performance and firm age-at-IPO. As previously mentioned, mean difference t-tests are used to test if the relationships are statistically significantly different from zero.

6.1. Net profit margin

When testing the age effect on the NPM (hypothesis 1), we do not find evidence of a statistically significant relationship ($p > 0.05$). Thus, we do not reject the null hypothesis and conclude that we do not find any support for the hypothesis. The lack of significance may be affected by highly volatile net profit margins. Although, the results are not statistically significant at a sufficient level, the results suggests that it is a weak positive relationship among the two variables in accordance with previous studies (Baldwin, 1995; Garnsey, 1995) (table 6.1).

6.2. Research & development expenditures

The results from testing hypothesis 2, show no evidence of a statistically significant relationship between the level of R&D expenditures and firm age-at-IPO ($p > 0.05$). Thus, we do not reject the null hypothesis i.e., there is no support for our hypothesis that a firm's level of R&D expenditures is related to the age of the firm (table 6.1). The results from this test may be explained by the low number of observations. Therefore, we do not find any evidence to support the results in any of the existing literature regarding product innovation and firm age-at-IPO.

6.3. Sales growth

In contrast with the previous tests, the result from testing hypothesis 3 reveals evidence of a statistically significant relationship between sales growth and firm age-at-IPO ($p < 0.05$). Hence, we reject the null hypothesis and conclude that we find support for hypothesis 3 (table 6.1). The findings are in line with existing literature (Coad et al., 2013), showing a negative relationship between sales growth and firm age-at-IPO. The coefficient estimate of -30.88 shows that a 100% increase in firm age results in a 30.88% decrease in sales growth.

6.4. Cash flow volatility

From the results of testing hypothesis 4, we do not find evidence of a statistically significant relationship between cash flow volatility and firm age-at-IPO ($p > 0.05$). Thus, we do not reject the null hypothesis and conclude that we do

not find any support for this relationship. The statistically insignificant result can be explained by the high variation in cash flow volatility in our sample. Similar to a previous sub-section, there results suggest a weak negative relationship among the two variables in accordance with previous literature (Chi & Su, 2017) (table 6.1).

6.5. Abnormal return

The last mean differences t-test conducted in this study seeks to find a conclusive argument for our research question; whether there is a relationship between long-term stock performance and firm age-at-IPO. More specifically, the test investigates whether the relationship between abnormal returns and firm age-at-IPO is statistically different from zero. From the results, we can infer that there is no evidence of a statistically significant relationship between abnormal returns and firm age-at-IPO ($p > 0.05$). Due to the statistically insignificant result, we can therefore confirm that there does not exist a relationship between abnormal returns and firm age-at-IPO in our sample, differentiating our findings from previous research (Ritter, 1991; Clark, 2002) (table 6.1).

<i>lnAge</i>	<i>Abnormal return</i>	<i>NPM</i>	<i>R&D</i>	<i>SG</i>	<i>CFV</i>
p-Value	0,46945	0,06976	0,35134	0,03724	0,09099
t-Statistic	-0,72577	1,83148	-0,93755	-2,10819	-1,70572

Table 6.1 *p-Value and t-Statistic from each regression.*

6.6. Alternative explanations

The regression results between NPM and age do not show a significant enough relationship in order to conclude that there is indeed an age effect on the profit margin of companies. As seen in appendix 2 net profit margin varies considerably across different sectors. This, in turn, can be more of an indicator for NPM than age. For instance, if firms in specific sectors typically have high-profit margins, the sector could explain the value of NPM more than age. (As observed in the sector Consumer Defensive.)

Our examination of a possible age-effect on the level of R&D expenditures finds no significant results. The lack of age effect is not unexpected in our sample considering the low number of observations compared to the other variables in this study. In addition, we find that R&D is a variable that varies considerably

across sectors. For example, the difference in importance R&D has as a value driver in Healthcare as opposed to Financial Services. (Appendix 2)

We have found evidence that there is a significant relationship between sales growth and firm age at IPO. This gives support to the theory of inertia-effect that explains that older firms tend to be more rigid, which affects the way they are able to cope with changes in the market. The inverse relationship is also in line with Cowling et al.'s (2018) and Evans's (1987) findings. However, we cannot conclude that there is an actual age effect in the data given our limited number of observations and other possible effects determining the level of sales growth. For instance, if we examine the industry classification used by Maksimovic & Phillips (2008) one could argue that the revenue growth can be more significant in a *Growth Industry* with typically younger and fewer firms than in a *Declining Industry* with more and older firms. Hence, sales growth may depend more on the state of the industry than the age of the firm.

The test result concerning the relationship between CFV and firm age-at-IPO suggests the same tendency as previous literature (Chi & Su, 2017). However, the result is not statistically significant at a sufficient level, so our results do not provide any evidence of a relationship between the variables. The findings indicate that there are other factors, independent of age, that explain a firm's CFV. One of these factors could be FX risk. Exporting firms that are exposed to several exchange rates may experience increased volatility in their cash flow due to the appreciation and depreciation of the domestic and foreign currency.

7. Conclusion

In this thesis we have examined whether age affects firm performance and investigated the relationship between long-term stock performance and firm age-at-IPO. The study is performed with a sample of 117 IPO firms in the period 1st of January 2000 to 31st of December 2015 from Denmark, Finland, Norway and Sweden. To examine the age effect on firm performance we tested four different hypotheses with four unique variables (NPM, R&D, SG, and CFV). To investigate the relationship between long-term stock performance and firm age-at-IPO, we used the estimated five-year abnormal return relative to portfolios of matching firms.

The variables tested show that there is a significant inverse relationship between firm age and sales growth in line with existing literature (Coad et al., 2013). However, additional research on sales growth and firm age are required to conclude that the relationship is explained by age. Furthermore, our analyses find no significant relationship between abnormal returns and firm age-at-IPO. Thus, our results differ from previous research which have found a significant relationship between long-term stock performance and firm age-at-IPO (Ritter 1991, Clark 2002).

Regarding the variables NPM, CFV and R&D expenditure, we find no significant relationship in our sample. However, the result from testing the age effect on NPM and CFV show the same tendency as the existing literature (Baldwin, 1995; Garnsey 1995; Chi & Su, 2017).

To summarize, from our four variables examined only sales growth has a significant relationship with firm age-at-IPO. However, additional research is required to conclude that the declining growth of sales is determined by firm age. Our research question is: *Is there a relationship between long-term stock performance and firm age-at-IPO in the Nordic countries?* In answering our research question, we find that there is no evidence that confirms a relationship between long-term stock performance and firm age-at-IPO in the Nordic countries.

8. Limitations and further research

One of the most profound limitations in our study is our limited sample size. As a consequence of this limitation, a single observation can have a considerable impact on our results. Greater sample size could have provided more conclusive results. For instance, the sample could be expanded to include the entire European stock market or include a longer observation period. Given the complexity of the stock market and what drives stock prices and firm performance, additional research on the age effect is needed to conclude whether or not this effect actually exists.

Furthermore, there are other interesting characteristics that could have been examined for the age effect on firm performance. It would be interesting if future research examined asymmetric information, management and governance, and product diversification in relation to age. We also recommend that future researchers expand the peer group of each firm to generate a more realistic “market” when estimating the abnormal return.

9. Appendix

9.1. Appendix 1

Sample and Portfolios			Sample and Portfolios		
IPO Firm			IPO Firm		
Peer		Peer	Peer		Peer
	Telia Company AB			Pandora A/S	
<i>Elisa Oyj</i>		<i>Tele 2 AB</i>	<i>New Wave Group AB</i>		<i>Marimekko Oyj</i>
	Dometic Group AB			ISS A/S	
<i>BULTEN AB</i>		<i>Dedicare AB</i>	<i>Intrum AB</i>		<i>Caverion Oyj</i>
	Attendo Care AB			Chr Hansen Holding A/S	
<i>GHP Specialty Care AB</i>		<i>Inwido AB</i>	<i>Fluegger Group A/S</i>		<i>Hexpol AB</i>
	Alfa Laval AB			Danske Andelskassers Bank A/S	
<i>Trelleborg AB</i>		<i>SKFB AB</i>	<i>Ringkjoebing Landbobank A/S</i>		<i>Vestjysk Bank A/S</i>
	Eltel AB			German High Street Properties	
<i>Hexatronic Group AB</i>		<i>Peab AB</i>	<i>Jeudan A/S</i>		<i>Scandinavian Investment Group A/S</i>
	Scandic Hotels Group AB			Novozymes A/S	
<i>Pandox AB</i>		<i>Unlimited Travel Group AB</i>	<i>Fluegger Group A/S</i>		<i>SP Group A/S</i>
	Hoist Finance AB			SimCorp A/S	
<i>Axactor SE ASA</i>		<i>B2holding ASA</i>	<i>Vitec Software Group AB</i>		<i>Columbus A/S</i>
	Coor Service Management Holding			Zealand Pharma A/S	
<i>Bure Equity AB</i>		<i>Rejlers AB</i>	<i>Genmab A/S</i>		<i>Bavarian Nordic A/S</i>
	Nobina AB			Strategic Investments A/S	
<i>Viking Line</i>		<i>NTG Nordic Transport Group AS</i>	<i>EAC Invest A/S</i>		<i>Newcap Holding A/S</i>
	Dustin Group AB			Nordic Shipholding A/S	
<i>Nelly Group AB</i>		<i>Inwido AB</i>	<i>Maersk A/S</i>		<i>D/S Norden A/S</i>
	Indutrade AB			Prime Office A/S	
<i>Atlas Copco AB</i>		<i>Beijer Alma AB</i>	<i>Jeudan A/S</i>		<i>Scandinavian Investment Group A/S</i>
	Bufab AB			Copenhagen Capital A/S	
<i>Addtech AB</i>		<i>B&B Tools AB</i>	<i>Blue Vision A/S</i>		<i>Jeudan A/S</i>
	BYGGmax Group AB			Rovsing A/S	
<i>Clas Ohlson AB</i>		<i>Kakel Max AB</i>	<i>Saab AB</i>		<i>INVISIO AB</i>
	Intrum AB			cBrain A/S	
<i>Svolder AB</i>		<i>Securitas AB</i>	<i>Vitec Software Group AB</i>		<i>Columbus A/S</i>
	Nobia AB			REC Silicon ASA	
<i>Electrolux AB</i>		<i>JM AB</i>	<i>Nordic Semiconductor ASA</i>		<i>Kitron ASA</i>
	Collector AB			Entra ASA	
<i>Skandinaviska Enskilda Banken AB</i>		<i>Pareto Bank ASA</i>	<i>Olav Thon Eiendomsselskap ASA</i>		<i>KMC Properties ASA</i>
	Biotage AB			Equinor ASA	
<i>BioGaia AB</i>		<i>Karo Pharma AB</i>	<i>DOF ASA</i>		<i>DNO ASA</i>
	Swedish Orphan Biovitrum AB			BW LPG Ltd	
<i>Lundbeck A/S</i>		<i>Bavarian Nordic A/S</i>	<i>Concordia Maritime AB</i>		<i>Awilco LNG AS</i>
	Karolinska Development AB			Europpris ASA	
<i>CapMan Oyj</i>		<i>Castellum AB</i>	<i>Gyldendal ASA</i>		<i>Stockmann OYJ Abp</i>
	Platzer Fastigheter Holding AB			XXL ASA	
<i>Castellum AB</i>		<i>Dios Fastigheter AB</i>	<i>Gyldendal ASA</i>		<i>Stockmann OYJ Abp</i>
	Arise AB			Electromagnetic Geoservices ASA	
<i>Cortus Energy AB</i>		<i>Vestas Wind Systems A/S</i>	<i>DOF ASA</i>		<i>Prosafe SE</i>
	Camurus AB			Shanken ASA	
<i>Karo Pharma AB</i>		<i>Probi AB</i>	<i>DNB ASA</i>		<i>Pareto Bank ASA</i>
	Mycronic AB			BW Offshore Ltd	
<i>Firefly AB</i>		<i>Vaisala Oyj</i>	<i>PGS ASA</i>		<i>Akastor ASA</i>
	Bactiguard Holding AB			Wallenius Wilhelmsen ASA	
<i>Getinge AB</i>		<i>Xvivo Perfusion AB</i>	<i>Odjell SE</i>		<i>Belships ASA</i>
	Tobii AB			Norwegian Property ASA	
<i>Doro AB</i>		<i>JLT Mobile Computers AB</i>	<i>Olav Thon Eiendomsselskap ASA</i>		<i>Dios Fastigheter AB</i>
	Besqab AB			HOEGH LNG HOLDINGS	
<i>NCC AB</i>		<i>Peab AB</i>	<i>FLEX LNG Ltd</i>		<i>Avance Gas Holding Ltd</i>
	Orexo AB			Ocean Yield ASA	
<i>Medcap AB</i>		<i>Karo Pharma AB</i>	<i>PGS ASA</i>		<i>Akastor ASA</i>
	Magnolia Bostad AB			Aker BP ASA	
<i>Wihlborgs Fastigheter AB</i>		<i>Fabege AB</i>	<i>DNO ASA</i>		<i>Interoil Exploration and Production ASA</i>

BioInvent International AB	American Shipping Co ASA
<i>BioGaia AB</i> <i>Karo Pharma AB</i>	<i>Odjfell SE</i> <i>Belships ASA</i>
NP3 Fastigheter AB	Scatec ASA
<i>Wihlborgs Fastigheter AB</i> <i>Fabege AB</i>	<i>Aega ASA</i> <i>Cortus Energy AB</i>
Note AB	Polarcus Ltd
<i>Hexagon AB</i> <i>Vaisala Oyj</i>	<i>Eidesvik Offshore ASA</i> <i>PGS ASA</i>
Vitrolife AB	Austevoll Seafood ASA
<i>BioGaia AB</i> <i>Karo Pharma AB</i>	<i>Leroy Seafood Group ASA</i> <i>Mowi ASA</i>
Moberg Pharma	Grieg Seafood ASA
<i>Medcap AB</i> <i>Karo Pharma AB</i>	<i>Leroy Seafood Group ASA</i> <i>Mowi ASA</i>
BTS Group AB	Kid ASA
<i>AddNode Group AB</i> <i>Poolia AB</i>	<i>Gyldendal ASA</i> <i>Clas Ohlson AB</i>
Boule Diagnostics AB	Selvaag Bolig ASA
<i>C-RAD AB</i> <i>Elos Medtech AB</i>	<i>Alm Equity AB</i> <i>Olav Thon Eiendomsselskap ASA</i>
eWork Group AB	Nordic Nanovector ASA
<i>Novotek AB</i> <i>Prevas AB</i>	<i>PCI Biotech Holding ASA</i> <i>Targovax AS</i>
Rnb Retail and Brands AB	Seabird Exploration PLC
<i>H & M Hennes & Mauritz AB</i> <i>Rizzo Group AB</i>	<i>Prosafe SE</i> <i>Eidesvik Offshore ASA</i>
Immunovia AB	Protector Forsikring ASA
<i>C-RAD AB</i> <i>Elos Medtech AB</i>	<i>Gjensidige Forsikring ASA</i> <i>Storebrand ASA</i>
Episurf Medical AB	Solon Eiendom ASA
<i>Ambu A/S</i> <i>Dignitana AB</i>	<i>Park Street A/S</i> <i>Olav Thon Eiendomsselskap ASA</i>
SRV Group Oyj	North Energy ASA
<i>AF Gruppen ASA</i> <i>YIT Oyj</i>	<i>DOF ASA</i> <i>Reach Subsea ASA</i>
Pihlajalinna Oyj	PhotoCure ASA
<i>Feelgood Svenska AB</i> <i>Dedicare AB</i>	<i>BioGaia AB</i> <i>Karo Pharma AB</i>
Verkkokauppa.com Oyj	Norwegian Air Shuttle ASA
<i>Nelly Group AB</i> <i>GHP Specialty Care AB</i>	<i>SAS AB</i> <i>Finnair Oyj</i>
Robit Oyj	AKVA Group ASA
<i>Metso Outotec Oyj</i> <i>Nekkar ASA</i>	<i>Ponsse Oyj</i> <i>Kesla Oyj</i>
Consti Oyj	Otello Corporation ASA
<i>YIT Oyj</i> <i>NRC Group ASA</i>	<i>Tele2 AB</i> <i>Schibsted ASA</i>
Ovaro Kiinteistösijoitus Oyj	Norway Royal Salmon ASA
<i>Citycon Oyj</i> <i>Investors House Oyj</i>	<i>Leroy Seafood Group ASA</i> <i>Mowi ASA</i>
SSH Communications Security Oyj	Zalaris ASA
<i>Bittium Oyj</i> <i>F-Secure Oyj</i>	<i>Bouvet ASA</i> <i>Kitron ASA</i>
Sievi Capital Oyj	Insr Insurance Group ASA
<i>CapMan Oyj</i> <i>eQ Oyj</i>	<i>Storebrand ASA</i> <i>Gjensidige Forsikring ASA</i>
NoHo Partners Oyj	Hunter Group ASA
<i>Viking Line Abp</i> <i>Stockmann OYJ Abp</i>	<i>Eidesvik Offshore ASA</i> <i>Frontline Ltd</i>
BasWare Oyj	ArcticZymes Technologies ASA
<i>Enea AB</i> <i>Innofactor Oyj</i>	<i>BioGaia AB</i> <i>Karo Pharma AB</i>
Revenio Group Oyj	Arribatec ASA
<i>Karo Pharma AB</i> <i>Biohit Oyj</i>	<i>TOMRA Systems ASA</i> <i>Studsvik AB</i>
Evli Bank PLC	Napatech A/S
<i>CapMan Oyj</i> <i>eQ Oyj</i>	<i>Teleste Oyj</i> <i>Net Insight AB</i>
Talenom Oyj	EAM Solar ASA
<i>Dovre Group Oyj</i> <i>Panostaja Oyj</i>	<i>Arendals Fossekompani A/S</i> <i>AEGA ASA</i>
United Bankers Oyj	Salmar ASA
<i>CapMan Oyj</i> <i>eQ Oyj</i>	<i>Leroy Seafood Group ASA</i> <i>Mowi ASA</i>
Etteplan Oyj	VOW ASA
<i>AF Poyry AB</i> <i>Panostaja Oyj</i>	<i>TOMRA Systems ASA</i> <i>Lassila & Tikanoja Oyj</i>
Wulff-Group PLC	Bakkafrost P/F
<i>Brodrene A&O Johansen A/S</i> <i>Exel Composites Oyj</i>	<i>Leroy Seafood Group ASA</i> <i>AAK AB</i>
EAB Group Oyj	5th Planet Games A/S
<i>CapMan Oyj</i> <i>eQ Oyj</i>	<i>Gaming Innovation Group Inc</i> <i>Gaming Corps AB</i>
Sii Solutions Oyj	NattoPharma ASA
<i>TietoEVRY Oyj</i> <i>Digia Oyj</i>	<i>New Nordic Healthbrands AB</i> <i>MedicaNatumin AB</i>
QPR Software Oyj	RAK Petroleum PLC
<i>Innofactor Oyj</i> <i>Solteq Oyj</i>	<i>DOF ASA</i> <i>DNO ASA</i>
	Havila Shipping ASA
	<i>Reach Subsea ASA</i> <i>Prosafe SE</i>

9.2. Appendix 2

Average							
<i>Sector</i>	<i>Number of IPOs</i>	<i>Abnormal Return</i>	<i>PM</i>	<i>RD</i>	<i>Salesgrowth</i>	<i>CFVOL</i>	<i>AGE</i>
Basic Materials	2	0,62 %	13,80 %	9,386 %	6,39 %	12,86 %	83,50000
Communication Services	3	7,50 %	-256,56 %	36,215 %	22,79 %	21,90 %	16,00000
Consumer Cyclical	8	-1,23 %	6,77 %	0,037 %	35,28 %	90,69 %	26,12500
Consumer Defensive	6	-3,22 %	10,86 %	0,154 %	29,53 %	133,20 %	23,66667
Energy	10	0,90 %	-55,61 %	4,133 %	75,15 %	466,35 %	18,00000
Financial Services	13	0,12 %	8,10 %	0,000 %	22,49 %	796,56 %	21,76923
Healthcare	20	0,04 %	-150,12 %	890,604 %	70,65 %	226,86 %	10,85000
Industrials	25	-8,22 %	0,24 %	0,646 %	20,07 %	389,77 %	29,44000
Real Estate	12	-0,35 %	-18,00 %	17,631 %	69,36 %	259,25 %	14,33333
Technology	15	1,08 %	-0,07 %	15,764 %	19,82 %	1182,94 %	11,80000
Utilities	3	7,39 %	-106,44 %	0,000 %	57,68 %	246,01 %	4,33333
(Number of observations)	(117)	(117)	(111)	(81)	(114)	(108)	(117)
Total	117	0,234 %	-36,23 %	192,09 %	41,12 %	442,69 %	20,03

9.3. Appendix 3

Company	Abnormal	Salesgrowth	RD	CFVOL	PM	Founded yr	IPO Date	Age	Logage	Sector
Telia Company AB	6,10 %	10,95 %	2,80 %	21,90 %	5,98 %	1966	13.06.2000	34	3,56	Communication Services
Dometic Group AB	0,32 %	16,61 %	2,19 %	51,04 %	9,28 %	2001	26.11.2015	14	2,71	Technology
Attendo Care AB	0,52 %	6,30 %	0,00 %	32,39 %	5,24 %	1988	02.12.2015	27	3,33	Healthcare
Alfa Laval AB	-0,12 %	5,09 %	2,63 %	31,55 %	9,48 %	1883	20.05.2002	119	4,79	Industrials
Eltel AB	0,64 %	-2,31 %	0,00 %	1321,00 %	-4,48 %	1993	09.02.2015	22	3,14	Industrials
Scandic Hotels Group AB	0,23 %	12,02 %	0,00 %	56,42 %	4,02 %	1963	03.12.2015	52	3,97	Consumer Cyclical
Hoist Finance AB	0,29 %	12,87 %		21,57 %	17,68 %	1994	26.03.2015	21	3,09	Financial Services
Coor Service Management Holding	-4,55 %	8,85 %	0,00 %	32,11 %	1,49 %	1998	17.06.2015	17	2,89	Industrials
Nobina AB	-11,64 %	6,11 %	0,00 %	59,11 %	2,79 %	1990	19.06.2015	25	3,26	Industrials
Dustin Group AB	-0,89 %	11,35 %	0,00 %	77,25 %	2,53 %	1984	16.02.2015	31	3,47	Technology
Indutrade AB	0,15 %	13,08 %	0,43 %	29,38 %	6,56 %	1978	06.10.2005	27	3,33	Industrials
Bufab AB	1,00 %	13,32 %	0,00 %	22,69 %	5,86 %	1977	25.02.2014	37	3,64	Industrials
BYGGmax Group AB	2,50 %	7,81 %	0,00 %	37,92 %	6,00 %	1993	03.06.2010	17	2,89	Industrials
Intrum AB	0,41 %	5,12 %	0,00 %	21,58 %	7,25 %	1923	10.06.2002	79	4,38	Financial Services
Nobia AB	0,58 %	13,96 %		42,96 %	4,76 %	1996	20.06.2002	6	1,95	Consumer Cyclical
Collector AB	0,30 %	23,42 %	0,00 %	101,78 %	20,33 %	1999	11.06.2015	16	2,83	Financial Services
Biotage AB	-0,48 %	66,14 %	53,02 %	61,12 %	-94,01 %	1969	04.07.2000	31	3,47	Healthcare
Swedish Orphan Biovitrum AB	2,52 %	16,87 %	47,46 %	188,25 %	-3,68 %	2001	18.09.2006	5	1,79	Healthcare
Karolinska Development AB	-0,04 %	-23,96 %	249,37 %	59,32 %		2006	18.04.2011	5	1,79	Healthcare
Platzer Fastigheter Holding AB	-0,06 %	21,40 %		31,85 %	88,17 %	1969	02.12.2013	44	3,81	Real Estate
Arise AB	19,59 %	71,01 %		82,34 %	-1,53 %	2006	26.03.2010	4	1,61	Utilities
Camurus AB	0,09 %	0,10 %	276,32 %	61,22 %	-255,10 %	1991	04.12.2015	24	3,22	Healthcare
Mycronic AB	-1,07 %	20,92 %	28,48 %	226,59 %	-5,34 %	1989	13.03.2000	11	2,48	Technology
Bactiguard Holding AB	-0,07 %	5,52 %	0,00 %	143,69 %	-33,31 %	2005	20.06.2014	9	2,30	Healthcare
Tobii AB	0,53 %	20,62 %	30,71 %	272,10 %	-10,03 %	2001	27.04.2015	14	2,71	Technology
Besqab AB	-2,31 %	22,75 %	0,00 %	272,20 %	15,09 %	1988	13.06.2014	26	3,30	Real Estate
Orexo AB	0,94 %	49,38 %	115,93 %	60,24 %	-80,98 %	1995	10.11.2005	10	2,40	Healthcare
Magnolia Bostad AB	-2,35 %	109,04 %	0,00 %	187,27 %	17,22 %	2009	10.06.2015	6	1,95	Real Estate
BioInvent International AB	0,35 %	28,80 %	154,80 %	51,52 %	-115,40 %	1996	13.06.2001	5	1,79	Healthcare
NP3 Fastigheter AB	1,14 %	42,70 %		974,84 %	60,20 %	2007	05.12.2014	7	2,08	Real Estate
Note Ab	-1,30 %	15,74 %		44,00 %	1,03 %	1999	24.06.2004	5	1,79	Technology
Vitrolife AB	-1,61 %	8,33 %	19,41 %	1054,77 %	-15,82 %	1993	27.06.2001	8	2,20	Healthcare
Moberg Pharma	-0,63 %	153,61 %	22,37 %	218,35 %	5,66 %	2006	30.05.2011	5	1,79	Healthcare
BTS Group AB	0,24 %	11,72 %		83,55 %	7,18 %	1996	07.06.2001	5	1,79	Industrials
Boule Diagnostics AB	-1,11 %	7,71 %	16,04 %	56,23 %	-0,55 %	1990	24.06.2011	21	3,09	Healthcare
eWork Group AB	-2,43 %	18,80 %		69,82 %	1,32 %	2000	23.05.2008	8	2,20	Technology
Rnb Retail and Brands AB	-3,68 %	15,36 %		288,50 %	-1,52 %	2000	27.06.2001	1	0,69	Consumer Cyclical
Immunovia AB	1,34 %	11,58 %	6718,76 %	79,15 %		2007	02.12.2015	8	2,20	Healthcare
Episurf Medical AB	-0,97 %	356,34 %		16,24 %		2008	08.11.2010	2	1,10	Healthcare
SRV Group Oyj	-6,01 %	9,80 %		82,37 %	1,40 %	1987	13.06.2007	20	3,04	Industrials
Pihlajalinn Oyj	-4,66 %	31,60 %	0,00 %	20,12 %	1,17 %	2001	05.06.2015	14	2,71	Healthcare
Verkkokauppa.com Oyj	-0,78 %	15,10 %	0,00 %	114,92 %	2,03 %	2001	07.04.2014	13	2,64	Consumer Cyclical
Robit Oyj	-0,44 %	19,13 %	0,76 %	1685,94 %	-8,02 %	1985	22.05.2015	30	3,43	Energy
Consti Oyj	-0,05 %	8,08 %	0,00 %	132,30 %	0,82 %	2006	15.12.2015	9	2,30	Industrials
Ovaro Kiinteistösijoitus Oyj	0,10 %	50,41 %		219,66 %	30,93 %	2010	16.10.2013	3	1,39	Real Estate
SSH Communications Security Oyj	6,20 %	-6,70 %	42,11 %	112,36 %	-30,81 %	1995	21.12.2000	5	1,79	Technology
Sievi Capital Oyj	-0,73 %	61,55 %	0,00 %	36,01 %	6,88 %	1976	24.05.2000	24	3,22	Financial Services
NoHo Partners Oyj	-0,08 %	158,36 %		29,01 %	3,88 %	1996	29.11.2013	17	2,89	Consumer Cyclical
BasWare Oyj	9,46 %	42,28 %	15,91 %	93,34 %	5,30 %	1985	02.03.2000	15	2,77	Technology
Revenio Group Oyj	-1,12 %	-7,95 %	0,64 %	1733,52 %	-6,74 %	2000	21.06.2000	0	0,00	Healthcare
Evi Bank PLC	-0,46 %	5,57 %		247,18 %	19,95 %	1985	03.12.2015	30	3,43	Financial Services
Talenom Oyj	-5,30 %	14,44 %	3,04 %	37,50 %	8,50 %	1972	15.06.2015	43	3,78	Industrials
United Bankers Oyj	-0,57 %	20,10 %		0,00 %	9,63 %	1986	26.11.2014	28	3,37	Financial Services
Etteplan Oyj	4,95 %	24,46 %	0,00 %	57,92 %	4,35 %	1983	01.05.2000	17	2,89	Industrials
Wulff-Group PLC	0,37 %	24,14 %	0,00 %	67,18 %	6,25 %	1890	11.10.2000	110	4,71	Industrials
EAB Group Oyj	-0,16 %	14,80 %		6070,37 %	3,64 %	2004	02.12.2015	11	2,48	Financial Services
Siili Solutions Oyj	-3,60 %	30,73 %	0,60 %	46,31 %	5,40 %	2005	17.10.2012	7	2,08	Technology
QPR Software Oyj	-0,04 %	-1,54 %	23,16 %	139,21 %	9,27 %	1991	11.03.2002	11	2,48	Technology

Pandora A/S	-3,83 %	31,17 %	0,18 %	57,94 %	25,39 %	1982	06.10.2010	28	3,37	Consumer Cyclical
ISS A/S	0,49 %	-1,14 %	0,00 %	14,87 %	2,01 %	1934	14.03.2014	80	4,39	Industrials
Chr Hansen Holding A/S	1,49 %	8,23 %	5,96 %	18,16 %	15,25 %	1843	04.06.2010	167	5,12	Basic Materials
Danske Andelskassers Bank A/S	-0,19 %	-8,20 %		804,76 %	-20,14 %	1969	08.07.2011	42	3,76	Financial Services
German High Street Properties	0,38 %	261,24 %		272,78 %	-19,13 %	2007	24.09.2007	0	0,00	Real Estate
Novozymes A/S	-0,26 %	4,54 %	12,81 %	7,56 %	12,35 %	2000	20.11.2000	0	0,00	Basic Materials
SimCorp A/S	6,46 %	14,04 %	19,97 %	84,12 %	8,22 %	1971	18.04.2000	29	3,40	Technology
Zealand Pharma A/S	3,84 %	501,42 %	592,60 %	217,05 %	-586,07 %	1999	24.11.2010	11	2,48	Healthcare
Strategic Investments A/S	-0,31 %	0,00 %	0,00 %	0,00 %		1994	30.01.2001	6	1,95	Financial Services
Nordic Shipholding A/S	-192,62 %	35,42 %	0,00 %	263,25 %	-81,38 %	1984	13.06.2007	23	3,18	Industrials
Prime Office A/S	-0,65 %	7,24 %	0,00 %	189,50 %	-14,10 %	2007	11.07.2008	1	0,69	Real Estate
Copenhagen Capital A/S	1,90 %	0,00 %		717,58 %	-189,63 %	2007	01.11.2007	0	0,00	Real Estate
Rovsing A/S	-6,79 %	-6,98 %		133,75 %	-30,06 %	1992	07.12.2006	14	2,71	Industrials
cBrain A/S	4,23 %	28,96 %		119,00 %	15,65 %	2002	23.02.2006	4	1,61	Technology
REC Silicon ASA	0,28 %	43,40 %	2,35 %	0,00 %	9,73 %	1996	10.05.2006	10	2,40	Technology
Entra ASA	-0,84 %	13,86 %		24,70 %	111,34 %	2000	20.10.2014	14	2,71	Real Estate
Equinor ASA	3,24 %	11,36 %	0,30 %	53,99 %	7,42 %	1972	19.06.2001	28	3,37	Energy
BW LPG Ltd	-0,39 %	10,26 %	0,00 %	71,25 %	19,97 %	1935	22.11.2013	78	4,37	Industrials
Europris ASA	-0,28 %	7,66 %	0,00 %	54,21 %	6,96 %	1992	22.06.2015	23	3,18	Consumer Defensive
XXL ASA	-0,62 %	19,04 %	0,00 %	62,74 %	5,32 %	2000	06.10.2014	14	2,71	Consumer Cyclical
Electromagnetic Geoservices ASA	-46,61 %	21,85 %	3,99 %	99,41 %	-56,76 %	2002	02.04.2007	5	1,79	Energy
Sbanken ASA	-3,31 %	5,70 %		258,96 %	39,39 %	2000	03.11.2015	15	2,77	Financial Services
BW Offshore Ltd	-9,38 %	173,91 %	0,00 %	839,50 %	-20,64 %	1982	04.05.2006	24	3,22	Energy
Wallenius Wilhelmsen ASA	-2,04 %	15,37 %	0,00 %	0,00 %	59,62 %	1999	25.06.2010	11	2,48	Industrials
Norwegian Property ASA	-5,98 %	49,55 %		46,55 %	-37,28 %	2006	20.06.2006	0	0,00	Real Estate
HOEGH LNG HOLDINGS	2,75 %	28,07 %	19,21 %	203,98 %	-34,00 %	1973	06.07.2011	38	3,66	Energy
Ocean Yield ASA	8,33 %	11,19 %	0,00 %	7,98 %	36,54 %	2012	08.07.2013	1	0,69	Industrials
Aker BP ASA	21,94 %	28,82 %	7,92 %	0,00 %	-111,98 %	1971	02.01.2007	35	3,58	Energy
American Shipping Co ASA	-14,16 %	112,81 %	0,00 %	432,16 %	-101,29 %	1996	13.07.2005	9	2,30	Industrials
Scatec ASA	1,25 %	78,42 %	0,00 %	180,75 %	7,83 %	2007	03.10.2014	7	2,08	Utilities
Polarcus Ltd	4,09 %	110,27 %	0,00 %	945,56 %	-10,59 %	2008	11.07.2008	1	0,69	Energy
Austevoll Seafood ASA	-4,14 %	58,99 %		76,11 %	8,72 %	1981	09.06.2006	25	3,26	Consumer Defensive
Grieg Seafood ASA	-10,35 %	35,97 %		388,90 %	3,16 %	1990	01.06.2007	17	2,89	Consumer Defensive
Kid ASA	-1,70 %	17,25 %	0,00 %	73,06 %	10,27 %	1937	03.11.2015	78	4,37	Consumer cyclical
Selvaag Bolig ASA	-0,39 %	164,49 %		46,09 %	8,93 %	1948	15.06.2012	64	4,17	Real Estate
Nordic Nanovector ASA	0,00 %	1,45 %	6837,22 %	0,00 %		2009	10.07.2014	6	1,95	Healthcare
Seabird Exploration PLC	10,93 %	55,16 %	0,88 %	206,21 %	-14,82 %	2000	12.04.2006	6	1,95	Energy
Protector Forsikring ASA	14,14 %	16,13 %		0,00 %	16,36 %	2004	19.07.2006	3	1,39	Financial Services
Solon Eiendom ASA	4,87 %	20,32 %	70,52 %	127,95 %	-287,76 %	1993	09.05.2000	7	2,08	Real Estate
North Energy ASA	-6,87 %	0,00 %		223,09 %		2007	09.02.2010	3	1,39	Financial Services
PhotoCure ASA	-0,17 %	224,10 %	36,33 %	121,00 %	-980,22 %	1993	31.05.2000	7	2,08	Healthcare
Norwegian Air Shuttle ASA	13,38 %	65,13 %		149,90 %	-2,22 %	1993	19.12.2003	10	2,40	Industrials
AKVA Group ASA	1,93 %	33,89 %	2,11 %	164,93 %	0,44 %	1983	13.11.2006	23	3,18	Industrials
Otello Corporation ASA	16,01 %	45,10 %	0,00 %	0,00 %	14,57 %	1994	12.03.2004	10	2,40	Communication Services
Norway Royal Salmon ASA	1,06 %	11,96 %	0,00 %	168,16 %	6,06 %	1992	31.03.2011	19	3,00	Consumer Defensive
Zalaris ASA	2,15 %	23,95 %	0,00 %	68,04 %	2,41 %	2000	23.06.2014	14	2,71	Industrials
Insr Insurance Group ASA	-1,03 %	90,32 %		180,25 %	-31,91 %	2009	09.04.2014	5	1,79	Financial Services
Hunter Group ASA	30,06 %	197,48 %		35,86 %	-317,20 %	2003	16.01.2006	4	1,61	Energy
ArcticZymes Technologies ASA	0,06 %	-15,64 %		68,32 %	-118,51 %	1990	07.11.2005	15	2,77	Healthcare
Arribatec ASA	-1,86 %	38,91 %		15170,77 %	-21,09 %	1998	20.07.2001	3	1,39	Technology
Napatech A/S	-0,11 %	3,12 %	7,92 %	55,20 %	-1,51 %	2003	09.12.2013	10	2,40	Technology
EAM Solar ASA	1,34 %	23,59 %	0,00 %	474,94 %	-325,61 %	2011	27.03.2013	2	1,10	Utilities
Salmar ASA	-3,96 %	26,42 %	0,50 %	52,03 %	16,44 %	1991	09.05.2007	16	2,83	Consumer Defensive
VOW ASA	-0,02 %	17,25 %	5,34 %	6016,11 %	1,23 %	2011	14.04.2014	3	1,39	Industrials
Bakkafrost P/F	-1,64 %	36,20 %	0,11 %	59,76 %	23,85 %	1968	30.03.2010	42	3,76	Consumer Defensive
5th Planet Games A/S	0,38 %	12,31 %	105,84 %	0,00 %	-790,21 %	2011	29.06.2015	4	1,61	Communication Services
NattoPharma ASA	1,90 %	-8,66 %		67,86 %	-123,55 %	2004	31.01.2008	4	1,61	Healthcare
RAK Petroleum PLC	-7,60 %	105,43 %		126,74 %	10,52 %	2005	10.11.2014	9	2,30	Energy
Havila Shipping ASA	2,12 %	39,97 %	0,00 %	37,67 %	42,56 %	2003	18.03.2005	2	1,10	Industrials

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