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Master's thesis

Pricing and performance of Nordic initial public offerings

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ABSTRACT

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Initial public offerings (IPO) have been topic of interest in the field of finance for quite some time. Center of interest has revolved in pricing of IPOs, performance in short and longer run and why companies want to go public. Earlier research has provided evidence from around the world that IPOs are generally underpriced and short and long run performance over benchmark index is usually negative.

Research on initial public offerings has been thorough in the past trying to capture the phenomenon of IPOs from many angles. This thesis provides more recent results how Nordic IPOs are priced and aims to fill existing gap in the IPO research by observing whether so called size effect where smaller companies outperform larger companies, exists in Nordic IPOs stocks or not. The companies are main market listed companies in Sweden, Finland, Denmark, and Iceland from time period of 2010-2017. The performance of Nordic IPOs is observed from periods of one day up to two years. The study also evaluates whether the first day return has any implications for performance after the IPO. Size effect in IPOs has not been studied according to my knowledge and for that reason it is interesting addition to existing IPO research.

Theory part of this thesis focuses on theories explaining why companies want to go public, what are pros and cons of it and why IPOs are often valued as underpriced. Theories explain reasons for going public from practical point of view. Literature review after the theory part will show results from academic research of underpricing of IPOs, how newly listed companies perform on short and longer run and evidence of size effect.

The main findings from of this thesis is that Nordic IPOs from Finland, Sweden, Denmark, and Iceland have been underpriced 2010-2017, large cap IPOs had the highest initial return from the first trading day, small cap and underpriced IPOs had the best performance in longer run. Size effect seems to exist on Nordic IPOs.

TIIVISTELMÄ

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Pörssilistautumiset ovat olleet rahoitustutkimuksen kiinnostuksen kohteena jo pidemmän aikaa. Tutkimuksen keskiö on ollut listautumisten alihinnoittelussa, lyhyen ja pitkän ajan tuotoissa ja syissä, joiden takia yrityksen listautuvat. Maailmanlaajuinen aikaisempi tutkimus on osoittanut, että pörssilistautumiset ovat yleisesti alihinnoiteltuja ja lyhyen sekä pidemmän ajan suoriutuminen on negatiivista vertailuindeksiä vastaan.

Aikaisempi tutkimus on monipuolisesti tutkinut pörssilistautumisia ilmiönä. Tämä tutkielma täyttää olemassa olevaa aukkoa tutkimuksessa ja selvittää onko pienyhtiö anomalia Pohjoismaisissa pörssilistautumissa. Pienyhtiöanomalia tarkoittaa osakemarkkinoiden ilmiötä, jossa pienet yhtiöt tuottavat paremmin kuin suuret yhtiöt. Tutkielman yhtiöt ovat päälistalle listatut yhtiöt Ruotsissa, Suomessa, Tanskassa ja Islannissa vuosilta 2010–2017. Pohjoismaihin listautuneiden yhtiöiden tuottoja seurataan yhdestä päivästä kahden vuoden ajanjaksolla. Tutkielma selvittää myös miten eri tavalla hinnoitellut tuottavat listautumisen jälkeen. Pienyhtiö-anomaliaa ei ole tietojeni mukaan tutkittu aikaisemmissa pörssilistautumisia käsittelevissä tutkielmissa, joten tämä on mielenkiintoinen lisä aiheen tutkimuksen saralla.

Teoriaosuudessa keskitytään teorioihin, jotka selittävät syitä yhtiöiden pörssilistautumiseen ja sen hyviä ja huonoja puolia sekä miksi pörssilistautumiset ovat usein alihinnoiteltua. Teoriaosuus esittelee käytännön syitä miksi listautumiset ovat usein alihinnoiteltuja. Kirjallisuuskatsaus käy läpi aikaisemman akateemisen tutkimuksen tuloksia pörssilistautumisten alihinnoittelusta, kuinka listautuneet yhtiöt suoriutuvat lyhyellä ja pidemmällä aikajänteellä ja pienyhtiö anomaliasta.

Merkittävimmät tutkimustulokset tutkielmasta ovat, että Pohjoismaiset pörssilistautumiset Suomesta, Ruotsista, Tanskasta ja Islannista vuosilta 2010–2017 ovat alihinnoiteltua, suuret yhtiöt eniten. Alihinnoittelu ja yhtiön toivat parhaimmat tuotot listautumisen jälkeen. Pörssien pienyhtiö anomalia näyttäisi esiintyvän Pohjoismaissa.

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Long journey is coming to an end. This thesis will be the final accomplishment in my academic studies, at least for now. Now it is time to finish this chapter in my life and move towards new challenges awaiting ahead. Lots of valuable lessons will be taken from the university and some aspects of it will certainly be missed.

I would like to thank all the teachers and staff at LUT-university for providing excellent education and creating inspirational spirit and community to the campus. LUT-University is also thanked for providing international study environment and giving me an opportunity to study abroad for one semester. Praises also go the supervisor Azzurra Morreale for helping me with the thesis. Also, for patience, as it took some time to complete this work.

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Years studying has had ups and downs. Memories will be warm, and I had privilege to meet lots of wonderful people. Now it is time to move to working life with all the knowledge acquired.

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1.   Introduction

This study aims to gather recent results on how initial public offerings (IPO) are priced in the Nordic stock exchanges. Focus is on gathering results regarding first day returns to evaluate how Nordic IPOs are priced. The study investigates if Nordic companies of different market capitalization (market cap) perform differently after the first trading day for holding periods from one day up to two years. The study also looks how differently priced companies at IPO perform after the first trading day. Performance after the IPO will be evaluated against two Nordic indices and with risk-adjusted performance measures of Jensen's alpha and Sharpe ratio. The study will offer more recent results on Nordic IPOs and evidence on size effect in the Nordics. The Nordic IPOs were underpriced and small cap IPO stocks had the best performance after the first trading day with underpriced IPO stocks.

Becoming a public company offers many benefits for the company, but it has its downsides as well. For example, it offers a company an opportunity to raise capital for investments and provides a platform for current owners to liquidate their investment (Kim & Weisbach. 2009.pp. 281), (Pagano, et al. 1998, p. 39-40). Public companies can also benefit from public recognition by higher stock price (Merton. 1987. pp. 500-501). Being public company also means that the company must disclose more information publicly and meet requirements of stock exchange (Bancel & Mittoo. 2009. pp. 845).

The shares are offered to public via initial public offering (IPO). An underwriter typically helps in IPO by distributing, marketing, and pricing the offer. Underwriter is usually an investment bank (Baron. 1982. pp.955-956). The shares of newly listed companies are often offered seemingly at discount. This discount is observed by that newly listed share starts trading at higher price at stock exchange than offer price was for investors. The price at stock exchange is often more than ten percent higher after the first trading day than the offer price. Basically, it implies that the newly listed company could possibly have raised more funds via IPO by having higher offer price as investors are willing to pay higher price when the share starts trading at stock exchange. This creates a chance to make quick profits by buying shares at offer price and selling them immediately when trading starts at stock exchange.

IPO underpricing is an interesting phenomenon that has been puzzling academics and finance professionals for years why would companies sell their shares at discount when compared to price newly listed shares start trading at stock exchange. Research has documented it to be worldwide phenomenon. Loughran & Ritter (2004) documented from USA that IPO underpricing exists persistently through time and level of underpricing has varied.

Many theories have been developed to explain why IPOs are often irrationally valued at discount. Ritter and Welch (2002) presented that discounting the offer price is for purpose of signalling good quality and stand out from bad quality companies that cannot undervalue their offers (Ritter & Welch. 2002. pp.1803). One explanation offered is that company benefits from the IPO underpricing in future offers where they raise money at higher valuation (Chemmanur. 1993. pp. 285-286). Tinic (1988) explained underpricing as sort of an insurance against lawsuits and reputational damage that could follow if price of IPO stocks plummets during the first days of trading and investors sue the company for giving misinformation in before the IPO. Nevertheless, it is interesting phenomenon that newly listed companies and underwriters willingly discount their offer.

Other interesting stock market phenomenon has been size effect. Size effect is a stock market anomaly where small companies often outperform larger companies in returns. It has been documented for example by Reinganum and Smith (1983) and Fama and French (1992). Size effect is a stock market anomaly that contradicts efficient market hypothesis presented by Fama (1970) where markets generally efficiently price securities and above market returns should not be achieved in a long run. Various studies have empirically documented existence of size effect. Van Dijk (2011) compiled earlier research on the existence of size effect. According to his research the size effect phenomenon is global and appears to persist over time.

Companies are going public all the time. More on some years and fewer on others. Through spread of internet and increased number of tools for electronic trading stock trading has become increasingly popular, cheaper, and easier for retail investors. That development has led to participating in IPOs has become easier, especially for retail investors. This has made IPOs more attractive opportunity for retail investors to invest in exciting new companies and possibly make some money at the same time. This makes it important topic to see if there is chance to make money in short and longer run by participating

in IPOs. It is interesting to see if there has been a chance to make quick profits in the Nordics by buying at the offer price and then sell the shares during the first trading day.

IPOs have been a topic of research in the field of finance for decades. Researchers have widely studied returns of IPOs from different markets and countries. Focus has been on exploring underpricing, how they perform after the IPO and explaining why the IPOs are often undervalued. This study will gather more recent results from the Nordic countries. Despite ongoing research on the topic, we can still find uncovered areas from the IPO research.

One gap in the research of IPOs is size effect in IPO companies has not been studied much. This study aims to find if there is evidence of size effect among Nordic newly listed companies. Company's size as a factor explaining IPO returns and performance is not widely researched, especially for IPOs in the Nordic stock exchanges. This makes this study relevant to see what kind of returns an investor can achieve by picking Nordic IPO shares based on market cap and if it is worthwhile to hold these shares for longer periods. Company's size means company's market capitalization which is calculated by multiplying number of shares by share price at stock exchange. Addition of this aspect to investigating performance of IPOs makes this study interesting and relevant. The results will add new information to research on recent IPOs. Hopefully inspires future research with its ideas.

The study will explore on how Nordic IPOs perform overall for holding period of one month to two years. The performance of IPO stocks is evaluated against two Nordic indices and uses risk adjusted measurements of Jensen's alpha and Sharpe ratio. With the data we also categorize the IPO stocks how their pricing was perceived at offer price and look how they performed after the first trading day.

This study will shed light on underpricing and on performance of newly listed Nordic to main list IPOs from 2010-2017. The results show that Nordic IPOs are underpriced, size effect exists and underpricing at offer price is important factor in positive performance after the IPO.

1.1.   Research focus

The study focuses on investigating if Nordic IPOs are underpriced, how they perform after the first trading day and whether size effect anomaly exists with Nordic IPOs. This scope will enable the study to answer for research questions listed below and fill in the gaps in the academic research. IPOs included in this study are Nasdaq Nordic main market listings from years 2010-2017 that has been conducted in Finland, Sweden, Denmark, and Iceland. Norway had been dropped as Norwegian companies are not included in benchmark indices of this study.

This study aims to answers for research questions below:

1. How the Nordic IPOs perform on the first trading day and after one month?
2. Do companies of different size have difference in the first day returns?
3. How do IPO companies of different market capitalization and different first trading day return perform after the IPO?

This study will look how Nordic IPOs are priced. This will be measured by calculating %-difference of closing price on the first trading day to the offer price the shares were offered to investors. If percentage change from offer price to first close price is positive, the IPO is perceived to be underpriced, if it is zero the offer is perceived as accurately priced and overpriced if the percentage change is negative. First day returns are looked for all stocks, stocks sorted by country, sorted by size and by listing year.

Positive first day return is also called initial return or IPO underpricing in academic literature. First day return is most often calculated as percentage change from offer price to close price on the first trading day. Offer price is the price the shares are offered to investors before the company starts trading at stock exchange.

Most relevant evidence of first day returns from the Nordics are from Westerholm (2006) who investigated level of underpricing from IPOs between 1991-2002. Results of this study will be newer addition to research on IPO first day returns in the Nordic stock exchanges. To add more depth, this study also evaluates if there is evidence of size effect in the first day returns. This is done by sorting the IPO companies to large cap, mid cap and small cap categories based on the market capitalization at the time of the listing. That has not been studied from Nordic IPOs, according to my information. Also, we will look at first day returns in different listing countries to see whether there are differences in first day

returns across Nordic stock exchanges. These extensions will be valuable addition to research on IPO first day returns.

IPO stock performance in longer run after the IPO will be measured against two benchmark indices and with risk adjusted measures of Jensen's alpha and Sharpe ratio. The performance is measured for holding periods from one month up to two years. Benchmark indices are Nasdaq OMX Nordic growth index which is broad market index that consist of all main market listed companies from Nasdaq Nordic exchange. The second benchmark is Nasdaq OMX Nordic large cap growth index, Nasdaq OMX Nordic mid cap growth index and Nasdaq OMX Nordic small cap growth index. Each IPO stock will be sorted based on their market cap and will be compared against their Nasdaq OMX market cap index. By doing this comparison, we can see if it has been better to pick IPO stocks or if the above listed stock indices performed better.

Westerholm (2006) has done his research on Nordic IPOs where newly listed companies underperformed against benchmark index after the IPO. Performance in this study is also measured using risk adjusted measures which are Jensen's alpha and Sharpe ratio. All of these performance measures are done for all IPO stocks to evaluate how they perform in general for longer holding periods. As we also have data regarding pricing at IPO, we will use the same data to calculate how differently priced IPOs perform on longer holding periods. The performance after the IPO will be looked for all stocks and stocks sorted by listing country, size at the time of listing and perceived pricing at offer price.

Size effect is looked at this study. It will be done by checking first day returns by sorting the stocks based on market cap at the time of the listing. Stocks are sorted to large, mid and small cap categories. Performance after the IPO for these size groups will be evaluated against Nasdaq Nordic OMX growth index and Nasdaq Nordic OMX market cap growth index. This way we can check how IPO stocks of different size category perform against vast market index and index consisting of companies of the same market cap. For example, small cap IPO stocks would be evaluated against Nasdaq Nordic OMX growth index and Nasdaq Nordic OMX small cap growth index. Risk-adjusted performance measures of Jensen's alpha and Sharpe ratio are also implemented for evaluating perform after IPO. By using multiple methods for performance evaluation, we aim to gather more conclusive results.

1.2.   Structure of the study

The study will present existing, relevant theory regarding the topic of IPOs this study is covering. Theory will go through why companies may want to go public and what are pros and cons of being public company. Also, we will go through different theories explaining why IPOs are often underpriced as earlier research has found. Then follows literature review to show us results from earlier research. Data and methodology section then shows used data and methods applied. Results are then presented, and conclusions are made from the results. In the end suggestions for future will end the study. Structure of this study is presented in the figure 1. From it can be seen what the structure of the study is and what topics will be covered while reading the study further.
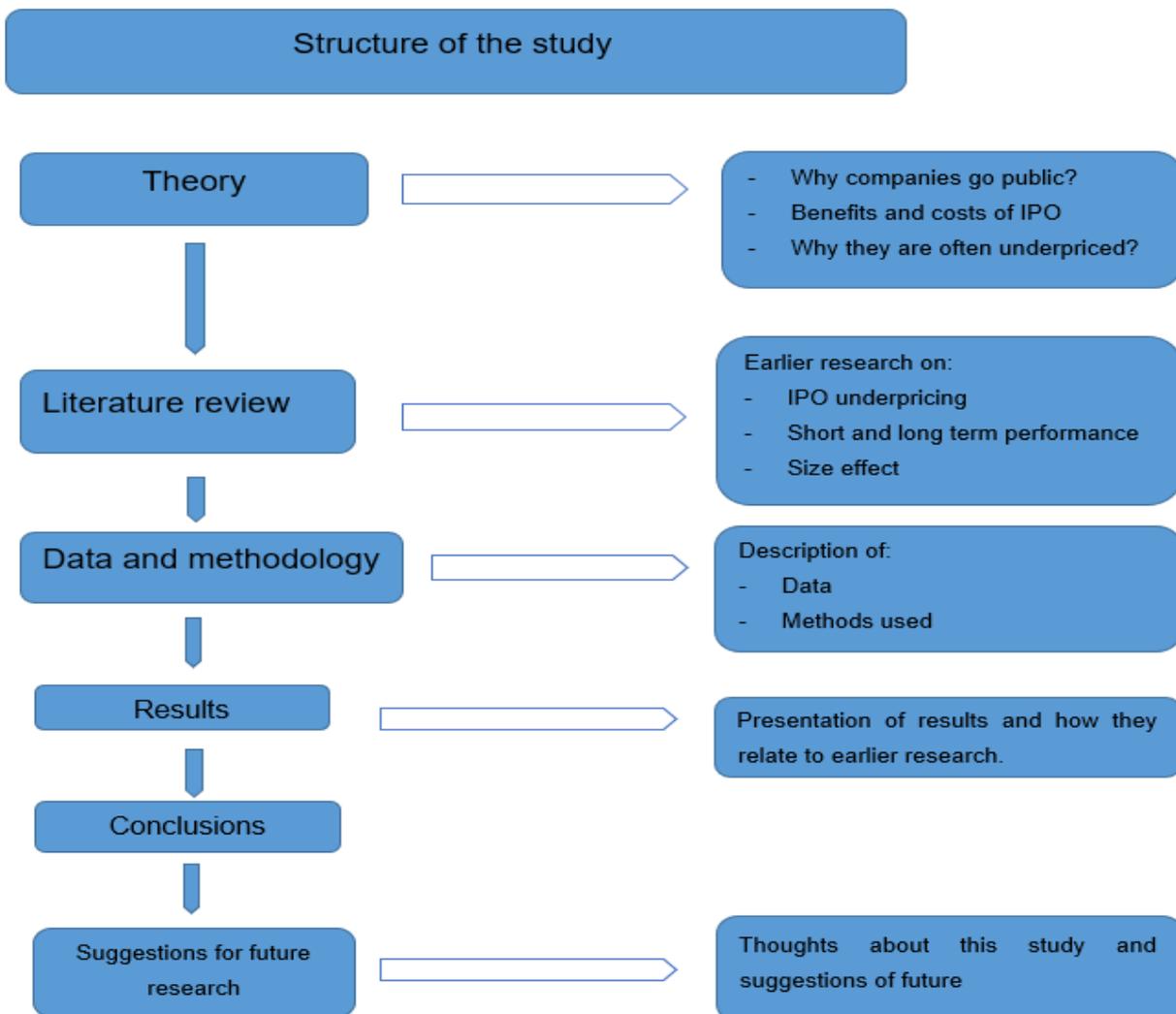
Figure 1. Structure of the study

This study starts by going through relevant theory around the topic of IPO underpricing. IPO stands for initial public offering where company sells its shares to large number of investors and the shares will then be traded publicly at stock exchange. Value of the shares and company is determined based on what price investors are willing to buy and sell the shares at stock exchange. Presented theories explain reasons why companies want to or do not want to go public and what may be benefits and costs of IPO for the company. Theory part will also show earlier theory that has been created to explain why IPOs are often underpriced. This will help the reader to understand the phenomenon.

Then literature review shows results from earlier academic studies to which results from this study can be compared to and see how the results position in the existing academic research and earlier results. Literature review shows us evidence of IPO underpricing from all around the world, how do newly listed companies perform in the following years after going public against benchmarks. Lastly evidence of size effect anomaly is presented.

Section of data and methodology describes data used for this study, how it is collected and processed. Then methods are presented and how they will be applied to get answer to the research questions.

Results are then presented, visualized, and reflected to earlier results. We will then present conclusions made from the results. Last section gives thoughts about this study and suggestions for future research that came up along the process of finishing this thesis.

2.   Why companies go public?

Initial public offering is an event in firm's life where a privately owned company sells existing shares and or issues new shares to be sold to public which often consists of funds, banks, institutions, private investors etc. The shares are traded at stock exchange where investors can buy and sell the shares. Price of the share is then determined by demand that investors are willing to buy or sell the shares. The share price will be determined constantly when trading is open at stock exchange. Stock exchanges are regulated marketplaces where listed firms must meet disclosure requirements, report regularly and publish information that may influence the value of company (Bancel & Mittoo. 2009. pp. 845).

Owners of private company are often entrepreneurs behind the business idea or an invention. Private companies typically have fewer owners than public companies. There can be other investors involved from the early stages of the firm, such as venture capitalists and angel investors. (Chemmanur & Fulghieri. 1999.pp. 250). Venture capitalists offer their expertise, reputation, connections, and funding for the company. Strategy of early-stage investors is to grow the business from early stages to a point when it will be listed, where they sell their investment and seek new early-stage companies to invest in. (Black & Gilson. 1998.pp. 245-246)

There are typically at least three reasons for a company to go public and acquire capital. To get financing for future investments, trying to benefit from favourable market conditions when valuations are higher and to increase liquidity of the stock. Going public is good way to raise financing for projects from large crowd. Also, if a company sees opportunity to raise money at higher valuations that they perceive their company is worth, value of already existing shares can be increased. Liquidity of stock benefits insiders and the company has it has better access to capital. (Kim & Weisbach. 2008. pp.281-282) Their results strongly suggest that IPOs are used to raise capital for investments in research and development projects(R&D). Increase in R&D spending were substantially larger than for companies funding these projects with money generated from their business. Also, they found results consistent with theory that companies go public to benefit from high valuations. Companies with high valuations had more of their proceeds from IPO kept as cash. (Kim & Weisbach. 2008. pp.301)

Chemmanur & Fulghieri (1999) created a model to answer the problem when a private company should go public and finance their projects with that money. They came up with three distinct differences

between private and public companies. The three differences of public and private companies are: larger number of owners, public companies need to appeal as an investable company to larger number of investors and a public share price. (Chemmanur & Fulghieri. 1999, p.250)

Public companies have large number individual investors, and they obtain required capital by selling their shares to large number of investors. Private companies usually acquire their needed capital from one or few large investors. The implications of this are that investors of public company usually have small portion of their whole wealth invested in the company and their overall investments are diversified. This leads to investors accepting lower rate of return as they have less risk due to diversification on their portfolios. Ownership is more concentrated in private companies and large investors have more influence over the entrepreneur than in a public company with numerous investors. (Chemmanur & Fulghieri. 1999, p.250-251)

Selling proportions of the company to large number of investors has its benefits. Individual investors own only small portion of the company, and their personal wealth is diversified. They also have very little leverage related to the entrepreneur as the company is valued in competitively in public markets. Having one large owner as private company has the advantage of lower information production costs as one large investor uses time and effort for evaluating the investment only once when making the decision to provide funds. Disadvantage of having large investor in private company is that they expect higher rate of return from their investment as much of their whole wealth is invested in the company thus leading their portfolios not being diversified. That cost will be reflected as lower share price the large investor is willing to pay. Also, they have more bargaining power related to the entrepreneur. (Chemmanur & Fulghieri. 1999, p.251-252)

As public companies have more investors, each of them spends their time and effort at a cost to evaluate whether the company is investable. This cost will be reflected at lower stock price investors are willing to pay. This leads to a trade-off for the company having large number of investors with small stake of the company, little bargaining power relative to the company and well diversified portfolios and with all of them spending their effort evaluating the company at cost. The benefits of being public are weighted by costs of information production by investors. Easier to evaluate more mature companies would have lower information production costs thus would benefit more for being public. In the model

companies with high information production costs for outside investors, typically younger companies, would prefer to stay private. (Chemmanur & Fulghieri. 1999, p.251-252)

Stock price of the company is observable to everyone after the company has gone public. As the price is public to everyone, it leads to reduction in costs of producing information about the company. Reduction comes from the fact that some investors can free ride more sophisticated investors that have used their time and effort for analysing the company. That is reflected on the price information that is publicly available. (Chemmanur & Fulghieri. 1999, p.250-251)

Bancel & Mittoo (2009) surveyed chief financial officers (CFO) from European countries who had undergone process of becoming public companies. Survey was after finding out what the chief financial officers valued in going public and what were downsides of doing that. Reasons for going public vary based on characteristics of the companies, countries, and legal systems. Large companies valued the increased external monitoring as an important benefit and small companies were seeking capital for growth. Family firms see the decision to go public as means to increase their power with creditors and keeping their control of the company. Major support was found for theories of increased reputation and prestige, more flexibility for financing growth. Some support was found on theories focusing on exit strategy, increased monitoring and mergers and acquisitions. Least support was found for theories of information asymmetries and reducing cost of capital. Their results suggest that the companies are looking for more than just one benefit when going public. (Bancel & Mittoo. 2009.pp. 845-846)

Pagano, Panetta and Zingales (1998) found from studying Italian companies that there are multiple drivers affecting the decision to go public. The biggest driver for predicting likelihood of IPO is market-to-book ratio at which industry peers trade at stock exchange. Higher these valuations are the more likely non-listed company from the same industry is going go public. This relationship could indicate that owners are trying to benefit from high valuations and time their IPOs to those periods. It could also point towards larger need to invest in industries with good growth prospects. Their results signal that they owners are more likely trying to time the market with their IPO than to capture growth opportunities as both profitability and investments decreased for companies after they became publicly traded. (Pagano et al.1998, p. 28-29)

Size of company is the second biggest driver for firms going public. Larger the firm, more likely it is going to go public. They also found that rapid growth and large investment for company raises the probability of company going public to lower their leverage and rebalance their balance sheets (Pagano, et al. 1998, p. 29)

2.1.   Benefits

Going public decision and reasons behind it has been a topic of discussion for quite some time. The main benefits are gathered to this chapter. There are many benefits for the company to be public and companies probably go public because of the combination of benefits, not just one that they are looking for. The usual reason to go public is to raise capital for investments from public by selling shares of the company (Kim & Weisbach. 2009.pp. 281). Other benefits revolve around benefits to future M&A actions, getting financing for projects, liquid trading of the stock, monitoring from the market and public visibility, and attempts to time the market.

Rajan (1992) examined sources of debt for companies and what are the trade-offs. Main benefits of being public are that the company can expose its lender to more competition leading to lower costs of borrowing money and better supply of funds as the borrower can get money from multiple investors. Bank as lender cannot use its privilege on private information as the company has to disclose more information to public. If a private company relies only on one bank as source of financing, the bank with information it has acquired during the lending process would have control over investments decisions whether the company can continue its projects or not, leading the owner to exert lower effort. Benefit of the bank lending is that it is easier to renegotiated as the bank already has information about the company and its projects. A public company can collect needed funds from multiple lenders, and it can reduce the control that the bank has over its projects and profits. More control will incentive owner to work harder. On the other hand, these investors with less information about company's activities could allow the company to continue its unprofitable projects which bank as a lender could have stopped. Being publicly traded company allows the company to choose if it wants to use bank lending or lending from general public or both together. (Rajan.1992.1368-1369)

Black and Gilson (1998) argued that IPO is important for both venture capitalists and for the entrepreneur. Company owned by prestigious venture capital fund benefits from financial capability, advisory, monitoring and reputation of the venture capital company. Performance of venture capitalist

is hard to evaluate for investors of venture capital funds. To tackle this problem, successful exits via IPO serve as proof of skill of the venture capitalist to investors of venture capital funds. More mature companies do not enjoy benefits from the features of venture capital to the same degree and an IPO is an opportunity to cash the investments and reinvest it. IPO can also be an important goal for the entrepreneur who wishes to have more control over his company. By working hard and showcasing managing skills, an entrepreneur can regain control of his company when the venture capitalist makes his exit at the IPO. (Black & Gilson. 1998. pp. 245-246)

One benefit of being public company is that it can lower company's cost of credit. Pagano et al (1998) recorded from data of Italian companies that going public decision reduced their cost of credit. As newly listed companies they had more sources available to borrow money from. Their possible explanation for lowered cost of credit was that as public company more data was available and increased competition to banks for lending money. Their results also hold when they controlled that newly listed companies lowered their leverage. (Pagano et al. 1998. 29)

Going public increases liquidity of company's shares and is a possibility for owners to diversify their investments by selling some portion of their stake of the company. Also venture capitalist can cash out their investment at the IPO. Trading at stock exchange is cheaper, faster, and easier compared selling shares of private company where you have to find interested buyer, initiate negotiations which takes more time and costs more. Owners can diversify their overall investment by selling their shares at stock exchange and buy some other asset with that money. They can also raise new capital from investors after the trading has commenced or buy other companies. Riskier companies are expected to go public and initial owners should sell bigger proportion of their holdings if this diversification as a motive for going public holds. (Pagano, et al. 1998, p. 39-40)

Public companies have their market value constantly determined in the stock exchange. Private companies do not have that benefit in the same degree as there is more uncertainty in the value. Having actively traded stocks makes M&A actions easier as the stock can act as currency for those actions. Hsieh, Lyandres and Zhdanov (2011) argue that private companies have hard time evaluating their own value. This uncertainty around the true value of private company may lead doing suboptimal acquisitions as it is hard to track how effective the acquisition was. More accurate company valuation after the IPO allows the company to increase its value by better acquisitions. Having more accurate valuation as public company also can benefit companies that may be under a threat of other company

buying them. (Hsieh, Lyandres & Shdanov. 2011. pp. 1368-1369) Bancel and Mittoo (2009) have evidence supporting this theory from their results surveying European CFO's. 56% of interviewed CFO's agreed that M&A actions enabled by IPO is important in the decision to go public. Also, most CFOs saw that IPO has helped them making market value estimation of their company easier and the stock can be used for facilitating future acquisitions. (Bancel & Mittoo. 2009. p.862)

Holmström and Tirole (1993) came up with their research in which publicly traded stock can affect incentives of managers of the company. If the company performs badly, it can become a target for takeover in which case managers would often be fired. This is assumed to keep managers in check and trying to perform well in the best interest of shareholders. Having publicly traded stock also makes it easier align interests of shareholders and the management by making management rewards tied to stock price performance. These control tools can be one reason a company would like to go public among other reasons. (Holmström & Tirole. 1993. pp. 678-679)

Holmström and Tirole (1993) believed that stock price is objective third party-evaluation of performance and it is valuable for designing managerial incentives and for monitoring of the company. Liquidity of a stock affects how much information from the managers' performance is in the stock price. This comes from increased liquidity which lures market participants who would spend time monitoring and trying to evaluate the company's true value. The more liquidity there is on the stock, the more information the stock price contains about the company. Having more liquidity increases amount of information of managerial performance contained in the stock price. Being public company would have benefits in monitoring managers' performance and creating incentive programs. (Holmström & Tirole. 1993. pp. 678-680)

Getting listed in stock exchange makes the company more public to larger amount of people and institutions. Company is required to disclose more information to public, financial press follows the company more closely and writes articles of the company making it more visible. Analysts are also likely to be interested in creating information about the company. As there are large number of investments where an individual investor can choose from it makes sense to become more public to attract investors. Merton (1987) argued in his model that larger investor base lowers cost of equity for the company and increase value of the company. Following the model, it is in the interest of the company to grow number of investors and the company is incentivised to spend resources on that. Merton also noted that the company can have all its information public, but it has not captured attention

of the public until it spreads in the public for example by media. This can lead to growth in investor base without the company spending any resources on it. As new investors hop in, they evaluate public information and drive the stock price. This leads managers being induced to grow number of investors. (Merton. 1987. pp. 500-501)

Bancel and Mittoo (2009) found supporting evidence when they interviewed European chief financial officers (CFO). Increased investor base and visibility, reputation was one of the reasons these CFOs wanted to take their company public. Most of the CFO's listed these as important or very important reasons for going public. (Bancel & Mittoo. 2009.p.852-853)

Companies can choose when they want to go public and would try to do it when they get the most value out of it. Lucas and McDonald (1990) presented their evidence that companies would go public when they can get higher valuation from the market. They would try to time the market with the inside knowledge of the company's true value. Unlisted company wants to benefit from favourable market conditions and issue when average market valuations are higher. If the company knows that it will not get true value from the IPO, it will wait with the IPO. Companies that know they are overvalued would issue immediately. This explains variation in IPO activity through time and IPOs pooling to same time window after rise in the general market. (Lucas & McDonald. 1990. pp. 1020-1021)

Zingales (1995) presented his take on why companies want to go public to stem from owner's plan to sell the company and maximize the value the owner receives. IPO is used to change ownership structure to more optimal in order to maximise proceeds when the whole company is sold later. Value comes from two components of cash flow and corporate control. Cash flow rights are sold to public in the IPO and those investors would each have small portion of the company. Rights to cash flows are enjoyed by all investors proportionate to their stake of the company. Sale of corporate control is negotiated privately with large investor who would gain controlling portion of the company. Market for corporate control is less competitive as there are usually few large investors that can buy the stake. For that reason, it is better to private negotiate the sale of controlling block of the company to get more value of selling that block. The investor would get private benefits that come with controlling stake of the company. (Zingales 1995. pp. 425-426)

2.2. The costs of IPO

As there are clear benefits for companies being public, there are downsides for being publicly traded company which explain why there are companies that prefer staying private. There are costs that are paid to the underwriter at the time of the IPO and annual costs that are related to disclosure requirements etc. Also, there are others costs that stem from increased publicity and requirement to disclose more information.

Going public generates costs from the arrangement of the IPO such as underwriting services and registration fees There are also annual costs after the IPO event related to meeting disclosure requirements of public company. These costs do not proportionally increase with the increase in company size, so the costs are relatively heavier for smaller companies. These costs itself deters the smallest companies going public. (Pagano, et al. 1998, p. 38)

Important part of being a public company is the increased monitoring and regulation that public companies must publish more information compared to private companies. Public companies are under tougher supervision from shareholders, tax authorities, competitors, and other stakeholders. Public companies need reveal more information on their research and development projects, plans and strategies than they would like to as private company. When this information is public, competitors can evaluate it and counteract. Revealing this kind of information as public company acts as a cost. (Pagano et al. 1998. Pp. 38)

In general owner of the company has better knowledge about the value of the company and its projects than outside investors have. Investors do not know the quality of the company or its project. Due to investors not having all information related to the company, they would value the company or its projects to the average market value. This would lead to rise of low-quality companies seeking financing if average project value in the market is higher than their costs. This in turn leads to rise of cost of capital also for companies of high quality. High quality companies would need to give more information of their quality to investors to distinguish themselves from low quality companies. They can do that by giving signals that would show the true quality. Signals could be underpricing in the IPO, company insiders investing in the own company or give out other information. These signalling actions can be viewed as costs. For example, by signalling the quality by underpricing the IPO, the owner is losing

money by selling the company at discount in order to stand out from the rest of companies. (Leland & Pyle. 1977. pp.371)

Campbell (1979) made his analysis why companies would prefer to stay private based on leakage of insider information regarding technological and strategic advantages in the market. In his analysis Managers would have projects that would enhance market position of the company, for example by creating barriers to entry. These projects can generate excess returns to current owners in the future only if that insider information of these projects is not revealed to wider audience. To get financing for the projects that will enhance company's market position and to protect competitive advantages from leaking, a company would privately offer securities and give out some of their insider information in return to get the financing. These new securities would have different rights for profits to protect existing equity holders. This way the current owners can enjoy from the excess returns without letting market know of the insider information. Due to cost of information leakage, a company could decide to stay private. (Campbell.1979. pp. 915)

Yosha (1995) made similar observations. Yosha stated that small and medium size companies of good quality and innovation would issue debt or equity privately and to single lender to avoid leaking confidential information to its competitors. Companies with better competitive advantages would have more to lose if their information is revealed. These leaks could cause counter measures from competitors. Obtain financing from general public has higher chance of leaking private information as they would need to give their information to multiple investors. (Yosha. 1995. pp. 3-4)

2.3.   Valuation

This chapter discusses some reasons why IPOs are often undervalued at offer price. The topic has been under academic research for quite some time and trying to understand why owners are willing to leave money on the table by seemingly underpricing the IPO. This undervaluation is observed in the academic literature by percentage change from offer price at IPO to the first day close price. This is called initial first day return. There also other variations for calculating the initial return but using the offer price and first close price is the most common. IPO underpricing and initial first day return are both used for describing the phenomenon (Ritter & Welch.2002. pp. 1802).

Most practitioners and academics recommend valuing IPOs using accounting information and multiples to comparable companies. This is due to reason that lots of companies going public are young and their future cash flows are hard to forecast, which leads to valuation models based on future cash flows being imprecise. Kim and Ritter (1999) in their study found that valuing young companies was more imprecise that older companies when they looked at comparable company multiples. (Kim & Ritter. 1999. pp. 410-411.)

Roosenboom (2007) documented similar results about valuing IPO companies. Multiple valuation, the dividend discount model and the discounted cash flow model are the most widely used valuation methods for IPO in Euronext Paris from 1990-1999. Technology companies, fast growing and/or profitable companies were valued most often with multiples valuation. Older companies from more established industries were often valued using the dividend discount model. These companies often aim to distribute their profits as dividends to their shareholders. The discounted cash flow model and economic value-added method were more often used when expected stock market returns are high or the market was volatile. When the stock markets returns are low, the dividend discount model is more often used. (Roosenboom. 2007. pp 1238-1239)

Purnanandam and Swaminathan (2004) examined valuation and performance of US IPOs by comparing price multiples at offer price to price multiples of industry peer companies. Companies were grouped by industry. Comparable companies were chosen by closeness to the IPO companies by operating characteristics. Their data of IPOs from 1980 to 1997 show that IPO companies are overvalued at the offer price when compared to their peer companies. (Purnanandam & Swaminathan. 2004. p.812) Their observation was that IPOs are overpriced at the offer price when compared to peers. This overvaluation does not disappear during the first trading day and IPO stocks often increase in value after the IPO. In long run these overvaluations fall back to their fair value. (Purnanandam & Swaminathan. 2004. p.845)

Level of underpricing has varied highly through decades. Loughran and Ritter (2004) had data from US over period of 1980-2003 from which they made their explanations for the change in underpricing. (Loughran & Ritter. 2004. pp.5). Explanation for the variation in level of underpricing comes from the change in profile of companies going public. Companies were quite similar by age and assets during 80' and 90's, during the internet bubble high proportion of the companies going public were

very young companies. After the bubble high number of companies going public were again older companies. (Loughran & Ritter. 2004. pp.31-32)

Changing issuer objective gives to two explanations why IPOs were more underpriced during 90' and the internet bubble period. During those periods analyst coverage was seen as necessity for newly listed company. Analyst coverage was paid indirectly by underpricing the IPO as the coverage was usually free. The second explanation is that venture capitalist and managers of the company intending to go public benefit from the underpricing via their personal accounts. They would choose underwriter known for underpricing IPOs. Venture capitalists and executives would lose money by underpricing their own IPO but get personal gains in other IPOs in which they would receive stocks from the underwriter. (Loughran & Ritter. 2004. pp.32)

2.4. Theories of asymmetric information

Undervaluation of IPOs is often explained by theories based on asymmetric information between issuers, underwriters, and investors. Issuer is a company getting listed and underwriter is typically a bank arranging the IPO. Asymmetry in information means that one or multiple parties of IPO have better or more information relative to party with less information. Asymmetry causes uncertainty and higher uncertainty interpreted as risk need to be compensated by offering higher return. This leads to prices going down as risk increases. Theories in this chapter revolve around information where some participant in market has more information than other participants.

Company insiders are expected to be more informed than investors when it comes to knowing their company's quality. Investors are afraid of buying bad quality companies to their portfolios. In IPOs it creates a risk that companies that are of lower quality than average companies try to sell their shares at average price. To stand out from bad quality companies, high quality companies sell their shares at a discount in the IPO to signal their superior quality as a company. Low or bad quality companies cannot replicate that. After IPO, these companies can possibly get their discount back in future issues from which they get better price. (Ritter & Welch. 2002. pp. 1803)

Rock (1986) presented his model where there are informed investors and uninformed investors. The informed investors, which are typical large institutions and professional investors, would get more of the shares from good offers and leave bad offers. This would lead uninformed investors to receive only scraps from good IPOs and full allocation from bad IPOs. Uninformed investors would need to be compensated for that risk of being at disadvantage to get them on board thus leading to IPOs being underpriced. (Rock. 1986. pp. 187-188.)

Some theories explain that the companies attempt to benefit from the undepricing in the secondary markets through future issues for example. Chemmanur (1993) in his model explained that company insiders have superior information about the quality of the company and its future possibilities when compared to outside investors. Creating information about the company creates costs to outside investors. They need an incentive to create information and valuation of that company. That is done by underpricing the IPO. Owners of good quality companies want investors to create information regarding the value of the company. The company will then benefit from the higher stock value caused information creation in future issues as there is more information about the value of the company. (Chemmanur. 1993. 285-286)

Welch (1989) followed the similar footsteps. High quality companies offer their shares at discount in the IPO to later get higher price in seasoned offerings. Low quality companies would try to mimic high quality companies in activities and attributes, at a cost, and true quality would at some point be revealed to investors. Welch's model suggests that companies going public are seeking to issue multiple times when they decide on price and stake to be sold at the IPO. The discount at the IPO is compensated later in seasoned offerings. (Welch. 1989. pp. 445)

Welch (1992) presented his approach on the information asymmetry where issuers want to underprice IPO to avoid negative cascades which could lead the IPO to be withdrawn. IPOs are not offered to all investors simultaneously, and investors in later rounds would observe overall demand from decisions of earlier investors who were approached earlier. Late investors could then base their decision on the decision of early investors rather than their own information. If early investors deem that the IPO is overpriced, that can create then negative cascade where early investors decline the IPO offer, late

investors observe that decision and decline also, leading the IPO to be withdrawn. This can also work the other way when early investors find that the IPO is offered at discount and participate in the IPO. Late investors can then follow this decision and create very high demand for the IPO. (Welch. 1992. pp. 695-969)

Baron (1982) created his explanation for underpricing, which discusses the market demand for the issue and how much the underwriter and the issuer know about the demand. In the model underwriter has more information about the market condition and demand for the IPO than the issuer does. Marketing efforts of the underwriter are not observable to the issuer. Issuer values underwriter's distribution efforts and pricing decision higher, the more uncertain the issuer is about demand. Marketing the offer creates cost to the underwriter as they have to use their time and effort doing that. Uncertainty of the demand causes the issuer to accept lower offer price. Underpricing the offer makes it easier for the underwriter to sell the offer. As marketing efforts of the underwriter are not observable to the issuer it is better to accept underpricing to get optimal marketing effort. (Baron. 1982)

2.5. Other theories explaining underpricing

Here we will go through few other theories explaining why IPOs are often underpriced. Two of the theories look from legal perspective where underpricing acts as protection from legal consequences. The third theory which explains underpricing as a possibility for underwriter to make profits from the aftermarket trading.

Tinic (1988) presented underpricing as protection against legal actions and reputational damage for the issuer and the underwriter. He describes underpricing as an insurance from damage caused by legal actions after the listing. These may come for example from the due diligence process or from disclosure requirements. (Tinic 1988. pp. 790) The model proposes that IPOs should be priced closer to the fair value when potential for legal consequences is low. The data also signals that high profile underwriters started to reject speculative companies trying to go public. (Tinic 1988. pp. 818-819)

Hanley and Hoberg (2012) studied also underpricing from the lawsuit perspective. In their analysis undepricing is used as hedge mostly by companies at the highest risk having missing information in the IPO material. They found that underpricing does not necessarily shield from lawsuits, but underwriters

get protection from the most harmful type of lawsuit by underpricing the IPO. Underwriters have strong motive to underprice the IPO to protect their reputation and potential losses of market share. (Hanley & Hoberg. 2012. pp. 252-253)

Ellis, Michaely and O'Hara (2000) studied relationship of IPO underpricing and trading profits from price stabilization actions after trading with the stock has started at stock exchange. They had data from Nasdaq of 306 IPOs. Price stabilization is provided by underwriter to ensure share has liquidity and price stability in trading for first month or few after going public. (Ellis, Michaely & O'Hara. 2000. pp. 1040-1041) Price stability actions are done via over-allotment option where underwriter can buy more shares at the offer price from the newly listed company, than planned in the beginning, usually within 30 days. With using or not option, the underwriter can provide buy support to the share thus reducing sharp declines in the share price for limited time after the IPO. (Ellis et al. 2000. pp.1043,1045) Their results show that underwriters generate profit from market making service as part of IPO. They found that profits from market making increased when the offering was more underpriced. This result suggests that underwriters could deliberately underprice IPOs to gain profits from trading activities after the IPO. (Ellis et al. 2000. pp.1072-1073)

3. Literature review

In this chapter we will go through earlier research conducted in area of initial public offering first day returns and performance in the longer periods. The material is from databases found from LUT Finna. Sources are from trustworthy sources and from prestige publishers of academic research. We will go through earlier research on the underpricing, longer term performance of IPO stocks and size effect. This helps the reader to evaluate results of this thesis to earlier work in the field.

3.1. Research on IPO underpricing

Evidence in earlier research from various countries and stock exchanges suggest that initial public offerings are generally underpriced when measured by percentage change in offering price to close price on the first trading day. In this chapter we will show some earlier results from similar research. This is done to give reader better perspective when looking at results of this study. Research has revealed that the degree of underpricing varies.

Chambers and Dimson (2009) examined IPO underpricing in the London Stock Exchange (LSE) from 1917 to 2007. The sample consisted of 4540 IPOs from 1917 to 2007. Both placings and public offers are included. (Chambers & Dimson. 2009. pp.1408, 1417-1418) Average first day returns were calculated for various periods. From 1980 to 1989 average underpricing was 15,80% for 762 firms. Between 1990-1999 the average underpricing was 18,08% for 641 companies. For period of 2000-2007 and for 1109 companies, the average underprcing was 19,86%. During period from 1987-2007 the average undepricing was 19,00% for 1987 firms. For the whole dataset from 1917 to 2007 and 4540 firms the average underpricing was 14,57% (Chambers & Dimson. 2009. pp.1425)

Study from Unlu, Ferris and Noronha (2004) studied IPO underpricing in the UK from period of 1993 to 2001. Results from each year showed variability in underpricing. Generally average underpricing in the UK was lower in the beginning of the observation period and increased towards end of the period. Underpricing varied from lowest 2,00% in 1995 to highest 64,48% from year 2000. (Unlu et al. 2004. pp.6)

Ljungqvist (1997) studied German IPOs from period 1970 to 1993. The study included 189 companies. Returns were calculated as logarithmic. First day returns were calculated against DAFOX index (Deutscher Aktien-Forschungsindex), which consist of listed German companies. First day return was on average 10,57% for the period and 9,22% when nine low tier IPOs were excluded from the sample. One explanation Ljungqvist gave why German IPOs had smaller underpricing when compared to US IPOs was that they generally raised more money through IPO and companies were older than companies going public in the US. (Ljungqvist. 1997.pp.1310–1313)

More recent evidence from Germany by Schmuhl & Schnier 2013 consists of 182 IPOs from period of 2002 to 2011. First day returns in the study were calculated as arithmetic return from the offer price to first close price. Average underpricing was 5,4% and median 1,5% in the study (Schmuhl & Schnier 2013. pp. 50, 52). Characteristics of the firms and offering and market environment were the main drivers for underpricing according to their evidence. (Schmuhl & Schnier 2013. pp.59).

Westerholm's research 2006 explores returns of newly listed Nordic companies that were listed 1991-2002. The sample consisted of 254 main market listings from Sweden, Finland, Denmark, and Norway.

Performance is followed from the first trading day to up to period of 5 years. Returns were calculated as arithmetic returns. (Westerholm. 2006. pp. 30.) Average first day returns were as follows 15,88% for Swedish IPOs, 21,89% for Finnish IPOs, 22,17% for Norwegian IPOs and 8,50% for Danish IPOs. For all countries average first day return was 17,11%. (Westerholm. 2006. pp. 33.)

Berk and Peterle (2015) examined IPO returns from central and eastern Europe with data consisting of 172 IPOs. Countries included were Austria, Bulgaria, the Czech Republic, Poland, Romania, and Slovenia. Companies selected had to have price data from 2000 to 2009. (Berk & Peterle. 2015.pp. 46) First day returns are calculated against main market index of the listing country. Initial return of the stock is calculated from the offer price to first close price. It is then compared against index return from start of the subscription period till index closing value on the first trading day. (Berk & Peterle. 2015.pp. 49) Index adjusted initial return was average of 11,30% for the whole sample and were positive in all countries except in Bulgaria. The returns varied from -4,5% from the Bulgarian Stock Exchange to 22,4% from the Bucharest Stock Exchange. They found small IPOs having higher average index adjusted initial return at 13,5% when compared to the whole sample which had average of 11,3%. (Berk & Peterle. 2015.pp. 52-53)

Alvarez and Gonzalez (2005) gave their effort to the topic by studying Spanish IPOs from period 1987-1997 which consists of 52 IPOs from the Madrid Stock Exchange. They found that average first day return was 14%. First day return was 13,00% when it was calculated General Index of the Madrid Stock Exchange. Average underpricing per year varied from -7% to 31% (Alvarez &Gonzalez.2005. pp. 340-341)

US evidence is collected from Purnanandam & Swaminathan (2004). Their returns were from period of 1980-1997 and their sample was 2288 companies. (Purnanandam & Swaminathan. 2004.pp.814) Average index adjusted initial return for the period was 11,40% (Purnanandam & Swaminathan. 2004.pp. 824-825). Loughran and Ritter (2004) also gathered data from US from period of 1980-2003, consisting of 6391 companies. (Loughran & Ritter. 2004.pp.12-13) Loughran and Ritter recorded great fluctuations in initial returns when they split the whole observation period to subperiods. For the whole sample initial return was 18,7% for period 1980-2003. Subperiods from the data set experienced

different performance. For years 1980-1989 it was 7,3%, 14,8% for period 1990-1998, impressive 65,0% for tech bubble period 1999-2000 and 11,7% for 2001-2003. (Loughran & Ritter. 2004.pp.15)

Earlier research is compiled in the table 1 below. Please note that initial returns from Berk and Peterle (2015), Ljungvist (1997) and Purnanandam and Swaminathan (2004) are index adjusted initial returns.

Table. 1. Earlier research on IPO underpricing

Underpricing				
Authors	Country	Observation period	Number of firms	Average Initial return
Chambers & Dimson (2009)	United Kingdom	1917–2007	4540	14,57 %
Unlu, Ferris & Noronha (2004)	United Kingdom	1993–2001	513	Annual average: 2,00 %-64,48 %
Ljungqvist (1997)	Germany	1970–1993	189	10,57 %
Schmuhl & Schnier (2013)	Germany	2002–2011	182	5,40 %
Westerholm (2006)	Finland, Sweden, Denmark Norway	1991–2002	254	17,11 %
Berk & Peterle (2015)	Central and Eastern Europe	2000–2009	172	11,30 %
Alvarez & Gonzalez (2005)	Spain	1987–1997	52	14 %
Purnanandam & Swaminathan. (2004)	USA	1980–1997	2288	11,40 %
Loughran & Ritter (2004)	USA	1980–2003	6391	18,70 %

3.2. Performance after the first trading day

Performance newly listed stocks after the first trading day has been topic of interest for decades in the field of finance. In this chapter we will go through earlier research on stock performance after IPO. Some of the research is already referred in this thesis earlier. When looking at performance after the IPO, earlier research suggests that short term buy and hold returns are higher than what market indices from the relevant market earned for up to 1 year. Buy and hold returns for newly listed companies were negative against market indices for holdings periods longer than one year. Buy and hold return means that the stock is bought at the start of the observation period and sold at the end of the period. Then the percentage change is calculated from the stock price at the start and end. No trading is done during the observation period.

As mentioned in the previous part, Ljungqvist (1997) studied German IPOs from 1970 to 1993 with sample consisting of 189 firms. Long-term performance is compared for three-years against DAFOX value-weighted total-return index that consist of German listed shares. Return against the benchmark index was average 19,85% for the whole sample of 189 and -12,11% for the sample of 180 firms, excluding low quality IPOs. These returns are calculated excluding the first day initial return. (Ljungqvist. 1997.pp. 1310-1312) Ljungqvist's concluded that performance of newly listed firms follows market for short period of 1-year. Buying IPO stocks from offer and holding them for one year would be a viable option according to the results. For longer period 3-years, holdings IPO stocks would be unprofitable investment choice. (Ljungqvist. 1997.pp. 1319)

Schmuhl and Schnier (2013) in their research calculated performance of German IPO stocks against SDAX index for periods of 20 and 60 trading days, which would amount to be 1- and 3-month periods. SDAX tracks performance of small cap companies in the Frankfurt Stock Exchange (Dax-Indices, 2021). The SDAX index by the time consisted of 50 German small cap companies. Sample consisted of 182 IPO firms from period 2002 to 2011. Buy and hold returns against the benchmark is calculated from the offer price. Buy and hold average return was 2,7% and for the period of 20 trading days and 0,5% for the period of 60 trading days. (Schmuhl & Schnier 2013. pp.50,52)

Westerholm (2006) researched returns from newly listed firms in the Nordic countries Sweden, Finland, Denmark and Norway. Listings are from time frame of 1991-2002. Returns were calculated against capital weighted all share index from the same stock exchange the stock was listed in. (Westerholm. 2006. pp. 30-31) 5-year annual returns for IPO stocks were 1,01% for Swedish IPOs, 0,41% for Finnish IPOs, 9,82% for Norwegian IPOs and 6,93% for Danish IPOs. For all companies the average was 4,54%. These returns were calculated excluding the initial first day return. (Westerholm. 2006. pp. 33)

Danish and Norwegian IPO firms managed to outperform their indices by 3,33% in Norway and 0,33% in Denmark when 5-year annual buy and hold return was compared to 5-year annual index return. Swedish and Finnish IPO firms underperformed against indices during the 5-year holding period by -3,75% in Sweden and -12,62% in Finland. These returns were calculated from first close

price, not from offer price. Excess return for the whole sample against benchmark index for 5 year holding period was -3,18%. (Westerholm. 2006. pp. 33)

Alvarez and Gonzalez (2005) looked at long-term performance of Spanish IPO stocks. Long-run returns were observed from periods of one, three and five years. Companies were listed during 1987-1997. (Alvarez &Gonzalez.2005. pp. 331) Stock returns were calculated against value-weighted market index and equally weighted market index from the Madrid Stock Exchange (Alvarez &Gonzalez. 2005. pp. 333-334). Abnormal returns against the value-weighted index were 6,11%, -28,24% and -20,98% for holding periods of one, three and five years. Returns against equally weighted index were for 8,55%, -18,59% and -1,98% for holding periods of one, three and five years. (Alvarez &Gonzalez.2005. pp. 338) Their results also showed that underpricing of IPO is positively correlated with five-year performance of IPOs. Results also showed that companies underprice their IPOs to raise more money in the future after the IPO. (Alvarez & Gonzalez.2005. pp. 347)

Berk and Peterle (2015) also calculated performance of IPO companies from Central and Eastern Europe for three year holding period. These returns were calculated against benchmark index from the listing country and against expected return estimated by the capital asset pricing model (CAPM). Returns are calculated from the first close price, not from offer price. (Berk & Peterle. 2015. pp. 49-50) Returns were calculated against benchmark index and CAPM for one, two- and three-year holding periods. For one year period the returns were mixed. Against the benchmark index excess return was positive 3,6%. Measured against the CAPM, one-year excess return was negative -3,5%. Against index the IPO companies underperformed by -4,7% and -17,2% for two and three-year holding periods. Against the CAPM underperformance was -16,7% and -31,3% for the same holding periods. (Berk & Peterle. 2015. pp. 55)

Loughran and Ritter (1995) investigated long-term performance of US IPOs from 1970 to 1990. Their sample consisted of 4753 companies that got listed to Nasdaq, American Stock Exchange (Amex) and New York Stock Exchange (NYSE). (Loughran & Ritter. 1995. pp. 24) Long-term performance of the IPO firms was calculated from the first close price, not from offer price. Performance of newly listed firms were compared against their matching firm. Matching firms did not issue stocks for five years before the IPO. Matching was done based on size. (Loughran & Ritter. 1995. pp. 26-27). Average buy

and hold return for newly listed firms was 8,4% and 15,7% for holding periods of 3 and 5 years. For matching firms, the same returns were 35,3% and 66,4%. (Loughran & Ritter. 1995. pp. 29)

Average annualized return for 5-year period was 5,1% for newly listed firms. Annualized return for matching firms was 11,8% for the same period. Third year average annual return for IPO firm was on average 5,0%. For matching firms, the average annual return was 13,3% (Loughran & Ritter. 1995. pp. 33)

IPO firms also underperformed against various indices in 5-year holding period. For example, Standard and Poor's 500 (S&P 500) index had return of 38,3% for 5-year period, CRSP (Center for Research in Security prices) Amex-NYSE equally weight index had return of 48,8% for the period. Whilst IPO firms' return was 15,7%. That would lead to excess return of -22,6% against S&P500 and -33,1% against CRSPAmex-NYSE equal weight index. Good thing to note is that the S&P500 index did not include dividends. (Loughran & Ritter. 1995. pp. 36)

As in the earlier part, Purnanandam and Swaminathan (2004) studied US IPOs from 1980 to 1997. The sample size was over 2000 companies. (Purnanandam & Swaminathan. 2004. p.814) Long-term performance of IPO companies were observed by calculating returns of IPO companies against value-weighted NYSE/AMEX/NASDAQ index. Their sample of newly listed companies underperformed indices on almost all periods from one to six months to 5-year period. First trading day returns were excluded from the calculations of long-term performance. Average annual market adjusted return was 2,23% for period from 1-6 months. That was the only period with positive return over the benchmark. For period of 7-12 months, it was -3,83%, -8,68% for two-year, -5,81% for three-year period, -3,72% for four-year period and -2,72% for five-year period. (Purnanandam & Swaminathan. 2004. p.829-830)

Lowry, Officer and Schwert (2010) studied IPO underpricing of US firms from period of 1965 to 2005. Their data consistent of 8759 IPOs. As most of research on IPO underpicing define initial return as percentage difference of first trading day close price and offer price, Lowry et al calculate the initial return from offer price to close price of the 21st trading day. Holding period is thus approximately a month. This is done to avoid effect of price support actions, that usually is active for month after firm going public. Initial one-month returns were 22% on average calculated from the whole period.

Standard deviation was 55% for the whole period. The study also calculated initial returns omitting hot IPO period from September 1998 to august 2000. Average initial monthly return was 15% when that period was left out. (Lowry, Officer & Schwert. 2010. 429-431) Their results showed large dispersion on IPO initial returns. This can suggest that underwriters taking companies public find it difficult to accurately value companies going public. (Lowry et al. 2010. 463)

Table 2. Earlier research on performance after IPO

Long term performance					
Authors	Country	Observation period	Number of firms	Excess return	Holding period
Ljungqvist (1997)	Germany	1970-1993	180	3 years: -12,11 %	three years
Schmuhl & Schnier (2013)	Germany	2002-2011	182	20 trading days: 2,7% 60 trading days: 0,5%	20 and 60 trading days
Westerholm (2006)	Finland, Sweden, Denmark, Norway	1991-2002	254	5-year return -3,18%	5 years
Alvarez & Gonzalez (2005)	Spain	1987-1997	52	1 -year: 8,55% 3-year: -18,59% 5-year: -1,98%	one, three and five years
Berk & Peterle (2015)	Central and Eastern Europe	2000-2009	172	1 -year: 3,6% 2-year: -4,7% 3-year: -17,2%	one week to three years
Loughran & Ritter 1995	USA	1970-1990	4753	5 years: -33,10 %	5 years
Purnanandam & Swaminathan (2004)	USA	1980-1997	2288	6 months: 2,23% 7-12months: -3,83% 2 years: -8,68% 3 years: -5,81%	6 months to 5 years
Lowry, Officer & Schwert (2010)	USA	1965-2005	8759	Average return 21 trading days: 22 %	21 trading days

3.3.   Size effect

Size effect is one of stock market anomalies that has been found and researched in the field of finance. Size effect meaning that small capitalization stocks outperform large cap stocks in the market which challenges theory of efficient markets by Fama (1970). Size effect has been widely research and there is evidence of its existence around the globe and magnitude of the phenomenon varies. Research on this chapter is compiled to table 3 for easier reading.

The capital asset pricing model (CAPM) presented in studies of this chapter is widely used method for calculating expected returns of assets. CAPM illustrates what a security or a portfolio is expected to earn with its risk level. It is used for pricing securities and as a benchmark return to which compare returns from securities or assets. (Bodie, Kane & Marcus. 2017. pp. 277)

In the research below beta is used as measure of risk in the CAPM. Stock's beta describes systemic risk that cannot be diversified away. Beta describes the degree that changes in stock's value is explained by changes in value of the chosen benchmark index. Assets with higher beta should have higher expected returns as they are deemed riskier and fluctuate more with movements of benchmark index. (Sharpe.1964. pp. 438-440)

Reinganum and Smith (1983) found that investors prefer larger firms and place more premium on larger firms which cannot be justified by lower risk on larger firms when the risk was measured with beta. The research revealed that smaller firms from NYSE and AMEX stock exhanges earned returns which were consistently above required return estimated by the CAPM. The results also hold when controlled for bankruptcies. (Reinganum & Smith. 1983. pp.213-215)

The research paper created ten portfolios based on market value of the companies. Mean monthly return for portfolio with the smallest firms was 3,36% and 0,54% for the portfolio with the largest firms when calculated returns from 180 months. Mean monthly returns were larger in the portfolios with smaller firms. The betas were higher for the smaller firms, meaning that the small firms were riskier. After measuring the performance with risk-adjusted measure, portfolio consisting of smallest decile of the firms outperformed portfolios with larger firms and had average excess return of 2,71% per month over what was predicted by the CAPM. Portfolio containing the largest firms had mean

risk-adjusted excess return of -0,02%. Both are for periods of 180 months. Small firms had higher betas than larger firms, but it was not enough to offset difference in returns. (Reinganum & Smith. 1983. pp.216-218)

Their data has issues that delistings were not reported accordingly. Their data source had estimated price for delisted securities. To deal with any inaccuracies this may have caused, they reported return of every delisted firm as -100% meaning that they all went bankrupt. Even after that adjustment, portfolios of small firms outperformed their larger counterparts. Mean monthly risk adjusted excess return was 2,04% for the portfolio containing the smallest firm out of ten portfolios. The same return for the portfolio with the largest firms was -0,05%. (Reinganum & Smith. 1983. pp. 218-219)

Fama and French (1992) researched stock returns from the USA and found that based on size, small firms earn better returns more than larger firms. Their results suggest that stock returns are not positively related to market betas, like earlier research has explained it. Their rationale for that was that stock risk is multidimensional. Their sample of companies were from NYSE, AMEX, and NASDAQ. (Fama & French. 1992. pp.427-429)

Returns were calculated from 1963 to 1990. Companies were sorted based on size to ten portfolios each representing one decile. The decile with the smallest firms had average monthly return of 1,52%. The decile of largest firms had average monthly return 0,89%. For all stocks average monthly return was 1,25%. Companies were also sorted to portfolios based on beta which showed no support that higher betas would result in higher return. Top and bottom deciles sorted by beta were splitted. The total number of portfolios sorted by beta was 12, consisting of eight deciles in the middle and top and bottom deciles split in half. The lowest beta portfolio had beta of 0,81 and the highest beta portfolio had beta of 1,73. However average monthly returns were almost similar being 1,20% for the lowest beta portfolio and 1,18% for the highest beta portfolio. Their finding was that there is strong relation with average returns and size but not average return and beta. (Fama & French. 1992. pp.432-437)

Reinganum (1982) researched whether US companies of different sizes have difference in average returns as earlier research have found. Earlier research had found that better performance of small companies could be explained by imprecise betas which are not reflecting true risks of small

companies appropriately. The study constructed ten portfolios based on market value. Stock returns were from period of 1964 to 1978. Mean daily return for the portfolio constructed from smallest firms was 0,14% and for the portfolio with the largest firms was 0,0241%. Annually compounded these returns would yield 42% for the portfolio of smallest firms and bit over 6% for the portfolio of largest firms. The finding was that even though small companies had higher betas than larger companies, the difference was not enough to explain the higher returns of small companies. (Reinganum. 1982. pp. 27-29) The conclusive result of the study was that possible misestimations on calculating beta were not enough to explain the abnormal returns of small firms. To put it together they concluded that the size effect was existing anomaly. (Reinganum. 1982. pp. 35)

Barry, Goldreyer, Lockwood and Rodriguez (2002) found that size effect exists in 35 countries from emerging markets from period 1985 to 2000. Results are calculated using both all returns and leaving out extreme 1% returns from low and upper tails of the return distribution. Five portfolios were constructed to measure size effect. Size effect is observable when using all returns and size is measured relative to firm's local market average size. When extreme 1% returns were removed from both ends or size is measured in absolute terms, the size effect is not observable. Absolute size meaning that the size portfolios are constructed from all firms in the sample. (Barry, Goldreyer, Lockwood & Rodriguez. 2002.pp. 5-7) Size relative to local market gives mean monthly return of 2,9% for the smallest firm size quintile extreme returns included. 1,4% when extreme returns are omitted. The largest firm size quintile has mean monthly return of 0,74% and 0,91% when are extreme returns are left out. (Barry et al. 2002.pp. 12) Test based on absolute size has mean monthly return 2,5% for the smallest quintile and 1,6% for the largest quintile. Extreme returns omitted yield mean monthly return of 1,2% for the smallest quintile and 1,6% for the largest quintile. (Barry et al. 2002.pp. 24)

Mathijs Van Dijk (2011) conducted a review of research on the size effect on stock returns around the world. His review on earlier, international research suggest that size effect consistently exists. Research from the US market had test periods from 1936 to 1989 and monthly size premium varied from 0,4% to 2,52%. (Van Dijk.2011. pp.3263-3264) International research from Europe and emerging markets were from periods 1954 to 2000. Monthly size premium varied in European and emerging markets from 0,4% to 5,06%. In 18 out of 19 countries small firms performed better than large firms. Van Dijk raised concerns on sample sizes, sample selection and applied methods some

monthly size premiums were very large. For example, monthly size premiums from Australia 5,06%, Mexico with 4,16% and 3,42% from Turkey were large. Van Dijk noted that when measured on raw returns small firms do better than larger firms. However, it is difficult to interpret if risk-adjusted returns are better for smaller firms. Two points he raised were that approximately half of the studies did not report any adjustments for risk and samples for multiple studies were not considered reliable enough as number of firms or years included in datasets was low. (Van Dijk.2011. pp.3264-3266) Van Dijk's conclusion was that size effect still exists even though strength of it has varied over time. More researched is still needed to explore and explain the phenomenon. (Van Dijk.2011. pp.3272)

Table 3. Earlier research on size effect

Size effect				
Author	Country	Observation period	Number of firms	Returns
Reinganum & Smith (1983)	USA	1964–1978	roughly 1500–2500	Average monthly risk adjusted returns: 2,71% per month for small firms, -0,02% per month for large firms
Fama & French (1992)	USA	1963–1990	All stocks: NYSE NASDAQ AMEX	Average monthly return: Smallest Decile: 1,52 % Largest decile: 0,89 %
Reinganum (1982)	USA	1964–1978	1457 to over 2500	Average daily return Smallest portfolio: 0,14 % Largest portfolio: 0,024 %
Barry, Goldreyer, Lockwood & Rodriguez. (2002)	35 emerging market countries	1985–2000	almost 2000 firms	Average monthly return Smallest firm quintile size relative to local market: 2,9% Largest firm quintile size relative to local market: 0,74%

4.   Data and Methodology

In this chapter we will go through methods used in this thesis. In the next chapter we will show gathered results. Price data is gathered from Nasdaq OMX Nordic's website. IPO prices are gathered from press releases from Nasdaq OMX Nordics website, from companies' investor relations page and from other similar reliable sources. We have included only main market listings, other listings, for example First North listings are excluded. Also transfers from other lists to main market list are excluded. Companies in this thesis must be listed for the first time. The first trading day of the company had to be between 01.01.2010-31.12.2017 and had to be listed for at least two years. If the company is removed from the main market list before two years from the first trading day, it would be excluded from the sample. Shares from the IPO had to be offered institutional and private investors. Spin-offs and etc are excluded from the data as well.

Market capitalizations of the listed companies are gathered from the same sources as IPO offer price data. If that was not available, it was calculated using offer price and number of shares and converted to euros with first trading day spot price if the stock price was in other currency than euro. Nasdaq OMX Nordics market values for the market caps were as follows: large cap with market value larger than 1 billion euros, mid cap as market value between 150 million euros to 1 billion euros and small cap companies have market value smaller than 150 million euros (Nasdaq. 2017).

Indices used in this study are Nasdaq OMX Nordic growth index (SE0001775644), Nasdaq OMX Nordic large cap growth index (SE0001775578), Nasdaq OMX Nordic mid cap growth index (SE0001776626) and Nasdaq OMX Nordic small cap growth index (SE0001775685). The used indices are gross total return indices that take tracks capital gains and cash distributions. The Nasdaq OMX Nordic growth index consists of all main market listed stocks in Nasdaq OMX Nordic. Nasdaq OMX Nordic market cap indices consist of the same main market listed stocks, but they are sorted by size. No taxes are deducted. Nasdaq OMX Nordic growth index will be referred as the Nordic index and Nasdaq OMX Nordic market cap indices (large, mid and small cap) will be referred as the market cap indices later in this text.

4.1.   Data

This section will go through gathered data on the performance of IPO stocks. The sample consists of 87 companies that were listed during 2010-2017. From the figures below we see basic information about the listed companies. Figure 2 shows as how the IPOs were divided between countries. Sweden had the highest number of IPOs with 59 companies making it to this thesis. Finland had the second highest number with 13 IPOs during the period.
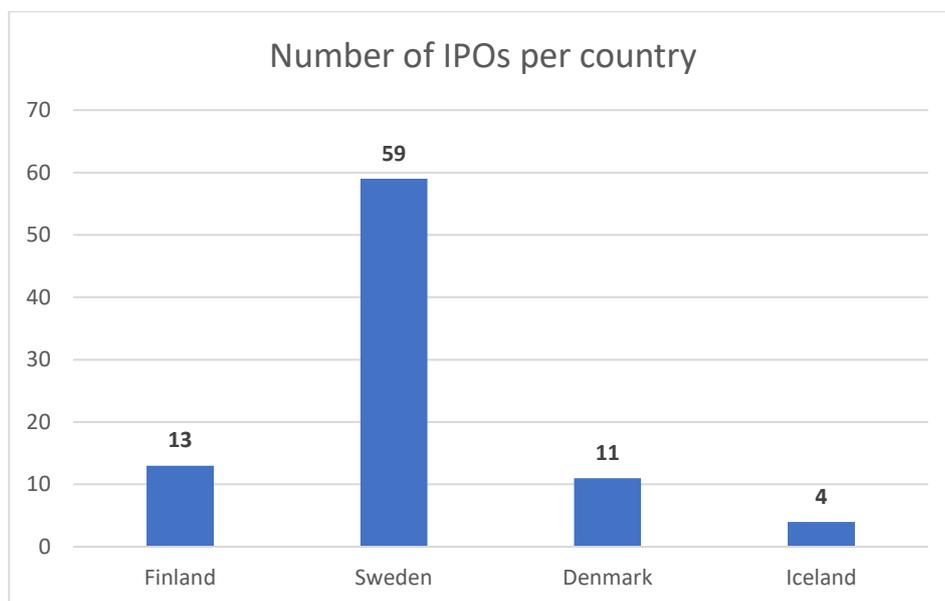

Figure 2. Number of IPOs per country

When it comes to how the IPOs were distributed based on listing year, we can see from the figure 3 that they were not evenly distributed during 2010-2017. Earlier years of the period had lower number of IPOs and the number increased moving forward to the end of the period. Peak year with number of IPOs was 2015 with 22 IPOs.
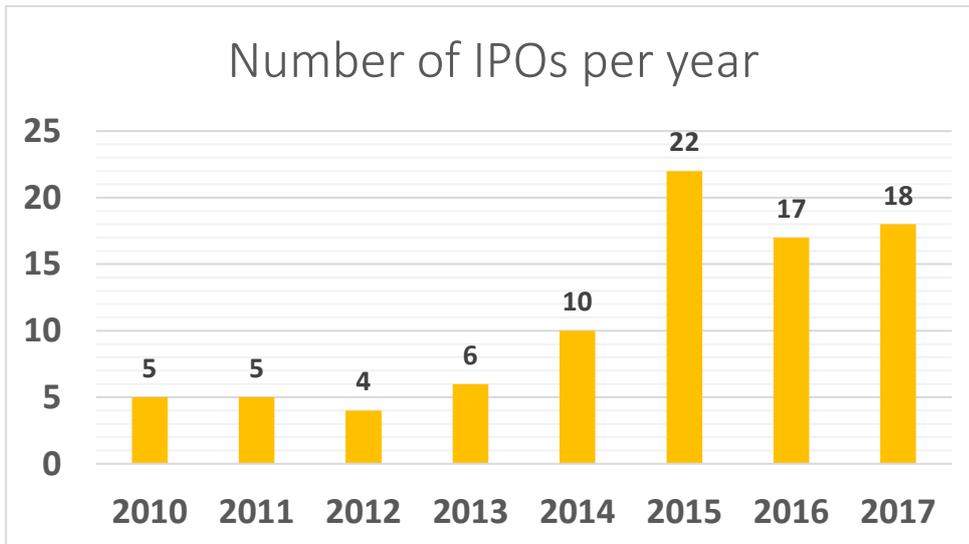
Figure 3. Number of IPOs per year

Distribution of IPOs was uneven between large cap, mid cap and small cap IPOs. Mid cap companies getting listed represented majority of IPOs in the sample. Small cap companies had 24 IPOs and large cap companies 10 IPOs. This can be seen from the figure 4.
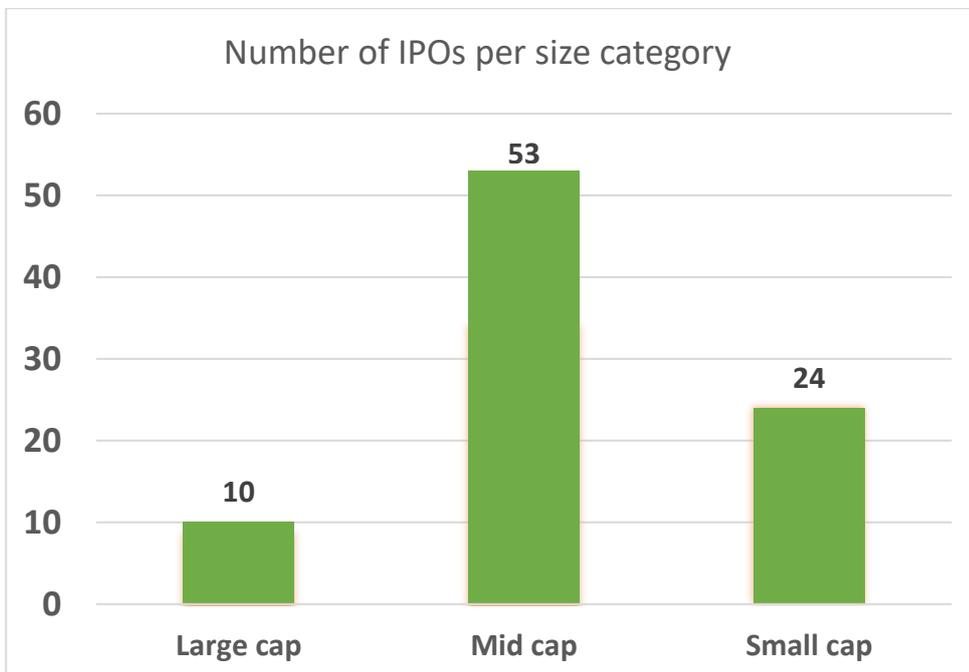

Figure 4. Number of IPOs per size category

Figure 5 below illustrates to us how the IPOs were priced at the IPO. It is measured by looking at the IPO price and the close price after the first trading day. If the close price higher than IPO price, it is categorized as underpriced IPO, if the close and IPO price are equal, then the IPO was correctly priced

and if the close price was lower than the IPO price, then the IPO was deemed as overpriced. From the figure 5 we can observe than majority of IPOs were underpriced with 62 out of 87 being underpriced. Correctly priced amounted to 12 IPOs and number of overpriced IPOs was 13.
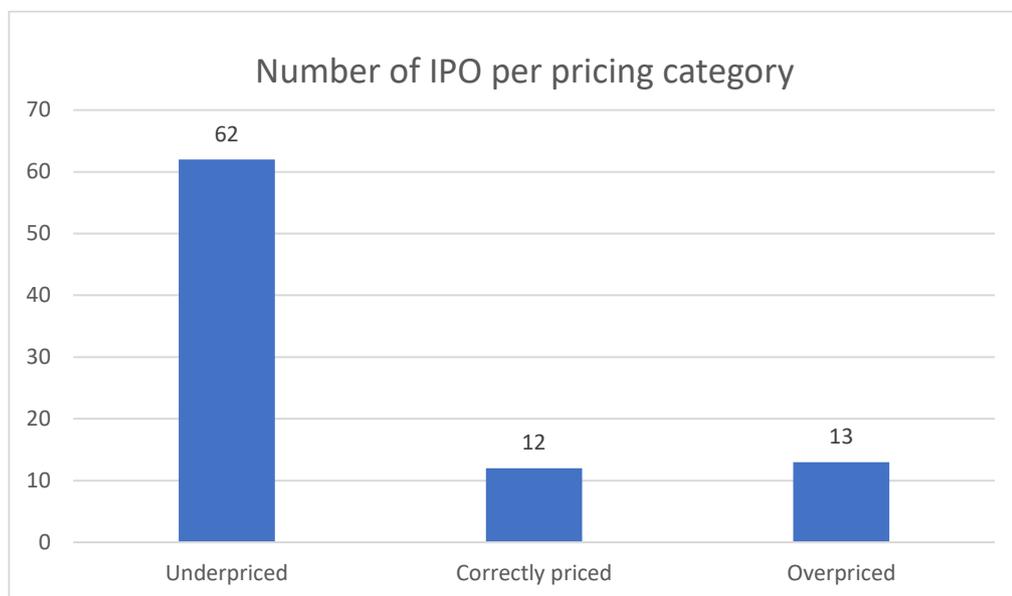

Figure 5. Number of IPOs per pricing category

When it comes to performance at the end of the 2-year holding period, we can see from the figure 6 that 60 IPOs from total of 87 had positive performance when calculating percentage difference from offer price to close price from the last trading day.
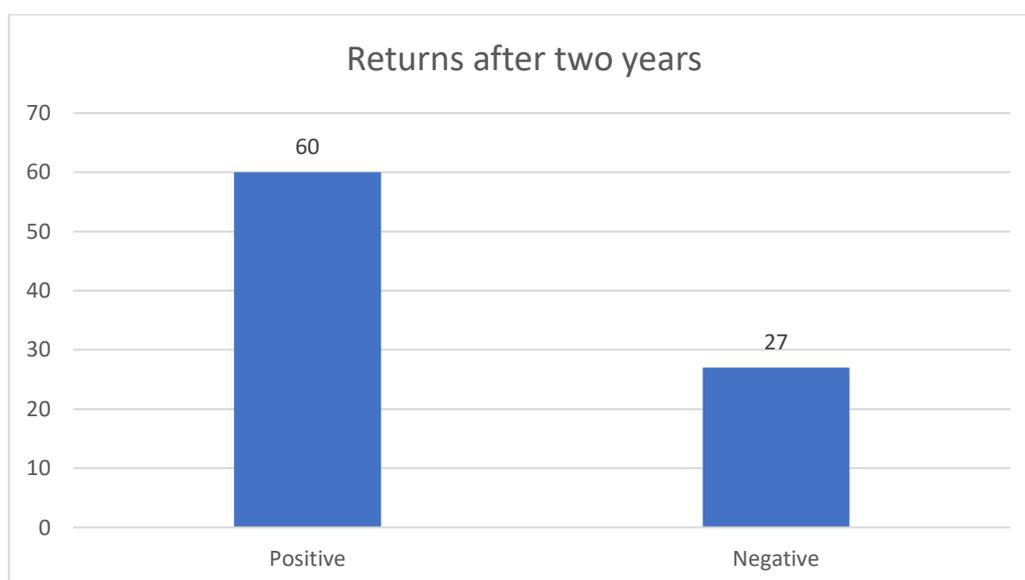

Figure 6. Number of IPOs with positive and negative returns

4.2.   IPO stock returns

Returns are calculated to see how IPO stocks performed on overall. We calculate both returns starting from the first day return to periods of 1, 3, 6 months, 1 year, 1,5 year and to 2 years. These intervals has been used in earlier research presented in this study. First day return is calculated from unadjusted prices. Periods are chosen to investigate returns for relatively short holding periods. If the first day return is positive, the IPO is interpreted as underpriced, if the return is 0% then the IPO is correctly priced and if it is negative then the IPO is overpriced.

$$First\ day\ return = LN\left(\frac{1cp_{pe}}{ipo_p}\right) \tag{1}$$

$1cp_{pe}$ = *Close price of the first trading day*

ipo_p = *IPO offer price*

Performance of IPOs for longer periods is calculated as logarithmic return from the IPO offer price to the close price of the last trading day of the period. Earlier research has used both logarithmic and arithmetic returns. Logarithmic returns were chosen for this study for ease of calculation. Returns are calculated from adjusted prices which are adjusted for corporate actions events such as splits and dividend payments. Months consist of 21 trading days, so 3 months return would be 63 trading days by following that logic for the whole period, the two-year period would consist of 504 trading days.

$$IPO\ stock\ return = LN\left(\frac{cp_{pe}}{ipo_p}\right) \tag{2}$$

cp_{pe} = *Stock price at end of period*

ipo_p = *IPO offer price*

4.3.   Performance against indices

Performance of IPO stocks is evaluated by comparing IPO stock return to return that Nasdaq OMX Nordic growth index and Nasdaq OMX market cap index provided for the same period. Returns are calculated as logarithmic with the below formula from the close prices of the indices. IPO stock return is calculated using IPO offer price and close price of the last trading day from period in question. Index returns are calculated starting from index value on the same day as the IPO stock started trading till close price of the last trading day of the period. This means IPO stocks and indices are compared

for the same period. Each stock gets measured against two indices, the Nordic index and against market cap index the stock belonged to at the time of the IPO. For example, performance of small cap stock will be compared against Nasdaq OMX small cap growth index. Same for large and mid cap companies. Performance against IPOs are calculated for periods of 1, 3, 6 months, 1 year, 1,5 year and 2-year periods. Stock and index prices are calculated from close prices.

$$Performance\ against\ index = LN\left(\frac{cp_{pe}}{ipo_p}\right) - LN\left(\frac{p_i}{p_{ipo}}\right) \tag{3}$$

$cp_{pe} = Stock\ price\ at\ end\ of\ period$

$ipo_p = IPO\ offer\ price$

$p_i = Price\ of\ index\ at\ end\ of\ period$

$p_{ipo} = Price\ of\ index\ on\ the\ first\ trading\ day$

4.4.   Risk adjusted performance measures

For risk adjusted performance measures we are going to use two methods. Jensen's alpha and Sharpe ratio. Both are widely used methods for evaluating performance of stocks and portfolios.

Jensen's alpha was presented in 1968 by Jensen (1968). In this study Jensen's alpha is calculated to evaluate performance of IPO stock to expected return measured by the capital asset pricing model (CAPM). The CAPM from Sharpe (1964), Lintner (1965) and Mossin (1966) is used modelling relationship of risk and expected return of an asset. Riskier assets should have higher expected return than assets with lower risk.

In the CAPM model risk is stock's beta which describes systemic risk that cannot be diversified away. Beta is calculated dividing covariance of asset's return with market return by variance of market returns. Beta describes the degree that changes in asset's value is explained by changes in value of the chosen benchmark index. Assets with higher beta should have higher expected returns as they are riskier. (Sharpe. 1964. pp. 438-440). Essentially investor should be able to eliminate risk borne from characteristics of single company by diversification in their portfolios. Risk being left would be systemic risk which describes risk of whole economy which cannot be diversified away. (Sharpe. 1964. pp. 441-442). Beta of 1 would mean that there is perfect positive relationship in return of an asset and return of benchmark index, -1 would mean that the relationship is inverse and beta of zero means that

there is no relationship. (Sharpe. 1964. pp. 430,) For example, an asset with beta of 0,5 would gain 5% in price if chosen market index gains 10%. In this study market indices are the Nordic index and the market cap indices.

If stock's performance was better than what was expected by the CAPM, then stock has earned alpha and has performed better than was assumed by riskiness of the asset. Jensen's alpha is most often used as measure of investors skill to pick shares. Random selection of shares for buy and hold strategy is assumed to yield zero alpha. Negative alpha would mean that an investor has chosen shares to his portfolio that performed worse than by random selection of shares. Positive alpha means that an investor has by skill or luck managed to pick shares that have earned more than expected return by CAPM. (Jensen. 1968. pp. 393-394). If CAPM expected return was 10% and the stock earned 12% for the period, the stock earned alpha of 2%. Alpha would be -1% if the CAPM expected return was 9% and the actual realized return of the stock was 8%.

Interest rate used for calculating Jensen's alpha is 12 months Euribor transformed to logarithmic values. Betas and Jensen's alpha are calculated in Excel with linear regression with SLOPE and INTERCEPT functions. Jensen's alpha is calculated using weekly data close prices. Jensen's alpha is calculated both against the Nordic index and the market cap indices. Index will be used for beta calculation and as return of index. For example, a small cap IPO stock would get two calculations of Jensen's alpha. One that uses the Nordic index and second that uses small cap market index. Equation for Jensen's alpha can be seen below. Jensen's alpha is calculated for holding periods of 1, 3, 6 months, 1 year, 1,5year and 2-year periods. Jensen's alpha is calculated two times for each IPO stock using both The Nordic index and the market cap index of the IPO stock for calculating Jensen's alpha.

$$Jensen's\ alpha = \bar{r}_{ipo} - (\bar{r}_f + \beta_{ipo}(\bar{r}_i - \bar{r}_f)) \qquad (4)$$

$\bar{r}_{ipo} = return\ of\ IPO\ stock$

$\bar{r}_f = Risk\text{-}free\ interest\ rate$

$\beta_{ipo} = Beta\ of\ stock$

$\bar{r}_i = Return\ of\ index$

Sharpe ratio is calculated to evaluate return of IPO stocks to risk that they have. It was presented by Sharpe (1966). It is also called reward-to-variability ratio and higher the ratio, the better the

performance has been. In the Sharpe ratio formula return of security minus risk-free rate is reward provided for holding risky security in a portfolio. Standard deviation of the security is the risk beared. It is calculated with below equation. (Sharpe. 1966, pp. 123) Sharpe ratio is often used measure of performance for professional investors and portfolios they manage. It's best suited for evaluating performance of portfolios. (Bodie et al. 2017. pp. 133). Sharpe ratio is calculated for holding periods of 1, 3, 6 months, 1 year, 1,5 year and 2-year periods using weekly data. Price data used is adjusted close prices. Risk-free rate is Euribor 12 months that is adjusted to every holding period.

$$Sharpe\ Ratio = (\overline{r}_{ipo} - \overline{r}_f)/\sigma_{ipo} \qquad (5)$$

$\overline{r}_{ipo} = return\ of\ IPO\ stock$

$\overline{r}_f = Risk\text{-}free\ interest\ rate$

$\sigma_{ipo} = Standard\ deviation\ of\ IPO\ stock$

5. Results

This chapter will present findings of this study. Results are presented in tables and will be reflected to earlier results. The section starts with evaluation of first day returns from the sample. Then returns from IPOs without any adjustments will be presented to get better perception of the results. Performance is then evaluated against two benchmark indices, Nasdaq Nordic growth index and Nasdaq Nordic market cap indices. IPO stocks are compared against market cap index the IPO stock belonged to at offer price. Jensen's alpha is the first risk adjusted measure of performance that the study presents. Jensen's alpha is calculated using both the Nordic index and the market cap indices.

5.1. First day returns

Average first day returns for all 87 stocks, per country, per size category and per listing year can be seen from the figure 7. Average first day return for all stocks was 8,95%. Based on the listing country, Swedish listings were the most profitable on average. Large cap listings proved to be the most profitable on average. First day returns had slight upward trend from 2010 to 2017. Listings in 2016 were the most profitable on average. Based on the first day returns we calculated that 62 out of 87 IPOs were underpriced, 12 out of 87 were correctly priced and 13 out of 87 were overpriced.
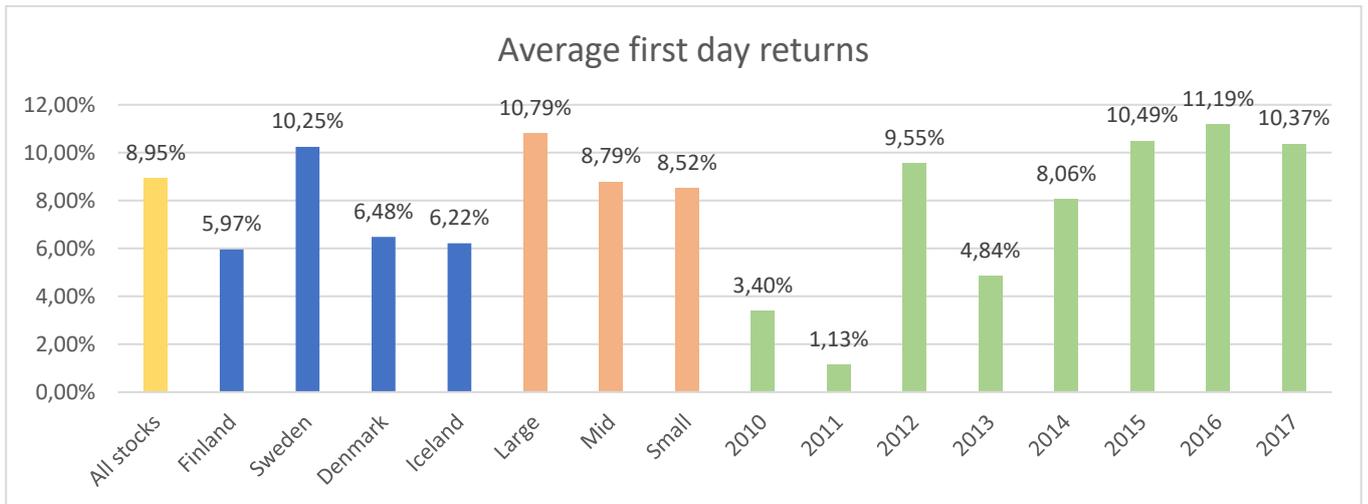
Figure 7. Average first day returns

From the table 4 below can be observed more complete dataset from first day returns. Included average, median and maximum and minimum values. Average underpricing was 8,98% for all stocks in the stock. Large cap IPOs had the highest undepricing among size categories and Swedish IPOs were the most undervalued.

Table 4. First day returns

First day returns	Average	Median	Max	Min
All stocks	8,95 %	7,86 %	38,87 %	-18,76 %
Finland	5,97 %	3,73 %	21,51 %	0,00 %
Sweden	10,25 %	9,53 %	38,87 %	-18,76 %
Denmark	6,48 %	3,42 %	28,14 %	-7,86 %
Iceland	6,22 %	5,03 %	14,82 %	0,00 %
Large	10,79 %	11,84 %	22,50 %	0,00 %
Mid	8,79 %	7,86 %	38,87 %	-18,76 %
Small	8,52 %	3,42 %	33,45 %	-2,11 %
2010	3,40 %	-0,63 %	22,50 %	-7,86 %
2011	1,13 %	0,00 %	3,92 %	-1,04 %
2012	9,55 %	5,03 %	9,55 %	9,55 %
2013	4,84 %	4,28 %	14,82 %	-2,11 %
2014	8,06 %	10,15 %	27,96 %	-18,76 %
2015	10,49 %	8,80 %	33,65 %	-6,06 %
2016	11,19 %	9,34 %	38,87 %	0,00 %
2017	10,37 %	9,75 %	32,38 %	-6,74 %

Results of initial return are lower compared to earlier research in the literature review. Westerholm (2006) recorded average initial return 17,11% for Nordic IPOs in 1991-2002. Other earlier research

from European IPOs recorded higher initial returns, such as Chambers and Dimson (2009) average 19,00%, Ljungqvist (1997) from German IPO with average initial return 10,57%, Alvarez and Gonzalez (2005) from Spanish IPOs with average initial return 14%, Berk and Peterle (2015) with Central and Eastern European IPOs with average initial return 11,30%. Schmuhl and Schnier (2013) had the only research that recorded lower initial return 5,40% than this study got as result. Overall, the result of initial return is similar to academic research. Fluctuation in the level of initial return is also documented in earlier research.

One explanation for higher underpricing in earlier research could be that much of the research from literature review has IPOs from the internet bubble period which may drive average initial return up in those research papers. However, that does not seem as definitive explanation as for example Alvarez and Gonzalez (2005) had higher initial return and Schmuhl and Schnier (2013) had lower initial return than the results here and neither of them had internet bubble IPOs in their samples.

From the results on table 4 can be seen that large cap IPOs had slightly higher initial return than mid and small cap IPO. Mid and small cap IPOs had slightly lower average initial returns. Level of average underpricing varies year to year in the results.

5.2.   Performance of IPO stocks

This section looks at returns of IPO stocks without any adjustments. From below table 5 can be see total returns for six periods from one month to two years. On average the listed companies gained 16,48% in value during two-year holding period. That annualized would give you return of 7,92%, which is higher than annualized return of the Nordic indices annual return 6,77%. Annualized returns for Nasdaq OMX Nordic large, mid, and small cap indices were 8,69%, 9,64% and 9,31%. IPO stocks overperformed against the Nordic index but underperformed against size-based market cap indices.

From the table 5 can be read average and median returns for listed companies in each country. Sweden had the highest average and median returns on IPO stocks for holdings period of 2 years. The lowest median return for 2 year holding period was for the Finnish IPOs and the lowest average return was for Danish IPOs.

Table 5. Average and median returns for all stocks and country categories

Total return		1 month	3 months	6 months	1 year	1,5 year	2 year
All stocks	Average	8,05 %	10,10 %	10,65 %	11,44 %	15,84 %	16,48 %
	Median	5,06 %	12,93 %	13,74 %	17,69 %	20,02 %	20,38 %
Finland	Average	5,16 %	6,49 %	9,29 %	11,05 %	20,05 %	14,17 %
	Median	0,49 %	4,91 %	14,20 %	12,23 %	16,68 %	6,73 %
Sweden	Average	9,67 %	11,04 %	13,03 %	16,85 %	20,76 %	22,37 %
	Median	9,53 %	15,65 %	14,55 %	19,45 %	24,65 %	37,16 %
Denmark	Average	2,62 %	5,28 %	-2,85 %	-17,92 %	-17,02 %	-14,50 %
	Median	0,80 %	3,21 %	-1,93 %	0,09 %	2,37 %	16,55 %
Iceland	Average	8,58 %	21,21 %	17,02 %	13,77 %	19,96 %	22,29 %
	Median	6,26 %	22,27 %	25,26 %	13,85 %	6,98 %	12,03 %

Table 6 below shows IPO stocks from different size categories performed. The small cap IPO category had the highest average total return of 24,19% for 2 year holding period and the large cap category had the lowest average return of 11,51% for two year holding period. Both can be seen from the table 6. This result points towards existence of size effect among Nordic IPOs. In long run the small cap IPOs had the highest return, mid cap IPOs second highest and large cap IPOs the lowest returns.

Table 6. Average and median returns per size category

Total return		1 month	3 months	6 months	1 year	1,5 year	2 year
Large	Average	11,13 %	13,18 %	12,09 %	0,90 %	7,41 %	11,51 %
	Median	9,71 %	14,05 %	8,58 %	22,75 %	18,91 %	17,68 %
Mid	Average	8,73 %	10,92 %	10,51 %	12,90 %	15,95 %	13,92 %
	Median	6,06 %	15,65 %	14,56 %	19,02 %	22,11 %	29,95 %
Small	Average	5,26 %	7,01 %	10,34 %	12,62 %	19,12 %	24,19 %
	Median	0,42 %	9,44 %	10,54 %	11,83 %	12,55 %	16,34 %

The small cap IPOs had the lowest short run returns for periods of one to six months and the large cap IPOs outperformed other categories for the same period. That is probably explained by large cap IPO stocks having the highest average initial return. One rationale for underpricing of the large cap IPOs is that they are more mature and have longer track-record which would suggest that they are easier to price to their fair value at IPO. To stand out from mediocre companies they signal their higher quality by underpricing the IPO and leaving money on the table at IPO as argued by Ritter & Welch (2002). Return of the large cap IPOs on longer holding periods however does not support that if we look at performance of size categories from the table 6.

Performance of small cap IPO companies on two year holding period is similar to earlier research. Fama and French (1992), Reinganum (1982) and Barry et al. (2002) all recorded that small companies outperform larger companies when measured in raw returns.

Lastly, performance of different price categories can be looked from the table 7 below. Underpriced IPOs had the highest average returns for all holding periods. For short periods under a year, it is no surprise that underpriced IPOs had the best performance.

Table 7. Average and median return per pricing categories

Total Return		1 month	3 months	6 months	1 year	1,5 year	2 year
Underpriced	Average	13,97 %	18,34 %	18,83 %	20,65 %	22,66 %	23,82 %
	Median	14,11 %	18,42 %	15,32 %	22,11 %	22,56 %	30,24 %
Correctly priced	Average	-2,82 %	-6,21 %	-5,44 %	0,94 %	1,04 %	1,73 %
	Median	0,23 %	-5,88 %	-0,05 %	10,64 %	7,22 %	0,28 %
Overpriced	Average	-10,12 %	-14,11 %	-13,51 %	-22,77 %	-3,00 %	-4,93 %
	Median	-7,12 %	-12,15 %	-10,54 %	-8,26 %	12,02 %	17,66 %

Effect of price support actions is not evident from the results. 25 out of 87 IPOs had first day return of 0% or negative return. That number was 27 after one month and 28 for three-month periods. It seems that price support actions are not keeping prices higher than they should be for the first few weeks. It is interpreted from the fact that number of companies having 0% or negative performance did not increase drastically after the first trading day. Also, average performance suggests that. Average performance did not reverse after one month from the first trading day. Average return for the whole sample after one month was 8,05% and 10,10%, 10,65% for periods of three and six months. These results should not be taken for a concrete fact as it is not documented how many of the Nordic IPOs had price support.

5.3. Performance against indices

This chapter will look how the IPOs performed against Nasdaq OMX Nordic growth index and against Nasdaq OMX market cap growth indices. Nasdaq OMX Nordic index is vast market index consisting of all companies in Nasdaq Nordic stock exchange. Companies for Nasdaq OMX Market cap indices are chosen based on market value of company. For example, in this study large cap companies are compared against Nasdaq Nordic market cap index consisting of large cap Nordic companies. Same with mid and small cap IPO companies. Nasdaq OMX Nordic growth Index will be

referred as the Nordic index and Nasdaq OMX market cap growth indices are referred as market cap index in this study.

Table 8 below shows results for all stocks and for all countries against the Nordic index. Average returns at two years show us that all IPO stocks together outperformed the Nordic index by 1,47%. Swedish IPOs had the highest excess return over the index for the two-year holding period. Danish IPOs had the worst average performance against the index. On short term, average returns against the index in 1-6 months periods are mostly positive. From the size of average initial returns we could interpret that short term excess return is generated from return earned on the first day of trading. These results are compiled into table 8.

Table 8. Performance against the Nordic index, all stocks and country categories

Performance against the Nordic Index		1 month	3 months	6 months	1 year	1,5 year	2 year
All stocks	Average	7,20 %	9,03 %	7,54 %	5,16 %	5,17 %	1,47 %
	Median	4,46 %	10,65 %	7,66 %	7,32 %	9,40 %	7,53 %
Finland	Average	4,56 %	6,43 %	7,19 %	6,30 %	7,79 %	0,59 %
	Median	-1,50 %	4,82 %	9,27 %	7,11 %	-7,91 %	-13,41 %
Sweden	Average	9,02 %	10,84 %	10,93 %	11,57 %	12,75 %	9,68 %
	Median	8,22 %	13,28 %	9,98 %	14,00 %	17,30 %	15,27 %
Denmark	Average	2,21 %	1,61 %	-9,10 %	-25,30 %	-31,82 %	-34,27 %
	Median	-0,35 %	2,88 %	-6,09 %	-11,61 %	-19,92 %	-7,51 %
Iceland	Average	2,72 %	11,13 %	4,39 %	-9,38 %	-13,40 %	-18,50 %
	Median	0,96 %	9,90 %	9,32 %	-10,72 %	-25,64 %	-26,37 %

Table 9 shows how IPO stocks performed against the market indices consisting of companies of the same market cap. All IPO stocks had average return of -4,14% against the market cap indices after two year holding period. On average the IPO companies did not perform well against companies of same size when the holding period was two years. Average return for shorter holding periods of one to six months seems to be driven by initial underpricing when looked at by what percentage IPOs performed over the market cap indices. Average excess return turns negative at 1,5 year holding period. These results are from the table 9.

When looking at performance of different countries, only Swedish IPO stocks had average excess return over their market cap index after the two-year holding period. Average returns against Nordic market cap indices were mostly positive also on periods of 6 to 12 months. From the results in table 9

conclusion can be drawn that the Nordic IPO companies underperform when compared against Nordic public companies of same market capitalization.

Table 9. Performance against market cap index, all stocks and country categories

Performance against market cap indices		1 month	3 months	6 months	1 year	1,5 year	2 year
All stocks	Average	6,84 %	7,30 %	5,22 %	0,80 %	-0,01 %	-4,14 %
	Median	4,98 %	9,49 %	6,39 %	4,46 %	-1,13 %	-2,10 %
Finland	Average	3,97 %	4,17 %	3,70 %	1,27 %	1,34 %	-7,42 %
	Median	-1,42 %	4,94 %	9,22 %	9,04 %	-7,37 %	-15,23 %
Sweden	Average	8,61 %	8,95 %	8,37 %	6,48 %	6,76 %	3,42 %
	Median	8,60 %	12,51 %	6,79 %	7,11 %	3,35 %	2,33 %
Denmark	Average	1,91 %	1,02 %	-9,38 %	-25,07 %	-31,51 %	-34,92 %
	Median	1,66 %	3,08 %	-5,24 %	-6,49 %	-18,34 %	-6,67 %
Iceland	Average	3,62 %	10,35 %	3,68 %	-13,42 %	-17,70 %	-20,31 %
	Median	0,18 %	10,41 %	7,61 %	-19,00 %	-29,92 %	-30,89 %

Then the study looks at IPO stocks of different market capitalization and how they performed against the Nordic index and the market cap indices. On shorter periods from 1 month to 6 months, the large, mid and small cap IPO stocks performed better than the Nordic index. Results can be read from table 10. For all the size categories, the short run returns are most likely caused by the initial underpricing. When looking at the size categories from the table 10, one can see that small cap stocks had the best performance with average excess return of 6,46% against the Nordic Index in two year holding period. On two-year holding period, the large and mid cap IPO stocks did not manage to generate excess returns over the index. Excess return of small cap IPO can be perceived as evidence of size effect.

Table 10. Performance against the Nordic index per size category

Perform against the Nordic Index		1 month	3 months	6 months	1 year	1,5 year	2 year
Large cap	Average	9,67 %	8,93 %	5,59 %	-10,18 %	-6,08 %	-2,48 %
	Median	10,93 %	8,67 %	3,38 %	4,67 %	4,69 %	-0,66 %
Mid cap	Average	7,66 %	9,82 %	7,20 %	7,38 %	6,86 %	-0,05 %
	Median	4,46 %	12,97 %	7,66 %	13,94 %	16,79 %	14,50 %
Small cap	Average	5,16 %	7,32 %	9,08 %	6,64 %	6,12 %	6,46 %
	Median	1,14 %	7,41 %	9,32 %	6,47 %	-1,88 %	3,83 %

IPO companies are then evaluated against indices consisting of companies of same size. Results can be observed from the table 11. On short term from one to six months, IPO stocks had average excess return against their market cap indices. This would mean that IPO companies perform better than other companies of same size from Nordic stock exchanges in short term. Large cap IPO stocks had the best

performance in short run one to three months, which is probably mostly explained by their higher initial return.

For longer periods, 1,5 years and 2 years periods, only small cap stocks managed to have excess return over the index of companies of same size. The large and mid cap IPO companies did not outperform their market cap indices in the same holding period. Only small cap IPO stocks managed to outperform both indices on all holding periods. These results can be seen from the table 11.

Table 11. Performance against market cap index per size category

Performance against market cap index		1 month	3 months	6 months	1 year	1,5 year	2 year
Large cap	Average	9,66 %	9,04 %	5,97 %	-9,78 %	-5,18 %	-1,50 %
	Median	10,91 %	8,92 %	3,00 %	5,54 %	5,36 %	0,55 %
Mid cap	Average	7,16 %	7,60 %	3,66 %	0,97 %	-0,93 %	-8,34 %
	Median	4,99 %	12,05 %	2,46 %	3,54 %	-2,15 %	-2,32 %
Small cap	Average	4,96 %	5,91 %	8,34 %	4,81 %	4,16 %	4,02 %
	Median	0,54 %	5,17 %	8,27 %	10,34 %	2,00 %	-0,19 %

Below results from tables 12 and 13 show how IPO stocks performed when they are categorized based on initial return. It is observed against the Nordic index and market cap index. The results suggest that only underpriced IPOs are worth investing in long term. Table 12 shows that underpriced IPO stocks had average excess return over the Nordic index of 8,83% at two-year holding period. Underpriced IPO stocks outperformed the Nordic index in all holding periods and show that underpriced IPO stock are worthwhile investment in short periods. Correctly priced and overpriced IPOs underperformed the Nordic index by -16,01% and -17,52% at the end of the two-year holding period.

Table 12. Performance against the Nordic index per price category

Performance against the Nordic Index		1 month	3 months	6 months	1 year	1,5 year	2 year
Underpriced	Average	13,27 %	16,88 %	15,62 %	13,48 %	11,79 %	8,83 %
	Median	12,49 %	14,86 %	10,88 %	12,07 %	17,00 %	14,33 %
Correctly priced	Average	-5,03 %	-7,31 %	-7,47 %	-5,90 %	-14,00 %	-16,01 %
	Median	-5,04 %	-8,15 %	-2,83 %	4,19 %	-23,19 %	-22,40 %
Overpriced	Average	-10,44 %	-13,32 %	-17,17 %	-24,30 %	-8,72 %	-17,52 %
	Median	-9,73 %	-8,45 %	-6,09 %	-10,77 %	9,40 %	4,27 %

Based on pricing at IPO, only underpriced IPO stocks managed to outperform Nordic market cap indices on all holding periods. This result is in line with results on table 12. Correctly priced and overpriced IPO stocks underperformed market cap indices an all holding periods. We can see the results from the table 13.

Table 13. Performance against market cap index per price category

Performance against market cap index		1 month	3 months	6 months	1 year	1,5 year	2 year
Underpriced	Average	12,83 %	14,90 %	12,96 %	8,17 %	5,29 %	1,95 %
	Median	13,21 %	13,42 %	11,89 %	7,72 %	0,18 %	0,35 %
Correctly priced	Average	-4,73 %	-8,89 %	-8,92 %	-6,97 %	-13,41 %	-16,38 %
	Median	-4,23 %	-11,32 %	-4,78 %	2,81 %	-18,47 %	-26,63 %
Overpriced	Average	-11,05 %	-14,01 %	-18,67 %	-27,21 %	-12,94 %	-21,91 %
	Median	-10,21 %	-13,12 %	-13,52 %	-6,49 %	-1,00 %	-1,08 %

One-month average excess return of all IPO Stocks in fall between research of Schmuhl and Schnier (2013) and Lowry et al. (2010). Schmuhl and Schnier (2013) recorded 2,7% excess return over benchmark index for 20 trading days holding period. Lowry et al. (2010) had average return of 22% for 21 trading days without any index adjustments. Excess return in this study for one month was 7,20% and 6,84% over the Nordic index and Nordic market cap index.

Overall, for holding period year or under, all the IPO stocks had excess returns over the two benchmark indices, as is seen from tables 8 and 9. Positive short-term performance of all IPO stocks against both benchmark indices are similar to earlier studies from Berk and Peterle (2015) and Alvarez and Gonzalez (2005). These studies had positive excess return for one year period. Research from Purnanandam and Swaminathan (2004) recorded positive excess returns over benchmark index for 6-month period, but the returns turned negative as the holding period got longer. Excess returns over benchmark for holding periods year or under are mixed in earlier research. Investing to IPO companies for that period was viable option when we look at our results.

The results are mixed when we look at average excess returns of all IPO stocks for holding periods longer than a year. Against the Nordic index it was 1,47% and -4,14% against the market cap indices at two-year mark. The results point that all IPO stocks do not perform well against companies of the same size but were able to beat broader Nordic index consisting of all Nordic listed companies. Performance of IPO stocks against benchmark index for holding periods longer than one year is mostly negative in earlier academic studies from Ljungqvist (1997), Alvarez and Gonzalez (2005), Westerholm (2006), Purnanandam and Swaminathan (2004) and Loughran and Ritter (1995). These studies had

returns measured starting from the first close price, not from offer price. When the average first day initial return 8,95% is excluded from results of this study, the IPO stocks would have negative return against the indices. Which gives results similar to earlier research.

Then this study will look at the size categories. On short term from 1-3 months, large cap and mid cap IPO stocks outperformed small cap IPO stocks. Both had higher excess return over benchmark indices. Short term results are likely due to higher underpricing of the large and mid cap IPO stocks. Based on the results, the large and mid cap IPO stocks would have been the best option to invest for few months period. From the data we had, I think it is too early to make a definitive conclusion which of the size categories is the best for few months period.

Size effect seems to exist in the results when the holding period is longer than a year. Small cap IPO stocks performed better as the holding period gets longer. Their average excess return for two years was 6,46% against the Nordic index and 4,02% against the market cap index. Only small cap IPO stocks were able to outperform both indices in two year holding period. The large and mid cap IPO stocks underperformed against the Nordic index and the market cap indices at two year holding period. Excess return of mid cap IPO stocks was -0,05% against the Nordic index and -8,34% against the market cap index. Mid cap IPO stocks performed well against the Nordic index up to holding period of 1,5 years and then the average return turned negative at two-year holding period. It is possible that there were extreme negative returns among the mid cap IPO stocks that dragged the average return down against the Nordic index. Excess return for the large cap IPO stocks at two years was -2,48% against the Nordic index and -1,50% against the market cap index.

The results show that the large cap and mid cap IPO did not generate positive returns against all Nordic listed companies and Nordic companies of same size. Our results are in line with earlier research we have gone through in the literature review regarding size effect. We can see the small cap IPO stocks performing better against the indices than larger IPO stocks. Size effect seems to exist at least when holding period is longer than a year and no adjustments for risk are made. Based on the results we can say that Nordic small cap IPO stocks outperformed Nordic mid and large cap IPO stocks.

Underpricing appears to be an important factor when looking at long term performance. In short term it is obvious that underpriced IPOs would perform the best. Against indices, only underpriced IPO stocks managed to earn positive excess return in long run. Bit surprising was that correctly priced IPOs

could not keep up with the indices and had negative return starting from the first month and getting more negative as holding period gets longer. It could be thought that correctly priced IPOs were valued to their fair value but were truly low-quality companies and the quality was revealed in long run as theorized by Ritter and Welch (2002). The idea from Ritter and Welch (2002) earlier in this study stated that high quality companies can undervalue their IPOs and the true value, which is higher, will then be revealed in longer run. For good performance after IPO, it seems crucial for the stock to be underpriced. This in line with theories that quality companies try to stand out from lower quality companies and one way to show it is the ability to underprice shares at IPO.

5.4. Jensen's Alpha

In this chapter we will check how IPO stocks performed measured by Jensen's alpha. Jensen's alphas are calculated using both the Nordic index and the market cap indices that the IPO stocks belonged to at the time of the IPO.

From tables 14 and 15 can be seen performance measured by Jensen's alpha, calculated both against the Nordic index and against market cap index. All the IPO stocks had an average Jensen's alpha of 7,89% at two-year holding period when calculated using Nasdaq Nordic index. All countries, except Denmark had positive Jensen's alpha at two-year holding period. On shorter holding periods of month and 3 months, the alphas were positive on all stocks and all countries. The results can be viewed from the table 14.

Table 14. Jensen's alpha against the Nordic index, all stocks and country categories.

Jensen's alpha against the Nordic index		1 month	3 months	6 months	1 year	1,5 year	2 year
All stocks	Average	6,41 %	10,81 %	9,69 %	9,41 %	10,80 %	7,89 %
	Median	3,24 %	12,14 %	11,48 %	13,31 %	13,39 %	16,35 %
Finland	Average	5,00 %	5,73 %	7,23 %	12,08 %	16,07 %	8,97 %
	Median	-0,10 %	0,74 %	15,08 %	11,47 %	13,16 %	-2,10 %
Sweden	Average	8,14 %	12,17 %	13,03 %	13,93 %	15,97 %	13,50 %
	Median	6,39 %	14,93 %	13,60 %	17,12 %	22,42 %	21,58 %
Denmark	Average	0,96 %	6,46 %	-6,86 %	-18,89 %	-25,02 %	-27,40 %
	Median	0,01 %	6,96 %	-6,71 %	-5,55 %	1,55 %	7,20 %
Iceland	Average	0,38 %	19,15 %	13,97 %	11,90 %	15,89 %	18,79 %
	Median	3,27 %	18,30 %	20,78 %	8,25 %	1,69 %	11,78 %

Results from calculating Jensen's alpha using the market cap indices can be seen from the table 15. As with the above results, all Jensen's alphas were positive except Danish IPOs. Icelandic IPO stocks had the highest alpha after the two-year holding period with average alpha of 16,28%. Danish stocks had the lowest alpha of -27,12%. as with the results on table 15, Jensen's alphas against market cap indices were positive for all stocks and countries for 1 and 3 month-holding periods.

Table 15. Jensen's alpha against market cap index, all stocks and country categories.

Jensen's alpha against market cap index		1 month	3 months	6 months	1 year	1,5 year	2 year
All stocks	Average	6,97 %	9,40 %	7,71 %	4,99 %	5,26 %	1,40 %
	Median	3,83 %	10,34 %	9,85 %	10,65 %	5,62 %	7,15 %
Finland	Average	4,89 %	5,18 %	7,04 %	7,92 %	10,15 %	1,20 %
	Median	0,95 %	1,08 %	13,36 %	12,53 %	5,35 %	-7,82 %
Sweden	Average	8,19 %	10,25 %	10,28 %	8,28 %	9,28 %	5,76 %
	Median	6,22 %	13,04 %	10,81 %	12,34 %	8,31 %	7,21 %
Denmark	Average	4,07 %	7,59 %	-6,18 %	-18,56 %	-25,05 %	-27,12 %
	Median	2,68 %	6,92 %	-7,13 %	-1,41 %	2,66 %	7,08 %
Iceland	Average	3,74 %	15,60 %	10,09 %	11,62 %	13,48 %	16,28 %
	Median	4,18 %	15,23 %	16,28 %	5,01 %	-0,39 %	8,95 %

From tables 16 and 17 below, can be seen Jensen's alphas sorted by the market cap of the IPO stocks at the time of the IPO. Table 16 shows that the large, mid and small cap IPOs produced positive alpha on all holding periods when Jensen's alpha was calculated using the Nordic index. Small cap stocks had the highest alpha of 14,36% after the two-year holding period. The large cap IPO stocks had the lowest Jensen's alpha for the same period with average alpha of 3,64%.

Table 16. Jensen's alpha against the Nordic index per size category

Jensen's alpha against the Nordic index		1 month	3 months	6 months	1 year	1,5 year	2 year
Large cap	Average	3,83 %	16,59 %	10,22 %	0,09 %	0,83 %	3,64 %
	Median	3,80 %	16,68 %	8,40 %	17,58 %	15,33 %	8,74 %
Mid cap	Average	7,04 %	9,97 %	8,92 %	10,52 %	11,86 %	5,77 %
	Median	3,24 %	12,14 %	13,98 %	13,31 %	13,39 %	21,04 %
Small cap	Average	6,09 %	10,26 %	11,17 %	10,85 %	12,61 %	14,36 %
	Median	1,91 %	11,36 %	9,46 %	7,02 %	2,53 %	10,89 %

Table 17 shows the Jensen's alphas when it was calculated using market cap indices that the IPO stock belongs to. The small cap IPO stocks had the highest alpha for the period with 10,02%. The mid cap

stocks produced negative Jensen's alpha of -3,06% for the same holding period of two years. All the size categories had positive alphas for shorter periods.

Table 17. Jensen's alpha against market cap index per size category

Jensen's alpha against market cap index		1 month	3 months	6 months	1 year	1,5 year	2 year
Large cap	Average	3,54 %	16,74 %	10,53 %	0,58 %	1,42 %	4,39 %
	Median	3,81 %	17,08 %	7,74 %	18,43 %	16,68 %	9,83 %
Mid cap	Average	9,24 %	8,04 %	5,92 %	4,64 %	3,83 %	-3,06 %
	Median	4,47 %	9,67 %	9,04 %	8,43 %	5,62 %	6,80 %
Small cap	Average	3,40 %	9,35 %	10,48 %	7,59 %	10,04 %	10,02 %
	Median	1,66 %	11,30 %	13,57 %	10,34 %	4,59 %	15,34 %

Tables 18 and 19 below will observe Jensen's alphas of stocks categorized based on the pricing at the IPO. Table 18 and table 19 show similar results that only the underpriced stocks yielded positive Jensen's alpha at the end of the holdings period with alpha of 14,78%. Jensen's alpha against the Nordic index for underpriced IPO stocks is positive also on all holding periods. Alphas for correctly and overpriced IPOs are mostly negative.

Table 18. Jensen's alpha against the Nordic index per price category

Jensen's alphas against the Nordic index		1 month	3 months	6 months	1 year	1,5 year	2 year
Underpriced	Average	12,26 %	18,49 %	17,45 %	18,02 %	16,93 %	14,78 %
	Median	9,38 %	17,26 %	14,73 %	17,89 %	17,19 %	21,30 %
Correctly priced	Average	-2,54 %	-1,90 %	-4,25 %	1,10 %	-3,82 %	-7,05 %
	Median	-0,86 %	-1,18 %	9,47 %	11,24 %	-9,93 %	-12,18 %
Overpriced	Average	-13,25 %	-14,10 %	-14,44 %	-23,95 %	-4,92 %	-11,16 %
	Median	-6,30 %	-14,77 %	-8,00 %	-5,55 %	10,00 %	10,32 %

From the table 19 can be observed that only the underpriced IPOs had positive alpha when measured against the market cap indices. Correctly priced and overpriced IPOs had an average alpha at the end of the holding period of -9,26% and -14,20%. The underpriced IPOs had positive alpha on all holding periods.

Table 19. Jensen's alphas against market cap index per price category

Jensen's alphas against market cap index		1 month	3 months	6 months	1 year	1,5 year	2 year
Underpriced	Average	12,40 %	16,85 %	15,27 %	13,14 %	10,15 %	6,74 %
	Median	7,77 %	14,90 %	13,43 %	13,06 %	7,73 %	11,15 %
Correctly priced	Average	-1,78 %	-4,52 %	-6,90 %	-3,40 %	-5,48 %	-9,26 %
	Median	-0,23 %	-4,53 %	8,47 %	1,98 %	-8,87 %	-21,73 %
Overpriced	Average	-10,84 %	-13,27 %	-14,84 %	-26,17 %	-8,11 %	-14,20 %
	Median	-5,11 %	-13,19 %	-8,58 %	-9,33 %	2,66 %	7,08 %

Generally, all IPO stocks together performed better than would have assumed by the CAPM. Average Jensen's alpha for one-year period was for all the IPO stocks 9,41% against the Nordic index and 4,99% against the market cap index. For two-year period the alphas were 7,89% against the Nordic index and 1,40% against the market cap indices. Overall if an investor were able to buy stock at the offer price, the investor would have gained better returns than expected by the CAPM. These results contradict to some degree with research from Berk and Peterle (2015) to where Central and Eastern European had a negative alpha of -16,7% and -31,3% for two- and three-year holding periods. Their results were calculated from the close price of the first trading day. If we exclude average first day return from our results, then our Jensen's alphas are close to zero or negative for two year holding period.

The average alphas were mostly positive across all the size categories whether the alpha was calculated using the Nordic or the market cap indices as is seen from tables 16 and 17. The small cap IPO stocks were better compared to the mid and large cap IPO stocks in period of 2 years when evaluated with Jensen's alpha. On shorter period from one month to six months it is hard to find a pattern.

The small cap IPO stocks outperformed other size categories. This can be interpreted that size effect exists at least in for couple of years after the first trading day in the Nordic countries. These results are similar to earlier research presented in the literature review where smaller companies had higher returns than larger companies.

Reinganum and Smith (1983) calculated average monthly risk adjusted returns using Jensen's alpha and got similar results that smaller companies outperform larger ones. In their sample, portfolio of the largest companies did not earn higher returns than was expected by the CAPM and the returns were close to zero. In their sample smaller companies had better performance than assumed by the CAPM. These results are not directly comparable as Reinganum and Smith (1983) calculated monthly returns

and constructed ten portfolios based on size. This study had returns calculated for various periods from one month to two years and three size categories.

Results of this study show that all the size categories had mostly positive Jensen's alpha, not just small cap IPO stocks. Large and mid cap IPO stocks had negative excess returns against the benchmark indices in the earlier section but had mostly positive Jensen's alphas also on longer holding periods. These results could possibly be explained by the method of calculating returns from the offer price which leads to Jensen's alphas benefiting from the underpricing. It is possible that there are misestimations in beta or the CAPM is missing something needed for pricing securities more accurately. My best suggestion is that these positive alphas are most likely explained by the method of calculating retuns from offer price. I would say this needs to be studied more.

Overpriced and correctly priced IPOs had negative alpha on almost all holding periods. Underpriced IPOs had positive alpha on all holding periods. These results suggests that performance of IPO stocks overall is mostly driven by the underpricing at the offer price.

5.5. Sharpe ratio

This last chapter of results looks on the Sharpe ratios which is reward to variability ratio. Higher the Sharpe ratio, the better. Observed from the table 20 we can see that all IPO stocks had an average Sharpe ratio of 0,44 at the end of the holding period. All Sharpe ratios were positive at the end of the period for country category. Icelandic IPO stocks had the highest Sharpe ratio of 0,96 at the end of the holding period.

Table 20. Sharpe ratio for all stocks and countries

Sharpe ratio		1 month	3 months	6 months	1 year	1,5 year	2 year
All stocks	Average	0,35	0,52	0,46	0,41	0,46	0,44
	Median	0,63	0,69	0,44	0,64	0,56	0,55
Finland	Average	0,26	0,36	0,57	0,53	0,66	0,47
	Median	0,29	0,28	0,85	0,64	0,55	0,17
Sweden	Average	0,36	0,52	0,50	0,44	0,48	0,46
	Median	0,76	0,69	0,50	0,73	0,72	0,73
Denmark	Average	0,14	0,25	-0,16	0,02	-0,01	0,09
	Median	0,45	0,61	-0,10	0,12	0,11	0,49
Iceland	Average	1,04	1,94	1,16	0,66	0,87	0,96
	Median	1,13	1,80	1,56	0,59	0,24	0,42

Table 21 shows us Sharpe ratios per size category. All the Sharpe ratios were well under 1 at the two-year holding period, small and large cap IPO stocks having nearly identical performance with Sharpe ratios of 0,54 and 0,55. In short run large cap IPO stocks had the highest Sharpe ratio with 0,95 and 0,79 for periods of one and 3 months. Investors are rewarded with lower variability when investing to large cap IPOs, at least on short term.

Table 21. Sharpe ratios per size category

Sharpe ratio		1 month	3 months	6 months	1 year	1,5 year	2 year
Large cap	Average	0,95	0,79	0,65	0,62	0,61	0,55
	Median	1,03	0,99	0,40	0,92	0,78	0,54
Mid cap	Average	0,30	0,54	0,47	0,38	0,40	0,37
	Median	0,62	0,64	0,55	0,65	0,68	0,73
Small cap	Average	0,21	0,38	0,35	0,37	0,54	0,54
	Median	0,20	0,68	0,39	0,41	0,40	0,42

Table 22 below shows as Sharpe ratios per pricing category. Underpriced IPOs had the highest average Sharpe ratio at the end of the two-year holding period, even though not very great. Sharpe ratios of correctly priced and overpriced IPOs are negative on shorter periods and become slightly positive towards longer holding periods.

Table 22. Sharpe ratios per pricing category

Sharpe ratio		1 month	3 months	6 months	1 year	1,5 year	2 year
Underpriced	Average	0,84	0,92	0,72	0,61	0,59	0,56
	Median	0,89	1,03	0,71	0,79	0,73	0,73
Correctly priced	Average	-0,33	-0,01	0,31	0,40	0,28	0,20
	Median	-0,25	-0,34	0,03	0,39	0,20	-0,01
Overpriced	Average	-1,35	-0,89	-0,69	-0,54	0,04	0,06
	Median	-1,55	-1,08	-0,72	-0,04	0,34	0,27

The large cap IPO stocks were better on short term with Sharpe ratio of 0,95 on one month holding period when compared to the mid cap and small cap IPO stocks. That result is probably mostly explained by the initial return. On longer holding period of 2 years Sharpe ratios were similar for the small and the large cap IPO stocks. The mid cap IPO stocks had slightly lower Shape ratio for the two-year holding period.

Sharpe ratios for pricing categories do not provide much different results for holding periods longer than a year. Underpriced IPOs have higher ratio than correctly or overpriced IPOs. Based on Sharpe ratio, none of the size categories of IPO stocks or pricing category is viable investment and investor is not much rewarded for the bearing risk.

In short run one to six months, the large cap IPO stocks were the best option, you would get most reward for the volatility. For longer holding periods Sharpe ratio was the highest for the large cap and small cap IPO stocks.

6.   Conclusions

This thesis aimed to investigate how newly listed Nordic companies are priced at IPO, how companies of different size are priced at IPO and whether companies of different size perform differently in longer run for periods of one month up to two years. The thesis evaluated how differently priced IPOs perform after the first trading day. This was done by calculating performance against the Nasdaq OMX Nordic growth index and Nasdaq OMX Nordic market cap growth indices and risk adjusted performance measures of Jensen's alpha and Sharpe ratio. Performance was evaluated from the first trading day up to period of two years. Results were evaluated sorting the IPO stocks by listing country, market capitalization and how the stock was priced at IPO. IPOs were gathered from Nordic stock exchanges in Sweden, Finland, Denmark, and Iceland. The companies had their first trading day in between 1.1.2010 to 31.12.2017.

The main findings are that the Nordic IPOs were generally underpriced. Large cap IPOs had the highest average initial return from the first trading day and one-year positive performance against indices is likely explained by initial underpricing. Nordic small cap IPO companies had the best performance for holdings periods longer than a year against the indices and when measured with Jensen's alpha. Size effect seems to exist on Nordic IPOs. Underpriced IPOs had the best performance after the first trading day both against indices and with the risk adjusted measures.

Research questions are listed below. The study was able to provide answers for the research questions.

1. How the Nordic IPOs perform on the first trading day and after one month?
2. Do companies of different size have difference in the first day returns?
3. How do Nordic IPO companies of different market capitalization and different first trading day return perform after the IPO?

The Nordic IPOs were generally underpriced at offer price during the observation period. The results of initial return show that Nordic IPOs are not different from earlier research. Research presented in the literature review had bit higher average initial returns than our results. Average initial return was 8,95% after the first trading day. After a month, average return from IPO stocks was 8,05%. Based on the results Nordic IPOs are underpriced and would be profitable investment for periods of one day and one month when bought at offer price. Level of initial returns showed fluctuation for different listing years from which there is evidence in earlier IPO research. Price support actions did not appear to exist at least in any notable degree. Number of IPO stocks with zero or negative return did not increase notably after one month, when price support actions were expected to disappear.

The second research question was to find out if there is difference in initial return based on market capitalization of the IPO company. The results show that the large cap IPOs had the highest initial first day return with average of 10,79% return from the first trading day. The mid and small cap IPO stock exhibited similar, but lower average initial returns with 8,79% for the mid cap IPO stocks and 8,52% for the small cap IPO stocks. I could not find any earlier research categorizing IPO stocks based on market cap, so we have no earlier research to which compare our results. For shorter hold, based on the results, the large cap Nordic IPOs should be preferred.

Even though the difference in average initial returns is not large between companies of different market capitalization, it is still noted that large cap IPO stocks had the highest initial returns. Large cap companies typically have longer track record and performance history which would suggest that there is less uncertainty valuing them. Pricing a company to its fair value would be easier for large cap companies than for smaller and younger companies. Ritter & Welch (2002) offered their view that companies signal their quality by underpricing to stand out from other companies. One would think larger companies are better positioned in market and can signal their quality by underpricing their offer. The quality would then be revealed in longer run and the company would benefit in future offers with

higher valuation. Contrary to this theory, large cap companies did not perform exceptionally well against the indices and with the risk adjusted measures for longer holding periods. At two year holding period, the large cap IPO stocks had negative return against both indices. Probably other theories for IPO underpricing gives better explanation for larger underpricing of the large cap IPO companies. Sample size of this study is not large, so it is probably too early to make any definitive conclusions. Also, this study is not testing IPO underpricing theories.

Third research question was to evaluate how Nordic IPO stocks of different market capitalization and different pricing at IPO perform after the IPO. This was evaluated by calculating returns against the Nordic index and Nordic market cap indices. Risk-adjusted measures for evaluating performance are Jensen's alpha and Sharpe ratio. The Nordic small caps and underpriced IPOs had the best performance after the first trading day. The small cap IPOs performed better than the large and mid cap IPOs in the longer holding periods, both against the indices and with risk adjusted measures.

Performance based on market capitalization was as expected from results of earlier research. The Nordic small cap IPO stocks were the best performing size category overall after the IPO and had the highest excess return over the Nordic index and the market cap indices at the end of two-year holding period. Jensen's alphas were the highest for the small cap IPOs for two year holding period. The large and mid cap stocks could not outperform neither of the indices at two year holding period. These results imply that size effect exist in the Nordic IPOs when examined with our measures of performance. Sharpe ratios were on same level for the large cap and small cap IPO stocks for holding periods over a year. The mid cap IPOs had the lowest Shape ratios for the same period. Overall Sharpe ratios were low on all size categories.

Results on Jensen's alpha raises a question whether it is proper measurement of performance of IPO companies, at least when returns are calculated from the offer price. In theory of efficient markets by Fama (1970), it should not be possible to consistently have abnormal returns, but all the IPO stocks together had Jensen's alphas of 7,89% and 1,40% when calculated using the Nordic index and the market cap index for two-year period. It may be that CAPM is not the best measure for risk and expected return for small IPO companies as they had the best performance. That issue has been raised in earlier research regarding size effect from such as Fama and French (1992) and Reinganum and Smith (1983). Also, our method of calculating returns from the offer price has some effect. Alphas and performance against indices would be worse if we exclude the initial return from calculations.

In short run, up to one year, all the size categories were viable choices for investing when measured against benchmark indices and by Jensen's alpha. This is probably mostly explained by the positive average initial return from the first trading day. Sharpe ratio was better in short run for the large cap IPOs, but it is probably mostly explained by their higher initial return and better performance in the first few months. For holding periods of one to three months, according to the results against the benchmarks, the large and mid cap IPO stocks should be preferred. In longer run our results point towards investing to Nordic small cap IPO stocks.

Measuring performance based on pricing at IPO has some problems when measuring performance in short run. This is due to underpricing when IPO companies often rise 5-20 percent in value during the first trading day. This almost certainly causes underpriced IPOs to perform the best in short run as price hikes on the first trading day.

The more interesting aspect of that price categorization is to see how they perform in longer run. Underpriced IPO companies was the only price category that could perform better than indices and had positive Jensen's alpha on holding periods and highest Sharpe ratios. It was surprising that correctly priced IPOs performed poorly in long run. Performance was poor against the two benchmark indices and in risk adjusted measures of performance. These results offer some support for the signalling quality by underpricing theory by Ritter and Welch (2002) presented earlier in this study. Correctly priced IPO companies maybe were not of high quality to undervalue their offer. The true, lower quality of the IPO company is then revealed as time goes when we look at the results. Gathered results suggest selling IPO stock on the first trading day if it is not underpriced. Correctly and overpriced IPOs performed poorly on risk adjusted measure of Jensen's alpha and Sharpe ratio. Based on Sharpe ratio alone, you probably should not invest in IPO companies as you would not get much reward for bearing volatility in your portfolio. These results highlight the importance of trying to select underpriced IPOs when placing your subscription to an offer. This is of course easier said than done.

The study revealed more in-depth knowledge what factors should be kept in mind when planning to invest in IPO. The results were not too different from earlier research. From the results one can make a conclusion that underpricing exists in the Nordic stock exchanges. By participating in all IPOs, you would get positive first day return given that you get full allocation from all offers. Size effect appears to be present as well. The Nordic small cap IPO stocks were the best performing size category for longer

holding periods. Based on the results, an investor should try to pick undepriced IPOs and small cap companies if the holding period is longer than one year.

6.1. Thoughts and suggestions for further research

The most limiting factor in this thesis is the number of companies that made it to the research. it is hard to draw definitive conclusions from the results as number of companies is low in some categories. Studies from the US market in the literature review had vastly larger number companies in their samples. Most of them had several thousand IPOs in sample. Studies done from European stock exchanges had sample sizes closer to what we used here. For example, research from Schmuhl and Schnier (2013) had 182 IPOs during 2002-2011, Alvarez and Gonzalez (2005) had sample size of 52 IPOs from period 1987-1997. This study had 87 IPOs from period 2010-2017. In European context most of the studies had larger sample size but the difference is not that large compared to studies done from the US stock exchanges.

Sample size in this study makes the results vulnerable to outliers in the data sample. For that reason, it would also be interesting to include more Nordic marketplaces such as Oslo Börs/Oslo Axxess and First North lists from the Nordic countries. Now Norwegian stocks had to be left out because they were not included in the indices of Nasdaq Nordic.

Ideas for future research in the field of IPO research came up along the process from stuff that had to be left out from this thesis. It would be interesting to evaluate performance of newly listed companies on industry level to see if there are differences in performances between industries. It would give some more insight how different industries would perform at the time of listing and years after.

Performance evaluation could include comparison of returns when the first trading day return is excluded from calculation meaning that returns would be calculated from first close price, not from offer price. In that way it could be compared how much the first day return affects performance in long run. This would reveal more knowledge about the performance of IPO stocks.

Risk adjusted measures should also be considered to come up with new approach to the topic. Also, it would be good to try to match and compare newly listed companies with more mature companies from stock exchanges as had been done in the earlier research.

IPOs are generally underpriced and quickly made conclusion would be that it makes no sense not to invest in all of them. You could get 5% to 20% average return from one day of trading when looking at past returns. Stock markets have given annual return of 5-7% in long run. Rock (1986) argued that investors would get partial allocations from underpriced IPOs and full allocation from overpriced IPOs. This could be tested to see what returns investors would get from Nordic IPOs when allocation is considered. First is to see if it holds that investors receive partial allocation from underpriced and full allocation from overpriced IPOs. Secondly if this exists, is receiving full allocations from overpriced IPOs enough to drag average returns down.

For future research I would recommend having longer holding periods for observing performance after the first trading day. Two year holding period is still relatively short and longer holding periods would give more evidence regarding performance. Also, companies that were delisted during observation period could be included. There could be bankruptcies and tender offers which would influence the overall performance. In my data sample there was only two companies that got delisted before two years holding period that would have otherwise made it to the research. They were delisted via tender offer where they were bought by another company price higher than what it was at stock exchange. No companies were delisted due to bankruptcies. Although the number of delisted companies was low, it could influence the overall performance.

Jensen's alpha could be also looked at in future research. I would use more intervals for calculating it to see if that makes any difference. What I mean is that one could use daily, weekly and monthly intervals for beta calculation to see if they give different results. There is no common practise what interval should be used.

These aspects I would highlight worth noting for anyone planning to do more research on IPOs.

7. References

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8.　　　Appendix 1 - Companies

Company	First day of trading	Stock exchange	Market cap	Offer price	1st close price	Change %
ORAVA RESIDENTIAL REAL ESTATE INVESTMENT TRUST PLC	14.10.2013	Nasdaq Helsinki	small cap	10,3	10,3	0,00 %
RESTAMAX OYJ	28.11.2013	Nasdaq Helsinki	small cap	4,6	4,97	7,74 %
ASIAKASTIETO GROUP PLC	27.3.2015	Nasdaq Helsinki	Mid cap	14,75	15,24	3,27 %
PIHLAJALINNA Oyj	4.6.2015	Nasdaq Helsinki	mid cap	10,5	11,5	9,10 %
KOTIPIZZA GROUP OYJ	7.7.2015	Nasdaq Helsinki	small cap	5	5,19	3,73 %
EVLI BANK PLC	2.12.2015	Nasdaq Helsinki	mid cap	6,75	8,37	21,51 %
CONSTI GROUP PLC	11.12.2015	Nasdaq Helsinki	small cap	9,5	9,8	3,11 %
LEHTO GROUP PLC	28.4.2016	Nasdaq Helsinki	Mid cap	5,1	5,9	14,57 %
TOKMANNI GROUP OYJ	29.4.2016	Nasdaq Helsinki	Mid cap	6,7	6,7	0,00 %
DNA OYJ	30.11.2016	Nasdaq Helsinki	Large cap	10,1	10,1	0,00 %
KAMUX OYJ	12.5.2017	Nasdaq Helsinki	mid cap	7,2	7,56	4,88 %
SILMÄASEMA OYJ	9.6.2017	Nasdaq Helsinki	small cap	6,9	7,6	9,66 %
ROVIO ENTERTAINMENT Oyj	29.9.2017	Nasdaq Helsinki	Mid cap	11,5	11,5	0,00 %
PANDORA A/S	5.10.2010	Nasdaq Copenhagen	large cap	210	263	22,50 %
ZEALAND PHARMA A/S	24.11.2010	Nasdaq Copenhagen	mid cap	86	79,5	-7,86 %
DANSKE ANDELSKASSERS BANK A/S	7.7.2011	Nasdaq Copenhagen	mid cap	25	26	3,92 %
SMARTGUY GROUP A/S	23.11.2012	Nasdaq Copenhagen	small cap	2,4	3,18	28,14 %
MATAS A/S	28.6.2013	Nasdaq Copenhagen	mid cap	115	119	3,42 %
FAST EJENDOM DANMARK A/S	27.12.2013	Nasdaq Copenhagen	small cap	45,96	45	-2,11 %
ISS A/S	13.3.2014	Nasdaq Copenhagen	large cap	160	184,8	14,41 %
SCANDINAVIAN TOBACCO GROUP A/S	10.2.2016	Nasdaq Copenhagen	large cap	100	100	0,00 %
DONG ENERGY A/S	9.6.2016	Nasdaq Copenhagen	large cap	235	258	9,34 %
ORPHAZYME A/S	16.11.2017	Nasdaq Copenhagen	mid cap	80	80	0,00 %
TCM GROUP A/S	24.11.2017	Nasdaq Copenhagen	small cap	98	97,5	-0,51 %
REGINN	2.7.2012	Nasdaq Iceland	small cap	8,2	8,2	0,00 %
EIMSKIPAFÉLAG ÍSLANDS HF.	16.11.2012	Nasdaq Iceland	mid cap	208	225	7,86 %
FJARSKIPTI hf. (Vodafone Iceland)	18.12.2012	Nasdaq Iceland	small cap	31,5	32,2	2,20 %
VÍS HF. (VÁTRYGGINGAFÉLAG ÍSLANDS)	24.4.2013	Nasdaq Iceland	small cap	7,95	9,22	14,82 %
ARISE WINDPOWER AB	24.3.2010	Nasdaq Stockholm	Mid cap	55	53,75	-2,30 %
BYGGMAX GROUP AB	2.6.2010	Nasdaq Stockholm	Mid cap	46	48,5	5,29 %
MQ HOLDING AB	18.6.2010	Nasdaq Stockholm	small cap	32	31,8	-0,63 %
KAROLINSKA DEVELOPMENT AB	15.4.2011	Nasdaq Stockholm	Mid cap	40	40	0,00 %
FINNVEDENBULTEN AB	20.5.2011	Nasdaq Stockholm	small cap	49	49	0,00 %
MOBERG DERMA AB	26.5.2011	Nasdaq Stockholm	small cap	29	28,7	-1,04 %
TRANSMODE HOLDING AB	27.5.2011	Nasdaq Stockholm	small cap	53	54,5	2,79 %
PLATZER FASTIGHETER HOLDING AB	29.11.2013	Nasdaq Stockholm	Mid cap	26,5	27,9	5,15 %
BUFAB AB	21.2.2014	Nasdaq Stockholm	MID cap	46	49	6,32 %
RECIPHARM AB	3.4.2014	Nasdaq Stockholm	mid cap	78	85,75	9,47 %
BESQAB AB	12.6.2014	Nasdaq Stockholm	Small cap	73	84,5	14,63 %
COM HEM HOLDING AB	17.6.2014	Nasdaq Stockholm	Large cap	58	63,55	9,14 %
BACTIGUARD AB	19.6.2014	Nasdaq Stockholm	Mid cap	38	31,5	-18,76 %
INWIDO AB	26.9.2014	Nasdaq Stockholm	mid cap	68	64,5	-5,28 %
LIFCO AB	21.11.2014	Nasdaq Stockholm	mid cap	93	123	27,96 %
THULE GROUP AB	26.11.2014	Nasdaq Stockholm	mid cap	70	78	10,82 %

NP3 FASTIGHETER AB	4.12.2014	Nasdaq Stockholm	mid cap	30	33,8	11,93 %
ELTEL AB	6.2.2015	Nasdaq Stockholm	mid cap	68	73	7,10 %
DUSTIN GROUP AB	13.2.2015	Nasdaq Stockholm	Mid cap	50	58,5	15,70 %
TOBII AB	24.2.2015	Nasdaq Stockholm	Mid cap	25	34,5	32,21 %
HOIST FINANCE AB	25.3.2015	Nasdaq Stockholm	Mid cap	58	66,1	13,07 %
TROAX GROUP AB	27.3.2015	Nasdaq Stockholm	Small cap	66	78,75	17,66 %
COLLECTOR AB	10.6.2015	Nasdaq Stockholm	mid cap	55	63,6	14,53 %
COOR SERVICE MANAGEMENT HOLDING AB	16.6.2015	Nasdaq Stockholm	mid cap	38	38	0,00 %
NORDAX GROUP AB	17.6.2015	Nasdaq Stockholm	mid cap	45	43,9	-2,47 %
ALIMAK GROUP AB	17.6.2015	Nasdaq Stockholm	mid cap	93	101,25	8,50 %
PANDOX AB	18.6.2015	Nasdaq Stockholm	mid cap	106	107,1	1,03 %
NOBINA AB	18.6.2015	Nasdaq Stockholm	mid cap	34	32	-6,06 %
CLX COMMUNICATIONS AB	8.10.2015	Nasdaq Stockholm	mid cap	59	75	24,00 %
BRAVIDA HOLDING AB	16.10.2015	Nasdaq Stockholm	mid cap	40	43	7,23 %
DOMETIC GROUP AB	25.11.2015	Nasdaq Stockholm	large cap	48	55,4	14,34 %
ATTENDO AB	30.11.2015	Nasdaq Stockholm	mid cap	50	70	33,65 %
SCANDIC HOTELS GROUP AB	2.12.2015	Nasdaq Stockholm	mid cap	67	63,75	-4,97 %
CAMURUS AB	3.12.2015	Nasdaq Stockholm	mid cap	57	66	14,66 %
GARO AB	16.3.2016	Nasdaq Stockholm	Small cap	73	102	33,45 %
HUMANA AB	22.3.2016	Nasdaq Stockholm	mid cap	62	74	17,69 %
RESURS HOLDING AB	29.4.2016	Nasdaq Stockholm	large cap	55	55,1	0,18 %
WILSON THERAPEUTICS AB	12.5.2016	Nasdaq Stockholm	Small cap	49	49	0,00 %
NORDIC WATERPROOFING A/S	10.6.2016	Nasdaq Stockholm	mid cap	71	71,5	0,70 %
TF BANK AB	14.6.2016	Nasdaq Stockholm	mid cap	77	85	9,88 %
ACADEMEDIA AB	15.6.2016	Nasdaq Stockholm	mid cap	40	59	38,87 %
INTERNATIONELLA ENGELSKA SKOLAN I SVERIGE HOLDINGS II AB	29.9.2016	Nasdaq Stockholm	mid cap	52	69	28,29 %
AHLSELL AB	28.10.2016	Nasdaq Stockholm	large cap	46	56	19,67 %
ALLIGATOR BIOSCIENCE AB	23.11.2016	Nasdaq Stockholm	mid cap	32,5	38,1	15,90 %
SERNEKE GROUP AB	24.11.2016	Nasdaq Stockholm	mid cap	110	110	0,00 %
EDGEWARE AB	9.12.2016	Nasdaq Stockholm	Small cap	29	29,5	1,71 %
ONCOPEPTIDES AB	22.2.2017	Nasdaq Stockholm	mid cap	46	43	-6,74 %
MIPS AB	23.3.2017	Nasdaq Stockholm	Small cap	46	51,5	11,29 %
AMBEA AB	31.3.2017	Nasdaq Stockholm	mid cap	75	82,5	9,53 %
SSM HOLDING AB	6.4.2017	Nasdaq Stockholm	mid cap	59	58,5	-0,85 %
FM MATTSSON MORA GROUP AB	10.4.2017	Nasdaq Stockholm	Small cap	68	94	32,38 %
INSTALCO INTRESSENTER AB	11.5.2017	Nasdaq Stockholm	mid cap	55	65	16,71 %
MUNTERS GROUP AB	19.5.2017	Nasdaq Stockholm	large cap	55	66,05	18,31 %
MEDICOVER AB	23.5.2017	Nasdaq Stockholm	mid cap	56	65,5	15,67 %
BOOZT AB	31.5.2017	Nasdaq Stockholm	mid cap	62	77,5	22,31 %
BONESUPPORT HOLDING AB	21.6.2017	Nasdaq Stockholm	Small cap	29	32	9,84 %
BALCO GROUP AB	6.10.2017	Nasdaq Stockholm	Small cap	56	65,5	15,67 %
HANDICARE GROUP AB	10.10.2017	Nasdaq Stockholm	mid cap	50	55	9,53 %
BIOARCTIC AB	12.10.2017	Nasdaq Stockholm	mid cap	24	29	18,92 %