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Board Gender Diversity and the Underpricing and Long-Run Performance of Initial Public Offerings

Evidence from Finland

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ABSTRACT:
Initial Public Offering (IPO) is a process where a private company wants to get publicly listed and sells its stocks to the public for the first time. IPOs have attracted many finance professionals, such as researchers and investors, during the last few decades. The attraction towards IPOs has been focusing on both, long- and short-run performances of IPOs. The purpose of this thesis was to study whether board gender diversity affects the Finnish IPO performance. Both short-term and long-term performances of the IPOs were examined. The first empirically motivated hypothesis stated that the greater female board presence reduces the underpricing of the IPO. The second hypothesis was about the long-term performance, claiming that IPOs with greater female board presence outperform the IPOs with lower female board presence in a one-year period. The data sample consisted of 45 IPOs that were divided into two groups, depending on whether the companies had women sitting on the board during the listing process or not. All IPOs in the sample occurred between 2013 and 2018 in the Nasdaq Helsinki. The short-run performance was examined with 1st-day market-adjusted returns. The long-term performance was studied with 12-month returns, using market- and risk-adjusted methods. In a market-adjusted framework, results were calculated using data with 1st-day returns included and excluded. The risk factors considered in the empirical part were size and beta. OMX Helsinki Cap was used as the market benchmark, and 3-month Euribor was used as a risk-free rate. Regarding the first hypothesis, the results show that even though the mean and median underpricing was somewhat smaller for IPOs with a diverse board, the connection found was only a weak tendency. There is no statistical significance in the difference. However, the empirical studies revealed that Finnish markets' underpricing had impaired quite largely during the last decades. While observing the long-term performance, the IPOs with gender-diverse boards earned higher and even statistically significant alphas compared to its counterpart. However, the difference between the groups is relatively small, meaning that there is no statistical significance. Interestingly, the Finnish IPOs from the sample performed quite much better than expected from the previous studies, meaning that the long-term performance was better than expected. Even though the hypotheses needed to be rejected due to the lack of statistical evidence, this thesis offers excellent value for upcoming studies and of the historical performance of Finnish IPOs.

KEYWORDS: Board gender diversity, board of directors, initial public offering, IPO, underpricing, underperformance

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1 Introduction

Initial Public Offering (IPO) is a process where a private company wants to get publicly listed and sells its stocks to the public for the first time. After the IPO procedure, the company's stock trades in a selected market, such as in Nasdaq. From the market, individual investors are able to either buy or sell the company's stock. After the listing, the company is subject to regulatory, legal, and disclosure requirements, leading to better corporate governance. A typical IPO company is a small and young business seeking capital to expand. Alternatively, IPOs can also be issued by larger privatively owned companies seeking to increase their capital and become publicly traded firms.

IPO performances have been one of the most attractive niches of finance among researchers during the last few decades. The studies have been focusing on both, long- and short-run performances of IPOs. Based on these studies, three individual anomalies have gained a foothold and recognition in finance. First, and probably the most known, is the IPO underpricing, which states that IPOs tend to be underpriced in their listing price (Ritter, 1991). Usually, these IPOs create abnormal returns during the first trading day. The second phenomenon, the long-run underperformance of IPOs, focuses on the reasons behind the relatively weak long-term (1year – 5 year) performance of IPOs (Ritter, 1991). The last anomaly is called the hot issue markets, which claims that during periods with high listing activities, the IPOs tend to be significantly underpriced (Ibbotson, 1975). These anomalies will be discussed in more detail later in this thesis.

Another widely researched topic during the last few decades that has a crucial role in this paper is gender representation on corporate boards of directors or board gender diversity. It refers to the proportion of men and women that sits on the company's board. In 2012, the EU started to take action against the unequal representation of men and women on the board. The solution to this is the gender quota suggesting every EU country to have at least 40% of women sit in listed companies' boards (European Commission, 2012). This suggestion has sparked a debate whether the board gender diversity is just a social dilemma or has any economic effect.

The impact of board gender diversity on a company's performance has been studied from many different perspectives. Most of the studies have focused on the risk and performance differentials of companies with different board diversity. This thesis will focus on the anomalies presented above, especially on the first two, using data from Finnish IPOs. The purpose of this thesis is to link these phenomena to the IPO companies' board gender diversity. In short, the idea is to study whether the IPO companies' board's gender structure affects its short- and long-term performance.

1.1 Purpose of the Study

This thesis aims to research the relation between Finnish IPOs performances between 2013 and 2018 and the IPO companies' board gender diversity. Classification into different groups regarding the board gender diversity is made by dividing all IPOs into two groups. The first one consists of IPO companies having at least one woman sitting on the board during the listing process, and the second group includes all other companies that have no women on the board. More precisely, the object is to examine both short- and long-term performance. For the short-term, the first-day return horizon is used. For more extended performance, a one-year period is used. The short-run performance is tested market-adjusted framework. The long-run performance is examined with both market- and risk-adjusted returns. In addition to the two groups, the third group consisting of all IPOs is investigated too.

This study makes a few contributions to the existing literature relating to IPO performances. First, this seems to be the first paper studying the relation between IPO performances and IPO companies' board gender diversity in Finnish markets. Besides, this study offers a bit controversial results of IPO underpricing and long-term IPO underperformance from Finnish markets. When it comes to the controversial results, the most remarkable findings are the shrunken underpricing and moderate long-term

performance. The differences and reasons behind them are addressed and described more precisely later in this thesis.

This thesis offers excellent value for both researchers and investors. Even though the small sample size creates its own problems regarding the results, the findings can be helpful and cause further research or new hypotheses. First, researchers worldwide might find the motivation to create a similar study using different time-period or different markets. Also, the empirical part can be extended in many ways if it is wanted. Second, financial professionals and small investors are provided with empirical results of the behavior of Finnish IPOs, offering them a piece of extraordinary evidence to rely on when making investment decisions.

1.2 Hypotheses of the Study

The previous literature shows that IPOs, on average, are significantly underpriced. In the U.S markets, Ritter (1991) and Purnanandam et al. (2004) report high first-day returns over few decades. Scandinavian and Finnish markets have been studied way less, yet there are similar findings regarding the underpricing. Keloharju (1993) observes Finnish IPOs and his results show that IPOs in Finland tend to increase in price during the first trading day. In addition, Westerholm's (2006) study offers similar results with clear underpricing in Scandinavian markets. In fact, Westerholm's study shows that the underpricing has even increased from the 80s to the 00s. Hahl et al. (2014) examine the performance of Finnish IPOs between 1994 and 2006, focusing on the comparison between value and growth IPOs. Their results offer great evidence on the underpricing of Finnish IPOs.

The underpricing of IPOs has been widely studied and recognized, yet the different IPO subcategories' affection has gained less attention. While certain IPO-groups behavior, such as low and high B/M-IPOs and low and high P/V-IPOs have been acknowledged, the relation between board gender structure and IPO performance is virtually unexplored.

However, few studies regarding the relation have been published, mostly from emerging markets. Handa and Singh (2015) studied the relation in Indian markets, finding no evidence that women on the board affect the possible underpricing. Kaur and Singh (2015) found a negative relation between gender diversity on the board and IPO underpricing. As the number of women on the board increases, the underpricing of IPO decreases. However, the results are not statistically significant. Reutzel and Belsito (2015) explore how IPO investors view female presence on boards of directors in the United States. Their study suggests that US IPO investors react negatively to the female presence on the board of directors. As many previous studies focus on Indian markets, it is important to address the cultural differences in India and Finland. The role of women in Finnish culture and business is a lot better compared to India. Therefore, it can be assumed that a woman's role is much more appreciated and vital in Finland. Consequently, a woman can be believed to be a stronger "quality signal" in Finland than in emerging markets. These factors motivate the first hypothesis, which in this study is:

H_1: The greater female board presence reduces the underpricing of the IPO.

As the previous literature regarding IPOs shows, the underpricing of IPOs is not the only unique characteristic. In addition to underpricing, the long-term underperformance of IPOs is a widely accepted phenomenon. Purnanandam et al. (2004) provide results with statistically significant long-term underperformance of U.S IPOs. Keloharju (1993), Westerholm (2006), and Hahl et al. (2014) offer similar results from Finnish markets. As with underpricing, the relation between board gender diversity and long-term IPO underperformance has not gained much attention. However, few papers have studied the relationship. Welbourne et al. (2007) show in their study from U.S markets that in the long-term, having women on the board results in higher earnings and greater shareholder wealth compared to a situation where there are no women on the board. McGuiness's (2018) results from Hong Kong's markets are in line with Welbourne et al., suggesting that women sitting on the board affects positively to IPO company's long-term performance. However, this is not studied in either European or Finnish markets.

Based on the clear evidence from other markets and lack of study in Finnish markets, the second testable hypothesis can be formed:

H_2: IPOs with greater female board presence outperform the IPOs with lower female board presence in a one-year period.

Altogether, the two hypotheses claim that there is a converse relationship between long-term and short-term performance. In almost all IPO-related papers, this negative connection has been recognized. These hypotheses are formed from a company's point of view, as from an investor's point of view, the higher underpricing is seen as a good thing due to its ability to create higher excess returns.

1.3 Structure of the study

This thesis consists of a theoretical and empirical part. In this first chapter, a quick introduction to the topic and objective of the study is given. The second chapter begins the empirical part, as it introduces the Initial Public Offering and its Finnish characteristics. The third chapter is all about the determinants of stock prices. Classic theories and valuation models, such as Modern Portfolio Theory, Capital Market Efficiency and Capital Asset Pricing Models, are reviewed. The fourth chapter continues building the theoretical part, describing the most known IPO anomalies and theories explaining them. The fifth chapter ends the theoretical part with a cross-section to the theoretical part of the board of directors and gender diversity's effect on the business's performance. Different theories around gender diversity are discussed too.

The sixth chapter begins the empirical part of this thesis. First, data used in this study is reviewed, and the IPO categorization is explained. Following that, this paper's methodology is described, explaining both market- and risk-adjusted methods. To conclude the sixth chapter, the limitations of the study are listed. The seventh chapter is about the empirical results of the study. The chapter starts with descriptive statistics. After that,

both short- and long-run performances of the sample IPOs are reviewed, and the results are explained open with possible statistical effects. The last chapter, conclusions, concludes the study as the name implies. The empirical results are stapled together, the results' contributions to the existing literature are explained, and further research possibilities based on this study are motivated.

2 Initial Public Offerings

The purpose of this chapter is to describe the fundamentals of Initial Public Offerings and explain how they work. First, the basics about Initial Public Offerings are explained, including reasons why firms go public. Secondly, the fundamentals of Finnish companies going public will be walked through since Initial Public Offerings have many country-specific details that affect both motives and consequences of Initial Public Offerings. Initial Public Offering is often abbreviated to IPO, and the latter will be used during this thesis in order to simplify the sentences.

2.1 The Fundamentals of Initial Public Offerings

Going public is a significant entity around most companies at some point in their life. The going public might help expand the business's size and take it to the next level. On the other hand, it may affect the company's business negatively and cause harm. The process of going public is considered to be a natural part of a company's growth. However, it is not always necessary, and business can do enormously well without being a public company. In the Initial Public Offering, the company going public offers its stocks for investors to buy. Going public, for example, helps the company to raise capital and makes valuation more transparent. For investors, the IPOs are an excellent opportunity to invest among the firsts and benefit from the company's stock's possible undervalue that has gone public. In addition to the investor and the issuing company, the underwriter is the third key party of the IPO-process. IPO underwriters are specialists, usually investment banks & bankers, whose job is to work closely with the issuing company to determine the Initial Offering price and market it. (Bodie et al., 2006)

To go a bit deeper into the IPOs, the motives behind going public need to be considered. The motives why companies go public differ because of segment and location, but in most cases, firms go public in order to raise equity capital. A company seeking growth might need capital to expand its businesses, increase R&D, or invest in marketing. Non-

financial reasons, such as increased publicity, usually play a minimal role in firms' "going public"-strategies (Ritter & Welch, 2002).

2.2 The Listing Process

The firms' IPO listing processes have their own characteristics based on the market where they are going public. This chapter will focus on Nordic countries' listing process, as they all share the same characteristics. The listing process is generally started at least six months before the actual listing happens, and it is usually a very laborious period. The underwriter, also called book runner or book manager, is often selected at this stage at the latest. In more significant listings, it is typical that the issuing company selects few underwriters, which forms an entity called a syndicate. The average amount of underwriters per IPO has been growing during the last decades. Before the 1990s, the IPOs usually had just one underwriter, but from 2010 to 2018, the average has risen to 6,5 underwriters per listing process (Ritter, 2019). Each IPO has one leading underwriter, which may suggest possible co-underwriter & co-managers based on different motives.

When a company considers applying to listen in Helsinki, a meeting with Nasdaq Helsinki needs to be arranged to discuss the listing details. The listing's final application needs to be done at least a week before the Listing Committee meeting. Listing of the shares is decided by the same committee reporting to Nasdaq Helsinki's Board of Directors. To pass the application, the listing company needs to present itself and its business to the committee. In the second meeting, the listing company offers a written report to the committee, which includes an agreement on exchanging the shares. In addition to that, the latest balance sheet and income statement need to be delivered. (OMX Nordic Exchange, 2008b)

Most IPOs include a lock-up agreement, which is conducted for several reasons. The lock-up agreement prevents the pre-IPO shareholders from selling their shares during the first 180/365 days after listing, which is called the lock-up period. The lock-up

agreement's main motive is to ensure that no new shares are coming to the early aftermarket. Secondly, it gives the underwriter time to deliver the securities. Third, the lock-up agreement makes sure that employees are committed to the company for the upcoming six or twelve months. (PriceWaterhouseCoopers, 2003)

On the other hand, such a deal attempts to stabilize a freshly issued stock's early price development. With a lock-up deal, the investors can be sure that no new shares will be delivered to the early aftermarket (PriceWaterhouseCoopers 2003). The next big decision for the company is choosing the contract type. Usually, firms end up doing either a firm commitment contract or the best efforts contract. In a firm commitment underwriting, the underwriter, or a syndicate, guarantees to buy all shares offered to the sale and then markets and tries to resale them to the investors. The underwriter bears the risk of the possible unsold shares, so the deal's commission is higher. In other words, it is more expensive but riskless for the issuing firm. In a best efforts contract, the underwriter does their best in marketing the shares so that all of them get sold. The firm commitment contract's main difference is that the issuing company keeps the risk and suffers financially if some shares remain unsold. The underwriter is not obligated to purchase the shares. Logically, this agreement type is cheaper but riskier for the issuing company.

2.3 IPO Valuation

Valuation is one of the main challenges in the listing process. It is a very dynamic process, and the valuation gets more accurate regularly during the listing process. The valuation process can be divided into three different phases. The first phase is called the preparation phase. The leading underwriter produces a preliminary valuation range based on the discussions between them and the issuing company. During the second phase, the premarketing phase, valuation is amplified based on possible investors' feedback. The premarketing discussions are held between underwriters, analysts, and the issuing company. The third and last phase is the actual equity issuance. The subscription price is set, and it is either exact or a price range. The final price is determined based on the demand

on the so-called book-building process if the price range-method is used instead of an exact price. (Pörssisäätiö, 2006)

The most used methods in valuations while working with IPOs in Finland are described below. They can be categorized into three different categories. The first one is a benchmark firm analysis, where the valuation is done by comparing the issuing company's financial figures to benchmark companies' figures that trade publicly. The most common ratios used in this kind of valuation are EV/Revenue, EV/EBITDA, EV/EBIT, and P/E. The second category produces the valuations based on completed Initial Public Offerings. These already listed companies' multiples are analyzed and amplified if necessary, based on their share price development. The most used ratios in valuation in this category are EV/Revenue, EV/EBIT, and EV/EBITDA. The last category is maybe the most common, so-called Discounted Cash Flow model, or DCF. It estimates the value of a company based on its future cash flows. In these kinds of valuations, the weighted average cost of capital is usually used as a discount rate, as it takes into consideration the expected rate of return. The most important method for the issuing company depends on many factors, such as size, industry, and market. (Pörssisäätiö, 2016)

According to Aggrawal et al. (2009), the valuation of IPOs plays a significant role in finance, as IPO provides public capital market players their first chance to value a set of corporate assets. However, the valuation of the IPOs seems to be very difficult, as the first-day close price usually differs a lot from the listing price. Reasons and motives behind the valuation need to be revised to understand the pricing's difficulty. While numerous papers have studied whether accounting information is relevant for publicly traded stocks, there have been very few studies investigating the relationship between that information and IPO firms. Based on Kim and Ritter's (1999) studies, using historical benchmark accounting numbers results in very little precision in the valuations when they were used without further adjustments for profitability and growth. However, specific ratios, such as P/E, resulted in much more accurate valuations than historical accounting information methods. Kim and Ritter (1999) underlined in their study that

investment bankers and underwriters have a significant role in the pricing of Initial Public Offerings.

IPO underpricing is a phenomenon that has been widely studied in different markets worldwide. Underpricing of IPO means that the listing price has been set below its real value in the stock market. When a new stock closes its first day of trading above the listing price, it is considered to have been underpriced. The classic IPO literature offers a few leading theories on the determinants of underpricing. First, Allen and Faulhaber (1989) state that high-quality firms want to underprice their stocks to signal their high quality to the market. Higher underpricing allows them to raise more capital later with more favorable rates. Second, Ritter and Welsch (2002) theorize that possible underpricing of IPOs is caused by information asymmetry between parties involved in the IPO valuation. Issues that are characterized by higher uncertainty are often priced cheaper in order to compensate for the risk. The IPO underpricing and reasons around it will be covered more widely during the “IPO Anomalies”-chapter.

The difficulties of IPO valuations were further studied by Purnanandam et al. (2004), who found out that despite the widely known IPO underpricing, IPOs in their sample were actually overvalued on average. Purnanandam et al. (2004) claim that behavioral theories may explain the overvaluation. According to their research, the median IPO from their sample is overvalued by 50% relative to its benchmark firms. The most overvalued IPOs based on their P/E-ratios earn from 5% to 7% higher first-day returns than low P/E-IPOs. Over a five-year period, overvalued IPOs underperform the undervalued IPOs by 20% to 50% depending on the benchmark industry. Even though the traditional theories of IPO pricing states that IPOs are undervalued, more recent studies have shown evidence of the possible overvaluation. Later in this thesis, it will be studied whether the traditional theories still stand on the Finnish IPOs.

3 Determinants of stock prices

To completely understand the price behavior of a stock and price movements of IPO stocks, it is crucial to be familiar with underlying generally accepted theories. This chapter aims to cover the basic notions of modern financial theory and explain market efficiency studies. Initially, modern portfolio theory (MPT) will be covered. It is a theory on how one can construct a portfolio with minimized risk for a given level of expected return. Also, capital market efficiency will be covered, which leads to efficient market hypothesis and studies covering it. Lastly, this chapter introduces the most general stock valuation models to determine a stock's fair value.

3.1 Modern Portfolio Theory

Stock prices and risk go hand in hand, and there are no exceptions. The investment decision is always a trade-off between risk and return. Risk is defined as a change that an investment's actual return will differ from an expected return. A rational investor invests only in situations where the expected return is sufficient compared to the risk in the situation. The risk can be divided into two parts, which are systematic risk and unsystematic risk. Systematic risk, also known as market risk, undiversifiable risk, or volatility, is the risk inherent to the whole market or segment. It usually reflects the impact of more significant entities, such as economic or geopolitical factors. It is very much unpredictable and challenging to avoid. Unsystematic risk, known as diversifiable or specific risk, is, however, avoidable by diversification. Diversification means that a portfolio is formed using multiple different investments, including different assets and derivatives. (Bodie et al., 2014)

The modern era of diversification was kicked off by Markowitz (1952), who stated that risk and return profiles of single assets should not be viewed as individuals but in their portfolio context. This means that a portfolio can be considered efficient if its total risk is minimal compared to a given return level or its returns are maximally high compared

to a given level of risk (Pfaff, 2016). Markowitz's modern portfolio theory's key finding is that securities could not be selected just by their characteristics to construct a perfect portfolio. Investors need to consider how each asset co-moved with all other assets. Based on these facts, investors can construct a portfolio with the same expected return and less risk than a portfolio constructed by ignoring the interactions between securities (Elton & Gruber, 1997). In practice, this means that the unsystematic risk measured with a standard deviation of expected returns reduces every time an eligible asset is added to the portfolio. According to Markowitz's (1952) findings, the rational investor always chooses the portfolio with the highest ratio between excepted returns divided by the total risk. This particular portfolio lies on the efficient frontier.

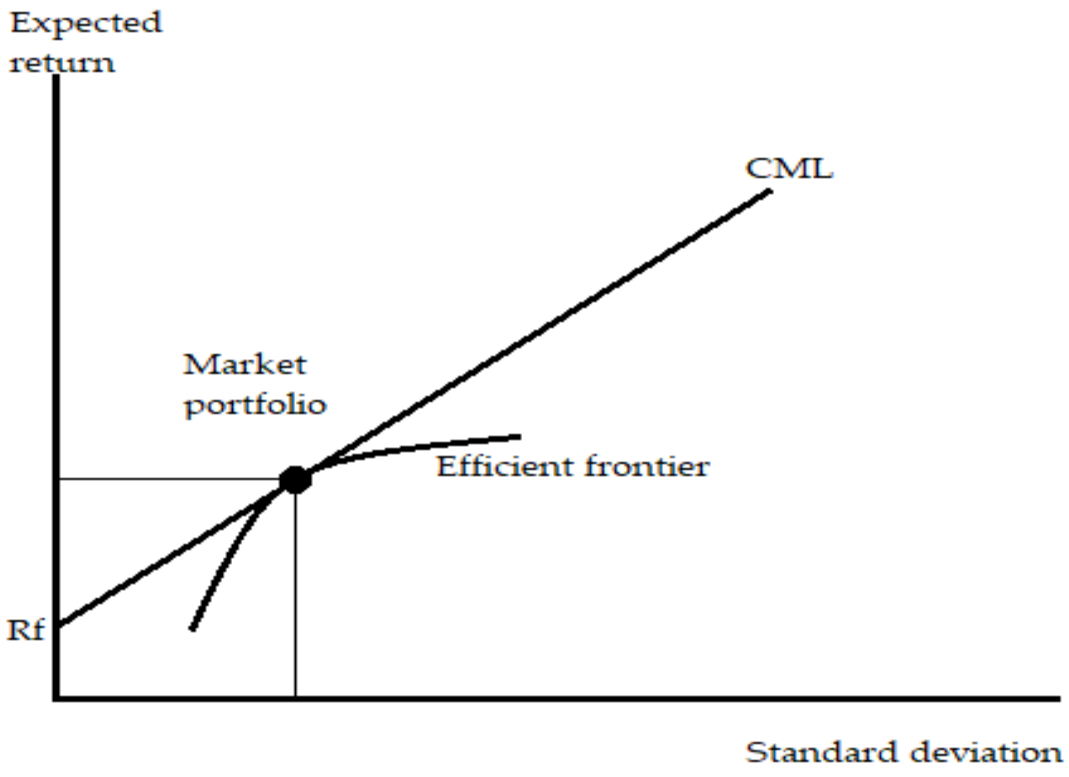

Figure 1. Capital market line and the efficient frontier.

3.2 Capital Market Efficiency

To describe efficient markets, it is helpful first to contrast them with perfect capital markets. The following four suppositions are necessary for perfect capital markets to work (Copeland et al. 1983). These conditions make markets operationally and allocative efficient.

- Markets are visible and balanced, which means there are no transaction costs or taxes, and all assets are perfectly marketable and available for everyone
- Competition is perfect in the product and securities market
- All information is available for everyone; it is costless and simultaneously available for all individuals
- All individuals are entirely rational

Not every condition needs to be filled for markets to be efficient. The only requirement for efficient markets is that everyone can react immediately to all information available. In practice, all markets are seen to be incomplete, at least to some extent. The more markets fill previously mentioned conditions, the more efficient they become.

3.2.1 The Efficient Market Hypothesis (EMH)

The hypothesis of market efficiency is created by Eugene Fama (1970). He states that an efficient market is defined as a market where large numbers of rational, profit maximizers are actively competing, each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants. In an efficient market, competition among the many intelligent participants leads to a situation where at any point in time, actual prices of individual securities already reflect the effects of information based both on events that have already occurred and on events which, as of now, the market expects to take place in the future.

Fama (1970) claims that stocks should always trade at their correct value, reflecting on all information available. Due to this statement that stocks should always trade reflecting on all information available, it would be impossible to "beat the market" as the prices are constantly reacting with emphasis to the new information. According to Fama's (1970) market efficiency theory, overvalued or undervalued securities are impossible to find. The market efficiency hypothesis by Fama (1970) is a consequence of earlier studies, which include financial models such as efficient markets theory and random walk hypothesis, which states that stock market price changes are random. The efficient market theory became popular in the 1960s when computers started calculating and comparing prices of hundreds of stocks more effortlessly. The efficient market theory is strongly linked with the random walk hypothesis because market prices are seen to reflect all available information, so the prices change only in response to news (Fama, 1970).

The market efficiency hypothesis and its existence have been a controversial topic over the years, as some studies oppose its idea. Some investors are said to be demonstrably less rational, which makes the pricing irrelative as it does not fully reflect the recent news and information. Because of irrationally, the efficiency of the market decreases (Malkiel 2003). The non-efficient market enables discovering repetitive patterns from the stock price movements, making abnormal stock returns possible (Hamid et al., 2017). The efficient market hypothesis has been said to be the most misunderstood theory of finance. Even though stocks' prices may increase or decrease, they still eventually return to their correct value due to market efficiency. Efficient markets should be seen as a self-correcting mechanism. There might be seen some ineffectiveness in the market, but the effective markets eventually repair the prices after investors have exploited them. (Puttonen & Knüpfer, 2009)

3.2.2 Three levels of efficient markets

The efficient market theory's efficiency is usually divided into three different levels, each having different implications for how markets work (Fama & Malkiel 1970). Levy and Sarnat (1994) define Fama's and Malkiel's levels (1970) as follows:

1. *Weak form efficiency.* The markets are efficient in a weak form, which means excess returns are not possible in the long-term. Future prices cannot be predicted by analyzing previous prices. The price movements are not connected to previous movements, making abnormal returns impossible for investors to earn.

2. *Semi-strong form efficiency*. The markets are efficient in a semi-strong form when securities' prices reflect immediately and without exceptions to all recently published information. Investors cannot get any returns above average with all published information available because every investor is buying and selling stocks with the same data.

3. *Strong form efficiency*. The markets are efficient in a strong form when all public and unpublished relevant information is reflected in the securities' prices. Abnormal returns are impossible to earn, even with insider information.

The three previously explained forms are all connected. To fill the requirements for semi-strong form, the market needs to be initially efficient in weak form. Respectively, the market needs to be efficient in a semi-strong form before being efficient in a strong form. Markets would not reflect all relevant public and unpublished information if one of the form's requirements were not filled. It is argued that strong form efficiency never occurs in any stock markets. (Kallunki, 1995)

3.3 Valuation Models

Valuation is the analytical process of determining the current or expected worth of a security. Valuation models are tools to be used when doing the valuation. Different models or methods produced a different outcome, depending on the variables involved in the analytical process. The purpose of the valuation is to find the fundamental value for security. This value can also be called a fair or intrinsic value. In simple terms, the intrinsic value of a company's stock is a combination of its earnings, dividends, and expected growth rate. Even though these three variables are easy to value mathematically, the process of choosing a correct method that satisfactorily uses all these concepts to price a stock's value is a difficult task. First, in this subchapter, the different pricing models will be introduced and briefly explained. Last, the most important and widely used fundamental variables are discussed with their pros and cons.

3.3.1 Capital Asset Pricing Model

As the fundamental approach to efficient markets has now been implemented, it is essential to introduce the Capital Asset Pricing –model (CAPM), which Fama et al. (1970) introduced to calculate securities' expected returns. Traditional asset-pricing models were firstly discovered in the early 1960s to make predictions about asset returns. The CAPM is the most known and used asset-pricing model in the literature, and it was first introduced in the scientific publications by Sharpe (1964), Lintner (1965), and Mossin (1966). The CAPM aims to determine an expected rate of return for security theoretically. With the expected rate of return, the model defines an expected price for the security. The riskier the asset, the lower the present value of its future cash flows. The theoretical form of the CAPM can be expressed as follows:

(1) $$E(r_i) = R_f + \beta_i \ (E(r_m) - R_f)$$

Where:

$E(r_i)$ = expected return for the capital asset (i)

R_f = risk-free rate of interest

β_i = beta

$E(r_m)$ = expected return of the market

The basic idea of the CAPM formula is that the expected return of a security or a portfolio is a value of risk-free security plus a risk premium. ($E(r_m)$-R_f equals to the risk premium). According to CAPM, investors need compensation for two variables. The first one is the time value of money. Time value of money means that money available at present is worth more than the same amount in the future. Investors favor having the money now than getting it later because of the money's potential growth. The second of the variables is risk. The risk-part defines the amount of compensation the investor needs for taking that additional risk.

3.3.2 Arbitrage Pricing Theory

Ross introduced the first respectable alternative for CAPM in 1976. It is called *Arbitrage Pricing Theory* (APT). Unlike CAPM, APT does not rely on just one factor. Instead, it takes into consideration multiple factors, typically macroeconomic. APT's basic idea is that an asset's returns can be predicted using the linear relationship between the asset's expected return and several macroeconomic variables that capture systematic risk. APT and CAPM differ a lot when it comes to efficient markets. Unlike CAPM, APT assumes that markets sometimes misprice assets before the market eventually corrects asset prices to their fair value. The main advantage of Ross's APT is that its empirical testability does not hinge upon knowledge of the market's portfolio (Huberman, 1982).

APT's formula can be expressed as follows:

(2) $$E(r_i) = \beta_{1i}E(r_{factor1}) + \beta_{2i}E(r_{factor2}) + \cdots \beta_{ni}E(r_{factor\,n})$$

Where:

$E(r_i)$ = the expected return for security i

$E(r_{factor\,n})$ = return on factor n

βn = the factor loading of security i on factor n

3.3.3 Dividend Discount Model

Maybe the most simplified valuation method is the *dividend discount model* (DDM), also known as the *Gordon Growth Model,* brought to daylight in 1962 by Myron J. Gordon. Since then, this valuation model has been widely accepted and used for determining the value of the *discounted cash flow* (DCF) method, which will be discussed later in this chapter (Hitchner, 2011).

The DDM formula is usually expressed as follows:

(3) $$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^1}$$

Where:

P_0 = stock price at a time 0

D_t = dividend at time t

$r =$ required rate of return

While the DDM method is easy to use and available in many kinds of financial valuation ns, its simplicity often leads to misuses or mistakes. For example, the dividend growth rate in DDM keeps constant, requiring the user to understand its affections (Hitchner, 2011).

3.3.4 Discounted Free Cash Flow Model

Given the demerits of DDM, it is often more reasonable to use the discounted free cash flow model (DCF). Instead of dividends used in DDM, DCF discounts the free cash flows of the company. In DCF, any operating asset's value is equal to its present value of the expected economic benefit stream (Hitchner, 2011). In DCF, the present value of expected future cash flows is arrived at by using a discount rate to calculate the discounted cash flow (DCF). Its benefits to DDM are the immunity to dividend policy and the added benefit that the accounting standards do not affect the amount of *free cash flow*, FCF. The DCF's most significant limitation is the inaccuracy in the estimations on future cash flows that it relies on.

The discounted cash flow is often calculated assuming the firm is all-equity financed. The formula is expressed as follows:

(4) $$P_0 = \sum_{t=1}^{\infty} \frac{FCF_t}{(1+r)^1}$$

Where:

P_0 = stock price at a time 0

FCF_t = free cash flow at time t

$r =$ required rate of return

3.3.5 Fundamental Variables

Investors and financial analysts evaluate a company's fundamentals to compare its economic performance relative to its industry peers or to itself over time. Fundamental ratios, also called fundamental variables, are the most vital tools for that kind of evaluation. The most used variables in IPO valuation were briefly mentioned in the second chapter of this thesis. Following this introduction to the fundamental variables, three very generally used ratios are explained to clarify a company's stock valuation.

The most used and the most known fundamental variable is called *price to earnings* (P/E). It is a very straightforward ratio comparing a firm's stock price to its yearly earnings. It describes how many years it takes for earnings to reach a company's market value (Kallunki et al., 2002). The basic rule is that P/E-ratios should be used for comparisons only within a homogenous group of stocks as possible. However, like all indicators, P/E has its own flaws. Growth expectations between firms are not taken into consideration. As stock price reflects all upcoming expectations, growth companies' valuation levels are higher, even though the current year's earnings are expected to be the same. Due to this, growth companies' P/E-ratios are inherently higher than lower growth companies (Kallunki et al., 2002).

The most common ratio concerning a company's balance sheet substance is the share price ratio to the balance sheet value of equity per share, the *price to book* (P/B) ratio (Kallunki et al., 2002). The P/B implicates the value that market participants attach to a company's equity relative to its equity book value. The difference between a book value and stock value comes from possible growth potential. Previous studies show that P/B has a weak power to predict market returns (Lewellen, 2002).

Finally, *size* (market value of the firm) can be counted as a fundamental variable, although it is not ratio as the previously mentioned variables are. Size as a variable became a popular indicator when Banz (1981) found out that stocks of small caps had outperformed large caps over several decades in the NYSE. Hence, the market anomaly called "the small firm effect" was introduced. Since then, more recent studies have shown the size effect to be a proxy for risk. On the other hand, with IPOs, the small firm effect has been studied to be valid only for initial returns, while it is invalid for long-run returns.

4 IPO Anomalies and the theories explaining them

Anomalies associated with IPOs have been studied during the last three decades. The two most known anomalies that characterize IPOs are first-day underpricing and long-term underperformance. Even though both subjects have been studied widely, it is fair to say that they remain unsolved to some extent (Guo et al., 2006). This chapter will introduce both the first-day underpricing and the long-term underperformance, including motives and studies behind them. As suggested, the underpricing in this thesis will be calculated as a change between the offer price and the first-day closing price.

4.1 IPO Underpricing

First-day IPO Underpricing happens when, during the first-day trading, the IPO stock closes higher than the listing price was set. The underpricing is calculated as a percentage of the price at which the assets were sold to the buyers at the time of the IPO compared to the price the shares subsequently closed on the first day on the market after the IPO launch. In well-developed capital markets, the underpricing seems to disappear reasonably quickly. In most of the research, the first-day closing price is used to calculate underpricing. In less developed markets, the underpricing may occur longer due to situations where there are restrictions on the price fluctuation.

In the 1980s, the average first-day returns on IPOs in U.S Markets was 7%. During the following decade, the average first-day returns doubled to almost 15%. The most substantial evidence for the IPO underpricing has been documented during the IT-bubble when first-day average returns climbed to 65% (Loughran & Ritter, 2004). One of the first research associated with IPO underpricing in Finland is created by Keloharju (1993). The research data consists of IPOs in Finland between 1984 and 1989, including 80 offerings from a possible 91. 11 IPOs are excluded from the sample because of missing and incorrect information. Keloharju's (1993) results from his Finnish IPOs sample show that the average initial excess return is 8.7%, which means that the underpricing is confirmed.

The results do not differ from other IPO studies made at that time, even though Keloharju's sample period and market were quite different in terms of attributes and size. Keloharju's results suggest that during the sample time, the smallest IPOs were the most underpriced. (Keloharju, 1993)

The IPO underpricing has changed over time. Even though it still exists, the level of underpricing has changed a lot during the last decades. The reasons why IPOs underprice vary depending upon the environment. In some cases, the increased (or decreased) underpricing is correlated to the risk. It is called the changing composition hypothesis (Loughran & Ritter, 2004). The underpricing of IPOs issued in the 1980s U.S markets can be partly explained by the winner's curse problem and the dynamic information acquisition. During the IT-bubble, analyst coverages, side payments to CEOs, and venture capitalists might have increased the underpricing of IPOs (Loughran & Ritter, 2004).

The relation between IPO underpricing and board gender diversity has not been widely studied. However, few studies connecting previously mentioned topics have been done. Kaur and Singh (2015) studied the relation in Indian markets. The purpose of their study was to explore the benefits of having women on the board at the time of IPO launch, specifically in terms of reduction in first-day trading returns. Their result indicates no impact of female directors' presence on IPO underpricing, thereby meaning that female directors on the board at the time of IPO fail to act as 'quality signals' to reduce underpricing in India. However, the equality and the social status of women in India and Finland differ a lot. It needs to be taken into consideration while reviewing this sort of previous literature. Reutzel and Belsito (2014) explored how initial public offering (IPO) investors view female presence on boards of directors in the USA. Their study's findings suggest that US IPO investors react negatively to the female presence on the board of directors. However, this negative effect has weakened the post-Sarbanes-Oxley Act. Reutzel & Belsito claim that their study represents one of the first studies to consider the influence of director gender on IPO performance, which practically means that the entity studied in this thesis is relatively recent and not widely explored.

Winner's curse hypothesis is a theory designed by Rock (1986), and it helps to analyze the IPO underpricing. The winner's curse is a tendency for the winning bid in an auction to overrun the fair value of the asset. The gap between fair and paid value can usually be explained by incomplete information, bidders, and emotions. According to Rock's studies, there are two kinds of market participants: informed and uninformed investors. The first group has better information about the listing firm's cash flows and financial state, so they are more aware of the profitable and unprofitable issues. Their knowledge of the issuing company's fair value is also better than the underwriters and issuing firms. Consequently, investors with better information crowd out the others when the issuing company's price is set below the fair value. On the other hand, they know to withdraw when overpriced assets are offered. The overpriced IPO shares are unsubscribed because informed investors avoid buying them. Uninformed investors consequently lose money, although they "won" by managing to get the shares. Because uninformed investors are wanted in the market, the IPO issuers have to give them compensation against adverse allocation bias through underpricing. Practically, IPOs are underpriced on purpose, according to the winner's curse hypothesis (Rock, 1986). Keloharju (1993) found similar evidence of the existence of the winner's curse in Finnish markets.

Another famous theory explaining IPO underpricing is called the *informational cascades hypothesis* (Welch, 1992). It emphasizes the information asymmetry between investors. An information cascade occurs when an investor decides to invest in an IPO based on other people's information while ignoring his knowledge of the situation to the contrary. More specifically, the information cascades hypothesis states that the issuers underprice IPO to induce a few influential investors to buy initially. Thus, less rational investors may mimic influential investors, which leads to higher demand and a higher closing price on the first trading day. If influential investors find the price to be too high, they avoid subscribing to it. This may lead to a mass exodus from the IPO. To prevent this, the issuer may decrease the listing price. Westerholm (2006) considers the information asymmetry

in his study, offering a relatively different result than previous studies. His results show that clustering is weakly and positively related to high initial returns.

Another theory on IPO underpricing studied by Welsch (1989) and Allen and Faulhaber (1989) is the *signalling hypothesis.* A theory suggests that a company may want to underprice its IPO purposely to indicate a positive future prospect. Underpricing is stated to be a tool used by the issuing company to signal their high quality. Based on the signalling hypothesis, one of the motives for underpricing is the increasing possibility of SEOs, leading to higher returns. In other words, this theory believes that a listing company creates a multiple issue strategy in the form of a lower subscription price. However, Michaely and Shaw (1994) found little evidence to support the signalling hypothesis theory. Their studies suggest that companies that are underpriced in their IPOs create weaker future earnings and dividends. On the other hand, in their studies, Álvarez and González (2005) found out similar results to Welsch (1989), which supported a positive relationship between long-run performance with underpricing and the gross proceeds obtained in SEOs.

One of the most studied symmetric information-based theories on IPO underpricing is the *lawsuit avoidance hypothesis* by Tinic (1988). According to the lawsuit avoidance hypothesis, IPO companies want to underprice their shares on purpose to decrease the number of possible lawsuits by investors. Thereby, the issuing companies use underpricing as insurance against legal liability. The lawsuit avoidance hypothesis was empirically studied in Finland by Keloharju (1993). However, he did not find any significant support for the hypothesis. According to Keloharju (1993), different characteristics between Finnish and U.S. laws cause opposite findings. In Finland, IPO attendants have much less incentive than those in the U.S. to take legal action if the prospectus contains false or inadequate information about the issuing company. Consistent with Tinic (1988), Lin et al. (2012) found evidence to support the lawsuit avoidance hypothesis in an international environment. Their results show a significant positive relationship between underpricing and all litigation risk proxies. However, their studies resulted in a significant negative

relationship between underpricing and law enforcement's quality, which suggests that better enforcement of the securities laws reduces the level of underpricing.

As seen above, behavioral finance and psychology strongly influence theories explaining IPO underpricing. A company with a female majority on the board may behave differently than a more traditional company, which is having a male-oriented board. In practice, this is the topic that will be empirically examined in this thesis.

Author(s)	Market	Period	IPOs	Initial
Ritter (1991)	The U.S.	1975-1984	1526	14,1 %*
Keloharju (1993)	Finland	1984-1989	80	8,7 %*
Rajan et al. (1997)	The U.S.	1975-1987	2725	10,0 %
Purnanandam et al. (2004)	The U.S.	1980-1997	2288	11,4 %*
Álvarez et al. (2005)	Spain	1987-1997	52	13,0 %*
Westerholm (2006)	Denmark	1991-2002	51	8,5 %
	Finland		55	21,9 %
	Norway		102	22,2 %
	Sweden		82	15,9 %
Hahl et al. (2014)	Finland	1994-2006	67	15,62%*

Table 1. Earlier studies of initial returns on IPOs. Returns denoted with* are market adjusted.

4.2 Long-term IPO underperformance

The second crucial IPO anomaly is *called long-term IPO underperformance.* This anomaly was established by Ritter (1991). During that time, two significant anomalies dominated the scene around IPOs: IPO underpricing and the "hot issue" market phenomenon. Instead of focusing on them, Ritter (1991) studied the long-term performance of IPOs. Using a sample of 1526 U.S. IPOs that went public between 1975 and 1984, he found out that firms significantly underperformed a set of comparable companies matched by size and industry after three years of the listing. The average return on the three-year holding period was -17%. Younger firms and firms listing on high volume years performed even worse than the average. Remarkable in Ritter's (1991) studies was his methodology. Instead of using market indexes, he created his own indexes consisting of matching firms

by size and industry. Another significant difference to previous literature was that Ritter (1991) excluded the initial first-day returns from his data. In brief, his main finding was the anomaly itself: In the long-term, IPOs tend to be overpriced.

Keloharju (1993) had many similarities to Ritter in his methodology while studying Finnish IPOs. His results corresponded strongly to Ritter's results and so supported the Long-term IPO underperformance anomaly in Finland. Nordic IPO markets were further studied by Westerholm (2006), whose research sample included IPOs between 1992 and 2002 from Denmark, Finland, Norway, and Sweden. Westerholm's (2006) research showed changes in Finnish IPOs. The long-term IPO underperformance had deepened since Keloharju's (1993) study was conducted from a sample ending in 1989. In fact, during a five-year period, the market index generated twice as much value as the Finnish IPOs. In Sweden, the IPOs performed poorly too. However, in Denmark and Norway, the newly issued IPOs outperformed the market in a long-term period. The author argued that the Norwegian economy, which relies on natural resources, did not suffer that poorly from the IT-bubble end. Besides, the low number of ICT-IPOs increased long-run performance during the sample period. Westerholm (2006) stated that weak long-run performance occurred because of momentary overvaluation in the hype-industries, supporting Ritter's (1991) U.S. market results.

Author(s)	Market	Period	IPOs	Long-Run
Ritter (1991)	The U.S.	1975-1984	1526	0.83*
Keloharju (1993)	Finland	1984-1989	80	0.73*
Purnanandam et al. (2004)	The U.S.	1980-1997	2288	-19,4%
Álvarez et al. (2005)	Spain	1987-1997	52	0.78*
Westerholm (2006)	Denmark	1991-2002	51	1.6%
	Finland		55	-49,0%
	Norway		102	17,8%
	Sweden		82	-17,4%
Hahl et al. (2014)	Finland	1994-2006	67	0,78*

Table 2. Earlier studies on long-run performance on IPOs. Results denoted with* are calculated wealth relatives (WR).

As seen from the table, IPOs tend to underperform the benchmarks in the long-term. In addition to the apparent underperformance, most of these abnormalities seem to be statistically significant. Given the relatively small sample size in the European studies, the great magnitude of the phenomena confirms this fact and rejects the possibility of them being coincidental. However, some exceptions can also be found, as shown in the table, but they have often been explained by ample evidence.

The first recognizable theory explaining long-term IPO performance is made by Miller (1997), and it is called the *divergence of opinion hypothesis*. As the name of the hypothesis states, the divergence of opinion may lead to the asset's overvaluation. Investors may have different opinions on a firm's financial performance and potential. As the most optimistic investors buy the issues, the price increases in the early aftermarket. The spread between opinions converges because optimistic and pessimistic opinions come closer to each other as time goes by. Hence, investors' disagreement on the valuation becomes less volatile, which causes the market price to fall. Purnanandam et al. (2004) confirm this hypothesis in their study on the U.S market.

The overconfidence hypothesis by Daniel et al. (1998) asserts that investors with inside information are overconfident and tend to underreact to public news and reports. It causes initial overvaluation, which will even out over time. Based on this theory, the IPOs are overvalued before listing and even more overvalued during the first day of the aftermarket life. The overvaluation weakens over time, which makes the IPO underperform in the long-term. This hypothesis was also supported by Purnanandam et al. (2004). Their finding indicated that an IPO investor's overconfident state of mind could continue for months, but not for years.

Fads hypothesis is a very current topic; however, the hypothesis was created as early as the 90s by Shiller (1990). Fads hypothesis argues that the IPOs abnormal initial returns do not occur because of the underpricing. However, it is overvalued due to the over-optimistic forecasts (fads) during the first day after listing. So, the fads hypothesis claims

that IPOs are not underpriced, but investors tend to overvalue them during the first days of aftermarket trading. Because of the eventual mean reversion, the long-term IPO performance and initial returns due to underpricing have negative correlation. Westerholm's (2006) results supported the fads hypothesis, as fads were found in the Finnish IPO market at the millennium turn. Evidence supporting the fads hypothesis was also found in the U.S. and U.K. markets provided by Ritter (1991) and Lewis (1993).

In addition to all theories explaining the long-term underperformance of IPOs, few studies argue that the long-run underperformance of IPOs does not exist. The most significant research against the long-term underpricing of IPOs is produced by Fama (1998), who stated that reasonable changes in technique make most anomalies disappear. With Fama's 3-factor model, IPOs can outperform their benchmarks, according to studies by Brav et al. (2000). The choice of the benchmark significantly affects the possible abnormal initial returns. However, it must be stated that even though beta and size can be seen as a synonym for risk, B/M is not, especially considering IPOs.

4.3 Hot Issue Markets

Last, it is essential to discuss and introduce the hot issue markets, a period with extraordinarily high listing activity. It became public knowledge after Ibbotson and Jaffe (1975) introduced it in their paper. The hot issue markets are considered as the third primary anomaly regarding the IPOs. During these periods with high listing activity, the IPO underpricing has been documented to be even higher than during regular periods. In their study, Ibbotson and Jaffe (1975) claim that investors can easily exploit this anomaly and earn high initial returns by recognizing the high listing activity periods. This causes market inefficiency.

Evidence for the hot issue markets has been found consistently after its discovery. Ritter (1984) discovered a period with high listing activity a decade after Ibbotson (1975). The main finding in his paper was the positive relationship between initial returns and risk.

Ibbotson et al. (1994) took this matter further, discovering that since riskier IPOs are more underpriced to a greater extent than their less risky equivalents, the changes in risk might explain the fluctuation in average initial returns. This means that when there is a period with riskier firms listing public, they are expected to gain higher initial returns. As with other IPO-related anomalies, the hot issue markets are typical in Scandinavia too. Keloharju (1993) recorded an extraordinarily high listing activity between 1988-1989 in Finnish markets. Slightly over dozen years later, Westerholm (2006) detected that Nordic IPOs in the same industries tend to cluster when optimism dominates the market. A great example was the IT-boom in 2000 when almost all Finnish IPOs came from computer and software industries.

5 Board of Directors and Gender Diversity

Gender representation on boards of directors refers to the proportion of women and men representing the company on the board. The gender diversity of the board of directors is usually expressed as a percentage of the women holding board seats. The number of women on the board of directors has been increasing recently, as the European average nearly doubled in six years between 2001-2006. In the Nordic countries, the representation has always been higher than average, and for example, in Sweden, the percentage was 21,3% in 2007 (Cambell & Mínguez-Vera, 2008). Usually, diversity is seen as a value-adding resource for the company. In general, diversity and diversification reduce the risk. This can be seen happening in the board of directors, too, as the diversity reduces group thinking, a psychological behavior including lack of criticism and conflict aversion. This chapter aims to introduce the previous literature connecting the company's IPO performance and its board's gender diversity. Concepts like the board of directors, gender diversity, agency theory, resource dependency theory and gender differences in risk behavior will be explained.

5.1 Board of directors

Corporate governance is the entity including rules, practices and processes used to manage and direct a company. The board of directors is a primary force of a firm's corporate governance. In publicly listed companies, the board of directors is selected with elections to represent the shareholders. The board of directors is responsible for the company, and they are in charge together with shareholders. According to regulations, the board of directors is a mandatory operator in a publicly listed company, and it serves as an advisory unit for the management. The board of directors serves a different purpose than management, as its objective is to advise management on corporate strategy rather than develop it (Larcker & Tayan, 2011). A board member's purpose in a listed company is to act in the shareholders' best interest.

According to Larcker and Tayan (2011), the board of directors has two fundamental responsibilities: advise the management and monitor its operations. The board of directors is usually selected based on their business and leadership abilities. The board of directors selects its chief executive officer (CEO) for the company, who manages the company. In Finland, publicly listed companies have specific special legal requirements that affect the board of directors' operations. In addition to annual reports, the publicly listed companies have to produce quarterly reports. Also, the CEO and at least three board members are required. Regulation of the board of directors in Finnish publicly trading companies is mainly controller by the Limited Liability Company Act (OYL (624/2006)). In Finland, the board of directors is responsible for accounting, governance, and the company's financial management, as mentioned in chapters six § 2–7 (OYL). The opinion of the majority constitutes board decisions when at least half of the board members are present. A member can be disqualified from the decision-making if their interest argues against the company's essential benefit. The Chairman of the board is responsible for organizing a board meeting when necessary.

Board members usually have a strong background in business and have a great understanding of financial reporting. Also, board members are usually very educated, and they have often graduated with either Ph.D. or master's degree. Board of director members tends to sit on several boards at the same time. If board members have too many positions, they are considered "busy board members." According to Fich and Shivdasani (2006), companies with these kinds of members are associated with poor corporate governance. Compared to benchmark firms, these companies had lower book-to-market ratios and overall weaker financial performance than companies with board members operating in just one board of directors.

5.2 Gender Diversity

Diversity in the field of business refers to a heterogeneous group of people with diverse backgrounds. Previous literature has introduced two distinctions of diversity,

demographic and *cognitive.* Demographic, also called observable diversity, contains matters related to racial, ethnic, or political diversity. Furthermore, demographic diversity includes gender-related matters. Cognitive, also known as non-observable diversity, can be based on education and personality characteristics (Erhardt et al., 2003). Most of the research on diversity and firm performance usually focuses on demographic diversity due to its observability. This thesis focuses on gender diversity, as it is a trendy topic, and the number of women on the board has been increasing during recent decades. National specialties and regulations regarding the board of directors' diversity were introduced in the previous chapter. They need to be considered when studying the relation between IPO performance and board gender diversity.

Since 2008, the Finnish Corporate Governance Code has included a precise recommendation that both sexes should be represented on the board. Since that, women's average growth rate on the board has been approximately 1-2% per year. Of all Finnish publicly traded companies, just 9 (7%) have a female CEO in 2020. Virtanen (2010) has studies the roles and behavior of Finnish members of the board. She found out that both men and women are quite the same by characteristics, such as family status and educational background. Over 60% of the board members have graduated with either master's degree or a Ph.D. According to Virtanen's (2010) studies, female members' lower average age was statistically significant. In short, the Finnish female board members were more flexible, more active; they enjoyed using their power more than men and had a higher demand to have more women on the board.

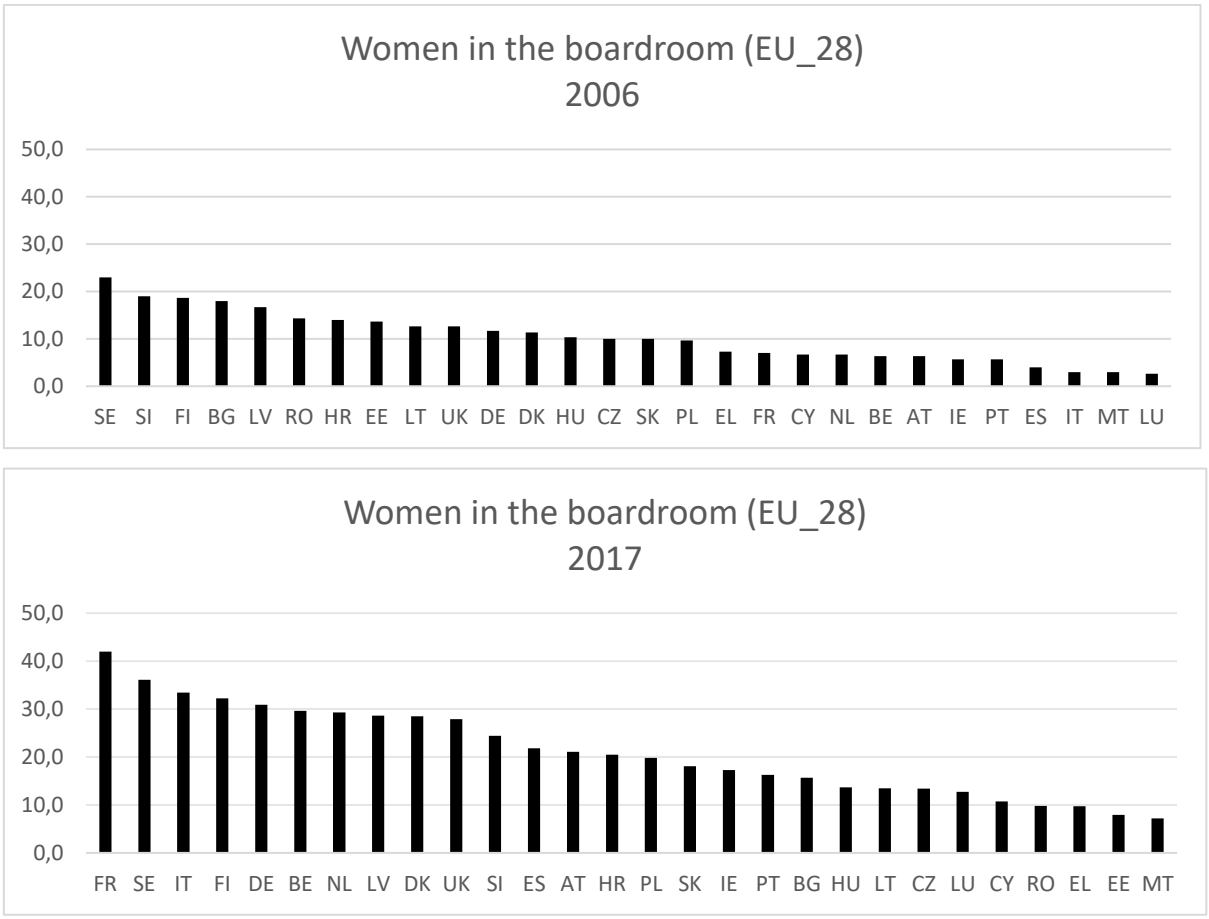

Figure 2. Years 2006 and 2017 of women in the boardroom of the largest publicly traded firm of the EU_28 countries (European Institute of Gender Equality, 2019).

As seen in the table above, the number of women in the board room has drastically increased during the last ten years. The European average has increased from 10,4% to 25,0% during this sample period. The most significant transformation has occurred in France and Italy, as both countries' number of women on the board of directors has increased by over 25%. Nordic countries are well represented in the tables, as all of them belong to the top half of the EU_28 in terms of gender diversity during 2003-2016. A few motives are explaining the increased number of women on the board. First is self-regulation, which is usually part of the countries Corporate Governance Core. Some regulations require an explanation if the company does not have both genders sitting on the board. Another reason for the growth is legislative actions, as countries have started to

demand companies to have a certain percentage of women on the board (Adams & Kirchmaier, 2013).

5.2.1 Agency theory and Gender Diversity

The agency theory was first introduced to finance by Fama (1980). Agency theory considers the relationship between the agent (manager) and the principal (shareholder) and the difference in priorities between the agent and the principal. The manager may not be as motivated as the shareholder to pursue the company's interest, yet he or she is responsible for managing the business. When the control and ownership of the company are separated, an agency cost may arise. Agency theory examines how agency loss could be reduced. The board of directors has an essential role in acting between shareholders and managers of the company. They need to forward shareholders' wishes to managers who make decisions considering the business itself.

According to Nyberg et al. (2010), one of the critical problems for businesses is the increased agency costs that arise from asymmetric information and the difference in priorities between managers and shareholders. Typical solutions for agency problems are contract designs and compensations. However, the agency cost cannot be wholly eliminated, as firms' managers cannot always make optimal decisions for shareholders even if it is their own company (Nyberg et al., 2010). The agency cost can usually be minimized by good corporate governance and smooth information (Reguera-Alvardo et al., 2017). Fama (1980) claims that with adequate monitoring and informing by the board of directors, its performance can be improved. It has been argued that more diverse companies have smaller agency costs, as they have both smoother information and monitoring.

Previous literature has suggested that female directors better monitor and inform CEOs and managers than male directors. In their research, Francoeur et al. (2007) studied whether a higher proportion of women on the board of directors affects the firm's performance. Their result indicates significantly higher returns on firms that operate in a

complex environment with a higher proportion of women on the board. However, if the environment is neutral, there seem to be no significantly higher returns on firms having more women on the board. On the other hand, more gender-diverse firms can outperform their benchmark companies due to the benefits of having a diverse board of directors. These benefits include higher motivation, better monitoring skills, better information flow and increased attendance in the board meetings.

5.2.2 Resource dependence theory and Gender Diversity

Resource dependence theory (RDF) explains how a company's performance and behavior depend on its external resources. Resource dependence theory is based on the idea that organizations depend on multidimensional resources, such as labor, capital, and raw material. Organizations are dependent on one another and other entities in that context. These other external entities handle essential resources, creating challenges and uncertainties for other organizations (Muhammad et al., 2013). The role of a board of directors in this theory is to act between the company and external resources to perform as well as possible. According to Dalton et al. (1999), companies that are better at controlling recourses and dealing with environmental uncertainty can perform better.

Diversity in this theory is characterized as the knowledge about the industry, relationships with customers, and the industry itself. According to Reguera-Alvardo (2017), the more diverse board often has more knowledge concerning the environment, which leads to increased performance. Board diversity helps to build linkages between critical external stakeholders. Companies may reduce uncertainties and dependencies if they operate with a diverse board. For example, younger managers may be more familiar with technological recourses, whereas older directors might have more senior contacts in established firms (Muhammad et al., 2013). A diverse board signals stakeholders about the equal background, which might attract consumers from a broader range than a more conservative board of directors. Besides, a diverse board could increase access to a

broader range of consumers. Compared with male networks, female networks are often more diverse and are more likely to contain weak ties.

5.2.3 Gender Differences in Risk Behavior

Many studies have focused on gender differences in risk behavior, especially in cognitive psychology and behavioral economics literature. The questions are whether men and women act differently when it comes to risk. The studies around this topic differ with results regarding gender's risk behavior. The well-known stereotype states that men are less risk-averse and make more risky financial decisions (Levin et al. 1988). Consequently, men are seen to seek more risk compared to women.

Mateos et al. (2010) examined relationships between riskiness and board gender diversity. Their findings suggest that less risky banks usually have more women on the board. They state that these banks seem to be more risk-averse. Palvia et al. (2015) studied whether female board chairmen and CEOs are more conservative and risk-averse in the banking industry during the financial crisis. Their findings are in line with previously mentioned beliefs. Their result shows support for the view that female board members and CEOs may inherently promote more conservative strategies and less risky financial decisions.

Sila et al. (2016) were among the firsts to study boardroom gender diversity's affection to firm risk in non-financial organizations. Their results show no evidence of female boardroom representation affecting any of the equity risk measures included in their study. Sila et al. (2016) state, based on their research, that a board with a high number of women is no more less risk-taking than a more male-dominated board. Their results are explained by high carefulness when identifying the causal relationship between director gender and firm risk.

6 Data and Methodology

In this chapter, the data and methodology used to examine the research hypotheses empirically will be introduced. As mentioned in the introduction, the first hypothesis suggests that a greater female board presence reduces IPO underpricing. The second hypothesis states that IPOs with higher female board presence perform better in the long run than IPOs with lower female board presence. Here, long-term means a one-year performance. First, the data used in this research will be discussed, and its characteristics and sources will be named. Secondly, it will be explained how the IPOs are classified based on the women's presence on the board. Subsequently, the research methodology applied to investigate IPO underpricing and long-term performance is described in two parts. First, the market-adjusted methodology is presented, and following that, the risk-adjusted, calendar-time approach is introduced.

6.1 Data Description

Data for this thesis was collected from a few different sources. The list of Finnish IPOs was collected from the Thomson Reuters database. The listing dates, IPO firms' board of directors and offering prices of Finnish IPOs between 2013 and 2018 were collected from listing prospectuses and companies' public statements. 2013 was selected to be the starting year, as two previous years had no IPOs in the Finnish market. 2018 had to be the ending years as one-year performance after the IPO is necessary for the second hypothesis's methodology. Several IPOs were excluded from the sample due to incomplete information regarding either stock prices or the board of directors' structure during the IPO. IPOs selected for the sample had to be listed in the Helsinki Stock Exchange and targeted at both private and institutional investors. Finally, 47 IPOs were selected for the final sample.

Daily returns for IPOs, the market index, and the risk-free rate were collected from the University of Vaasa databases. The value-weighted OMXHCAP Index was used to proxy

the market returns since its 10% weight limitation for individual shares better illustrates the overall market behavior than the OMX All-Share Index. The risk-free rate used was the 3-month Euribor. In some IPOs, the listing firms' board of directors changed just when the listing began. In these cases, the board of directors sitting the day before the listing date was used as it can be assumed that board members who join the board the day a company is listed do not affect the underpricing. The empirical tests were conducted using mainly two programs: Microsoft Excel and EViews, using Excel as the major tool and supporting the empirical tests with EViews. In empirical calculations, the dividends were excluded due to their complex characteristic.

6.2 Categorization of IPOs

Number of Females	Number of companies	Percentage
0	22	48,9 %
1	15	33,3 %
2	7	15,6 %
3	1	2,2 %

Table 3. Number of Women across Finnish Boards during IPOs.

In the empirical tests throughout this thesis, IPOs are divided into two groups based on board diversity. The first category includes IPO firms with no women on the board during the listing process (NW.) The second category includes IPO companies with at least one woman sitting on the board (W). The exact date used in the categorization is the one day before the stock starts to trade publicly. The first category includes 22 IPOs, which covers 48,9% of the sample. The second category consists of 23 IPOs that make 51,1% of the sample. A bigger sample size would have been preferred for more precise empirical results, but the small number of IPOs in the Finnish market does not make it possible. The IPOs would have been split into four categories in the optimal scenario, but the small sample size does not allow it.

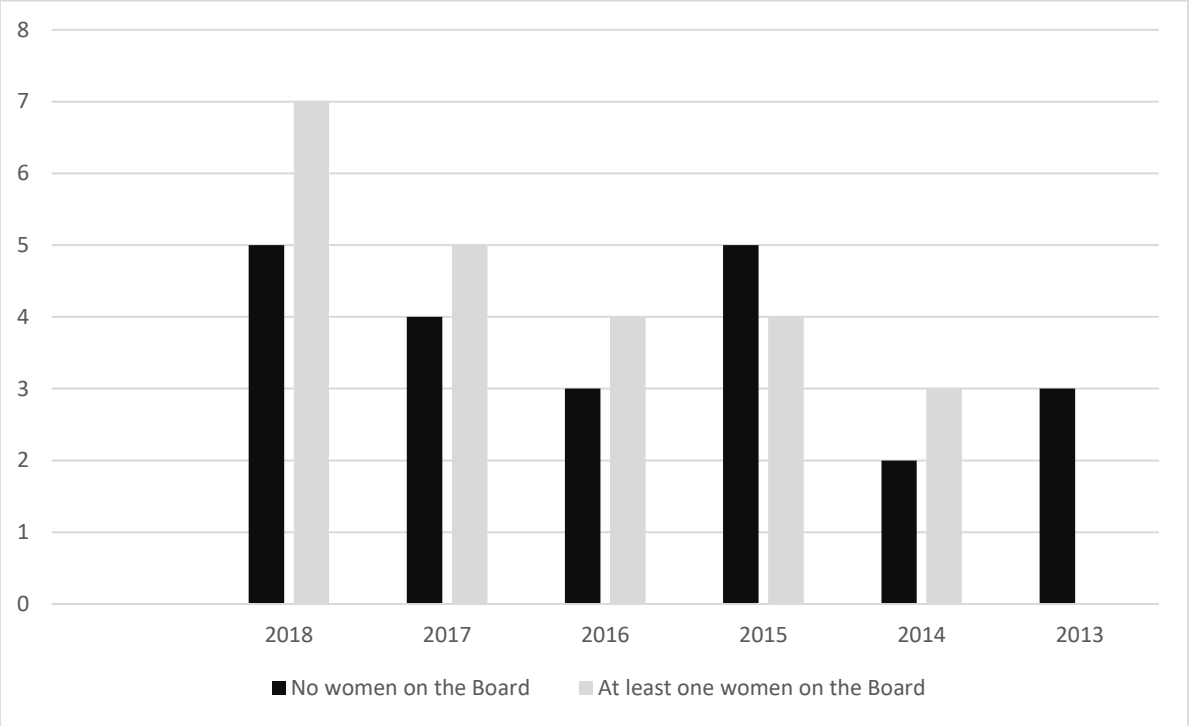

Figure 3. IPOs included in the study categorized by gender diversity on the board.

Figure 3 shows how IPOs are categorized over time. The number of IPOs with no women on the board is more random during the period. The number of women sitting on the board has been slightly increasing during the time, as seen in Figure 3. The exact listing dates and gender distributions of IPO boards are represented in the Appendix.

6.3 Methodology

This study uses two different methods to measure the abnormal underpricing of IPOs and the differences in performance between IPO boards having either at least one or no women or the board. The first approach adjusts the first-day returns for the corresponding market returns and takes place in event time. As mentioned earlier, the value-weighted OMXHCAP Index will proxy the market returns. Because this method completely ignores the traditional measures of risk, CAPM-adjusted and two-factor adjusted abnormal returns in a calendar-time setting will be calculated too. All the methods used

in this study are based on previous IPO literature, which gives a robust empirical justification to use them.

6.3.1 Market adjusted returns

Abnormal initial return for the IPO is the difference between the IPO return and market return on a listing day. IPO returns in the percentage change between the listing price and first-day closing price. This method is widely used in previous IPO research to calculate the first day IPO returns, and it works well in studies focusing on developed markets such as Ritter (1991), Purnanandam et al. (2004) and Álvarez et al. (2005). Abnormal initial returns are computed as follows:

(5) $$\mathrm{ar_{it}} = \mathrm{r_{it}} - \mathrm{r_{mt}}$$

where $\mathrm{r_{it}}$ is the return between IPO listing price and first-day closing price and $\mathrm{r_{mt}}$ is the market return for the same day. Abnormal initial return for the security is the $\mathrm{ar_{it}}$. The mean (Equally-weighted average) abnormal initial return is computed separately for all IPOs, NW IPOs and W IPOs:

(6) $$\mathrm{AR_t} = \frac{1}{\mathrm{n}} \sum_{\mathrm{i=1}}^{\mathrm{n}} \mathrm{ar_{it}}$$

where $\mathrm{AR_t}$ means the average abnormal initial return, $\mathrm{ar_{it}}$ is the abnormal initial return for security *i,* and *n* stands for the number of IPOs / assets.

As the sample size in this study is remarkably small, handling outliers need to be considered. Due to the small sample size in this study, the outliers will not be excluded. However, they are included by converting them to the value of the nearest non-suspicious observation. This transformation is called winsorization, and it reduces the effect of

spurious outliers. Then, it needs to be calculated whether the ARs differ statistically from zero by using Student's (1908) *t*-test:

$$t = \frac{\mathrm{AR} - 0}{S/\sqrt{\mathrm{n}}} \quad (7)$$

where AR explains the average abnormal initial return, *s* is the standard deviation, and *n* is the number of securities. *t* is the Student's *t*-statistic. The possible statistical significance is denoted with either *, ** or *** depending on whether the significance is 10%, 5% or 1% level. This logic is utilized in other empirical results-tables too.

Student's *t*-statistic requires certain assumptions to hold to be considered as a trustworthy method. Firstly, the initial abnormal returns need to be normally distributed. According to Keloharju (1993), it is expected that in this kind of study, the results have excess kurtosis and are right-skewed. Secondly, the initial abnormal returns need to be independent. Since one-day returns are used in this study, the overlapping is not a problem. The non-parametric Kolmogrov-Smirov test is examined in order to test whether the ARs are normally distributed. If its results in p-values less than 0.100, the results are considered as non-normal. Consequently, the medians are presented with the target of measuring central tendency comprehensively. The null hypothesis stating that medians are zero is tested with Wilcoxon (1945) ranked-sum test, and p-values resulting from this test are shown in the results tables. The median tests are also examined similarly to the mean tests, based on the assumption of independence.

Next, cross-sectional analysis is used to find which factors might affect abnormal initial returns. Ordinary Least Squares (OLS) is used as a regression method. Women's percentage on the board will be used as one of the independent variables because this study aims to find whether the women on the board affect the IPO underpricing. Another remarkable variable used in this analysis is the size of the issue, which is represented by the IPO's gross proceeds. In order to avoid problems with non-normality, logarithmic

transformation is made for both these variables. The regression is mathematically expressed as follows:

(8) $$\mathrm{ar}_i = \alpha_\mathrm{i} + \beta_1 \ln\,(\mathrm{Women})_\mathrm{i} + \beta_2 \ln\,(\mathrm{Size})_\mathrm{i} + \varepsilon_\mathrm{i}$$

Where ar_i is the abnormal initial return for security *i,* α_i is the constant term, β_1 and β_2 represents the parameter estimates for $\ln(\mathrm{Women})_\mathrm{i}$ and $\ln(\mathrm{Size})_\mathrm{i}$, $\ln(\mathrm{Women})_\mathrm{i}$ is the natural log of security *i*'s ratio of women on the board compared to men, $\ln(\mathrm{Size})_\mathrm{i}$ is the natural log of security *i's* total amount raised from an IPO and ε_i is the error term.

Independent variables for the regression above were chosen on purpose. Earlier literature has shown strong evidence on gross proceeds affection on IPO underpricing. The correlation between gross proceeds and 1st day IPO returns is negative based on previous literature. This belief is based on Ritter's (1991) studies, where he found out that big issues are less speculative and the "initial size" of the IPO is a proxy for risk, so small IPOs need to be more underpriced. Keloharju (1993) has documented similar evidence from Finnish markets where a strong negative relationship between size and initial underpricing has been found out, although only economically.

According to previous studies, women directors' percentage has not shown any statistical significance to IPO underpricing (Handa & Singh, 2015). Handa and Singh's result shows that gender diversity of the board has no significant effect on IPO's 1st-day performance. Kaur and Singh (2015) found a negative relation between gender diversity on the board and IPO underpricing. As the number of women on the board increases, the underpricing of IPO decreases. Hence, the women on the board can be seen as a quality signal reducing the IPO underpricing. However, the relation is not statistically significant. The studies above focus on Indian markets, which significantly differ from Finnish markets. Too strong assumptions from the studies above should not be made due to the difference in market behavior.

As the 1st-day market-adjusted returns are calculated as explained above, the time-period in tests will be broadened to a more extended period. In this study, long-term performance is measured in a one-year period. In many studies, the starting point for the long-term performance is the 1st-day closing price, as the first-day price movements are seen to be abnormal. On the other hand, some studies use the offering price as the starting point. Both styles will be used in this study to maximize the practical implications and identify the alleged movements on the IPO stock prices.

A market-adjusted method to measure both long-run and short-run IPO returns was chosen based on previous studies. This study will mimic Keloharju's (1993) methodology to use wealth relatives (WRs). This methodology is not restricted to only Finnish markets, as both Ritter (1991) and Álvarez et al. (2005) have used WRs to measure the market-adjusted IPO returns. A WR greater than 1,00 can be interpreted as IPO outperforming the market during a set time-period. Consequently, a WR under 1,00 indicates that the market outperformed the IPO. In order to calculate the WRs, the holding period return (HPR) needs to be computed first:

$$\mathrm{HPR}_{it} = \prod_{t=1}^{T}(1 + r_{it}) - 1 \tag{9}$$

where HPR_{it} is the holding period return for security *i* in time period *t*, and r_{it} is the return for security *i* in time period *t.* After that, the HPR plus one is divided by one plus the market return for the equivalent time period:

$$wr_{it} = \frac{1 + \mathrm{HPR}_{it}}{1 + r_{mt}} \tag{10}$$

where wr_{it} is the wealth relative for security *i* in time period *t,* HPR_{it} is the holding period return for security *i* in time period *t* and r_{mt} is the market return for time period *t*. Next, equally-weighted average (mean) WRs are computed separately for each N and NW, and all IPOS:

$$(11) \qquad \mathrm{WR_t} = \frac{1}{\mathrm{n}} \sum_{\mathrm{i=1}}^{\mathrm{n}} \mathrm{wr_{it}}$$

Where $\mathrm{WR_t}$ is the mean wealth relative in time period *t*, $\mathrm{wr_{it}}$ is the wealth relative in time period *t* for security *i*, and *n* is the number of securities in the equation.

Consequently, it needs to be calculated whether the WRs differ statistically significantly from 1,00 by using Student's *t*-test:

$$(12) \qquad t = \frac{\mathrm{WR} - 0}{S/\sqrt{\mathrm{n}}}$$

where WR explains the average wealth relative, *s* is the standard deviation, and *n* is the number of securities. *t* is the Student's *t*-statistic.

Finally, pooled OLS regression is created to identify whether women's presence on the board or the IPO's size has affection on the one-year abnormal returns (1st day not included). This cross-sectional model is very similar to the model used to calculate initial abnormal returns since only the response variables are different:

$$(13) \qquad \mathrm{wr}_i = \alpha_\mathrm{i} + \beta_1 \ln(\mathrm{Women})_\mathrm{i} + \beta_2 \ln(\mathrm{Size})_\mathrm{i} + \varepsilon_\mathrm{i}$$

Where wr_i is the wealth relative (12 months) for security *i,* α_i is the constant term, β_1 and β_2 represents the parameter estimates for $\ln(\mathrm{Women})_\mathrm{i}$ and $\ln(\mathrm{Size})_\mathrm{i}$, $\ln(\mathrm{Women})_\mathrm{i}$ is the natural log of security *i*'s ratio of women on the board compared to men, $\ln(\mathrm{Size})_\mathrm{i}$ is the natural log of security *i's* total amount raised from an IPO and ε_i is the error term.

Just like the relationship between women's presence on the board and the IPO underpricing, the relationship between women on the board and long-term IPO

underperformance is not extensively studied. Welbourne et al. (2007) have studied Wall Street's reaction to women in IPOs. They examined the relationship between gender diversity in top management teams and IPO performance. Their long-term performance results indicate that having women on the board results in higher earnings and greater shareholder wealth, which is explained by the increased stock price. This finding of the role of the Female-variable was statistically significant. Singh et al. (2019) had similar results in the Indian markets.

Based on previous studies, a significant positive relationship between size and long-run performance has been detected. Although the results have been statistically insignificant, Keloharju (1993), Álvarez et al. (2005) and Westerholm (2006) have found a similar relationship in Finnish, Spanish and Nordic markets. To conclude, both coefficients of independent variables are hypothesized to have positive signs in the cross-sectional regression.

In addition to previously mentioned coefficients, t-statistics, standard errors and p-values for independent variables, adjusted coefficient of determination and F-statistics are reported in the results-tables too. The first one is used to test the regression's significance. The latter is a goodness-of-fit measure that explains the percentage variation in the dependent variables explained by the regression. In other words, it punishes for including too many additional independent variables.

6.3.2 Risk-Adjusted Returns

When market-adjusted returns are used as a benchmark, an implicit assumption is that the IPO's beta equals one. However, the previous literature has shown that this may be misleading. The betas of IPOs seem to exceed one's value consistently, suggesting that the market-adjusted abnormal returns are upward biased. So, in this study, the beta-adjusted performance will be examined too. The history of international IPOs shows that the IPOs are smaller both size and sales-wise on average than seasoned firms. These IPO

companies are more likely to suffer from small size risk, which needs to be considered when studying the aftermarket IPO performance. Hence, the 2-factor adjusted method will be used. Monthly returns are used to minimize the effect of non-synchronous trading.

Another flaw that needs to be taken into account is the overlapping of IPO return periods. Thus, the mean and median tests' independence assumption does not hold, leading to overvalued statistical significance. The solution for this is the rolling portfolios, as they control the problems of event-clustering and cross-sectional correlation. These portfolios are constructed as follows: each IPO is placed in either of two portfolios, whether they have women on the board or not. In addition to that, IPOs are included in one portfolio, which has all IPOs in it. Each IPO is held from a month to next year's same month, starting the first calendar month after the IPO. At the end of the holding period, the IPO is dropped out of the portfolio.

After all, IPOs are divided into portfolios as mentioned above, time-series regressions are run for the equally weighted monthly portfolios (all, women, and no women) in long-run, starting with the basic one-factor CAPM:

(14) $$r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \varepsilon_p$$

where r_{pt} is the monthly portfolio return, r_{ft} is the risk-free rate, α_p is the abnormal return on the portfolio, β_p is the beta coefficient of the portfolio, r_{mt} is the market's monthly return and ε_p is the error term.

It is worth mentioning that since IPOs have no earlier returns, parameter estimates cannot be estimated from them. Instead, the calendar-time methodology of Espenlaub et al. (2000), Brav et al. (2000) and Purnanandam et al. (2004) will be mimicked in this study. Besides, instead of calculating betas for each IPO using the market model, the betas will be computed jointly on a portfolio-wide level. By doing that, the effect of thin trading

will be lowered, as it is a prevalent issue on IPOs. Using individual betas for IPOs does not seem rational.

In addition to the results that CAPM gives about IPOs performance compared to seasoned stocks, it gives parameter estimates of beta coefficients that are crucial to compute the beta-adjusted alphas. To calculate the beta-adjusted alphas for each portfolio, corresponding fixed beta derived from CAPM is used for every calendar month by reorganizing the Formula 14 above:

(15) $$\alpha_p = r_{pt} - [r_{ft} + \beta_p(r_{mt} - r_{ft})]$$

The formula above is also known as Jensen's (1967) alpha, which is used very widely to measure risk-adjusted performances. Next, the 2-factor model is regressed just like the CAPM, with just one additional factor, size:

(16) $$r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \varphi_p SMB_t + \varepsilon_p$$

Where in addition to the CAPM factors, φ_p is the factor loading on SMB_t (the monthly size factor. Once the loading factors are figured, they are used to determine the alphas for all, women, and no women portfolios, similarly to Formula 14:

(17) $$\alpha_p = r_{pt} - [r_{ft} + \beta_p(r_{mt} - r_{ft}) + \varphi_p SMB_t]$$

To study the statistical properties of the above-calculated CAPM and 2-factor adjusted alphas, the same methodology will be used that was used in the market-adjusted, event-time framework. So, Formulas 6 and 7 are applied, and similar normality and median tests are examined. The tables describing results are identical to the previous ones.

6.4 Limitations

As with all empirical studies, there are always some limitations. In this study, the first one is the small sample size. As the Finnish market is relatively small, there are not many IPOs per decade. This means that even though some economic significance may be found, it is most likely not statistically significant. The small number of observations might cause high standard deviations, leading to a larger standard error.

Another limitation is the ignorance of dividends. Due to their problematic characteristics in returns, they are challenging to take into account. The ignorance of dividends can have an impact, especially on long-run performance. Quite likely, both groups, IPOs with and without women on the board, suffer similarly from this ignorance, but the small sample size may drift the effect more beneficial to one group.

7 Empirical results

This chapter describes the empirical results of this study. The results are obtained with the methodology which was presented in the previous chapter. During this chapter, the results are shown separately for all IPOs, IPOs with at least one woman sitting on the board during the listing process and IPOs with no women on the board. The first category is presented as "All," second as "Women," and third as "No women." In the first subchapter, descriptive statistics will be introduced. After that, short- and long-run results are discussed separately. Short-run results are obtained with market-adjusted returns, while long-run tests are examined with both market- and risk-adjusted methods.

7.1 Descriptive statistics

Descriptive statistics of the number of women on the board are illustrated in Table 4. Results are presented as a ratio of women on the board compared to all board members. The whole sample is divided into just about half, as the "Women"-category has 23 IPOs compared to the "No Women"-category's 22 IPOs. Not surprisingly, looking at the historical data, the average percentage of women sitting on the board is relatively low, as it is only 13%. Finnish IPOs average fewer women sitting on the board than Finnish publicly traded companies (European Institute of Gender Equality, 2019). However, the numbers are quite high from an international perspective while looking at IPO companies' numbers, as we saw in this paper's theoretical part. The percentage of women on the board in the "Women"-category differs from 13% to 43%. No IPO company had more women than men sitting on the board.

	Mean	Median	Max.	Min.	Std.	N
All	0,13	0,13	0,43	0,00	13,67 %	45
Women	0,24	0,20	0,43	0,13	8,21 %	23
No women	0,00	0,00	0,00	0,00	0,00 %	22

Table 4. Descriptive statistics on women on the board.

Next, in Table 5, we have statistics about the size, more precisely about gross proceeds of the individual IPOs. IPOs in Finland are relatively small compared to larger markets, such as the United States or the UK, averaging 56,11m€ gross proceeds while looking at all IPOs. The standard deviation is relatively high in all three categories, as the difference between minimum and maximum is big. The "Women"-the category includes IPOs with higher gross proceeds, as the maximum of "No women"-category is only 169,63m€ compared to "Women's" 169,93m€. Overall, it can be seen that "Women" IPOs are much more extensive compared to "No women" IPOs. Finnish IPOs have grown a lot since the late 1980s, as Keloharju (1993) documented a mean of 11,33m€. The high standard deviation of 173,63% in the "Women"-category causes difficulties while making conclusions from this table.

m€	**Mean**	**Median**	**Max.**	**Min.**	**Std.**	**N**
All	56,11	15,32	762,19	1,55	129 %	45
Women	82,06	17,94	762,19	1,55	173,63 %	23
No women	28,98	12,57	169,63	2,05	44,27 %	22

Table 5. Descriptive statistics on size (gross proceeds).

Table 6 includes characteristics of Finnish IPOs' offer prices. As seen from the table, there is not much difference between different categories' IPO prices. "No women"-category averages slightly higher numbers, mainly because it has more IPOs in the higher-end and fewer IPOs in the lower end. So-called penny stocks, trading below 1€ per share, are often affiliated with more radical proportional price changes than stocks with higher prices. Luckily, the "Women"-the category has only one IPO of listing price under 1€, so it will not cause a problem in later parts of the empirical research.

€	**Mean**	**Median**	**Max.**	**Min.**	**Std.**	**N**
All	7,57	6,35	33,00	0,65	52,50 %	45
Women	6,10	5,90	11,50	0,65	25,99 %	23
No women	9,11	7,18	33,00	4,20	67,69 %	22

Table 6. Descriptive statistics on the offer price.

7.2 Short-run performance

This chapter provides empirical results on the short-run performance of Finnish IPOs. Differences between IPOs with and without women sitting on the board will be presented. In addition, the performance of all Finnish IPOs is studied. Market-adjusted methods are used to examine the test.

Initial abnormal results, so-called ARs are presented in table 7. As can be assumed from previous evidence, Finnish IPOs have been significantly underpriced during the time-period 2013-2018. However, the power of the underpricing-phenomenon has weakened, as the mean (median) abnormal return for the "All"-category is 5,11% (4,11)%. Keloharju (1993) obtained initial abnormal returns of nearly 9% in a sample of 1980s IPOs. Even though the underpricing for all IPOs is still statistically significant, the effect is not as strong as it used to be. This is a remarkable finding, as Finnish IPOs have not been studied much after the financial crisis. One critical factor explaining the weakened phenomenon is the most recent financial crisis. IPOs post-crisis has gained a lot smaller initial abnormal returns than IPOs pre-crisis (Li et al., 2018). A high deviation of IPO pricing might be caused by the complexity of the valuation process of IPOs.

AR	All	W	NW	W-NW
Mean	5,11 %***	4,97 %**	5,26 %**	-0,29 %
Conventional t-statistic	2,631	1,817	1,862	-0,108
Kolmogorov-Smirnov	0,090	0,116	0,122	0,522
Conventional p-value	0,006	0,041	0,038	0,458
Median	4,11 %	3,49 %	4,14 %	-0,65 %
Max.	45,36 %	29,65 %	45,36 %	
Min.	-21,29 %	-21,29 %	-20,68 %	
Std.	13,03 %	13,11 %	13,25 %	
N	45	23	22	

Table 7. Initial abnormal returns, so-called ARs.

Both "Women"- and "No Women"-categories have statistically significant mean of 4,97% and 5,25% at the 5% level of significance in initial abnormal returns. Even though the "Women"-category has a slightly smaller mean, straight conclusions cannot be made as the difference is minimal. From the companies' perspective, it cannot be directly

assumed that women act as a “quality signal” that reduces the underpricing. Hence, the first hypothesis stating that the greater female board presence reduces the IPO's underpricing cannot be accepted yet. These results are in line with the few previous papers that have studied the relation between IPO underpricing and women on the board (Handa & Singh, 2015). Both groups have nearly identical standard deviations, so there is basically no difference in the difficulty of valuating these IPOs. Overall, the “No women”-category has performed slightly better in all tests from the company’s perspective. Average, median and maximum are higher, and minimum lower compared to “Women”-category. The median and mean difference is shown in the “W-NW”-column, and it is relatively small.

Table 8 shows regression results with initial abnormal results as the dependent variable. As seen from the coefficients, the women on the board’s affection for the underpricing is shallow. Hence, it seems clear that the gender diversity of a company’s board does not affect the IPO's underpricing. As for the size, another control variable, it seems not to have any impact on initial abnormal returns. However, in contrast to previous studies, the sign of its coefficient is opposite (Ritter, 1991). However, as the p-value is as high as 0,383, it cannot be stated that there is a positive relationship between abnormal initial returns and the IPOs size. The possibility for a mistake by making such as statement is 38,28%.

AR	Coefficients	Standard Error	t Stat	P-value	N
Intercept	-0,1612	0,2434	-0,6625	0,5113	
Women on the board	0,0032	0,0259	0,1231	0,9026	
Size	0,0128	0,0146	0,8821	0,3828	
Regression					45

Table 8. Regression results with AR’s as the dependent variable.

Overall, as the effect of the women on the boardroom in IPO companies have been extensively analyzed by going through the empirical evidence in Tables 7 and 8, there is no other choice than reject the first hypothesis stating that the greater female board

presence reduces the underpricing of the IPO. While IPOs were clearly underpriced, there was no evidence towards either of the categories, “Women” or “No women,” to be more underpriced. However, few implications of the first-day performance can be made regarding the first-day returns of IPOs. First, on average, IPOs give owners great returns on a one-day time-period. Second, the volume of the underpricing has reduced since the financial crisis. Another motive reducing the volume of the underpricing phenomenon is the awareness about it. Financial anomalies tend to lose power or even completely disappear when they get well-known.

7.3 Long-run performance

This chapter examines whether IPOs having women on the board perform better than IPOs having no women in the boardroom in the long-run, or vice versa. As in the previous chapter, the performance of all IPOs is included in the analysis too. The first subchapter explains the market-adjusted results, and the second focuses on risk-adjusted results using CAPM and 2-factor corrections.

7.3.1 Market-Adjusted returns

Table 9 presents market-adjusted IPO performance one-year after the IPO launch with wealth relatives, so-called WRs. First, the table shows that the abnormal initial returns make an enormous difference in the stock’s one-year performance. While the WR for “All” is 1,101 when first-day returns are taken into calculations, it is just 1,035 when abnormal initial returns are excluded. The same logic applies to the other two categories as well, where the gap between WRs is 0,07 for “Women” and 0,062 for “No Women.” The only statistically significant result is the “All”-category’s mean, while first-day returns are included, which is statistically significant at the 10% level. Overall, even though there is not much statistical significance, IPOs offer a great value investment-wise when investing in them for a one-year period. They beat the market on average, even without the

first-day returns. However, even though the mean WRs for all three categories are over 1,00 when first-day returns are excluded (1,035, 1,046 and 1,024), medians for "All"- and "Women"-categories fall slightly under 1,00 (0,969 and 0,955).

WR12	All	W	NW	W-NW
Mean	1,101*	1,116	1,086	0,030
Conventional t-statistic	1,435	1,200	0,815	-0,423
Kolmogorov-Smirnov	0,084	0,079	0,160	0,151
Conventional p-value	0,079	0,121	0,212	0,338
Median	1,078	1,006	1,082	-0,076
Max.	2,729	1,994	2,729	
Min.	0,367	0,367	0,466	
Std.	47,22 %	46,23 %	49,26 %	
N	45	23	22	

WR12 first day excluded	All	W	NW	W-NW
Mean	1,035	1,046	1,024	0,022
Conventional t-statistic	0,592	0,598	0,256	-0,223
Kolmogorov-Smirnov	0,097	0,111	0,165	0,072
Conventional p-value	0,278	0,278	0,400	0,413
Median	0,969	0,955	1,007	-0,053
Max.	2,500	1,734	2,500	
Min.	0,372	0,372	0,456	
Std.	39,39 %	36,50 %	43,04 %	
N	45	23	22	

Table 9. Wealth relatives (WRs) 12 months after the IPO launch.

Next, differences between "Women" and "No women"-categories' WRs will be described. There are no significant differences in groups' performances, even though the "Women"-category has a higher mean no matter if the first-day returns are included or excluded. However, it has slightly smaller median in both situations, which is mostly because of its lower minimum (0,367 vs 0,466 and 0,372 vs 0,456) and maximum (1,994 vs 2,729 and 1,734 vs 2,500). This table's last clear finding is that being a subscriber instead of an early aftermarket buyer would be preferable since all groups performed better when first-day returns were included.

Table 10 presents the findings from the cross-sectional analysis, where the one-year WRs is the dependent variable. The coefficient of "Women on the board is negative," indicating that women sitting on the board negatively affects to company's stock performance

in a one-year period. On the other hand, women sitting on the board could be seen as a "quality signal" that reduces the underpricing, which is excellent from a company's perspective. After all, by having p-values over 10% in all samples, comprehensive conclusions cannot be made by the long-run WR abnormal return analysis.

The next regressor, size, is positive. This is a slight surprise, as it suggests that the best investments for a year-period would be large-cap IPOs having no women sitting on the board. However, as with the first regressor, the problematic sample causes this to have no statistically significant effects.

WR12	Coefficients	Standard Error	t Stat	P-value	N
Intercept	0,6206	0,8871	0,6997	0,4880	
Women on the board	-0,0093	0,0944	-0,0986	0,9219	
Size	0,0283	0,0530	0,5336	0,5964	
Regression					45

Table 10. Regression results with WR's as the dependent variable.

7.3.2 Risk-Adjusted Returns

In Table 11, risk-adjusted returns in long-run performance are presented in one-year CAPM regressions on rolling, calendar-time IPO portfolios. The first observation is the relatively low beta coefficients. Previous literature suggests that IPO betas are over 1,00, indicating higher than average systematic risk. This study's sample offers different results, as beta coefficients for three different groups are 0,264, 0,270 and 0,545. A few different factors are explaining the difference. The first factor is the characteristics of IPOs, mainly Finnish IPOs. Preliminary analysis showed that many of the IPOs had eve a negative beta, and for many others, they were under 0,10. This pushes the portfolio's beta coefficient down.

Second, the sample size is very small, which increases the probability of having extreme values. Based on these beta coefficients, IPOs having no women on the board are more

defensive than IPOs with women on the board. Finally, the statistically insignificant alphas give evidence that the generally thought poor long-run performance of IPOs is not a distinct phenomenon in the Finnish market. In fact, the alphas are even positive, meaning that the Finnish IPOs seem to beat the market in a one-year time period.

CAPM	a_P	β_ρ	N	R-square
All	0,0081	0,2644	78	0,0414
	(1,4502)	(1,8103)*		
Women	0,0098	0,2703	60	0,0246
	(1,1307)	(1,1829)		
No women	0,0056	0,5453	78	0,1231
	(0,8748)	(3,2669)**		

Table 11. One-year CAPM regressions on rolling, calendar-time IPO portfolios.

In Table 12, one-year CAPM-adjusted alphas are presented for each group. They are adjusted with beta coefficients from Table 11. Means for "All" (0,81%) and "Women" (1,13%) are statistically significant at the level of 10%. The "No women" group performed slightly weaker, having a mean of 0,56%. In addition to one-year CAPM regressions, these CAPM-adjusted alphas give evidence that Finnish IPOs actually beat the market in a one-year period with statistically significant results. Median alpha for the "All"-category is positive too (0,80%).

During a one-year time-period, IPO companies having at least one woman on the board performed slightly better than IPO companies with no women on the board (1,13% vs. 0,56%). Even though the difference is slight, it is obvious and in line with previous literature from India, where an extended analysis on the topic of IPOs with women on boards reveals that that greater percentage of female representation leads to lower long-run underperformance (Ahmad-Zaluki, 2012). This means that in longer time-periods, for example, one year, the women on the board can be seen as "quality signals" that positively affect a company's performance.

In addition, the “Women”-group performed better compared to “No women” group in all categories, having higher median (0,42% vs 0,11%), maximum (27,39% vs 20,90%) and minimum (-10,81% vs 13,87%). It also confirms that the possible premium of having women on the board cannot be explained by coefficients such as beta, as they are taken into calculations in Table 12. This all supports the second research hypothesis that states that IPOs with greater female board presence outperform the IPOs with lower female board presence in a one-year period. However, it cannot be accepted yet, as the statistical evidence is not strong enough.

CAPM-adjusted alphas	All	W	NW
Mean	0,81 %*	1,13 %*	0,56 %
Conventional t-statistic	1,493	1,325	0,901
Kolmogorov-Smirnov	0,0820	0,120	0,090
Conventional p-value	0,070	0,095	0,185
Median	0,80 %	0,42 %	0,11 %
Max.	17,49 %	27,39 %	20,90 %
Min.	-10,63 %	-10,81 %	-13,87 %
Std.	4,79 %	6,63 %	5,48 %
N	78	60	78

Table 12. One-year CAPM-adjusted alphas.

Table 13 offers parameter estimates from the one-year two-factor regressions. The results are consistent with earlier results from CAPM regressions. Consistent with the empirically motivated expectations, the SMB factor loading is significantly positive for all groups. It is statistically significant at the 1% level for “All” (0,632) and “No women” (0,549) and significant at the level of 5% for “Women” (0,600). Hence, it is clear that the Finnish IPOs are exposed to relatively high small size risk. Both of the “Women” and “No women” groups contribute to this phenomenon, as both of their values are clearly positive. Besides, the SMB factor seems to be a justifiable addition to the regression model, as it increases its R-square.

2-factor	a_P	β_ρ	φ_P	N	R-square
All	0,0039	0,4467	0,6319	78	0,2080
	(0,7408)	(3,1612)***	(3,9695)***		
Women	0,0069	0,3052	0,6006	60	0,1070
	(0,8155)	(1,3819)	(2,3130)**		
No women	0,0019	0,7036	0,5487	78	0,2110
	(0,3067)	(4,1747)***	(2,8898)***		

Table 13. One-year 2-factor regressions on rolling, calendar-time IPO portfolios.

Consistently with one-year CAPM regressions, the 2-factor regression results with positive alpha for all three groups. This is against the well-known anomaly that IPOs underperform in the long-term (Keloharju, 1993). According to this empirical study, this is not the case with this sample of Finnish IPOs. IPOs in this study seem to beat their non-IPO counterparts, but not statistically significantly. Once again, the "Women"-category gained higher alpha compared to the "No women"-category (0,0069 vs. 0,0019). This strengthens the finding considering the second research hypothesis that IPOs with women on the board outperform their counterparts in the long-term in the Finnish market. However, the difference is not statistically significant.

Table 14 offers long-run alphas with two-factor adjustments. As expected from Table 12, all the alphas are lower than the CAPM-adjustments due to the SMB-factor. The statistical significance from Table 12 is gone, and one of the groups has even a negative sign. However, the mean for the "All"-category is still positive (0,213%), as well as the median (0,056%). For the other two groups, the addition of the SMB-factor pushes the medians below zero. Nevertheless, their means stay positive. Overall, looking at the whole sample in the "All"-group, it seems like the Finnish IPOs do not underperform compared to the market in a one-year time period. This, too, supports the belief created by this study and its evidence that the Finnish IPOs do not underperform the market in a one-year time period. Also, the size risk seems to have quite the same effect on all three groups, meaning that having women on the board does not reduce the exposure for the size risk.

2-factor adjusted alphas	All	W	NW
Mean	0,213 %	0,509 %	-0,022 %
Conventional t-statistic	0,413	0,612	-0,036
Kolmogorov-Smirnov	0,087	0,148	0,083
Conventional p-value	0,340	0,271	0,486
Median	0,056 %	-0,309 %	-0,449 %
Max.	12,12 %	21,82 %	20,23 %
Min.	-10,88 %	-13,41 %	-11,31 %
Std.	4,56 %	6,44 %	5,45 %
N	78	60	78

Table 14. One-year 2-factor adjusted alphas.

Finally, differences between “Women”- and “No women”-groups are considered when using the long-run alphas with two-factor adjustments to understand whether they perform differently. The results are quite in line with the previous CAPM regressions. “Women”-group outperforms the “No women”-group, both mean and median wise (0,509% vs -0,022% and -0,309% vs -0,449%). Even though there is no statistical significance in either group’s performance while using the two-factor adjusted alphas, the difference between the means is large. Hence, it further strengthens the second research hypothesis's acceptance, stating that IPOs with diverse boards outperform the IPOs with no women on the board. Overall, the long-term risk-adjusted regressions and alphas show investors that there is no need to avoid investing in Finnish IPOs in the long-term, even as the previous literature might claim that they tend to underperform in longer periods.

8 Conclusion

Investors are always trying to find ways to create excess returns. During the past few years, one of the hot topics has been the Initial Public offerings, as the IPO underpricing phenomenon has become very popular in behavioral finance. On the other hand, IPOs are well known for their relatively bad long-term performance (Ritter, 1991). The IPO market has been overheated in a way where investors try to subscribe to as many stocks as possible, and after the possible initial returns, they dump the stocks back to the market.

This study aims to find empirical evidence from Finnish IPOs between 2013 and 2018 for both of the anomalies mentioned above, adding in one trendy factor: gender diversity. The objective of the study is to investigate whether IPO companies having women on the board perform differently, or more precisely better, both short- and long-term. Basically, the primary purpose is to empirically test whether the women on the board decrease short-term underpricing and long-term underperformance. The study considers underpricing from a company's perspective when the underpricing is not seen as a good thing as investors see it. From a company's perspective, the valuation should be as precise as possible, meaning that the stock's price does not move massively on the first trading day. Investors want, of course, the stock to rocket as much as possible during the first day, assuming that they have subscribed to it.

This study's sample consists of 45 IPOs, all listed to Finnish markets between 2013 and 2018. The IPO data is collected from companies listing prospectuses and from the Thomson Reuters database. The IPOs are divided into two groups, depending on whether the companies had women sitting on the board during the listing process or not. After doing the procedure mentioned above, the sample has two groups: "Women," including 23 IPOs and "No women," including 22 IPOs. OMX Helsinki Cap is used as the market benchmark, and 3-month Euribor is used as a risk-free rate.

The study's first hypothesis suggests that women sitting on the IPO company's board reduces the underpricing. A few market-adjusted research methods are used to find evidence to either accept or reject the first hypothesis. Based on the empirical findings in this study, the first hypothesis is entirely rejected. Even though the mean and median underpricing is somewhat smaller for IPOs with a diverse board, the connection found is only a weak tendency. There is no statistical significance in the difference. Although women can be seen as a "quality signal" from the company's perspective as they reduce the underpricing, the volume in the difference is not big enough to conclude it. Nonetheless, both categories and consequently all IPOs from the sample are statistically significantly underpriced, suggesting that subscribing to the IPOs is still a viable way to gain excess returns.

However, the empirical studies reveal that the underpricing in Finnish markets has impaired during the last decades, as it has fallen from 8,7% in Keloharju's (1993) studies to 5,11% found in this study. A few factors can well explain the change. First, studies from other markets show that the underpricing has drastically weakened after the 2010 financial crisis. Second, the underpricing anomaly has gained popularity, which is proven to weaken the intensity of any phenomenon in behavioral finance. Finally, another variable studied in the first regression, size, has no connection to the level of the first day returns.

The second research hypothesis of this study, which states that IPOs with greater female board presence outperform the IPOs with lower female board presence in a one-year period, is tested with both risk- and market-adjusted methods. The market-adjusted abnormal returns are computed for both groups and for all IPOs, with and without the first-day returns, to achieve the most comprehensive results. In addition, cross-sectional regressions are examined. Interestingly, the Finnish IPOs from the sample performed quite much better than expected from the previous studies. As known, IPOs tend to underperform in the long-run, but this study offers relatively different outcomes when it comes to long-run performance. As for all IPOs, the market-adjusted returns are clearly positive no matter whether the first trading day is taken into account or not. In addition, the

group consisting of IPOs having at least one woman sitting on the board performed slightly better compared to its counterpart giving support to the second research hypothesis.

Risk-adjusted returns follow the same pattern as market-adjusted returns. All three groups achieve positive alpha, yet the "Women"-group performs best. Hence, this again strengthens the belief achieved from previous tests that IPOs having at least one woman on the board perform slightly better than other IPOs in the long-term. While looking at the betas, IPOs having no women on the board are more defensive than IPOs with women on the board. This supports the modern belief that men are actually more risk-averse compared to women (Sila et al., 2015). Once again, while the IPOs with gender-diverse boards earn higher and even statistically significant alphas than their counterpart, the difference between the groups is relatively small (1,13% vs. 0,56%). Even though the difference is close to being statistically significant at the 10% level, due to limitations, it is not. Two-factor regressions continue along the same path, as again "Women"-category beats the "No women"-category with higher alpha in a one-year period. Actually, the difference in mean here is the most precise and most significant (0,509% vs. -0,022%), supporting the second research hypothesis. However, as the results lack statistical significance, the second research hypothesis needs to be rejected too.

Nonetheless, the results of this study need to be critically reviewed as this study has its limitations. First of all, the research sample size is relatively narrow, consisting of only 45 IPOs. However, there is not much to do about it as the Finnish market offers very few IPOs due to its small size. This negatively affects the regressions and their explanation degrees. Luckily, the listing boom has increased the number of IPOs during the last few years, improving the sample quality and quantity for future research. In addition, the data lack dividends because of their complex characteristics. This weakens at least the long-term performance of the IPOs. It can be expected that the IPOs would have performed even better in the long-term if the dividends could have been added to the data.

However, this is pure speculation, and the absence of dividends should not significantly affect the differences between different groups' results.

Furthermore, it is crucial to observe how this study's empirical results align with previous literature. First, the empirical findings strongly support the existence and behavioral explanations on the existence of IPO underpricing. It is still statistically significant in Finnish markets, even though the phenomenon's volume has decreased since the last financial crisis. Still, the underpricing is very comprehensively present. The most common reasons explaining the underpricing in the previous empirical studies have been the underestimation of the demand, a will to boost the demand and even a deliberate underpricing. Next, mirroring the previous empirical work, this study offers contradictory results regarding the long-term underperformance of IPOs. While IPOs are well known for their relatively bad long-run performance compared to the benchmark indexes, this study declines this argument in a one-year period with Finnish IPOs. Even though the Finnish sample did not create any massive excess returns during the one-year period, the sign describing the long-term performance in most scenarios is positive. This refers to the fact that IPOs in Finland might have started to perform better fundamentally during their early stage. However, this study uses a one-year time-period to describe the long-term performance, which is a relatively short length compared to certain other studies' time-periods. Nonetheless, based on previous studies, the underperformance has been significant even in a one-year period, making this finding viable and interesting.

To conclude, it is essential to discuss how this study's findings could motivate further research. First, the significantly good one-year performance of Finnish IPOs could be researched more precisely and with more time-periods. Time-period of 24 and 36 months could be used to confirm the good long-term performance of Finnish IPOs. It may be a great idea to include Scandinavian IPOs to gain some Nordic evidence in the empirical research. As mentioned previously in this study, the underpricing of IPOs has significantly reduced since the latest financial crisis. There is a strong demand for a paper, which empirically testes the IPO underpricing with Finnish IPOs, comparing two time sets: the first

set consisting of IPOs pre-crisis and the second consisting of IPOs post-crisis. Based on this study's findings, there is an excellent opportunity to find a statistically significant difference in these two sets' underpricing.

When it comes to gender diversity, there is undoubtedly an outstanding possibility to bring forth this study's research problems. As this study faces most of its problems with the sample and its size, it could be modified to get more statistically significant results. The IPOs could be collected from a more extended period, and Nordic markets could be used instead of the Finnish market. However, this would not guarantee better results. It would be good to have more evidence on the relation between IPOs performance, both short- and long-term and the board's gender diversity. Unfortunately, this relationship is researched very little in all markets, but the number of papers can be expected to grow as both topics are trendy.

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