

Pricing Errors in Finnish Rights Offerings? - Implications for Market Efficiency in NASDAQ OMX Helsinki

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OBJECTIVES OF THE STUDY

The primary objective of the study is to find whether the subscription rights trade at their fundamental values in Finnish rights offerings. The secondary objectives of the study are to find whether the stock price of the issuing firm correctly adjusts to the de-attachment of the rights on ex-rights day; if there is an announcement date effect on the date of announcement; and how large is the discount to theoretical ex-rights price used in pricing of the offerings.

DATA

The data on rights offerings and historical share prices is sourced from Nasdaq OMXH Stock Exchange. The sample of offerings is downloaded with use of Bloomberg Professional. The sample consists of all executed rights offerings in OMX Helsinki and its predecessor Helsinki Stock Exchange during time period 2003 – 2013. The size of the sample is 45 rights offerings. Characteristics of the rights offerings are picked from respective stock exchange announcements.

FINDINGS OF THE STUDY

The study finds that on average the subscription prices trade at 20,4 percent discount to their fundamental values when measured by daily closing prices. Other findings include the stock prices to underreact to the de-attachment of the rights; the abnormal return on the announcement date to equal -1,3 percent; and the discount to theoretical ex-rights price to equal 36,0 percent. The study does not argue that abnormal gains can be experienced in practice by participating in rights offerings but implies that it could be highly possible.

Keywords Rights offering, rights issue, efficient market hypothesis, subscription price, subscription right, theoretical ex-rights price, announcement date effect

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TUTKIELMAN TAVOITTEET

Tutkielman päätavoite on mitata, määräytyykö merkintäoikeuksien kaupankäyntihinta tehokkaasti OMX Helsingin arvopaperipörssissä. Tutkielma tutkii myös osakekurssin reagointia merkintäoikeuksien irtoamiseen sekä osakeanti-ilmoitukseen. Tutkielma selvittää lisäksi, minkä suuruisella alennuksella osakekurssiin merkintäetuokeusanti toteutetaan.

DATA

Tutkielman data, eli merkintäoikeuksien sekä osakkeiden hinnat on saatu Nasdaq OMX Helsingin arvopaperipörssiltä. Otos toteutetuista merkintäetuokeusanneista on haettu käyttäen Bloomberg Professional – ohjelmaa. Otokseen kuuluvat kaikki OMX Helsingissä ja sen edeltäjässä Helsingin Pörssissä toteutetut merkintäetuokeusannit aikavälillä 2003 – 2013. Merkintäetuokeusantien määrä on 45 kappaletta. Merkintäetuokeusantien lisätiedot on haettu julkisista pörssi-ilmoituksista.

TULOKSET

Tutkielman tulosten mukaan merkintäoikeuksien kaupankäyntihinta on alittanut niiden fundamentaalisen arvon keskimäärin 20,4 prosenttiyksiköllä, päivittäisistä päätöskursseista mitattuna. Tulosten mukaan osakekurssit alireagoivat merkintäoikeuksien irtoamiseen ja reaktio pörssi-ilmoitukseen on suuruudeltaan -1,3 prosenttiyksikköä. Otoksen merkintäetuokeusosakeannit on toteutettu 36,0 prosenttiyksikön alennuksella osakkeen teoreettiseen merkintäoikeuden irtoamisen jälkeiseen arvoon nähden. Tulokset eivät todista markkinoiden tehottomuutta, mutta antavat ymmärtää mahdollisuuden ylisuurien tuottojen tekemiseen olevan suuri.

Avainsanat Merkintäetuokeusanti, markkinoiden tehokkuus, merkintähinta, merkintäoikeus, teoreettinen merkintäoikeuden irtoamisen jälkeinen arvo, julkistusvaikutus

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1 Introduction

1.1 Background and motivation

A common way for publicly listed companies to raise funds in terms of equity is to execute a seasoned equity offering (SEO). An SEO can be described as a sale of additional shares by a company that's stock is already publicly traded; hence, all equity offerings taking place subsequent to an IPO can be regarded as SEOs. In this thesis I study equity offerings that are primarily directed to existing shareholders via subscription rights (rights offerings).

The primary motivation for this study emerges from Ixonos' rights offering executed in November 2013, in which the share price and subscription right price behaved non-rationally during the offering. Moreover, rights offering activity in OMX Helsinki Stock Exchange has increased during the previous year with 6 offerings fully completed and one offering started in December to be completed in January 2014, which makes the subject more topical.

While academic literature contains a number of papers that study the stock performance before and after an equity issue (stock performance studies), relatively small amount of emphasis has been given to the actual offering period and how the securities behave during that time. The efficient market hypothesis implies the security prices to include all relevant public information but even if that being the case, no theory defines the correct level for the subscription price used to purchase the news shares issued.

As it is later pointed out, subscription price of rights offerings is commonly set to level significantly lower than the theoretical ex-rights price in order to improve the probability of the offering to go through. One of the aims of this study is to find out what level of discount is used in practice in defining the subscription price and whether the stock price adjusts correctly to the de-attachment of subscription rights. The study also shows what kind of immediate effect the announcement has on the stock price.

The main purpose of the study is to investigate whether the OMX Helsinki Stock Exchange works efficiently in pricing of the subscription rights. Efficient market hypothesis states that the acts of market participants ensure that no arbitrage opportunities exists during rights offerings. If the findings indicate the subscription rights to trade at a significant discount or premium to share price, we must question the market efficiency in this security class.

The main motivation for the study is to investigate a topical issue that has been covered fairly little in recent academic studies and the results can be used in another paper to study possible arbitrage opportunities.

1.2 Research questions

The thesis studies how the stock price and subscription right price behave during a rights offering and whether the market works efficiently in determining the value of subscription rights. Moreover, the empiric data indicates how the subscription price is set in practice and how the announcement of an offering affects the stock price on the announcement date. The research questions are summarized below.

- Q₁: How large is the discount to theoretical ex-rights price of the subscription price?
- Q₂: How large is the announcement date effect on the stock price?
- Q₃: Does the stock price equal the theoretical ex-rights price at the closing of Stock Exchange on the ex-rights day?
- Q₄: Does the OMX Helsinki Stock Exchange work efficiently in determining the value of subscription rights?

1.3 Contribution to existing literature

Academic literature widely used in business schools and universities take the approach where certain parameters such as the subscription price are simply “given”. This study presents empiric results of how decisions related to rights offerings are done in practice by finance professionals.

The study brings added value to existing literature by presenting results of the determination of prices of subscription rights; with the empiric data showing how the market prices can differ significantly from fundamental values. Secondly, the study also presents results of how the subscription price in a rights offering is defined in practice by Finnish companies and their financial advisors. Thirdly, the announcement date effect is illustrated with a Finnish sample to strengthen the theory that the market considers a rights offering to include new negative information about the issuing company’s future performance. Finally, the study presents results of the market’s underreaction to the de-attachment of subscription rights, which is not largely covered in studies using the OMX Helsinki Stock Exchange as its source of data.

1.4 Results

This study shows that on average the discount to theoretical ex-right price of subscription prices has been 36 percent during 2003 – 2013, with the discount increasing in the aftermath of financial crisis. The study also implies that the nature of the offering can determine the level of discount, with offerings to decrease leverage and pay off debts having higher discount levels than offerings used to finance growth and investments.

Secondly, the study finds the rights offerings performed in OMXH Stock Exchange to experience abnormal returns equaling -1,9 percent on average on the announcement date. The study does not suggest that the announcement effect should be different in the so-called *balance sheet offerings* and *growth offerings* but it shows that the abnormal return has been 1,3 percent more negative (not statistically significant) in balance sheet offerings during the study period 2003 – 2013.

Thirdly, the study finds that the stock market has underreacted to the de-attachments of subscription rights. While Fama (1998) argues that overreactions and underreactions are equally common on the market, the data does, however provide contradicting results; in 27 instances the stock price underreacted to the de-attachment of subscription rights, while in only 9 instances the market overreacted.

Finally, the study finds results that the market prices of subscription rights differ significantly from their fundamental values in OMXH Stock Exchange, with the median discount being 4,1 percent (average 20,4 percent) when measured with daily closing prices. Further analysis finds that the number of new shares issued correlates negatively with premium to fundamental value and offerings where the term ratio is over 2:1 the discounts are extremely high.

1.5 Limitations of the study

The thesis does not take a stand for or against arguments of market timing, hubris or other theories often presented in the behavioral corporate finance. To simplify things, the thesis treats all rights offerings of the sample equally; they are occurring to finance new investments or to strengthen the balance sheet of the issuing firm unless otherwise stated.

When investigating the possible difference between the market prices of subscription rights and their theoretical values (as defined later in the study) the thesis treats the effective stock price as the

fundamental value of the stock; if both the value of the right and value of the share are put under question, no meaningful results can be found.

This thesis does not take into account possible transaction costs or tax liabilities that could have had an impact on investor behavior. Currently the Finnish tax legislation treats profits made with sale of shares or subscription rights as taxable capital gains that are taxed at 30 – 32 percent rate depending on the size of the profit¹, however, these rates have been subject to various adjustments during the last decade. Issue-sensitive, it is possible that investors have been obliged to pay a transaction fee for share subscriptions, currently all transaction fees are commonly paid by the issuing company. Later in the study I will treat all subscriptions as free-of-cots transactions.

The taxation of capital gains can also differ depending on the duration an investor has owned the shares that she decides to sell. The legislation regarding shares subscribed in rights offerings treats primary subscriptions and secondary subscriptions differently but this is ignored in the study in order to simplify the findings.

The study does not argue whether or not arbitrageurs can lock into risk-free positions to gain abnormal profits during rights offerings due to issues related to transaction costs or tax liabilities. Arbitrage is defined as the simultaneous purchase and sale of the same or essentially similar security for advantageously different prices (Sharpe and Alexander, 1990) without a need to bear any long run fundamental risk (Shleifer and Vishny, 1997). With the short sale of subscription rights being prohibited in Finland, this study does not take a stand on whether pure arbitrage opportunities exist in the OMX Helsinki that involve the use of subscription rights. Also, the short selling of actual shares is rather uncommon in Finland and is impossible with majority of Finnish retail banks, potentially increasing the costs of arbitrage attempts in OMX Helsinki Stock Exchange. The arbitrage issue should be studied separately in a more advanced research paper.

1.6 Structure of the study

The thesis is structured as follows. Second chapter presents background information about seasoned equity offerings with the spotlight being on rights offerings as well as the efficient market hypothesis, its different forms, critique and acclaims. Third chapter presents the hypotheses that are utilized in the study.

¹ The Finnish Tax Administration, www.vero.fi

Fourth chapter presents the data used to conduct the study. Fifth chapter presents the results from the study. Sixth chapter comprises of discussion of the results and references are listed in chapter seven. Chapter eight includes the appendices.

2 Background and methodology

In this chapter I will introduce the reader to two fields that are essential to understand regarding the study: the structure of a rights offering and the definition and hypotheses of market efficiency, as it is understood in economic literacy. Other types of equity offerings are also given a gentle glance in order to better understand the nature of rights offerings.

A number of economists have studied the effect of an equity offering on long-term stock price performance. My primary point of concentration is not on the stock performance before or after the offering, instead the purpose of the thesis is to investigate if NASDAQ OMX Helsinki Stock Exchange (OMXH) works efficiently during the rights offering in pricing the shares and subscription rights.

2.1 Raising of equity capital

It is widely understood in the financial literacy that publicly listed companies finance their investments with either internally generated funds or use external financing by issuing debt or equity. The choice of financing follows a so called pecking order theory, which states that firms tend to rely on internally generated cash as their chief source of financing and tend to use equity offerings as their last resort (Donaldson 1961, Lintner 1960 and Sametz 1964). One leading argument for the pecking order is that the companies wish to avoid the adverse selection problem that an equity offering creates between the investors and the management and which leads to higher financing costs (Myers, 1984).

Other arguments include the Price Pressure Hypothesis, which states that a company's stock price is likely to decline after it sells more equity to the public, since the demand curve for the company's shares is not perfectly elastic but instead downward sloping, which is an indication of a market inefficiency (Scholes, 1972). On the other hand, there is little sign that the extent of the price fall increases with the size of the offering (Asquith and Mullins, 1986), which stands against Scholes' argument.

The alternative view generally assumes markets to be efficient and demand curves for securities to be perfectly elastic or flat. The elasticity stems from the assumption that very close substitutes exist for all traded risky securities (Marsh, 1979) and thus the prices of securities are determined solely by the risk and expected return associated with the company's future cash flows. If the projections for future cash flows do not change, also the share prices should not decline after an equity offering announcement.

The behavioral school of economists and the supporters of the Information Effect Hypothesis argue that the offering itself is a signal of stock overpricing and that managers are bound to misuse asymmetrical information in their favor by selling overpriced stock to investors (Myers and Majluf, 1994), which leads to adverse selection and is the primary cause for the share price decline. Brealey, Myers and Allen (2006) also suggest that the share price falls because the equity offering may indicate that the management's view on the company's ability to generate cash flow has been too optimistic in the past, and thus the firm needs cash from the market.

Most financial economists now interpret the stock price drop on equity offering announcements as an information effect and not a result of the additional supply (Brealey, Myers and Allen, 2006). Evidence and statistics can be found to back up the supporters of both schools of economists but in the following sections I will take the safe path and stick with the argument that an equity offering does not contain information that should drive the stock price down nor will I trust to the Price Pressure Hypothesis.

In the following sections different types of alternatives for external equity financing are described with the spotlight being on rights offerings. Afterwards the efficient market hypothesis is portrayed.

2.1.1 Types of seasoned equity offerings

Once a company has executed an initial public offering (IPO) its common stock can be traded on a Stock Exchange. The company can also issue more equity if it wishes to, and in fact Brealey et al. (2006) point out that most of the time companies that have gone public come back to shareholders' pockets also in the future. A common way for companies to raise funds in terms of equity is to execute a seasoned equity offering (SEO). An SEO can be described as a sale of additional shares by a company that's stock is already publicly traded; hence, all equity offerings taking place subsequent to an IPO can be regarded as SEOs. Gao and Ritter (2007) state that there are three issue types commonly used; accelerated offerings (further divided to accelerated bookbuilt offerings and bought deals), fully marketed offerings and rights

offerings. In the thesis I concentrate on equity offerings that are primarily directed to existing shareholders via coupons, the rights offerings.

Figure 1:
Types of Seasoned Equity Offerings

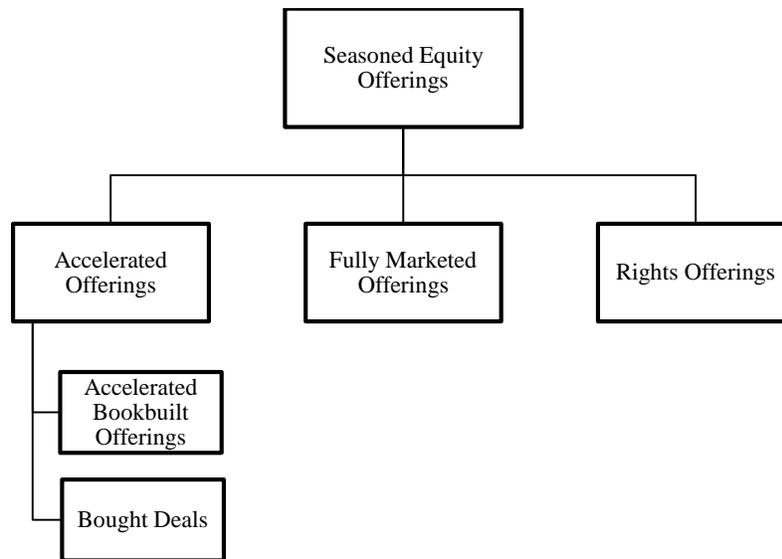


Figure 1 presents the types of SEOs in accordance to Gao and Ritter (2007). In the following sections the characteristics of different offering types are described, with focus being on rights offerings.

2.1.2 Accelerated offerings

Accelerated offerings are commonly shelf registered offers – i.e. the prospectus of the offering has been earlier accepted by the financial administrator – and thus, they are faster to accomplish. In a bought deal the issuing company announces the amount of new shares it wishes to sell and investment banks make their respective bids for the shares, which they plan to sell to investors afterwards, usually within the next 24 hours (Gao and Ritter, 2007). In an accelerated bookbuilt offering the investment banks do not make straightforward bids but specify a gross spread they wish to have for taking the role of underwriter in the offering. No roadshows are performed in accelerated offerings and the underwriting procedure is typically completed in 48 hours (Gao and Ritter, 2007).

2.1.3 Fully marketed offerings

Fully marketed offerings are in many ways similar to IPOs with the firm issuing primary shares and existing shareholders issuing secondary shares to public. The investment bank performs a due diligence thus certifying the quality of the company and writes a prospectus for the offering. Also a roadshow is organized in order to market the offering and to receive investor feedback about the price they are willing to offer for the stock. In the end the investment bank (or syndicate of investment banks) distributes the shares to public.

2.1.4 Rights offerings

A rights offering is a type of SEO where existing shareholders are given call option type warrants, or subscription rights, with a short maturity on a pro rata basis. The shareholders can either exercise their subscription rights to buy new shares and maintain their proportion of ownership for a given subscription price, or they can sell all or part of their subscription rights in the market before they expire. Effectively, the existing shareholders are able to fully capture the value from the rights by either exercising or selling; they have the right of first refusal to all new shares issued.

If a rights offering is not fully subscribed, the shares that are left unsubscribed are offered to shareholders who are willing to subscribe more shares than their pro rata share of the offering, phenomena called as overallotment option (Eckbo and Masulis, 1995).

Rights offerings have typically lower issue costs than public offerings, Smith (1977) and Eckbo and Masulis (1995) illustrate that the direct flotation costs of public underwritten offerings are over 6 percent of offering proceeds, but are only 4 percent for standby rights offerings and 2 percent for pure rights offerings. According to Kothare (1997) rights offerings lead to a more concentrated ownership structure while public issues result in a more diffuse share ownership. He indicates that rights offerings impose a remarkable indirect cost for issuers by reducing the liquidity of the company's stock, while public offerings actually increase the stock's liquidity measured in terms of bid-ask spreads.

Rights offerings are a popular measure to raise equity finance in European countries, while in the U.S. they are more uncommon despite their lower issuance costs. Less than 10 percent of U.S. companies issued equity directly to existing shareholders in time period 1973–1986 (Kothare, 1997). U.S. public policy promotes passive and diffuse shareholdings and the resulting increase in liquidity over more active

and concentrated ownership (Bhide, 1993). In Europe, on the other hand, seasoned offerings of common stock must generally be sold through rights offerings in order to protect existing shareholders (Brealey, Myers and Allen, 2006).

Generally, a rights offering is structured as follows; firstly, the issuing company has to decide on the amount of cash it wishes to raise; secondly, it has to decide on the amount of shares it issues (e.g. one new share for every existing five shares, or 1:5); and thirdly, the subscription price has to be decided on. The first issue is often solved within the company and the two latter are commonly solved with the advice of an investment bank (Cornelli and Goldreich, 2003).

The amount of cash to be raised depends on the financing needs of the company. Commonly, equity offerings can be divided into two different types; rescue issues, where the issuing company is having problems in serving its debt; or offerings to finance growth, where the issuing company needs cash to finance its projected investments (Masulis and Korwar, 1986). Therefore, the issuing company normally decides on the amount of cash raised without the help of the investment bank.

The second issue can be more problematic than what it sounds, since the amount of shares to be issued depends on both the first and the third matter. That is because the company's cash requirement is satisfied by the following equation,

Equation 1:

Gross amount of cash raised in the offering

$$C = X_S * N$$

where C is the amount of cash raised, X_S is the subscription price and N is the number of new shares issued. While at this point C can be considered to be constant, X_S on the other hand can be considered as variable, since it needs to be daily adjusted with the share price of the issuing company as later discussed. Due to these above-mentioned circumstances the amount of new shares to be issued and the subscription price are typically decided and approved by the board only just before the stock market announcement. Investment bank's fees are deducted from the gross proceeds of the offering.

2.1.5 Pricing of rights offerings

Although the setting of the subscription price is a major decision for a manager planning a rights offering, the pricing itself is not comprehensively covered in academic literature. Financial managers have long

understood that for a rights offering to be successful, the subscription price should be set below the current market price but only at the risk that significant underpricing may affect adversely the price performance of their company's stock following the issue (Bacon, 1972). Hietala and Löyttyniemi (1991) find the discount to equal 50,7% for Finnish companies during 1975 – 1988.

In practice, the subscription price is always set substantially below the current share price as well as below the theoretical ex-rights price (TERP) (Van Horne, 1971). The reason for this is that should the market price of the share drop below the subscription price, a rational investor would be unwilling to exercise her subscription rights (she would be better off buying for market price). TERP is defined as the market price that the stock will theoretically have after the subscription rights have de-attached from the existing shares, and it is defined as follows:

Equation 2:

Theoretical ex-rights price

$$TERP = \frac{P_S * n + X_S * N}{n + N}$$

where P_S stands for share price before the issue announcement, n is equal to the number of shares before the issue, X_S is the subscription price and N is the number of new shares to be issued.

In theory, the issuer could increase the subscription price discount until the offering would be guaranteed to be fully subscribed. This would, however, lead to a larger number of shares to be issued in order to raise the desired amount of cash and it would decrease the firm's earnings per share ratio, which could impact negatively on the company's value in the eyes of the investor community (Van Horne, 1971). In practice, the price is set with the guidance of an investment bank, which has a better understanding of the investor appetite and demand (Benveniste and Spindt, 1989). The issuer can also agree with the investment bank on an underwriting contract, where the investment bank will pledge to subscribe all unsubscribed shares for a fee.

The price of a subscription right is determined in the market by buyers and sellers but mathematically it should always equal the following equation (Bacon, 1972):

Equation 3:**Value of a right**

$$V = P_S - X_S$$

where V is the value of a right, P_S is the share price and X_S is the subscription price. Thus, the value of a right is higher when the subscription price is set low and thus underpricing is large; and the value of a right decreases when the share price falls in the market. If the share price declines below the subscription price the right's value is always zero, because any investor can acquire an actual share for a lower price from the market. Therefore, it is critical to set the subscription price on a level that enables the offering to succeed.

The value of a right can also be calculated with the familiar option pricing model introduced by Myron Scholes and Fischer Black in their paper *The Pricing of Options and Corporate Liabilities* published in 1973. The value of a right in terms of Black & Scholes parameters is defined as follows,

Equation 4:**Black & Scholes equation**

$$V(S, t) = N(d_1)S - N(d_2)Ke^{-r(T-t)}$$

$$d_1 = \frac{1}{\sigma\sqrt{T-t}} \quad d_2 = d_1 - \sigma\sqrt{T-t}$$

where $V(S, t)$ is the value of the right as a function of time and share price, S is the share price, $N(\cdot)$ is the cumulative distribution function of the standard normal distribution, K is the subscription price, r is the risk-free rate, σ is the volatility of the returns of the underlying asset and $T-t$ is the time to expiration. Wahlroos and Berglund (1985) tested the efficiency of Helsinki Stock Exchange (HESE) with the use of the Black & Scholes equation to value rights and found that the market was working efficiently even if a dealer would have been able to avoid all transaction costs. If the dealer would have been able to also hedge her position (short selling was prohibited in HESE) she could have experienced abnormal returns depending on the level of transaction costs.

In this study the value of a right is estimated with the use of Equation 3, as $T-t$ – or the time to expiration – is very short, only a few days, for the subscription rights; the level of volatility and risk-free rate become

statistically negligible when the time to expiration is very short and the option is well in the money (Brealey et al., 2006).

In the following section the alternatives for existing shareholders of the company executing a rights offering are described and illustrated.

2.1.6 Shareholder's alternatives in a rights offering

In order to illustrate a rights offering from the shareholders' point of view I will use a simple example; Company X has 10 million shares outstanding with a share price of 5 euros, thus its market value being 50 million euros. The company wishes to make an investment worth 10 million euros and decides to finance the investment with a rights offering on the following terms: one new share for four old shares with a 4 euro subscription price.

Exhibit 1:**Shareholder's alternatives in a rights offering**

Investor	A	B	C
N. of shares owned before issue	10000	10000	10000
Share price (€)	5,00	5,00	5,00
Value of ownership before issue (€)	50000	50000	50000
Issue ratio	1:4	1:4	1:4
N. of new shares issued	2500	2500	2500
Subscription price (€)	4,00	4,00	4,00
Value of a right (€)	0,80	0,80	0,80
Shares subscribed	2500	0	0
Proceeds (€)	-10000	0	0
Subscription rights sold	0	2500	0
Proceeds (€)	0	2000	0
N. of shares owned post issue	12500	10000	10000
Theoretical ex-rights price (€)	4,80	4,80	4,80
Value of ownership post issue (€)	60000	48000	48000
Total proceeds (€)	-10000	2000	0
Total wealth (€)	50000	50000	48000

Exhibit 1 illustrates the alternatives for an existing shareholder of the company raising cash with a rights offering. In the example there are three shareholders who each own 10 thousand shares, or 0,10 percent of Company X. The shareholders' wealth and share of ownership depends on how she acts in the offering as will be explained below.

In principal, the shareholder can exercise her subscription rights to buy new shares (Investor A), she can opt to sell her rights in the market (Investor B) or she can do nothing and remain passive (Investor C). The exhibit shows that shareholders A and B end up in the same situation in terms of wealth, while the passive shareholder C ends up worse off than the other two because she loses the proceeds from selling her rights. The other non-subscribing shareholder B gains 2,000 euros from selling her rights to another investor.

Also, one does not have to exercise or sell all of her rights in an issue. Any combination of subscriptions and sales ends up in the same total wealth of 50,000 euros; the key is to be active and not to let one's rights to expire without selling them.

Exhibit 2:

Effect on shareholder's wealth when underpricing increases

Investor	A	B	C
N. of shares owned before issue	10000	10000	10000
Share price (€)	5,00	5,00	5,00
Value of ownership before issue (€)	50000	50000	50000
Issue ratio	1:3	1:3	1:3
N. of rights allocated	3333	3333	3333
Subscription price (€)	3,00	3,00	3,00
Value of a right (€)	1,50	1,50	1,50
Shares subscribed	3333	0	0
Proceeds (€)	-10000	0	0
Subscription rights sold	0	3333	0
Proceeds (€)	0	5000	0
N. of shares owned post issue	13333	10000	10000
Theoretical ex-rights price (€)	4,50	4,50	4,50
Value of ownership post issue (€)	60000	45000	45000
Total proceeds (€)	-10000	5000	0
Total wealth (€)	50000	50000	45000

It can be argued that a larger underpricing can increase the probability of a rights offering to be fully subscribed. Since all the rights are first allocated to existing shareholders, they have the so called right of first refusal to the offering, i.e. if all shareholders exercise their rights there is no dilution in ownership and no gain at any other's expense. If we accept that some investors can be passive and withhold from subscribing or selling their warrants the offering may not succeed. However, with increasing the gap between the share price and subscription price the company can improve the chances for a shareholder to i) exercise her rights and ii) sell her warrants in the secondary market.

Exhibit 2 illustrates what happens when the underpricing is larger. Company X decides with an investment bank that it should offer shares with a higher discount in order to succeed in the offering. The

subscription price is set at 3,00 euros (discount to market price is now 30 percent); meaning that a larger amount of shares has to be issued in order to raise 10 million euros than in the first scenario. It is clear that the value of a right increases (see Equation 3), thus improving the proceeds of Shareholder B who sells her coupons in the market. TERP decreases due to the lower subscription price (see Equation 2) but the total wealth of investors A and B does not change from Exhibit 1. Now, however, the passive Investor C takes even larger losses than in the first example (-5,000 euros vs. -2,000 euros).

This illustrates how the issuing company can increase the probability of a successful rights offering via larger underpricing; when underpricing increases, the passive shareholders will have a greater incentive to act. Brealey et al. (2006) argue that as long as the issuing company successfully sells the new shares, the subscription price is irrelevant. The argument is technically true but it does not make the decision about the level of underpricing irrelevant, as pointed out in the previous example.

Subscription price is not the only factor that dictates whether a rights offering will be successful. Bacon (1972) argues that many factors influence the success of a rights offering but he also found a statistically significant correlation between the magnitude of underpricing and the success rate.

2.1.7 Dilution of ownership in a rights offering

As mentioned before, a rights offering is primarily directed to existing shareholders and they have the right of first refusal to the new shares offered by the issuing company. Dilution of ownership is defined here as the reduction in proportion of ownership in the company caused by the sale of additional shares. In addition to equity issues, dilution occurs also when debt is converted to equity or when e.g. key employees exercise their stock options thus increasing the number of shares outstanding. When the number of shares outstanding increases, each existing shareholder will own a smaller proportion of the total stock, and thus a smaller right to the company's earnings and assets. Dilution is determined as:

Equation 5:

Shareholder's dilution of ownership

$$Dilution\ percent = \left(\frac{n_s + N_s / n + N}{n_s / n} - 1 \right) * 100percent$$

where S is the ownership of shares a given shareholder owns in the company.

Exhibit 3:**Shareholders' dilution of ownership in a rights offering**

Investor	A	B	C
N. of shares outstanding before issue	10000000		
N. of shares owned before issue	10000	10000	10000
Share of common stock before issue	0,10 %	0,10 %	0,10 %
N. of new shares	2500000		
N. of shares outstanding post issue	12500000	0	0
N. of shares owned post issue	12500	10000	10000
Share of common stock post issue	0,10 %	0,08 %	0,08 %
Dilution	0 %	-20 %	-20 %

Exhibit 3 illustrates the dilution of ownership effect that a rights offering creates for the shareholders A, B and C who each own 10 thousand shares, or 0,10 percent of Company X. Investor A who uses all of her subscription rights suffers no dilution and maintains her share of common stock after the issue with buying 2,500 new shares for 10,000 euros. Non-subscribing investors B and C both own 0,08 percent of common stock after the issue with their ownership diluting by 20 percent, Investor B, however, is compensated for the dilution with proceeds from the sale of her subscription rights, unless, of course, she encounters downward pressure pressures on price during the subscription period (Bacon 1972).

2.1.8 Announcement date effect

The announcement date effect is the impact a rights offering announcement has on the stock price of the issuing company on the date it makes the oncoming offering public. The phenomenon has received much attention from the academic literature and it has been explained with various different theories relating to classical as well as behavioral financial hypotheses.

A study conducted shows that there is a remarkable drop in the market price associated with the announcement of a rights offering (Nelson, 1965) but due to various limitations regarding the ignorance towards other simultaneous announcements (e.g. profit warnings) and the stock's market correlation they were later challenged by economists. A further study by White and Lusztig (1980) stated that the hypothesis that on average investors believe that negative information is associated in a rights offering cannot be rejected.

More recent studies give more indications of negative stock performance following the announcement. Korwar (1983) found that the drop accounts for 2,5 percent on the announcement date in a sample of 424 equity issues. Asquith and Mullins (1986) found the decrease in market value to account 2,7 percent for all industrial issues and 0,9 percent for all utility issues in their sample (both statistically significant) and point out that in four-out-of-five for industrial issues and in two-out-of-three utility issues the impact was negative.

One of the explanations of classical financial literature for the announcement date effect is that an equity offering decreases the leverage of the firm, which will change the issuing firm's valuation in the eyes of investors (Masulis and Korwar, 1986). Studies of Masulis (1980), Vermaelen (1981) and Asquith and Mullins (1986) find an inverse relationship between the number of outstanding shares and stock price, in the sense that share repurchase announcements have a positive effect on stock price while common stock offerings have a negative one. Despite the evidence, Mikkelson and Partch (1985) argue that while we can accept the presented evidence from capital structure changes, our understanding of the determinants of the price effect is still quite limited.

Behavioral school of financial economists considers other factors than capital structure changes or shifts in costs of financing to be the determinants of the announcement date effect. Many of them argue that the changes in management's shareholdings impacts on stock prices because the investors assume the managers to have better information of the firm than the market has. According to this hypothesis, a stock offering includes negative information because the management's proportion of shares declines (although not necessary in a rights offering). Jensen and Meckling (1976) among others argue that a decrease (increase) in the ownership of the management is negative (positive) information since it increases (decreases) the potential conflicts of interest between the managers and shareholders.

The adverse selection model assumes that the managers are willing to issue new shares when they consider their company's stock to be overvalued, thus, doing a favor to existing shareholders in expense of new ones (Myers and Majluf, 1984). If new shares are issued when the company is "undervalued", existing shareholders lose in the offering and thus managers are unwilling to sell new shares. Due to this adverse selection, announcements of equity issues are argued to have a negative impact on stock price.

All of the above-described theories predict an equity offering to include negative information of the issuing company and its stock price to drop after the offering announcement.

2.1.9 What happens to share price during a rights offering?

As cited previously, announcements of equity offerings can have a negative impact on stock price due to various explanations. This section describes what should happen to the share price after the possible announcement date effect has passed and the rights offering process continues. After the stock market announcement has been given, the existing shares still trade “rights-on”, meaning that buying the share will give the purchaser the right to participate to the oncoming offering. On a pre-determined day the rights are eventually separated from the old shares and they start to trade as independent call option type of securities.

After the rights are no longer attached to the existing shares, the shares start to trade “ex-rights” or without the rights. The ex-rights share price should thus be lower than on-rights price, as long as the subscription price is lower than the share price, as seen in Equation 6,

Equation 6

Ex-rights share price

$$P_{Ex} = P_r - V$$

where P_{Ex} is the ex-rights price, P_r is the rights-on price of the share and V is equal to the value of a right (see Equation 3).

2.1.10 Different types of rights offerings

There are a few common types of rights offerings a company can execute with the help of an investment bank. When the issuing company signs a ‘standby underwriting’ contract with the investment bank the underwriter agrees to purchase all the remaining shares it fails to sell to the public for their subscription price. ‘Best efforts’ offering is a rights offering where the issuing company bears all the risk of a failure while the investment bank acts as a plain marketing agent for the issue. In a ‘firm commitment’ offering the underwriter acts as the dealer and guarantees to purchase all unsubscribed shares for their market price, thus being the riskiest option for the underwriter.

2.2 Efficient Market Hypothesis

In this section a popular theory of market efficiency is described and evidence shown for and against its presumptions. Since this paper studies whether subscription rights are efficiently priced in OMXH, it is important to understand the framework of market efficiency.

The primary role of the capital market is the allocation of ownership of the economy's capital stock; the ideal is a market in which prices provide accurate signals for resource allocation (Fama, 1970). The efficient market hypothesis (EMH) is one of the cornerstones of finance literature and it argues that financial markets reflect all information available and thus it is impossible to consistently find under or overpriced securities that would lead to excess returns over the market portfolio (Jensen, 1968).

The EMH states that the market always has rational expectations and on average the investor population is correct, although it accepts that individual agents can be wrong in their expectations. The "all information available" expression means that the market will react without delay to new information that will be incorporated to prices (Malkiel, 2003) and while individuals may overreact or underreact to new information, the market as a whole will react correctly (Fama, 1998). The EMH model was widely supported by the previous generation (Fama, 1970) but by the start of the new century its intellectual dominance has become far less universal among economists (Malkiel, 2003).

The EMH recognizes three levels of efficiency; the weak-form, semi-strong-form and strong-form, with each forms having their own point of views on how the market works or how securities are priced. In the following sections the different forms of efficiency are described.

2.2.1 Weak-form efficiency

The weak-form efficiency states that the market reflects that investors cannot consistently achieve abnormal returns by using historical data or share prices; the prices of securities do not follow any identifiable patters from past behavior (Fama, 1970). Since the prices do not follow any patterns it is impossible to predict in which direction a security will move; it follows a random walk. The weak-form efficiency does not argue the prices to be correct but it implies that investors cannot consistently benefit from the possible mispricing. When the market is efficient in the weak-form, it is not possible to consistently profit from anomalies such as "The January Effect" which argues the stock prices to experience from abnormal performance in January (De Bondt and Thaler, 1987). Rozeff and Kinney

(1976) found that the average monthly return of share prices in New York Stock Exchange during 1904–1974 accounted for 3,5 percent while other months averaged about 0,5 percent. After receiving a large public attention, the January Effect has diminished (Malkiel, 2003), implying that market can repair itself.

2.2.2 Semi-strong-form efficiency

The semi-strong-form efficiency is stricter than the weak-form efficiency, when the market efficiency is semi-strong the security prices react to new public information without delay and unbiasedly, thus making it impossible to systemically benefit from the use of such an information (Fama, Fisher, Jensen and Roll, 1969). When the market is efficient in the semi-strong-form, it is not possible to make systematic abnormal returns with e.g. fast reactions to public company announcements such as profit warnings.

2.2.3 Strong-form efficiency

The strong-form efficiency is the ultimate form of market efficiency; it argues that in addition to all public information, the market prices include also all private information including insider information. The fact that some investors may have experienced abnormal returns for many consequent years does not, however, overrule the strong-form efficiency since the normal distribution of returns predicts a small right “tail”, where a few investors can exist due to pure chance.

2.2.4 Conditions that are consistent with the EMH

Market conditions can have an effect on the adjustment of stock prices. Fama (1970) lists three conditions that are consistent with capital market efficiency but are not necessary pre-requisites for capital market efficiency.

Firstly, the absence of transaction costs in trading of securities is seen as a benefit. This can be fairly easy to argue, since the transaction costs can be considered to have an inverse relationship with investor’s willingness to trade; when costs are smaller, the investor’s gains (losses) are larger (smaller).

Secondly, if all available information is available without a cost to all market participants, it can be argued the share prices to better reflect their fundamental values; if the costs from obtaining information

were very high, a smaller investor population would be willing to access that information and thus, there would be a larger number of uninformed investors.

Thirdly, if all market participants agree on the effect of current information for the current share price, it can be argued the share price to fully reflect all available information.

Such a market where all the three conditions are met is very hard to find as in practice all markets have their share of frictions (Fama, 1970). However, Fama states that while the violations of the three can potentially create inefficiencies, they are not necessarily sources of inefficiency; if transactions costs are high the number of transactions can be smaller but actual transactions can still be made at the price that reflects all available information. Secondly, if “sufficient” number of investors have access to available information the prices can be set correctly also in practice, as proven by Fama, Fisher, Jensen and Roll (1969). Thirdly, disagreements about the implications of available information on stock price do not create inefficiency, if the investors cannot consistently achieve abnormal returns by making more accurate evaluations than others; which is the case according to Jensen (1968).

2.2.5 Evidence to back up the EMH

Important evidence for the market efficiency was collected in 1960s by acclaimed economists, including Eugene F. Fama, Michael Jensen and Lawrence Fisher. While the EMH’s proposition that market prices equal fundamental values is not typically testable, the predictability of stock prices can be tested. Fama (1965) found that serial correlations of price differences converge to zero and that sequences of consecutive positive (or negative) days are similar as expected in random sequences; implying non-predictability in share price movements.

Whether new public information can be used to gain abnormal returns can also be tested by event studies of corporate announcements. Fama, Fisher, Jensen and Roll (1969) found that on average, investors do not overreact or underreact to new information, such as a stock split; instead, the announcement effect occurs without delay. Findings of Fama et al. shows that it is not possible to experience abnormal returns with trading strategies incorporated to the use of newly issued public information. This implies that the market is efficient at least in semi-strong-form.

The third classical result to back up the EMH was found by studying mutual fund performance and whether it would be possible for fund managers to achieve abnormal returns year to year. A study done

for the performance of 115 mutual funds during 1945-1964 points out that the fund managers indeed cannot make abnormal returns for their clients systematically, with the average alpha being negative after as well as before the fund expenses (Jensen, 1968), meaning that, on average, the fund managers performed worse off than the market. Similar results have been witnessed in numerous studies after Jensen's findings.

Equation 7

Jensen's alpha

$$\alpha = r - (r_f + \beta(r_M - r_f))$$

Equation 7 illustrates abnormal performance, measured by α . r stands for actual return, r_f for risk-free rate, β for the security's beta and r_M for the return of market portfolio.

2.2.6 Evidence against the EMH

The behavioral school of financial economists has presented results to refute the claims of market efficiency and these days many economists and statisticians believe that stock prices are at least partially predictable (Malkiel, 2003). The expression "behavioral" refers to psychological and behavioral elements of stock price determination that are discussed in the following paragraphs.

The claim of non-predictability is challenged by Lo and MacKinlay (1999), whose study finds non-zero short-run correlations as well as existence of "too many" successive moves in the same direction by a stock price. Their results seem to reject the hypothesis of stock prices following a true random walk (Malkiel, 2003).

Short-run momentums of stock prices are consistent with psychological feedback mechanisms such as the "bandwagon effect" in which individuals are captured by the psychological contagion of e.g. a boom in stock prices (Shiller, 2000). Another theory for short-run momentums is investors' tendency to underreact to new information (Abarbanell and Bernard, 1992) that extends the period a share price reacts to the news. Underreaction to new information is strictly against the semi-strong-form of market efficiency. However, Malkiel (2003) claims it is important to distinguish statistical significance from economical significance; can short-run momentums utilized to achieve abnormal returns? According to another study the transaction costs of momentum riders far exceed the benefits of their behavior (Odean, 1999).

In addition to short-run momentums, share prices seem to experience long-run reversals, or past losers tend to outperform the market in the future and past winners tend to underperform (DeBondt and Thaler, 1985). One explanation for long-run reversals is that waves of optimism and pessimism direct the investors, and make share prices to deviate significantly from their fundamental values due to overreaction, before a reversion to mean that is consistent with Kahneman's and Tversky's (1982) behavioral theory. Theory that overreactions are guiding the market would put EMH in jeopardy but Fama (1998) argues the underreactions to be as common as their counterparts. Momentum effect, which shows stocks with high returns over past twelve months to experience high returns for the following three to six months (Jegadeesh and Titman, 1993) echoes Fama's thoughts.

A large number of patterns that are argued to be predictable are based on company characteristics and different valuation parameters (Malkiel, 2003). One characteristic that has been argued to predict performance is firm size. Keim (1983) found that small stocks have outperformed large stocks by over 1 percent annually and also Fama and French (1993) found results for small firms outperforming the large ones. In the same study, however, the economists argued that the higher returns were outcome of a higher risk; size is a risk-factor not captured by the capital asset pricing model (CAPM) and thus the results do not deny existence of market efficiency.

Equation 8:

Capital asset pricing model

$$E(r) = r_f + \beta(r_M - r_f)$$

CAPM is explained in Equation 8, where $E(r)$ stands for expected return of a security, r_f stands for risk-free rate, β stands for the security beta and r_M stands for the return of market portfolio.

Number of studies divide firms into growth stocks and value stocks (Malkiel, 2003) by their price-to-earnings multiples and book value-to-market value multiples. The studies imply that a portfolio, which consists of value stocks tends to outperform a portfolio of growth stocks (Nicholson 1960, Ball 1978 and Basu 1983). Fama and French (1993) take a similar position with arguing that firm size and book value-to-market value can be used to predict future returns. After these findings it seems feasible to deny semi-strong-form of market efficiency but by challenging the efficiency of the actual risk-return model, or the CAPM, the EMH can still hold its ground if the beta does not measure risk correctly (Lakonishok, Shleifer and Vishny, 1994). Fama and French (1993) argue that book value-to-market value and size are

risk factors themselves and should be included in the risk-return model when anomalies are searched after.

Equation 9:

Fama-French three-factor model

$$E(r) = r_f + \beta(r_M - r_f) + \beta_s * SMB + \beta_v * HML$$

Equation 9 illustrates the model presented by Fama and French, where $E(r)$ is the expected return of the portfolio, β_s is beta to capture size-effect, β_v is beta to capture value-effect, SMB is the excess return of “Small (market capitalization) Minus Big” portfolio and HML is the excess return of “High (book value-to-market value) Minus Low” portfolio. Fama and French (1993) found that abnormal returns from the three-factor model were not reliably different from zero for portfolios of stocks sorted by market capitalization, book value-to-market value multiples, dividend yields or price-to-earnings multiples, implying the market to be efficient in the semi-strong form.

Dimensional Fund Advisors created a mutual fund consisting of value stocks using the Fama-French three-factor model and experienced negative abnormal monthly returns (or negative alpha) of 0,2 percent during 1993-1998 measured by classical CAPM; indicating the possible value vs. growth anomaly to have disappeared (Schwert, 2001).

2.2.7 Arbitrage

This study does not investigate whether or not arbitrageurs can lock into risk-free positions to gain abnormal profits during rights offerings due to issues related to transaction costs or tax liabilities.

Arbitrage is defined as the simultaneous purchase and sale of the same or essentially similar security for advantageously different prices (Sharpe and Alexander, 1990) without a need to bear any long run fundamental risk (Shleifer and Vishny, 1997). With the short sale of subscription rights being prohibited in Finland, this study does not take a stand on whether pure arbitrage opportunities exist in the OMX Helsinki that involve the use of subscription rights. Also, the short selling of shares is rather uncommon in Finland and is impossible with majority of Finnish retail banks, potentially increasing the costs of arbitrage attempts in OMX Helsinki Stock Exchange. The arbitrage issue should be studied separately in a more advanced research paper.

2.2.8 Summary

Although the modern finance literature has produced a number of studies in which long-term return anomalies have been presented, the evidence does not suggest we should abandon the EMH (Fama, 1998). Theory of market efficiency does not exclude neither overpricing nor underpricing of the market but it argues that gaining a systematic benefit from the anomalies is not possible. Markets can be efficient even if they sometimes fail to value securities correctly such as in the Internet “bubble” (Malkiel, 2003) and it is impossible to consistently profit from the misvaluations since market’s overreactions are as common as its under reactions (Fama, 1998). Also, the anomalies described above tend to disappear when either the time period or the measurement methods are changed, making the anomalies fragile.

Moreover, the possible anomalies seem to be self-destructive. For example the January Effect diminished briefly after it was published and the same will happen to any repetitive and exploitable pattern that can be found in the stock market (Malkiel, 2003). The self-destruction of January Effect is easy to explain; if share prices (of especially small firms) were bound to rise substantially during the first days of January, any rational investor would purchase those shares before the anomaly occurs on the last days of previous December. But the smarter group of investors would of course purchase the shares a bit earlier to gain the most from the buying pressure, and the most rational ones even before the end of December. This type of investor behavior will ultimately make the anomaly to disappear, or self-destruct.

The latter part of this paper studies whether OMXH works efficiently in pricing of subscription rights. “Efficiency” can be thought as in its semi-strong-form due to regulation and legal restrictions, which prohibit corporate insiders from the use of insider information. Indeed, one of the caveats of the study interlocks to the potential lack of compliance of those laws and standards, which should be studied in a separate research.

The following chapter will discuss and present the hypotheses used in this study.

3 Hypotheses used in the study

The study is done by using hypotheses presented in the previous literature review regarding rights offerings and efficient market hypothesis. Hypotheses 1 – 2 relate to simple equations defining the value

of rights offering components. Hypothesis 3 relates to the EMH's interpretation of effective share prices. With the hypotheses it is possible to define whether the subscription rights traded in OMXH are valued as classical financial literature predicts.

The first hypothesis relates to market efficiency once the subscription rights de-attach from the existing shares. According to the EMH, new public information will be incorporated into share prices without delay (Fama et al., 1969), thus the stock should start to trade at its theoretical ex-rights price once the subscription rights are de-attached.

H₁: On the ex-rights day the shares should trade at their current theoretical ex-rights price.

H₁ will be tested by comparing the stock's first ex-rights closing price to its theoretical ex-rights price. If no significant differences exist between closing prices and current theoretical ex-rights prices, H₁ can be considered to hold and market considered to be efficient in the sense that new public information is digested without delay.

The second hypothesis assumes the market to work efficiently regarding the pricing of subscription rights. Universal financial literature defines the value of a right as the difference between the theoretical ex-rights price and the subscription price. Since the stock price should adjust without delay to new public information (Fama et al., 1969) the theoretical ex-rights price can be at this point (after the rights have de-attached from old shares) be replaced with the current share price.

H₂: Subscription rights should trade at the price equal to the difference between the share price and subscription price.

H₂ will be tested by comparing prices of the subscription rights to the differences between share price and subscription price. If H₂ holds, market can be considered to price the rights correctly.

The third hypothesis predicts the stock price to equal its fundamental value, as it should do in an EMH universe, *during* the subscription period. The study does not investigate whether the stock is "correctly" valued during the issue, as it would lead to a joint hypothesis problem when measuring fair value for the subscription rights.

I could define the fair value for the stock during the subscription period by extrapolating using the first ex-rights closing price, daily market returns and respective equity betas; but since the share price cannot

be argued to act according to its historical beta daily in the future, I simply use the actual data on share prices.

H₃: Share price equals the fundamental value of the stock during the subscription period of new shares.

Since a perfect model for share price development cannot be constructed due to the non-predictability of returns (Fama, 1965) H₃ will not be tested by any method to avoid a joint hypothesis problem. During the subscription period, each day's closing price will be treated as the fundamental value of the share price.

Table 1 summarizes the hypotheses used in the study. The first two hypotheses relate to the valuation of rights offering components and H₃ relates to the efficient market hypothesis.

Table 1:
Summary of hypotheses

<u>Hypothesis</u>
H ₁ On the ex-rights day the shares should trade at their current theoretical ex-rights price.
H ₂ Subscription rights should trade at the price equal to the difference between share price and subscription price.
H ₃ Share price equals the fundamental value of the stock during the subscription period of new shares.

The next chapter of this study presents the sample of Finnish rights offerings used in investigating the pricing of subscription rights.

4 Data description

This chapter introduces the data collection process in addition to presenting selected sample characteristics.

The empiric data of this study consists of all rights offerings that have occurred in OMXH Stock Exchange during the past 10 years² (2003 – 2013) time. Directed equity issues or other type of offerings

² Bloomberg Professional

that can include similar characteristics with rights offerings are not included in the sample, also, rights offerings that have occurred in any other Finnish marketplace, e.g. First North, are not included in the sample due to differences in regulation and extremely small trading volumes. The completed rights offerings are searched with Bloomberg Professional.

The data includes rights offerings that have been both announced and completed during the period 1/1/2003 – 12/31/2013, thus, e.g. Cencorp's rights offering that was announced on 12/9/2013 is not included in the sample because subscription period lasts until January 10 of 2014. The historical stock prices and subscription right prices have been obtained with using Thomson One and with the help of data provided by NASDAQ OMXH. Stock Exchange announcements of issuing companies are used to define the nature and characteristics of the offerings as well as to determine the success of the offerings³.

The fundamental value of a right is estimated as stated in Equation 3. The Black-Scholes model is not used due to the time to expiration of the rights, which is extremely short (only a few trading days) in all rights offerings in the sample.

In four rights offerings subscription rights were given to holders of two different share classes (Metsä Board, Stockmann, Ilkka-Yhtymä and Bank of Åland). These "dual" offerings are treated as single offerings when measuring the number of offerings; but as two different offerings when I measure the average and median announcement date effect and discount to TERP; as well as when the market efficiency is investigated.

During the time period 2003 – 2013 45 rights offerings were executed in OMXH by 33 different companies who raised 7,149 million euros in total. The largest offering raised 2,500 million euros (Nordea Bank 2009) while the smallest one raised 3,3 million euros⁴ (Cencorp 2011). On average, the amount of cash raised in a rights offering accounted for 158,9 million euros (median 36,2 million euros). In terms of rights offering volume, year 2009 was the most active with 9 completed offerings, while year 2005 was the least active with only one fully completed rights offering⁵.

³ In this study the value of a right is estimated with the use of Equation 3, as $T-t$, or the time to expiration, is very short, only a few days, for the subscription rights; the level of volatility and risk-free rate become statistically insignificant when the time to expiration is very short.

⁴ Excluding Sanoma's rights offering in 2009 due to the nature of the offering (issued as compensation for the loss of voting power in combination of share series).

⁵ The rights offering of Suominen Oyj was started in December 2004 and completed during January 2005, thus, it is excluded from the sample.

In terms of monetary value, the most active year was 2009 with 3,555 million raised and year 2010 the least active with only 16 million of cash raised. On average, 650 million euros was raised during a year. The complete data sample is presented in Table 2.

The offerings are divided to two categories in many of the tables presented in the following sections depending on their nature. They are called as “growth offerings” or “balance sheet offerings” depending on how the company management has described the cash needs in the rights offering announcement. 23 of the offerings are growth offerings and 21 are balance sheet offerings, while one rights offering was made solely with the purpose to compensate the existing shareholders with major voting power in the combination of share series process.

The results of the study are presented in the next chapter which is followed by the final chapter discussing the results and their implications for the hypotheses.

5 Results

5.1 How large is the discount to theoretical ex-rights price of the subscription price?

As discussed before in this study, the subscription price is commonly set at a level that does not hinder the offering’s probabilities to succeed. If the company’s stock price falls below the subscription price, the offering can be in dire straits since rational investors purchase the stock from the secondary market instead of participating in the offering. On the other hand, the subscription price should be set at a high level in order to avoid potential dilution of existing shareholders’ ownership.

In the data sample of 45 rights offerings each one had a subscription price below their respective TERPs. The largest discount to TERP equaled 97,9 percent and the smallest one stood for 10,6 percent. The average discount to TERP was 36,0 percent and the median discount 32,7 percent for completed rights offerings in OMXH during 2003 – 2013. The complete data sample is presented in Table 3 and analyzed in more detail in the following sections.

Table 3:**Discount to theoretical ex-rights price**

Biotie Therapies	-31,5 %	Ilkka-Yhtymä (Share 2)	-46,1 %
Suominen	-58,8 %	Amer Sports	-42,8 %
Atria	-42,9 %	Kemira	-31,5 %
Metsä Board (A-share)	-33,3 %	HKScan	-34,9 %
Metsä Board (B-share)	-32,5 %	Ixonos	-51,0 %
HKScan	-38,7 %	Suominen	-53,0 %
Lassila & Tikanoja	-38,1 %	Oral Hammaslaakarit	-34,0 %
Norvestia	-23,4 %	Cencorp	-33,1 %
Pohjola Bank	-28,9 %	Cramo	-40,9 %
Citycon	-28,3 %	Aspo	-37,9 %
Sanoma	-97,9 %	Tiimari	-25,0 %
Tiimari	-21,1 %	Bank of Åland (A-share)	-28,7 %
Sponda	-30,0 %	Bank of Åland (B-share)	-29,0 %
Aspocomp Group	-23,9 %	Outokumpu	-41,2 %
Citycon	-19,7 %	Technopolis	-26,5 %
Finnair	-26,9 %	Tecnotree	-50,0 %
Technopolis	-14,2 %	Turvatiimi	-27,3 %
Terveystalo Healthcare	-16,3 %	Citycon	-22,4 %
Nordea Bank	-52,7 %	Ixonos	-87,4 %
Pohjola Bank	-61,1 %	Citycon	-23,1 %
Sponda	-48,0 %	Talvivaara Mining Co	-43,7 %
Finnlines	-11,6 %	Finnlines	-10,6 %
Stockmann (A-share)	-33,4 %	Technopolis	-27,0 %
Stockmann (B-share)	-32,7 %	Ixonos	-32,3 %
Ilkka-Yhtymä (Share 1)	-40,2 %		
Average	-36,0 %	Median	-32,7 %

Based on these results it can be argued that companies and their advisors clearly are cautious when determining the subscription price of the offering. If the sample is divided to two different periods, 2003 – 2008 and 2009 – 2013, it can also be argued that the amount of discount has increased with time: average discount to TERP for the first period is 33,7 percent and 36,5 percent for the second one. 17 rights offerings occurred in the first time period and 28 offerings during the second period.

In two rights offerings, Terveystalo Healthcare and Finnlines (2013), the stock price did momentarily fall below the subscription price, thus, making the subscription right momentarily worthless. These offerings used discount levels of 16,3 percent and 10,6 percent respectively.

A further research could study whether the level of discount correlates with the market sentiment; the stock market was booming during period 2003 – 2008 while the financial crisis has played a major role

on the market during the latter period. Also, another issue worth studying for would be the correlation between the level of discount and the amount of cash raised in a rights offering.

5.1.1 Large deviations from the average discount

The standard deviation of the sample is 17 percent. If the offerings outside the standard deviation range are treated as offerings with a “large” deviation, the following offerings were executed with a large discount: Suominen (2003), Sanoma, Pohjola Bank (2009) and Ixonos (1/2013); while the following offerings were executed with a very low discount: Technopolis (2008), Terveystalo Healthcare, Finnlines (2009) and Finnlines (2013).

The stock price of Suominen had climbed 35 percent during the three months before the offering announcement, which can explain the level of discount used in the pricing (58,8 percent), the shareholders could have been unwilling to purchase shares with a “normal” discount and the management could have gone under suspicion for “market timing”, as often referenced in behavioral corporate finance literature.

Sanoma’s rights offering was untypical in a way that its purpose was not to raise cash for investments or capital structure adjustments⁶ but to compensate the holders of A-class shares for their loss of voting power in the combination of A and B-share series. Therefore, the offering is unique in the sample and the extremely high discount rate (97,9 percent) can be rationalized.

The year 2009 saw the introduction of new capital requirements for a large amount of European banks. Both Nordea Bank and Pohjola Bank announced rights offerings in March 2009 in order to meet the new requirements set by European financial authorities. The levels of discount were high (52,7 and 61,1 percent respectively) probably in order to guarantee the success of the offerings, since they were vital for the banks’ survival.

The rights offering of Ixonos (1/2013) was performed in order to strengthen the balance sheet. The discount rate was very high (87,4 percent) and the majority shareholders had binding undertaken subscriptions to guarantee the success. In fact, Ixonos completed another rights offering only 10 months after January 2013 with a discount rate of 32,3 percent in order to further strengthen the balance sheet and pay off debts. The majority shareholder has given binding undertaken subscriptions in both of the

⁶ Stock market announcement

offerings and has increased its proportion of ownership without making a tender offer with a special permission from the Finnish financial authority Finanssivalvonta (FIVA).

The rights offering of Technopolis (2008) was executed with a 14,2 percent discount. Existing and new institutional shareholders including the company board gave binding undertaken subscriptions to purchase 48,2 percent of the new shares issued. The low discount rate can be thought to be linked to the undertaken subscriptions, since while the low discount can decrease probability of success; a large amount of undertaken subscriptions surely increases the probabilities. The stock price remained clearly above the subscription price for the whole subscription period and the offering was fully subscribed.

Terveystalo Healthcare's rights offering used a discount to TERP of 16,3 percent, which can also be considered as a large deviation from the average. The offering was announced to finance further investments after the company had beaten analyst estimates in their quarterly report. The low level of discount threatened to harm the offering, since during the subscription period the stock price fell under the subscription price first momentarily and then definitely during the last 5 days without rising above the subscription price 1,10 EUR. In the end the company raised only 14,2 million euros from the planned 30 million. In the beginning of 2009 Bridgepoint acquired Terveystalo Healthcare with a successful bid worth 2,00 EUR per share.

Finlines completed two rights offerings during 2003 – 2013 (in 2009 and 2013) which both used low discount rates of 11,6 percent and 10,6 percent respectively. Both rights offerings raised cash for balance sheet strengthening and both had the majority shareholder's undertaken subscriptions to purchase 65 percent (2009) and 100 percent (2013) of new shares issued. With such commitments the low discount can be rationalized, since while the first was still theoretically uncertain to be fully subscribed, the second one was certain to raise the planned amount of cash. The stock price remained above the subscription price for the whole subscription period in the first offering, which was subscribed by 90 percent. The stock price did fall under the subscription price in the second offering but it was still fully subscribed with the help of the majority shareholder.

5.1.2 Level of discount and offering type

The level of discount to TERP can be related to the nature of the issuing company's financing needs, i.e. for what purpose the cash raised will be used. The sample is divided to "growth" offerings and "balance sheet" offerings in Tables 4 and 5.

Table 4:**Discount to theoretical ex-rights price, growth offerings**

2003	Suominen	-58,8 %	2009	Stockmann (B-share)	-32,7 %
2004	HKScan	-38,7 %	2009	Ilkka-Yhtymä (Share 1)	-40,2 %
2004	Lassila & Tikanoja	-38,1 %	2009	Ilkka-Yhtymä (Share 2)	-46,1 %
2004	Norvestia	-23,4 %	2009	Kemira	-31,5 %
2005	Pohjola Bank	-28,9 %	2011	Oral Hammaslaakarit	-34,0 %
2006	Citycon	-28,3 %	2011	Cramo	-40,9 %
2007	Sponda	-30,0 %	2011	Aspo	-37,9 %
2007	Aspocomp Group	-23,9 %	2012	Outokumpu	-41,2 %
2007	Citycon	-19,7 %	2012	Technopolis	-26,5 %
2007	Finnair	-26,9 %	2012	Citycon	-22,4 %
2008	Technopolis	-14,2 %	2013	Citycon	-23,1 %
2008	Terveystalo Healthcare	-16,3 %	2013	Technopolis	-27,0 %
2009	Stockmann (A-share)	-33,4 %			
Average		-31,4 %	Median		-30,0 %

Regarding growth offerings, the average discount is 31,4 percent with the median discount being 30,0 percent; both clearly below the levels of the whole sample. Only one of the growth offerings (Suominen 2003) was executed with an extremely high discount (defined in section 5.1.1) while two offerings used an extremely low discount rate (Technopolis 2008 and Terveystalo Healthcare).

Table 5:**Discount to theoretical ex-rights price, balance sheet offerings**

2003	Biotie Therapies	-31,5 %	2010	Suominen	-53,0 %
2003	Atria	-42,9 %	2011	Cencorp	-33,1 %
2004	Metsä Board	-33,3 %	2011	Tiimari	-25,0 %
2004	Metsä Board	-32,5 %	2011	Bank of Åland	-28,7 %
2006	Tiimari	-21,1 %	2011	Bank of Åland	-29,0 %
2009	Nordea Bank	-52,7 %	2012	Tecnotree	-50,0 %
2009	Pohjola Bank	-61,1 %	2012	Turvatiimi	-27,3 %
2009	Sponda	-48,0 %	2013	Ixonos	-87,4 %
2009	Finnlines	-11,6 %	2013	Talvivaara Mining Co	-43,7 %
2009	Amer Sports	-42,8 %	2013	Finnlines	-10,6 %
2009	HKScan	-34,9 %	2013	Ixonos	-32,3 %
2010	Ixonos	-51,0 %			
Average		-38,4 %	Median		-33,3 %

Regarding balance sheet offerings, the average discount to TERP is 38,4 percent and median discount 33,3 percent; both a few percent above the levels of the whole sample. Extremely low discount was used in two offerings (Finnlines 2006 and 2013) while extremely high discount was used in two offerings (Pohjola Bank 2009 and Ixonos 1/2013).

When the discount levels of growth offerings are compared to the ones of balance sheet offerings, it can be argued that the balance sheet offerings were executed with clearly higher discounts, the difference between averages being 7 percent. However, it must be pointed out that vast majority of the balance sheet offerings occurred in the latter time period (17 out of 21) so the higher discount could also relate to the market sentiment. It is not meaningful to compare the time periods regarding balance sheet offerings, since only 3 offerings occurred during 2003 – 2008.

5.1.3 Conclusion

The study shows that the level of discount to TERP of subscription prices has increased when the time period is divided into two parts. It also implies that the nature of the offering can determine the level of discount, with offerings to decrease leverage and pay off debts having higher discount levels than offerings used to finance growth and investments.

The next section will study, whether the stock price reacts abnormally to the public announcement of a rights offering, or the so-called announcement date effect.

5.2 How large is the announcement date effect on the stock price?

According to different studies, the issuing firm's stock price commonly suffers from the so-called announcement date effect when it makes its plan to raise cash public (Asquith, Mullins 1986). Korwar (1983) found that the abnormal return on the announcement date accounts for -2,5 percent with a sample size of 424 rights offerings. Majority of the studies imply that, other things being equal, the announcement contains negative information about the issuing firm and its future performance given that no other announcements are made, e.g. profit warnings. Another view is that a rights offering announcement actually contains positive information, if the issuing company keeps its dividend policy unchanged and sells new shares with a discount to stock price (Hietala, Löyttyniemi, 1991).

In this thesis I study the announcement date effect by comparing the stock's return on the announcement date to its predicted performance. The predicted performance is estimated with the stock's beta; calculated from last 12 month's daily returns, and market index performance on the announcement date. E.g. if the stock price declines 1 percent on the announcement date while the market index rises 1 percent and the company's beta is 0,5; the announcement date abnormal return (or, the announcement date effect)

equals 1,5 percent. Equation 10 illustrates how the abnormal return on the announcement date is estimated:

Equation 10:

Announcement date effect

$$\alpha = r_{AD} - \beta * r_{mAD}$$

where, α is the announcement date effect, r_{AD} is the stock's actual return on announcement date, β is the stock's beta calculated from last twelve month's daily returns and r_{mAD} is the market index return on the announcement date. While the use of beta to predict future performance of course leads to a joint hypothesis problem, I still consider that it needs to be utilized in order to capture the general stock market sentiment.

Out of the data sample's 49 (including different share classes) rights offerings, 29 experienced negative abnormal return on the announcement date, while 18 companies' stock enjoyed from positive abnormal performance. The rights offerings of Suominen (2010) and Turvatiimi did not experience any abnormal returns on announcement date. The average abnormal performance on announcement date equaled -1,3 percent with the median return being -0,7 percent and abnormal returns varying between -15,8 percent and 9,0 percent.

The largest positive abnormal return was 9,0 percent (Ilkka Yhtymä Share 1) while the largest negative abnormal return was -15,8 percent (Cencorp) on the announcement date. The complete data sample is presented in Table 6 and analyzed in more detail in the following sections.

Table 6:
Announcement date effect, 2003 – 2013

2003 Biotie Therapies	-0,7 %	2009 Ilkka-Yhtymä (Share 2)	7,3 %
2003 Suominen	2,9 %	2009 Amer Sports	-11,5 %
2003 Atria	4,1 %	2009 Kemira	-3,9 %
2004 Metsä Board (A-share)	-2,6 %	2009 HKScan	2,8 %
2004 Metsä Board (B-share)	0,9 %	2010 Ixonos	-4,4 %
2004 HKScan	-1,6 %	2010 Suominen	0,0 %
2004 Lassila & Tikanoja	-5,1 %	2011 Oral Hammaslaakarit	-0,1 %
2004 Norvestia	-6,2 %	2011 Cencorp	-15,8 %
2005 Pohjola Bank	-0,8 %	2011 Cramo	-5,4 %
2006 Citycon	3,6 %	2011 Aspo	1,1 %
2006 Sanoma	4,5 %	2011 Tiimari	-6,7 %
2006 Tiimari	0,7 %	2011 Bank of Åland (A-share)	1,3 %
2007 Sponda	-1,1 %	2011 Bank of Åland (B-share)	0,7 %
2007 Aspocomp Group	4,4 %	2012 Outokumpu	-3,1 %
2007 Citycon	-2,8 %	2012 Technopolis	-2,9 %
2007 Finnair	-5,3 %	2012 Tecnotree	-4,4 %
2008 Technopolis	-0,1 %	2012 Turvatiimi	0,0 %
2008 Terveystalo Healthcare	-1,8 %	2012 Citycon	-6,4 %
2009 Nordea Bank	-1,6 %	2013 Ixonos	-1,5 %
2009 Pohjola Bank	-15,6 %	2013 Citycon	-1,4 %
2009 Sponda	5,0 %	2013 Talvivaara Mining Co	4,7 %
2009 Finnlines	2,8 %	2013 Finnlines	1,1 %
2009 Stockmann (A-share)	-0,4 %	2013 Technopolis	-0,5 %
2009 Stockmann (B-share)	0,7 %	2013 Ixonos	-8,4 %
2009 Ilkka-Yhtymä (Share 1)	9,0 %		
Average	-1,3 %	Median	-0,7 %

If the sample is divided into two time periods; 2003 – 2008 and 2009 – 2013, the magnitude of the average announcement effect increases from -0,4 percent to -1,9 percent during time. Despite the increase in the magnitude, the proportion of negative announcement effects has in fact gone slightly down from 61 percent to 58 percent, although the difference is not significant. The whole sample is divided into two time periods in Tables 7 and 8.

Table 7:
Announcement date effect, 2003 – 2008

2003 Biotie Therapies	-0,7 %	2006 Citycon	3,6 %
2003 Suominen	2,9 %	2006 Sanoma	4,5 %
2003 Atria	4,1 %	2006 Tiimari	0,7 %
2004 Metsa Board (A-share)	-2,6 %	2007 Sponda	-1,1 %
2004 Metsa Board (B-share)	0,9 %	2007 Aspocomp Group	4,4 %
2004 HKScan	-1,6 %	2007 Citycon	-2,8 %
2004 Lassila & Tikanoja	-5,1 %	2007 Finnair	-5,3 %
2004 Norvestia	-6,2 %	2008 Technopolis	-0,1 %
2005 Pohjola Bank	-0,8 %	2008 Terveystalo Healthcare	-1,8 %
Average	-0,4 %	Median	-0,7 %

Table 8:
Announcement date effect, 2009 – 2013

2009 Nordea Bank	-1,6 %	2011 Aspo	1,1 %
2009 Pohjola Bank	-15,6 %	2011 Tiimari	-6,7 %
2009 Sponda	5,0 %	2011 Bank of Aland (A-share)	1,3 %
2009 Finnlines	2,8 %	2011 Bank of Aland (B-share)	0,7 %
2009 Stockmann (A-share)	-0,4 %	2012 Outokumpu	-3,1 %
2009 Stockmann (B-share)	0,7 %	2012 Technopolis	-2,9 %
2009 Ilkka-Yhtymä (Share 1)	9,0 %	2012 Tecnotree	-4,4 %
2009 Ilkka-Yhtymä (Share 2)	7,3 %	2012 Turvatiimi	0,0 %
2009 Amer Sports	-11,5 %	2012 Citycon	-6,4 %
2009 Kemira	-3,9 %	2013 Ixonos	-1,5 %
2009 HKScan	2,8 %	2013 Citycon	-1,4 %
2010 Ixonos	-4,4 %	2013 Talvivaara Mining Co	4,7 %
2010 Suominen	0,0 %	2013 Finnlines	1,1 %
2011 Oral Hammaslaakarit	-0,1 %	2013 Technopolis	-0,5 %
2011 Cencorp	-15,8 %	2013 Ixonos	-8,4 %
2011 Cramo	-5,4 %		
Average	-1,9 %	Median	-0,5 %

In the next sections the rights offering sample is divided into two categories depending on the nature of the offering (“growth” and “balance sheet” offerings).

5.2.1 Announcement date effect in growth offerings

The amount or direction of the announcement date effect can be related to what the issuing company plans to do with the cash raised. If growth offerings experience positive abnormal returns after announcement and balance sheet offerings negative abnormal returns, it can be argued that investors

believe more in the managements' abilities in growing their companies than in their abilities in saving them. The growth offerings and their respective announcement date effects are listed in Table 9.

Table 9:
Announcement date effect, growth offerings

2003	Suominen	-0,7 %	2009	Stockmann (B-share)	0,7 %
2004	HKScan	-1,6 %	2009	Ilkka-Yhtymä (Share 1)	9,0 %
2004	Lassila & Tikanoja	-5,1 %	2009	Ilkka-Yhtymä (Share 2)	7,3 %
2004	Norvestia	-6,2 %	2009	Kemira	-3,9 %
2005	Pohjola Bank	-0,8 %	2011	Oral Hammaslaakarit	-0,1 %
2006	Citycon	3,6 %	2011	Cramo	-5,4 %
2007	Sponda	-1,1 %	2011	Aspo	1,1 %
2007	Aspocomp Group	4,4 %	2012	Outokumpu	-3,1 %
2007	Citycon	-2,8 %	2012	Technopolis	-2,9 %
2007	Finnair	-5,3 %	2012	Citycon	-6,4 %
2008	Technopolis	-0,1 %	2013	Citycon	-1,4 %
2008	Terveystalo Healthcare	-1,8 %	2013	Technopolis	-0,5 %
2009	Stockmann (A-share)	-0,4 %			
Average		-0,9 %	Median		-1,1 %

The average abnormal return is -0,9 percent and median -1,1 percent for 25 growth offerings⁷. The abnormal returns range from -6,4 percent (Citycon 2012) to 9,0 percent (Ilkka-Yhtymä Share 1 2009). Citycon has been very active in performing rights offerings to finance growth with four offerings occurring during 2007 – 2013. The announcement effect has decreased from year's 2007 positive 6,4 percent to -6,4 and -1,4 percent (2012 and 2013 respectively), which can imply that the shareholders have become more pessimistic about the management's abilities.

If the growth offering sample is further divided to two time periods, the first one has a higher negative abnormal return (-1,4 percent) than the latter one (-0,5 percent), the sample size is, however, too small to make any strong arguments.

5.2.2 Announcement date effect in balance sheet offerings

The announcement date effects of rights offerings performed to finance debt service and deleveraging are illustrated in Table 10.

⁷ The average abnormal return is -1,4 percent and the median is -1,4 percent when the dual share offerings (Stockmann and Ilkka-Yhtymä) are treated as single offerings.

Table 10:
Announcement date effect, balance sheet offerings

2003 Biotie Therapies	-0,7 %	2010 Suominen	0,0 %
2003 Atria	4,1 %	2011 Cencorp	-15,8 %
2004 Metsa Board (A-share)	-2,6 %	2011 Tiimari	-6,7 %
2004 Metsa Board (B-share)	0,9 %	2011 Bank of Aland (A-share)	1,3 %
2006 Tiimari	0,7 %	2011 Bank of Aland (B-share)	0,7 %
2009 Nordea Bank	-1,6 %	2012 Tecnotree	-4,4 %
2009 Pohjola Bank	-15,6 %	2012 Turvatiimi	0,0 %
2009 Sponda	5,0 %	2013 Ixonos	-1,5 %
2009 Finnlines	2,8 %	2013 Talvivaara Mining Co	4,7 %
2009 Amer Sports	-11,5 %	2013 Finnlines	1,1 %
2009 HKScan	2,8 %	2013 Ixonos	-8,4 %
2010 Ixonos	-4,4 %		
Average	-2,1 %	Median	0,0 %

The average announcement date effect for balance sheet offerings is -2,1 percent with the median being 0 percent⁸; the average being significantly higher than in growth offerings. The abnormal returns vary between 5,0 percent (Sponda 2009) to -15,8 percent (Cencorp). Most of the balance sheet offerings (17 out of 21) have occurred after the financial crisis struck Finland in 2008, with Nordea Bank and Pohjola Bank making their rights offering announcements in a three-day window during March 2009 in order to raise their core capital ratios to the levels demanded by European financial authorities.

Ixonos has completed three rights offerings during 2010 – 2013 in order to strengthen its balance sheet with the negative announcement effect changing from -4,4 percent (2010) first to -1,5 percent (1/2013) and finally to -8,4 percent (11/2013). Ixonos is the only company to make multiple rights offerings during a calendar year and it implies that the company management and their advisors may have failed in their efforts to turn the company around. The stock's reaction to the second rights offering during 2013 can reflect the shareholders' disappointment.

If the balance sheet offering sample is further divided to two equal time periods, the average announcement effect increases from positive 0,5 percent to negative 2,9 percent. This result is in contrast to the one found in the growth offering sample and reasserts the view that no arguments can be made about time being a determinant factor in the magnitude of announcement effect.

⁸ The average is -2,4 percent and the median is 0 percent when the dual share offerings (Metsa Board and Bank of Aland) are treated as single offerings.

5.2.3 Conclusion

This study finds the rights offerings accomplished in OMXH Stock Exchange to experience abnormal returns equaling -1,9 percent on average on the announcement date. The study does not suggest that the announcement effect should be different in so-called balance sheet offerings and growth offerings but it shows that the abnormal return has been 1,3 percent more negative in balance sheet offerings during the study period 2003 – 2013.

The announcement date effect seems to have increased in magnitude as time has passed when it is measured by dividing the population to two samples of equal length. However, this result has its weaknesses, since the market sentiment has changed a lot between the periods. When the population is divided to two samples by the nature of the offering, the effect related to time disappears.

The offering's financing purpose may play a role in the announcement effect, with balance sheet offerings experiencing from larger negative announcement effect than growth offerings when measured by average abnormal return. The caveat of this result is the fact that when measured by proportions, the growth offerings are more likely to experience negative abnormal returns (19 negative vs. 6 positive announcement effects) than the balance sheet offerings 10 negative vs. 11 positive announcement effects⁹.

The following section will investigate will the stock price equal its theoretical ex-right price on the ex-rights date, or how large is the difference between the two.

5.3 Does the stock price equal the theoretical ex-rights price at the closing of Stock Exchange on the ex-rights day?

The ex-rights day is the first day the stock trades without the subscription rights attached to it; therefore, it is common for share prices to decline steeply on the ex-rights day. As previously discussed, the theoretical ex-rights price can be calculated before the offering; in theory TERP equals the fundamental value of the stock on ex-rights day. In this section the stock prices are compared to TERPs on their ex-rights day in order to see if the market adjusts correctly to the de-attachment of subscription rights. If the

⁹ The rights offerings of Suominen (2010) and Turvatiimi did not experience any abnormal returns on announcement date.

stock price differs significantly from its TERP on ex-rights day, it can be argued that the market may underreact to the de-attachment event; in case no new information has come public.

5.3.1 Premium to TERP

The comparison of TERP and stock price is very straightforward when the ex-rights day is on the announcement day or just a day after it. While in many instances this happens to be true, sometimes there is a gap between the announcement day and ex-rights day for issue specific reasons. In the following table the rights offerings are listed with their announcement dates, ex-rights dates and ex-rights premiums or discounts.

Table 11:
Ex-rights premium (discount), 2003 – 2013

Company	Announcement date (1)	Ex-rights date (2)	N. of trading days between (1) and (2)	Premium to TERP	Company	Announcement date (1)	Ex-rights date (2)	N. of trading days between (1) and (2)	Premium to TERP
Biotie Therapies	23.5.2003	27.5.2003	2	-0,7 %	Ilkka-Yhtymä (Share 2)	28.8.2009	31.8.2009	1	23,7 %
Suominen	28.10.2003	29.10.2003	1	6,7 %	Amer Sports	1.9.2009	25.9.2009	18*	-9,8 %
Atria	22.10.2003	12.11.2003	15*	12,0 %	Kemira	28.10.2009	24.11.2009	19*	16,8 %
Metsä Board (A-share)	7.9.2004	8.9.2004	1	0,9 %	HKScan	24.11.2009	25.11.2009	1	2,1 %
Metsä Board (B-share)	7.9.2004	8.9.2004	1	1,2 %	Ixonos	18.5.2010	2.6.2010	11*	-2,8 %
HKScan	7.10.2004	28.10.2004	15*	-4,3 %	Suominen	1.6.2010	2.6.2010	1	49,7 %
Lassila & Tikanoja	16.11.2004	16.11.2004	0	-5,2 %	Oral Hammaslaakarit	17.1.2011	18.1.2011	1	11,3 %
Norvestia	21.12.2004	21.12.2004	0	5,0 %	Cencorp	18.2.2011	21.2.2011	1	-16,3 %
Pohjola Bank	14.10.2005	17.10.2005	1	3,6 %	Cramo	17.2.2011	25.3.2011	26*	3,3 %
Citycon	24.3.2006	27.3.2006	1	5,7 %	Aspo	5.4.2011	6.4.2011	1	0,4 %
Sanoma	9.3.2006	4.4.2006	18*	7,3 %	Tiimari	10.6.2011	31.8.2011	57*	83,3 %
Tiimari	28.11.2006	29.11.2006	1	4,4 %	Bank of Åland (A-share)	13.9.2011	14.9.2011	1	14,9 %
Sponda	9.1.2007	10.1.2007	1	0,3 %	Bank of Åland (B-share)	13.9.2011	14.9.2011	1	2,5 %
Aspocomp Group	16.3.2007	19.3.2007	1	6,0 %	Outokumpu	1.3.2012	8.3.2012	5*	3,5 %
Citycon	10.9.2007	11.9.2007	1	-1,6 %	Technopolis	15.5.2012	16.5.2012	1	-5,8 %
Finnair	21.11.2007	22.11.2007	1	-2,5 %	Tecnotree	4.5.2012	29.5.2012	16*	-12,5 %
Technopolis	28.4.2008	29.4.2008	1	4,6 %	Turvatiimi	24.8.2012	27.8.2012	1**	481,7 %
Terveystalo Healthcare	15.9.2008	16.9.2008	1	6,5 %	Citycon	7.9.2012	10.9.2012	1	-2,7 %
Nordea Bank	10.2.2009	13.3.2009	23*	-1,9 %	Ixonos	16.1.2013	17.1.2013	1	65,4 %
Pohjola Bank	12.2.2009	31.3.2009	13*	-34,8 %	Citycon	13.2.2013	14.2.2013	1	3,3 %
Sponda	25.5.2009	26.5.2009	1	-10,1 %	Talvivaara Mining Co	8.3.2013	11.3.2013	1	19,5 %
Finnlines	26.5.2009	27.5.2009	1	0,6 %	Finnlines	7.5.2013	8.5.2013	1	1,8 %
Stockmann (A-share)	14.8.2009	17.8.2009	1	1,0 %	Technopolis	4.11.2013	5.11.2013	1	8,3 %
Stockmann (B-share)	14.8.2009	17.8.2009	1	-0,1 %	Ixonos	11.11.2013	12.11.2013	1	83,9 %
Ilkka-Yhtymä (Share 1)	28.8.2009	31.8.2009	1	27,8 %					
Average								0,97	8,8 %
Median								1,00	2,9 %

* The rights offerings of Atria, HKScan (2004), Sanoma, Nordea Bank, Pohjola Bank (2009), Amer Sports, Kemira, Ixonos (2010), Cramo, Tiimari (2011), Outokumpu and Tecnotree are excluded from the Premium to TERP study due to large gaps between the announcement date and the ex-rights date.

** The rights offering of Turvatiimi is excluded due to its magnitude of Premium to TERP that stands out from the crowd.

Table 11 shows that the average premium to TERP for the sample is 8,8 percent with the median being 2,9 percent, when offerings with large gaps between the announcement date and ex-rights date are excluded. The offering of Turvatiimi is also excluded due to the magnitude of the premium (481,7 percent). The premium to TERP equation is illustrated in Equation 10:

Equation 10:

Premium to TERP

$$Premium_s = \frac{P_{Ex} - TERP}{TERP} * 100\%$$

where P_{Ex} stands for the stock price on ex-rights date and $TERP$ is the theoretical ex-rights price.

The premium (or discount) varies between 83,9 percent (Ixonos 12/2013) to -16,3 percent (Cencorp). 27 of the stocks in the sample traded at premium on ex-rights date while 9 stocks traded at discount to TERP.

The results can imply that the stock price underreacts to the de-attachment of subscription rights. The EMH states that on average the stock prices should equal their fundamental values but the results imply the market to have frictions in determining the ex-rights price (while no new information is published between the announcement date and ex-rights date). This study does not test whether it could have been possible to obtain abnormal returns with following a trading strategy based on the findings or not but it would be possible to test in further studies.

In the next sections two the population is divided to two time periods; 2003 – 2008 and 2009 – 2013 in order to illustrate whether the premium to TERP has diminished from the beginning of the millennium.

5.3.2 Premium to TERP, 2003 – 2008

Table 12 shows that the average premium to TERP is 2,3 percent while the median equals 3,6 percent. The premium (discount) to TERP varies between 6,7 percent to -5,2 percent.

Table 12:
Ex-rights premium (discount), 2003 – 2008

Company	Announcement date (1)	Ex-rights date (2)	N. of trading days between (1) and (2)	Premium to TERP
Biotie Therapies	23.5.2003	27.5.2003	2	-0,7 %
Suominen	28.10.2003	29.10.2003	1	6,7 %
Atria	22.10.2003	12.11.2003	15*	12,0 %
Metsa Board (A-share)	7.9.2004	8.9.2004	1	0,9 %
Metsa Board (B-share)	7.9.2004	8.9.2004	1	1,2 %
HKScan	7.10.2004	28.10.2004	15*	-4,3 %
Lassila & Tikanoja	16.11.2004	16.11.2004	0	-5,2 %
Norvestia	21.12.2004	21.12.2004	0	5,0 %
Pohjola Bank	14.10.2005	17.10.2005	1	3,6 %
Citycon	24.3.2006	27.3.2006	1	5,7 %
Sanoma	9.3.2006	4.4.2006	18*	7,3 %
Tiimari	28.11.2006	29.11.2006	1	4,4 %
Sponda	9.1.2007	10.1.2007	1	0,3 %
Aspocomp Group	16.3.2007	19.3.2007	1	6,0 %
Citycon	10.9.2007	11.9.2007	1	-1,6 %
Finnair	21.11.2007	22.11.2007	1	-2,5 %
Technopolis	28.4.2008	29.4.2008	1	4,6 %
Terveystalo Healthcare	15.9.2008	16.9.2008	1	6,5 %
Average				2,3 %
Median				3,6 %

* The rights offerings of Atria, HKScan (2004) and Sanoma are excluded from the Premium to TERP study due to large gaps between the announcement date and the ex-rights date.

5.3.3 Premium to TERP, 2009 – 2013

In Table 13 the latter time period is presented. The average premium to TERP has jumped from 2,3 percent to 13,4 percent while the median has decreased from 3,6 percent to 2,5 percent. The deviation range from the TERP has also widened remarkably from 11,9 percent to 100,4 percent, with the highest premium being 83,9 percent and the highest discount being -16,3 percent.

Table 13:
Ex-rights premium (discount), 2009 – 2013

Company	Announcement date (1)	Ex-rights date (2)	N. of trading days between (1) and (2)	Premium to TERP
Nordea Bank	10.2.2009	13.3.2009	23*	-1,9 %
Pohjola Bank	12.2.2009	31.3.2009	13*	-34,8 %
Sponda	25.5.2009	26.5.2009	1	-10,1 %
Finnlines	26.5.2009	27.5.2009	1	0,6 %
Stockmann (A-share)	14.8.2009	17.8.2009	1	1,0 %
Stockmann (B-share)	14.8.2009	17.8.2009	1	-0,1 %
Ilkka-Yhtymä (Share 1)	28.8.2009	31.8.2009	1	27,8 %
Ilkka-Yhtymä (Share 2)	28.8.2009	31.8.2009	1	23,7 %
Amer Sports	1.9.2009	25.9.2009	18*	-9,8 %
Kemira	28.10.2009	24.11.2009	19*	16,8 %
HKScan	24.11.2009	25.11.2009	1	2,1 %
Ixonos	18.5.2010	2.6.2010	11*	-2,8 %
Suominen	1.6.2010	2.6.2010	1	49,7 %
Oral Hammaslaakarit	17.1.2011	18.1.2011	1	11,3 %
Cencorp	18.2.2011	21.2.2011	1	-16,3 %
Cramo	17.2.2011	25.3.2011	26*	3,3 %
Aspo	5.4.2011	6.4.2011	1	0,4 %
Tiimari	10.6.2011	31.8.2011	57*	83,3 %
Bank of Åland (A-share)	13.9.2011	14.9.2011	1	14,9 %
Bank of Åland (B-share)	13.9.2011	14.9.2011	1	2,5 %
Outokumpu	1.3.2012	8.3.2012	5*	3,5 %
Technopolis	15.5.2012	16.5.2012	1	-5,8 %
Tecnotree	4.5.2012	29.5.2012	16*	-12,5 %
Turvatiimi	24.8.2012	27.8.2012	1**	481,7 %
Citycon	7.9.2012	10.9.2012	1	-2,7 %
Ixonos	16.1.2013	17.1.2013	1	65,4 %
Citycon	13.2.2013	14.2.2013	1	3,3 %
Talvivaara Mining Co	8.3.2013	11.3.2013	1	19,5 %
Finnlines	7.5.2013	8.5.2013	1	1,8 %
Technopolis	4.11.2013	5.11.2013	1	8,3 %
Ixonos	11.11.2013	12.11.2013	1	83,9 %
Average				13,4 %
Median				2,5 %

* The rights offerings of Nordea Bank, Pohjola Bank (2009), Amer Sports, Kemira, Ixonos (2010), Cramo, Tiimari (2011), Outokumpu and Tecnotree are excluded from the Premium to TERP study due to large gaps between the announcement date and the ex-rights date.

** The rights offering of Turvatiimi is excluded due to its magnitude of Premium to TERP that stands out from the crowd.

If market efficiency would be tested with the above results, it could be argued that the OMXH Stock Exchange has lost some of its efficiency after the financial crisis struck. While the median has in fact come down from the previous time period, a few extreme results raises the average premium significantly. In the following paragraphs the largest premiums are discussed further.

5.3.4 Extreme deviations from TERP

The stock price of Ixonos has been trading at a substantial premium after its two rights offerings (1/2013 and 12/2013) with the magnitude being 65,4 percent in the first and 83,9% in the latter. In the first offering the stock price acted very strangely since it actually increased on the opening hours of the ex-rights date after adjusting downwards but still closing at a 65,4 percent premium to TERP. The stock price declined on the following days but still remained overvalued by 20 percent at the closing on Friday 25th of January. The stock price fell below TERP 1,66 EUR on March 14 over one month after the offering was completed. The stock price development of Ixonos is presented in Table 14.

Table 14:
Ixonos' (1/2013) stock price and premium (discount) to TERP

Date	High	Low	Close	Premium (discount) at close	Description
8.2.2013	1,950	1,800	1,850	11,3 %	New shares start to trade in OMXH
31.1.2013	2,050	1,850	2,000	20,3 %	Subscription period ends
30.1.2013	1,900	1,850	1,850	11,3 %	Trading on rights ends
29.1.2013	1,900	1,800	1,900	14,3 %	
28.1.2013	2,000	1,850	1,950	17,3 %	
25.1.2013	2,200	1,850	2,000	20,3 %	
24.1.2013	2,400	2,050	2,200	32,3 %	Subscription period starts, rights start to trade
17.1.2013	3,400	2,150	2,750	65,4 %	Ex-rights date
16.1.2013	3,600	3,250	3,550	113,5 %	Announcement date
15.1.2013	4,150	3,500	3,600	116,5 %	Announcement date -1

In the second rights offering the stock price opened at 0,12 EUR on the ex-rights day, trading at 16 percent premium to TERP but again rose to 0,23 EUR (123 percent premium) at highest on the same day before closing at 0,19 EUR with 83,9 percent premium. The share price remained clearly above the TERP for the whole duration of the offering and equaled 45,2 percent on December 4 when the new shares started to trade in OMXH. On December 9, two trading days after the trading had begun, the stock price fell under the TERP and closed at 0,09 EUR remaining under TERP 0,103 EUR for the rest of the year. The stock price development of Ixonos (11/2013) during the offering is presented in Table 15.

Table 15:**Ixonos' (11/2013) stock price and premium (discount) to TERP**

Date	High	Low	Close	Premium (discount) at close	Description
4.12.2013	0,150	0,120	0,150	45,2 %	New shares start to trade in OMXH
3.12.2013	0,140	0,120	0,140	35,5 %	Subscription period ends
26.11.2013	0,140	0,130	0,140	35,5 %	Trading on rights ends
25.11.2013	0,150	0,120	0,130	25,8 %	
22.11.2013	0,150	0,130	0,150	45,2 %	
21.11.2013	0,180	0,140	0,150	45,2 %	
20.11.2013	0,160	0,140	0,140	35,5 %	
19.11.2013	0,190	0,120	0,140	35,5 %	Subscription period starts, rights start to trade
12.11.2013	0,230	0,120	0,190	83,9 %	Ex-rights date
11.11.2013	0,480	0,430	0,430	316,1 %	Announcement date
8.11.2013	0,480	0,460	0,470	354,8 %	Announcement date -1

The rights offerings of Ixonos completed in the end of 2013 could have provided an attractive opportunity for investors to benefit from the mispricing. The EMH argues that the arbitrageurs attempts to gain from mispricing drives the stock price to its “correct” level but that has not been the case in the two offerings. There is no rational explanation for the behavior of Ixonos’ share price during the two rights offerings.

Turvatiimi’s rights offering in 2012 is unique in the sample when it comes to premium to TERP or stock price behavior in general during the offering. The offering was performed in order to pay off maturing debt and to strengthen the company’s balance sheet, the offering had binding undertaken subscriptions (or commitments) accounting for over 90 percent of the issue.

The stock price closed at 0,08 EUR on the ex-rights date, with a staggering 482 percent premium over TERP. During the following week, the stock price fluctuated between 0,08 EUR to 0,03 EUR with the minimum premium equaling 118 percent. Similar to the offerings of Ixonos, Turvatiimi’s share price offered the arbitrageurs potential for enormous abnormal percentage gains (but not necessarily in monetary terms). The share price closed at 0,02 EUR on the last trading day of 2012. The stock price development of Turvatiimi during the offering is presented in Table 16.

Table 16:
Turvatiimi's stock price and premium (discount) to TERP

Date	High	Low	Close	Premium (discount) at close	Description
19.9.2012	0,040	0,030	0,040	190,9 %	New shares start to trade in OMXH
11.9.2012	0,050	0,030	0,040	190,9 %	Subscription period ends
10.9.2012	0,050	0,040	0,050	263,6 %	Trading on rights ends
7.9.2012	0,050	0,040	0,040	190,9 %	
6.9.2012	0,050	0,030	0,040	190,9 %	
5.9.2012	0,050	0,040	0,040	190,9 %	
4.9.2012	0,060	0,040	0,050	263,6 %	
3.9.2012	0,060	0,050	0,060	336,4 %	Subscription period starts, rights start to trade
27.8.2012	0,080	0,050	0,080	481,8 %	Ex-rights date
24.8.2012	0,025	0,021	0,025	81,8 %	Announcement date
23.8.2012	0,025	0,025	0,025	81,8 %	Announcement date -1

Large premiums seem to be more common than large discounts, according to this data sample. From the offerings where the ex-rights date is one trading day after the announcement date, the largest discount equals 16,7 percent (Cencorp). In Cencorp's case, the stock price did not reach its TERP level 0,179 EUR during the offering and in fact, it has failed to rise above 0,14 EUR until the end of 2013. Thus, an investor who would have tried to profit from Cencorp's possible misvaluation would not have succeeded. Cencorp's stock price development is presented in Table 17.

Table 17:
Cencorp's stock price and premium (discount) to TERP

Date	High	Low	Close	Premium (discount) at close	Description
4.4.2011	0,140	0,130	0,130	-27,5 %	New shares start to trade in OMXH
24.3.2011	0,130	0,130	0,130	-27,5 %	Subscription period ends
17.3.2011	0,130	0,130	0,130	-27,5 %	Trading on rights ends
16.3.2011	0,130	0,120	0,120	-33,1 %	
15.3.2011	0,140	0,120	0,130	-27,5 %	
14.3.2011	0,140	0,130	0,130	-27,5 %	
11.3.2011	0,140	0,130	0,140	-21,9 %	
10.3.2011	0,150	0,130	0,140	-21,9 %	
9.3.2011	0,150	0,140	0,150	-16,3 %	
8.3.2011	0,140	0,140	0,140	-21,9 %	Subscription period starts, rights start to trade
21.2.2011	0,160	0,150	0,150	-16,3 %	Ex-rights date
18.2.2011	0,176	0,156	0,156	-12,9 %	Announcement date
17.2.2011	0,195	0,166	0,186	3,5 %	Announcement date -1

If no offerings are excluded from the data, the largest discount is experienced in Pohjola's rights offering in 2009 (-34,8 percent). The magnitude of the discount is explained by Pohjola's stock price development between Announcement date -1 and Ex-rights date -1, during which the stock price plummeted 39 percent from 9,19 EUR to 5,62 EUR due to issues related to financial crisis.

5.3.5 Conclusion

The data provides proof of substantial misvaluations, when measured with comparing the ex-rights price to TERP. The evidence does not imply that OMXH Stock Exchange has lost its efficiency, although a few stocks were trading at very dubious levels during the offering. While Fama (1998) argues that overreactions and underreactions are equally common on the market, the data does, however provide contradicting results; in 27 instances the stock price under-reacted to the de-attachment of subscription rights, while in only 9 instances the market overreacted.

Possible explanations for the stock price behavior of Ixonos and Turvatiimi include the following theories: i) companies with small market capitalizations are of low interest to large multinational institutional investors, which can be thought to lead to a less efficient pricing and ii) while the potential percentage gains are large, in terms of monetary value, the stock of e.g. Turvatiimi does not provide potential for large gains due to the low market capitalization.

In the following and final section of the chapter the market values of subscription rights are compared to their fundamental values and mispricings are discussed and analyzed.

5.4 Does OMX Helsinki Stock Exchange work efficiently in determining the value of subscription rights?

In this section the market prices of subscription rights are compared to the fundamental, or market efficient, subscription right values that are derived from the stock price and subscription terms of the corresponding offerings. When the fundamental value of the right exceeds (goes below) its market price the right trades on a discount (premium). The differences between the market price and the fundamental value are measured in percentage terms as well as monetary terms.

The data utilized in this section contains the stock prices of the companies that accomplished rights offerings in OMXH Stock Exchange during 2003 – 2013 and the market prices of the subscription rights. On average the subscription rights have traded for 8 days in the stock market with 5 days being the

minimum and 14 days being the maximum number of days, the most frequent duration of trading is 6 days. The complete list of rights offerings, number of trading days of subscription rights and average closing price premiums (discounts) is presented in Table 18.

Table 18:

Average premiums (discounts) to fundamental values, 2003 – 2013

Year	Company	N. of trading days	Average premium (discount)	Year	Company	N. of trading days	Average premium (discount)
2003	Biotie Therapies	6	-84,8 %	2009	Ilkka-Yhtymä (Share 2)	10	-50,9 %
2003	Suominen	13	-5,0 %	2009	Amer Sports	6	-0,2 %
2003	Atria	13	-5,8 %	2009	Kemira	8	0,8 %
2004	Metsä Board (A-share)	8	-1,1 %	2009	HKScan	7	1,0 %
2004	Metsä Board (B-share)	8	-1,5 %	2010	Ixonos	6	-7,4 %
2004	HKScan	11	-4,7 %	2010	Suominen	6	-18,1 %
2004	Lassila & Tikanoja	11	-0,9 %	2011	Oral Hammaslaakarit	8	-4,1 %
2004	Norvestia	9	-9,6 %	2011	Cencorp	8	18,3 %
2005	Pohjola Bank	12	-0,8 %	2011	Cramo	6	0,0 %
2006	Citycon	8	-2,7 %	2011	Aspo	6	-6,9 %
2006	Sanoma	14	0,8 %	2011	Tiimari	6	-98,4 %
2006	Tiimari	5	4,7 %	2011	Bank of Åland (A-share)	11	-21,2 %
2007	Sponda	8	-1,2 %	2011	Bank of Åland (B-share)	11	-55,8 %
2007	Aspocomp Group	7	-15,1 %	2012	Outokumpu	10	-15,5 %
2007	Citycon	6	1,5 %	2012	Technopolis	9	7,7 %
2007	Finnair	7	-1,4 %	2012	Tecnotree	6	-82,0 %
2008	Technopolis	5	-0,2 %	2012	Turvatiimi	7	-83,6 %
2008	Terveystalo Healthcare	6	n.m.	2012	Citycon	6	5,4 %
2009	Nordea Bank	6	-92,1 %	2013	Ixonos	6	-92,3 %
2009	Pohjola Bank	7	-2,7 %	2013	Citycon	6	-18,6 %
2009	Sponda	9	-1,8 %	2013	Talvivaara Mining Co	8	-56,3 %
2009	Finnlines	5	-69,6 %	2013	Finnlines	6	n.m.
2009	Stockmann (A-share)	10	14,0 %	2013	Technopolis	9	0,3 %
2009	Stockmann (B-share)	10	-1,3 %	2013	Ixonos	6	-96,3 %
2009	Ilkka-Yhtymä (Share 1)	10	-11,8 %				
	Average					8,0	-20,6 %
	Median					8,0	-4,1 %

Table 18 illustrates that on average the subscription rights have traded at 20,6 percent discount, with the median being 4,1 percent, when measured as the difference between the closing right price and the closing fundamental value of the right¹⁰. The highest average premium equals 18,3 percent (Cencorp) while the highest discount stands for 98,4 percent (Tiimari 2011). 12 offerings (24 percent) of the sample's 49 observations have traded at premium while 25 offerings (76 percent) have traded at discount to fundamental value¹¹. This mispricing can be seen also in an earlier study of Knüpfer and Rantapuska (2008) which indicates the existing shareholders to sell their subscription rights with a discount¹².

In the next sections the deviations from fundamental values are discussed and analyzed with implications for market efficiency.

5.4.1 Subscription right misvaluation

According to universal financial literature, right prices should equal the gap between stock price and subscription price. The data sample shows that this has not been the case in OMXH during 2003 – 2013; it shows that the subscription prices have on average traded at over 20 percent discount at market close. But even if the average premium (discount) would equal zero it could not be argued the market to work efficiently in the pricing, one half of the rights could trade at 30 percent premium while the other half could trade at discount of equal measure; making the average premium zero. Later on, the deviations from the zero premiums are further discussed, for now, let us assume that the right prices are determined inefficiently.

While the correct value for a subscription right can be calculated with simple math, in practice the market price is of course determined by the buyers and sellers in the market. Since the subscription rights are on average trading at discount it implies that there are more sellers than buyers for those securities. If the number of subscription rights available in the market is very high they can trade at discount when the company does not attract new investors. While the existing shareholders are not acting rationally if they sell their rights for low prices, the phenomena can be explained with retail investors' capital limits and

¹⁰ Rights offerings of Terveystalo Healthcare and Finnlines (2013) are excluded from the sample since the fundamental values of the rights are zero in both cases with the subscription price exceeding the closing price of the corresponding stock.

¹¹ Rights offerings of Terveystalo Healthcare and Finnlines (2013) have both traded at premium, while the fundamental value has always closed at zero during the trading period.

¹² They find the median discount to intrinsic value to equal 7 percent (average 16 percent)

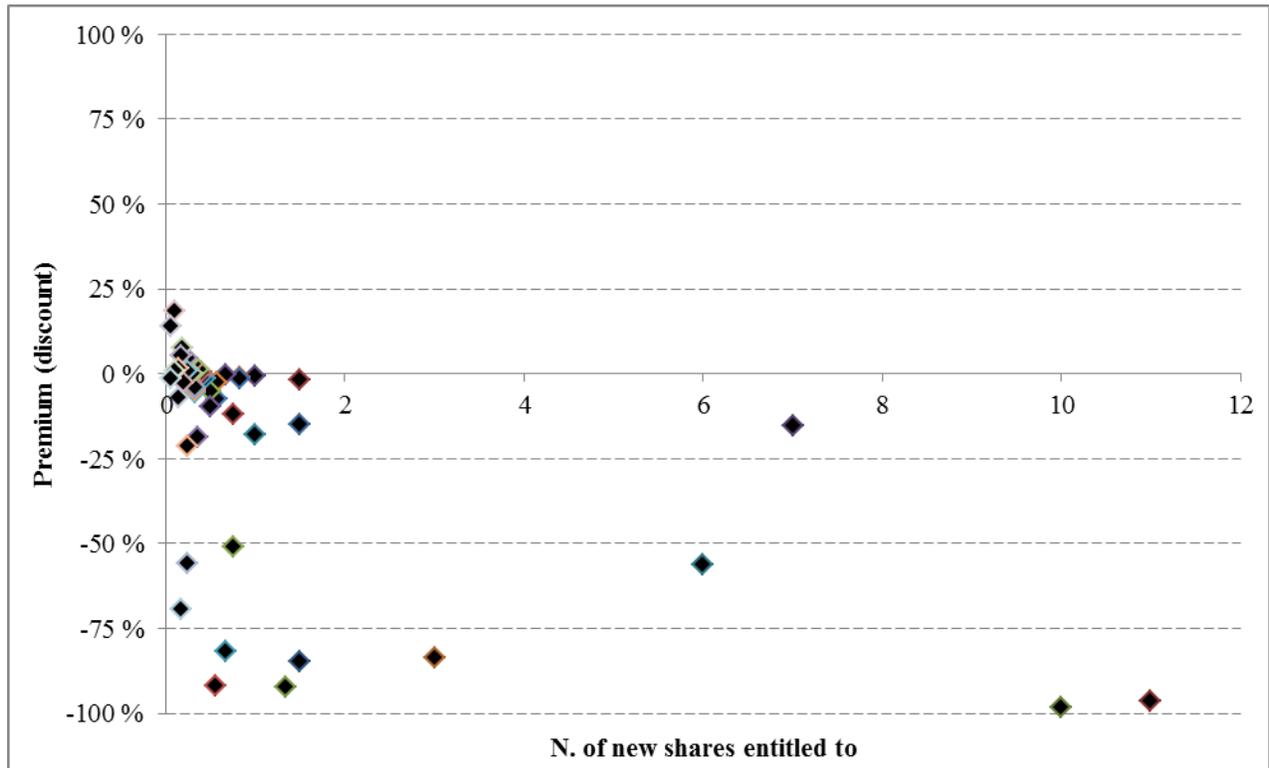
portfolio diversification; the shareholder does not wish to purchase more shares since she loses in diversification.

If it is assumed that the price discount has a positive correlation with the level of supply of the rights, it implies that rights offerings with a high potential dilution are more likely sources of price discounts than offerings with low dilution. In the following section the offerings are ranked by the level of premium (discount) and subscription terms.

5.4.2 Discount and dilution

Figure 2 illustrates how the subscription terms and the price premium (discount) relate to each other¹³. On the x-axis is the number of new shares an existing shareholder is entitled to in the issue and on the y-axis is the average premium (discount) to fundamental value.

Figure 2:
Subscription terms and premium (discount) to stock price



¹³ The rights offerings of Terveystalo Healthcare and Finnlins (2013) are excluded from the sample due to the zero-value of subscription rights.

The figure illustrates that when the subscription terms vary from 2:1 to 11:1 the discount has always exceeded 50 percent except for Outokumpu's offering where the discount equals 16 percent. The correlation coefficient for the sample equals -0,548 implying that the number of new shares offered for one existing share and the premium to stock price are strongly negatively correlated. The correlation strengthens the hypothesis that a large supply of subscription rights increases the discount and that the demand curve for subscription rights is not flat but downward sloping. Appendix 2 presents the results of regression and variance analysis tests. Since the P-value of the Intercept is clearly less than 0,05 the subscription terms seem to explain partly the discount.

In the following section the time effect on discount is studied. While the subscription rights on average closed at over 20 percent discount, the variance between trading days can have an impact on the results.

5.4.3 Variance of discount during the trading period

In this section the subscription rights' trading periods are analyzed with comparing the premiums (discounts) on certain dates: the first trading day, the day at halfway of the period¹⁴ and the last trading day. If there are repeating significant differences in the deviations from the fundamental value during the trading period, it can imply a pricing pattern to exist for investors to take advantage from.

Table 19 presents the average premiums (discounts) for the chosen trading days. The average discount has increased from the first trading days number -18,1 percent to -23,4 percent on the last trading day. This can imply that the liquidity of the subscription rights is at its best in the beginning of the trading window and that it decreases as the end of the window comes near. While the data of this study does not include the trading volumes of subscription rights it could be possible to study in a further research paper.

The largest movement in the discount level is 147,3 percent, with the subscription right of Cencorp closing at 66,2 percent premium on the first day while closing at -81,0 percent discount on the last day. The smallest movement equals 0,5 percentage points (Lassila & Tikanoja). On average, the movement equals negative 6,1 percentage points. The results imply that in order to gain the largest potential abnormal returns, the investors should purchase subscription rights on the last day of the transfer window.

¹⁴ When the trading window of subscription rights is an even number, the halfway point is considered to be the close of $n/2$, where n is the number of trading days.

Table 19:**Premiums (discounts) during trading period, 2003 – 2013**

Company	Premium (discount) at close			Company	Premium (discount) at close		
	First day	Halfway	Last day		First day	Halfway	Last day
Biotie Therapies	-73,3 %	-88,9 %	-86,7 %	Ilkka-Yhtymä (Share 2)	-9,6 %	-17,4 %	-12,6 %
Suominen	-10,7 %	-3,5 %	-7,7 %	Amer Sports	1,0 %	-0,6 %	2,8 %
Atria	-9,7 %	-4,5 %	-5,8 %	Kemira	0,5 %	1,0 %	1,8 %
Metsä Board (A-share)	-4,7 %	-2,0 %	7,5 %	HKScan	3,5 %	5,0 %	-2,0 %
Metsä Board (B-share)	-1,4 %	-2,0 %	-2,1 %	Ixonos	-3,2 %	-5,3 %	-16,0 %
HKScan	-4,8 %	-3,6 %	-8,6 %	Suominen	-14,9 %	-12,5 %	-22,6 %
Lassila & Tikanoja	-0,3 %	0,0 %	-0,8 %	Oral Hammaslaakarit	-8,9 %	0,0 %	-7,1 %
Norvestia	-7,4 %	-13,8 %	-11,7 %	Cencorp	66,2 %	9,2 %	-81,0 %
Pohjola Bank	-1,5 %	-0,9 %	0,7 %	Cramo	-1,7 %	-1,3 %	0,9 %
Citycon	-5,7 %	0,0 %	-8,3 %	Aspo	-15,5 %	-13,1 %	0,8 %
Sanoma	6,8 %	-0,4 %	-0,6 %	Tiimari	-95,1 %	-98,8 %	-99,9 %
Tiimari	14,3 %	-1,5 %	3,4 %	Bank of Åland (A-share)	-4,5 %	-83,1 %	-13,0 %
Sponda	-3,0 %	-0,2 %	-2,3 %	Bank of Åland (B-share)	-30,1 %	-62,5 %	-64,0 %
Aspocomp Group	-16,7 %	11,1 %	-33,3 %	Outokumpu	-10,2 %	-18,1 %	-21,6 %
Citycon	-15,0 %	3,5 %	-10,5 %	Technopolis	-8,3 %	19,7 %	-7,4 %
Finnair	-4,9 %	-8,0 %	0,4 %	Tecnotree	-57,5 %	-81,3 %	n.m.
Technopolis	-0,5 %	-9,1 %	-8,9 %	Turvatiimi	-89,3 %	-83,1 %	-82,1 %
Terveystalo Healthcare	n.m.	n.m.	n.m.	Citycon	-4,1 %	2,5 %	14,8 %
Nordea Bank	-91,5 %	-92,9 %	-92,1 %	Ixonos	-93,2 %	-91,8 %	-92,5 %
Pohjola Bank	-1,5 %	-4,2 %	-0,2 %	Citycon	-26,0 %	-20,4 %	-18,9 %
Sponda	-5,6 %	0,0 %	-2,2 %	Talvivaara Mining Co	-32,5 %	-57,6 %	-71,6 %
Finnlines	-67,3 %	-60,0 %	-69,2 %	Finnlines	n.m.	n.m.	n.m.
Stockmann (A-share)	30,2 %	29,8 %	-2,8 %	Technopolis	-0,4 %	-1,1 %	1,2 %
Stockmann (B-share)	3,1 %	-5,0 %	-0,3 %	Ixonos	-93,2 %	-97,7 %	-97,1 %
Ilkka-Yhtymä (Share 1)	-55,0 %	-54,4 %	-48,2 %				
Average					-18,1 %	-21,7 %	-23,4 %
Median					-5,7 %	-4,2 %	-8,0 %

In the next section the extreme deviations are studied further in order to find if similar features or characteristics exist between the offerings.

5.4.4 Extreme deviations from the fundamental value

Cencorp's and Stockmann's (A-share) rights offerings are the only ones in the sample in which the subscription rights have traded on average at over 10 percent premium to fundamental value. In both of the offerings the rights traded at substantial premiums during the first days of the trading window but ended up trading at discount.

The two offerings share one common feature, which is the number of new shares the existing shareholders are entitled to. In Stockmann's offering one new share was issued for 18 existing ones, while the shareholder of Cencorp was given the right to purchase 2 new shares for 19 existing ones.

Stockmann's offering had the smallest term ratio while Cencorp had the fourth smallest ratio with only offering of Finnlines (2013) and Sanoma between the two. The offering of Stockmann was a growth issue while the offering of Cencorp was performed to strengthen the balance sheet. The features and characteristics of the offerings are presented in Table 20.

Table 20:
Features of Stockmann's (A-share) and Cencorp's rights offerings

Company	Year	Terms	Cash raised, MEUR	Discount to TERP	Purpose	Result
Stockmann (A-share)	2009	1 per 18	44,8	-33,4 %	growth	fully subscribed
Cencorp	2011	2 per 19	3,3	-33,1 %	balance	fully subscribed

Table 21 presents the daily premiums (discounts) to fundamental values of the two offerings. The columns illustrate the share price, market price of the subscription right, fundamental value of the subscription right, difference between the market price and fundamental value and the level of premium (discount) to fundamental value in percentage units.

The figures of Cencorp illustrate how large the percentage premium can be when the stock price is very low. The subscription rights have traded at 0,01 EUR at highest while their fundamental value was 0,003 EUR at its highest. Although in terms of percentage units the premiums have been extremely large, in monetary terms the difference was only 0,008 EUR at its highest; probably too small to attract foreign institutional investors.

Table 21:
Premium (discount) to fundamental value¹⁵, Stockmann (A-share) & Cencorp

Stockmann (A-share)															
Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
11.9.2009	19,59	19,00	19,59	0,42	0,39	0,41	0,422	0,389	0,422	0,002	-0,001	0,012	-0,4 %	0,3 %	-2,8 %
10.9.2009	19,99	19,04	19,04	0,42	0,39	0,39	0,444	0,391	0,391	0,024	0,001	0,001	-5,4 %	-0,3 %	-0,3 %
9.9.2009	20,00	18,60	19,40	0,42	0,38	0,40	0,444	0,367	0,411	0,024	-0,013	0,011	-5,5 %	3,6 %	-2,7 %
8.9.2009	19,97	18,65	19,97	0,45	0,37	0,42	0,443	0,369	0,443	-0,007	-0,001	0,023	1,6 %	0,2 %	-5,1 %
7.9.2009	19,30	18,80	19,30	0,54	0,42	0,42	0,406	0,378	0,406	-0,134	-0,042	-0,014	33,2 %	11,2 %	3,6 %
4.9.2009	18,87	18,52	18,52	0,58	0,45	0,47	0,382	0,362	0,362	-0,198	-0,088	-0,108	52,0 %	24,2 %	29,8 %
3.9.2009	18,85	18,50	18,85	0,60	0,38	0,59	0,381	0,361	0,381	-0,219	-0,019	-0,209	57,7 %	5,2 %	55,0 %
2.9.2009	18,89	18,28	18,51	0,45	0,37	0,45	0,383	0,349	0,362	-0,067	-0,021	-0,088	17,6 %	6,1 %	24,4 %
1.9.2009	18,91	18,50	18,84	0,50	0,36	0,41	0,384	0,361	0,380	-0,116	0,001	-0,030	30,2 %	-0,3 %	7,9 %
31.8.2009	19,24	18,53	18,91	0,51	0,41	0,50	0,402	0,363	0,384	-0,108	-0,047	-0,116	26,8 %	13,0 %	30,2 %

Cencorp															
Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
17.3.2011	0,13	0,13	0,13	0,00	0,00	0,00	0,001	0,001	0,001	0,001	0,001	0,001	-62,0 %	-81,0 %	-81,0 %
16.3.2011	0,13	0,12	0,12	0,00	0,00	0,00	0,001	0,000	0,000	0,000	0,000	0,000	-33,5 %	n.m.	n.m.
15.3.2011	0,14	0,12	0,13	0,00	0,00	0,00	0,002	0,000	0,001	0,000	-0,001	0,000	-14,5 %	n.m.	-33,5 %
14.3.2011	0,14	0,13	0,13	0,00	0,00	0,00	0,002	0,001	0,001	-0,001	0,000	0,000	37,7 %	-33,5 %	-33,5 %
11.3.2011	0,14	0,13	0,14	0,01	0,00	0,00	0,002	0,001	0,002	-0,003	-0,001	0,000	137,5 %	118,5 %	9,2 %
10.3.2011	0,15	0,13	0,14	0,01	0,00	0,00	0,003	0,001	0,002	-0,005	-0,001	0,000	153,3 %	109,0 %	18,7 %
9.3.2011	0,15	0,14	0,15	0,01	0,01	0,01	0,003	0,002	0,003	-0,007	-0,003	-0,006	216,7 %	137,5 %	181,8 %
8.3.2011	0,14	0,14	0,14	0,01	0,00	0,00	0,002	0,002	0,002	-0,008	0,002	-0,001	375,0 %	-76,3 %	66,2 %

¹⁵ H, L and C stand for High, Low and Close respectively.

In contrast to the premium to fundamental value, there is a large number of rights offerings where the subscription rights have traded significantly below their fundamental value. The subscription rights in offerings of Biotie Therapies, Nordea Bank, Finnlines (2009), Ilkka-Yhtymä (Share 2), Tiimari (2011), Bank of Aland (B-share), Tecnotree, Turvatiimi, Ixonos (1/2013), Talvivaara Mining Co and Ixonos (11/2013) each traded at over 50 percent discount at market close on average.

The abovementioned companies are from various different industries while the offering size has also varied from 4,2 million euros (Ixonos 1/2013) to 2,500 million euros (Nordea Bank 2009). Ilkka-Yhtymä is the only company from the sample that's offering was performed to finance growth while the purpose of all the other offerings was to strengthen the balance sheet or simply rescue the issuing company from insolvency. While the purpose of the offering may well have an impact on investors' decision making, it is hard to argue that arbitrageurs with short holding periods would avoid rights offerings of this type.

The relationship between the experienced discount to fundamental value and purpose of the offering may in fact be linked to the relationship between the offering's purpose and subscription terms. When the rights offering sample is cross listed to growth offerings and balance sheet offerings; and high term ratio and low term ratio, it can be shown that it is significantly more common for balance sheet offerings to use higher term ratios. The connection between the supply curve and discount level can be found again. The cross listing of the offerings is presented in Figure 3.

Figure 3:**Offering type and subscription terms**

	Growth offerings		Balance sheet offerings	
High term ratio	Outokumpu	Suominen (2003)	Ixonos (11/2013)	Suominen (2010)
	Aspocomp Group	Norvestia	Tiimari (2011)	Metsa Board
	Pohjola Bank (2005)	Finnair	Talvivaara Mining Co	Amer Sports
	Ilkka-Yhtymä		Turvatiimi	Tecnotree
			Biotie Therapies	Pohjola Bank (2009)
			Sponda (2009)	Ixonos (2010)
			Ixonos (1/2013)	Nordea Bank
Low term ratio	Lassila & Tikanoja	Cramo	HKScan (2009)	Finnlines (2009)
	Sponda (2007)	Kemira	Atria	Cencorp
	Terveystalo Healthcare	Citycon (2012)	Tiimari (2006)	Finnlines (2013)
	Technopolis (2008)	Technopolis (2013)	Bank of Aland	
	Citycon (2013)	Citycon (2007)		
	HKScan (2004)	Citycon (2006)		
	Oral Hammaslaakarit	Aspo		
	Technopolis (2012)	Stockmann		

Figure 3 *Offering type and subscription terms* divides the sample to four groups depending on the offering type and term ratio, with the offerings where the ratio is above median (0,40 new shares for 1 existing share) are considered as *High* and the offerings where the ratio is below median as *Low*. The figure shows that the groups *Low Growth* and *High Balance* capture 30 of the 44 offerings in the sample¹⁶ while 14 offerings are divided to *High Growth* and *Low Balance*.

When the average discounts to fundamental values of *High Balance* and *Low Balance* are calculated, it can be shown that the discount is significantly higher for *High Balance* group (45 percent) than for *Low Balance* (18 percent) that is in fact below the average discount of the complete sample, 20,6 percent (Table 18).

Table 22 presents the premiums (discounts) to fundamental values of the offerings of Biotie Therapies, Nordea Bank, Finnlines (2009), Ilkka-Yhtymä (Share 2), Tiimari (2011), Bank of Aland (B-share), Tecnotree, Turvatiimi, Ixonos (1/2013), Talvivaara Mining Co and Ixonos (11/2013).

¹⁶ Excluding Sanoma's rights offering in 2009 due to the nature of the offering (issued as compensation for the loss of voting power in combination of share series).

Table 22:

Premium (discount) to fundamental value, Biotie Therapies, Nordea Bank, Finnlines (2009), Ilkka-Yhtymä (Share 2), Tiimari (2011), Bank of Aland (B-share), Tecnotree, Turvatiimi, Ixonos (1/2013), Talvivaara Mining Co & Ixonos (11/2013)

Biotie Therapies

Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
11.6.2003	0,45	0,44	0,45	0,01	0,01	0,01	0,075	0,060	0,075	0,065	0,050	0,065	-86,7 %	-83,3 %	-86,7 %
10.6.2003	0,46	0,45	0,45	0,01	0,01	0,01	0,090	0,075	0,075	0,080	0,065	0,065	-88,9 %	-86,7 %	-86,7 %
9.6.2003	0,49	0,45	0,45	0,02	0,01	0,01	0,135	0,075	0,075	0,115	0,065	0,065	-85,2 %	-86,7 %	-86,7 %
6.6.2003	0,46	0,46	0,46	0,01	0,01	0,01	0,090	0,090	0,090	0,080	0,080	0,080	-88,9 %	-88,9 %	-88,9 %
5.6.2003	0,48	0,44	0,45	0,03	0,01	0,01	0,120	0,060	0,075	0,090	0,050	0,065	-75,0 %	-83,3 %	-86,7 %
4.6.2003	0,50	0,45	0,45	0,15	0,01	0,02	0,150	0,075	0,075	0,000	0,065	0,055	0,0 %	-86,7 %	-73,3 %

Nordea Bank

Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
27.3.2009	4,02	3,83	3,87	0,10	0,09	0,09	1,216	1,111	1,133	1,116	1,021	1,043	-91,8 %	-91,9 %	-92,1 %
26.3.2009	3,97	3,80	3,95	0,10	0,08	0,09	1,188	1,095	1,177	1,088	1,015	1,087	-91,6 %	-92,7 %	-92,4 %
25.3.2009	4,00	3,66	3,89	0,10	0,08	0,09	1,205	1,018	1,144	1,105	0,938	1,054	-91,7 %	-92,1 %	-92,1 %
24.3.2009	4,38	3,80	3,86	0,11	0,08	0,08	1,414	1,095	1,128	1,304	1,015	1,048	-92,2 %	-92,7 %	-92,9 %
23.3.2009	4,30	4,06	4,19	0,11	0,09	0,11	1,370	1,238	1,309	1,260	1,148	1,201	-92,0 %	-92,7 %	-91,7 %
20.3.2009	4,27	3,95	4,16	0,12	0,09	0,11	1,353	1,177	1,293	1,233	1,087	1,183	-91,1 %	-92,4 %	-91,5 %

Finnlines (2009)

Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
10.6.2009	5,89	5,70	5,89	0,02	0,01	0,02	0,065	0,033	0,065	0,045	0,023	0,045	-69,2 %	-70,0 %	-69,2 %
9.6.2009	5,86	5,55	5,86	0,02	0,01	0,02	0,060	0,008	0,060	0,040	-0,002	0,040	-66,7 %	20,0 %	-66,7 %
8.6.2009	5,86	5,60	5,80	0,02	0,01	0,02	0,060	0,017	0,050	0,040	0,007	0,030	-66,7 %	-40,0 %	-60,0 %
5.6.2009	6,05	5,80	5,89	0,03	0,01	0,01	0,092	0,050	0,065	0,062	0,040	0,055	-67,3 %	-80,0 %	-84,6 %
4.6.2009	6,12	5,89	6,05	0,13	0,01	0,03	0,103	0,065	0,092	-0,027	0,055	0,062	25,8 %	-84,6 %	-67,3 %

Ikka-Yhtymä (Share 2)

Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
18.9.2009	8,14	7,49	7,80	1,65	1,58	1,62	3,383	2,895	3,128	1,733	1,315	1,508	-51,2 %	-45,4 %	-48,2 %
17.9.2009	7,40	7,06	7,40	1,64	1,59	1,63	2,828	2,573	2,828	1,188	0,983	1,198	-42,0 %	-38,2 %	-42,4 %
16.9.2009	7,40	7,06	7,40	1,64	1,55	1,60	2,828	2,573	2,828	1,188	1,023	1,228	-42,0 %	-39,7 %	-43,4 %
15.9.2009	8,25	8,25	8,25	1,63	1,44	1,62	3,465	3,465	3,465	1,835	2,025	1,845	-53,0 %	-58,4 %	-53,2 %
14.9.2009	8,10	8,10	8,10	1,51	1,45	1,49	3,353	3,353	3,353	1,843	1,903	1,863	-55,0 %	-56,7 %	-55,6 %
11.9.2009	8,10	8,10	8,10	1,61	1,51	1,53	3,353	3,353	3,353	1,743	1,843	1,823	-52,0 %	-55,0 %	-54,4 %
10.9.2009	8,10	8,10	8,10	1,69	1,58	1,60	3,353	3,353	3,353	1,663	1,773	1,753	-49,6 %	-52,9 %	-52,3 %
9.9.2009	8,52	8,50	8,50	1,75	1,67	1,70	3,668	3,653	3,653	1,918	1,983	1,953	-52,3 %	-54,3 %	-53,5 %
8.9.2009	8,51	8,50	8,51	1,89	1,69	1,78	3,660	3,653	3,660	1,770	1,963	1,880	-48,4 %	-53,7 %	-51,4 %
7.9.2009	9,48	9,44	9,44	2,43	1,80	1,96	4,388	4,358	4,358	1,958	2,558	2,398	-44,6 %	-58,7 %	-55,0 %

Tiimari (2011)

Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
14.9.2011	0,13	0,13	0,13	0,002	0,000	0,000	0,400	0,400	0,400	0,398	0,400	0,400	-99,5 %	-100,0 %	-99,9 %
13.9.2011	0,14	0,13	0,13	0,006	0,001	0,001	0,500	0,400	0,400	0,494	0,400	0,399	-98,8 %	-99,9 %	-99,8 %
12.9.2011	0,14	0,12	0,14	0,006	0,002	0,002	0,500	0,300	0,500	0,494	0,299	0,499	-98,8 %	-99,5 %	-99,7 %
9.9.2011	0,15	0,13	0,14	0,015	0,005	0,006	0,600	0,400	0,500	0,585	0,395	0,494	-97,5 %	-98,8 %	-98,8 %
8.9.2011	0,15	0,13	0,14	0,027	0,010	0,014	0,600	0,400	0,500	0,573	0,390	0,486	-95,6 %	-97,5 %	-97,2 %
7.9.2011	0,15	0,13	0,15	0,200	0,020	0,029	0,600	0,400	0,600	0,400	0,380	0,571	-66,6 %	-95,0 %	-95,1 %

Bank of Aland (B-share)

Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
6.10.2011	9,49	9,15	9,49	0,20	0,08	0,08	0,223	0,138	0,223	0,023	0,058	0,143	-10,1 %	-41,8 %	-64,0 %
5.10.2011	9,85	9,20	9,33	0,13	0,08	0,10	0,313	0,150	0,183	0,188	0,069	0,082	-60,0 %	-46,0 %	-45,1 %
4.10.2011	9,78	9,78	9,78	0,09	0,06	0,08	0,295	0,295	0,295	0,205	0,235	0,215	-69,5 %	-79,7 %	-72,9 %
3.10.2011	9,94	9,05	9,94	0,10	0,03	0,07	0,335	0,113	0,335	0,235	0,083	0,263	-70,1 %	-73,3 %	-78,4 %
30.9.2011	11,00	9,46	10,50	0,15	0,08	0,13	0,600	0,215	0,475	0,450	0,134	0,346	-75,0 %	-62,3 %	-72,8 %
29.9.2011	10,99	9,41	10,20	0,19	0,08	0,15	0,598	0,203	0,400	0,408	0,122	0,250	-68,2 %	-60,4 %	-62,5 %
28.9.2011	11,98	10,99	10,99	0,36	0,13	0,20	0,845	0,598	0,598	0,485	0,468	0,398	-57,4 %	-78,2 %	-66,6 %
27.9.2011	12,00	11,50	11,99	0,42	0,35	0,35	0,850	0,725	0,848	0,430	0,375	0,497	-50,6 %	-51,7 %	-58,6 %
26.9.2011	12,00	11,00	11,50	0,55	0,35	0,41	0,850	0,600	0,725	0,300	0,250	0,315	-35,3 %	-41,7 %	-43,4 %
23.9.2011	11,85	11,50	11,85	0,75	0,61	0,65	0,813	0,725	0,813	0,063	0,115	0,163	-7,7 %	-15,9 %	-20,0 %
22.9.2011	12,49	11,95	12,49	0,86	0,68	0,68	0,973	0,838	0,973	0,113	0,158	0,293	-11,6 %	-18,8 %	-30,1 %

Tecnotree

Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
12.6.2012	0,13	0,12	0,12	0,00	0,00	0,00	0,007	0,000	0,000	0,006	0,000	0,000	-95,5 %	n.m.	n.m.
11.6.2012	0,13	0,13	0,13	0,00	0,00	0,00	0,007	0,007	0,007	0,005	0,006	0,006	-82,0 %	-95,5 %	-95,5 %
8.6.2012	0,14	0,12	0,14	0,00	0,00	0,00	0,013	0,000	0,013	0,011	0,000	0,013	-83,5 %	n.m.	-95,5 %
7.6.2012	0,15	0,13	0,14	0,00	0,00	0,00	0,020	0,007	0,013	0,016	0,005	0,011	-79,5 %	-73,0 %	-81,3 %
6.6.2012	0,16	0,14	0,15	0,01	0,00	0,00	0,027	0,013	0,020	0,017	0,010	0,016	-62,5 %	-77,5 %	-80,0 %
5.6.2012	0,18	0,15	0,15	0,01	0,01	0,01	0,040	0,020	0,020	0,030	0,012	0,012	-75,0 %	-61,0 %	-57,5 %

Turvatiimi

Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
11.9.2012	0,05	0,03	0,04	0,02	0,02	0,02	0,120	0,060	0,090	0,101	0,045	0,074	-84,3 %	-74,8 %	-82,1 %
10.9.2012	0,05	0,04	0,05	0,02	0,02	0,02	0,120	0,090	0,120	0,102	0,075	0,103	-84,6 %	-83,2 %	-85,8 %
7.9.2012	0,05	0,04	0,04	0,02	0,01	0,02	0,120	0,090	0,090	0,102	0,079	0,072	-85,2 %	-87,7 %	-80,2 %
6.9.2012	0,05	0,03	0,04	0,02	0,02	0,02	0,120	0,060	0,090	0,100	0,045	0,075	-83,3 %	-74,7 %	-83,1 %
5.9.2012	0,05	0,04	0,04	0,02	0,02	0,02	0,120	0,090	0,090	0,101	0,073	0,072	-84,3 %	-81,0 %	-80,0 %
4.9.2012	0,06	0,04	0,05	0,02	0,02	0,02	0,150	0,090	0,120	0,130	0,073	0,101	-86,8 %	-81,6 %	-84,3 %
3.9.2012	0,06	0,05	0,06	0,02	0,01	0,02	0,150	0,120	0,150	0,129	0,109	0,134	-86,0 %	-90,5 %	-89,3 %

Ixonos (1/2013)

Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
31.1.2013	2,05	1,85	2,00	0,18	0,16	0,18	2,453	2,187	2,387	2,269	2,027	2,207	-92,5 %	-92,7 %	-92,5 %
30.1.2013	1,90	1,85	1,85	0,18	0,16	0,17	2,253	2,187	2,187	2,078	2,024	2,017	-92,2 %	-92,6 %	-92,2 %
29.1.2013	1,90	1,80	1,90	0,18	0,17	0,18	2,253	2,120	2,253	2,072	1,950	2,074	-92,0 %	-92,0 %	-92,0 %
28.1.2013	2,00	1,85	1,95	0,20	0,18	0,19	2,387	2,187	2,320	2,187	2,011	2,130	-91,6 %	-92,0 %	-91,8 %
25.1.2013	2,20	1,85	2,00	0,20	0,17	0,20	2,653	2,187	2,387	2,456	2,014	2,190	-92,6 %	-92,1 %	-91,7 %
24.1.2013	2,40	2,05	2,20	0,27	0,17	0,18	2,920	2,453	2,653	2,650	2,283	2,474	-90,8 %	-93,1 %	-93,2 %

Talvivaara Mining Co

Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
27.3.2013	0,25	0,20	0,22	0,12	0,04	0,11	0,510	0,264	0,377	0,391	0,229	0,270	-76,7 %	-86,7 %	-71,6 %
26.3.2013	0,26	0,22	0,24	0,17	0,07	0,09	0,600	0,360	0,467	0,432	0,290	0,381	-72,0 %	-80,5 %	-81,5 %
25.3.2013	0,27	0,25	0,25	0,25	0,16	0,17	0,659	0,540	0,564	0,409	0,380	0,394	-62,1 %	-70,4 %	-69,9 %
22.3.2013	0,28	0,25	0,25	0,29	0,18	0,20	0,744	0,525	0,532	0,450	0,344	0,332	-60,5 %	-65,5 %	-62,4 %
21.3.2013	0,30	0,28	0,28	0,42	0,28	0,30	0,846	0,690	0,695	0,430	0,410	0,400	-50,8 %	-59,4 %	-57,6 %
20.3.2013	0,32	0,29	0,30	0,64	0,42	0,44	0,960	0,786	0,840	0,321	0,365	0,402	-33,4 %	-46,4 %	-47,9 %
19.3.2013	0,33	0,30	0,31	0,66	0,61	0,64	1,010	0,843	0,880	0,350	0,233	0,240	-34,7 %	-27,6 %	-27,2 %
18.3.2013	0,37	0,30	0,33	0,75	0,47	0,67	1,247	0,846	0,998	0,497	0,375	0,324	-39,8 %	-44,3 %	-32,5 %

Ixonos (11/2013)

Day	Share H	Share L	Share C	Right H	Right L	Right C	Value H	Value L	Value C	Diff. (EUR) H	Diff. (EUR) L	Diff. (EUR) C	Premium (discount) H	Premium (discount) L	Premium (discount) C
26.11.2013	0,14	0,13	0,14	0,03	0,02	0,02	0,770	0,660	0,770	0,736	0,638	0,748	-95,5 %	-96,7 %	-97,1 %
25.11.2013	0,15	0,12	0,13	0,03	0,02	0,03	0,880	0,550	0,660	0,852	0,530	0,632	-96,8 %	-96,4 %	-95,8 %
22.11.2013	0,15	0,13	0,15	0,02	0,02	0,02	0,880	0,660	0,880	0,855	0,640	0,859	-97,2 %	-97,0 %	-97,7 %
21.11.2013	0,18	0,14	0,15	0,03	0,02	0,02	1,210	0,770	0,880	1,180	0,752	0,860	-97,5 %	-97,7 %	-97,7 %
20.11.2013	0,16	0,14	0,14	0,07	0,01	0,03	0,990	0,770	0,770	0,920	0,758	0,740	-92,9 %	-98,4 %	-96,1 %
19.11.2013	0,19	0,12	0,14	0,19	0,05	0,05	1,320	0,550	0,770	1,130	0,500	0,718	-85,6 %	-90,9 %	-93,2 %

As the figures in Table 22 illustrate, the discounts are extremely large during the whole trading period implying investors could have been able to achieve significant abnormal returns with buying rights from the market.

The data also shows an interesting phenomena; the stock price falls in all of the offerings during the trading window, while in 8 of the 11 offerings the discount increases from the first day to the last day. This implies that, firstly, the market price of the subscription right may overreact to the fall in stock price and secondly, the existing shareholders could achieve the largest abnormal returns by selling their shares on the first day of the trading window while buying subscription rights with the proceeds.

5.4.5 Conclusion

This section has illustrated that the rights offerings completed in OMXH Stock Exchange during 2003 – 2013 have provided, at least in theory, interesting opportunities for investors. The subscription rights have traded at 20 percent discount to fundamental value on average (with the level of discount increasing towards the end of trading window), which can be considered as a violation to market efficiency in this particular security class. Also, the subscription term ratio seems to correlate negatively with the rights' trading premium to their fundamental value; rights offerings with subscription ratios over 2:1 have experienced over -50 percent discounts, with the offering of Outokumpu being the only exception.

The final chapter of this thesis summarizes and discusses the results and their implications for the hypotheses. The chapter will also discuss about potential further issues to study.

6 Conclusion

The thesis has studied the behavior of stock prices and subscription right prices in rights offerings accomplished in OMX Helsinki Stock Exchange during 2003 – 2013. The primary objective of the study was to find out whether the subscription rights trade at a price equal to their fundamental value or whether there are potential misvaluations in the security class. The secondary objectives were to i) study whether the stock price reacts correctly to new information; in this case, to the offering announcement, ii) whether there exists an abnormal return on the announcement date, and iii) what kind of discount to TERP is used in practice when deciding the subscription price.

The primary motivation for the study stemmed from the rights offering of Ixonos in November 2013 where the subscription rights seemed to trade at an extremely low price compared to their fundamental values. Further motivation was the relatively low amount of studies covering the pricing of subscription rights by investment banks, especially in Finland.

The first question (Q_1) of this thesis studies the level of subscription price the company and their advisors choose for the offering. The average subscription price is 36 percent lower than the TERP (median 32,7 percent), which implies that finance professionals are quite cautious when determining the subscription price. Since only one offering in the sample suffered from a too high subscription price¹⁷ (Terveystalo Healthcare) it may be possible that the investment bankers are indeed too cautious regarding the pricing.

The results imply that the level of discount has come down as time has passed, since it is clearly below the number 50,7 percent found by Hietala and Löyttyniemi (1991) and 57 percent documented by Knüpfer and Rantapuska (2008). When the rights offerings were divided to growth offerings and balance sheet offerings, the discounts were significantly higher for the balance sheet offerings.

It could be further studied whether the level of discount relates to management's confidence of the success of the offering. It can be argued that a company with positive expectations would not need to use significant discount in order to attract the shareholders to take part in the offering.

The abnormal return on the day of the rights offering becomes public (Q_2) equals -1,3 percent (median -0,7 percent) after the return is beta-adjusted, which is on line with majority of previous studies of the announcement date effect (Asquith and Mullins (1986) found that for U.S. industrial issues the price decline amounts to 3 percent after the announcement). Perhaps surprisingly, the study of Hietala and Löyttyniemi (1991) found a positive 1,9% abnormal return on announcement day for rights offerings and an even larger one for general cash offerings.

According to the results, it can be interpreted that during 2003 – 2013, also Finnish investors seemed to find negative information in equity offering announcements. Whether this negative information relates to changes in capital structure or behavioral issues, remains unresolved after this study. Based on these empirical findings, it is not possible to make predictions whether a rights offering announcement will

¹⁷ While the stock price did fell under the subscription price during the offering of Finnliness (2013), it did not jeopardize the offering, since the majority shareholder was committed to subscribe 100 percent of the offering.

make the stock to jump or decline. If the time period is extended, there could possibly be some kind of time pattern in abnormal returns on the announcement date.

Thirdly, the evidence shows that the stock price does not equal the TERP on the ex-rights day, instead the average premium is nearly 9 percent (median 2,9 percent), which implies the market to underreact to new information (at least, regarding the subscription right de-attachment). Q₃ has not been tested in OMXH in past financial literacy, thus it cannot be compared to previous results but can be used as a benchmark to future studies.

The evidence does not imply that OMXH Stock Exchange has lost its efficiency, or become more “underreacting”, although a few stocks were trading at very dubious levels during the offering. While Fama (1998) argues that overreactions and underreactions are equally common on the market, the data does, however provide contradicting results; in 27 instances the stock price under-reacted to the de-attachment of subscription rights, while in only 9 instances the market overreacted. In further studies, it would be interesting to research whether market capitalization and liquidity of the stock contribute to the premium (or discount).

Finally, the evidence suggests that the answer to Q₄ is negative, as the median discount at daily close equals 4,1 percent (average 20,4 percent), although, this study does not test whether an investor could have benefited from the mispricing in practice (the study does not include transaction fees, taxes or other possible costs). It is very probable that rights offerings such as Ixonos (11/2013) and Turvatiimi have provided opportunities to achieve large abnormal returns. The interpretations of this study are similar to the ones of Knüpfer and Rantapuska (2008); who found a median discount of 7 percent (average 16 percent) during 1995 – 2002; and Berglund and Wahlroos (1985) in the sense that subscription rights tend to trade at a discount to fundamental value.

The offering term ratio seems to be a determinant in the pricing, with larger ratios larger discounts can be expected. This can imply that the companies issuing shares with large term ratios are usually in some kind of trouble and are forced to strengthen their balance sheet whatever the cost, scaring away the investors. Large term ratios can also lead to situations where the existing shareholder does not have enough cash to participate in the offering and turns to a passive investor, decreasing the liquidity of the subscription rights.

A further study should be done where the data allows a more thorough look into the arbitrage opportunities. It would be interesting to find out how company size and liquidity of the stock impact on the gap between the fundamental value and market value of a right. While in the study of Knüpfer and Rantapuska (2008) Sonera, as a large cap firm, did not experience from mispricing but in this study, in contrast, Nordea Bank was one of the issuing companies with the largest deviations from fundamental value.

To sum up, the results of the study indicate the market discount of subscription rights to equal 4,1 percent (median), when measured from daily closing prices. The shares of the issuing companies also tend to underreact to the de-attachment of the subscription rights, which is shown by the average premium of 8,8 percent. The so-called announcement date effect has been covered in number of studies and this paper finds similar results to majority of studies also from the Finnish market. Finally, the study implies that the investment banks and the issuing companies are cautious when deciding on the subscription price, with the discount to theoretical ex-rights price equaling 36,0 percent on average. Table 23 summarizes the results of the thesis.

Table 23:

Summary of results

Question	Empirical evidence
Q1 How large is the discount to theoretical ex-rights price of the subscription price?	Discount to TERP is 36,0 percent on average.
Q2 How large is the announcement date effect on the stock price?	The announcement effect equals -1,3 percent on average.
Q3 Does the stock price equal the theoretical ex-rights price at the closing of Stock Exchange on the ex-rights day?	The median premium to TERP equals 2,9 percent (average 8,8 percent).
Q4 Does the OMX Helsinki Stock Exchange work efficiently in determining the value of subscription rights?	The median discount is 4,1 percent (average 20,4 percent) for daily closing prices.

The hypotheses of this thesis are presented with empirical evidence in Table 24.

Table 24:
Summary of hypotheses

Hypothesis	Empirical evidence
H1 On the ex-rights day the shares should trade at their current theoretical ex-rights price.	H1 does not hold.
H2 Subscription rights should trade at the price equal to the difference between the share price and subscription price.	H2 does not hold.
H3 Share price equals the fundamental value of the stock during the subscription period of new shares.	H3 is not tested by any measure.

Hypotheses 1 and 2 do not hold according to this study. Shares do not react correctly to the de-attachment of subscription rights but instead seem to underreact to new information. Neither the subscription rights themselves trade at their fundamental values in the market. Hypothesis 3 is not tested by any measure in the study.

While no definite answer for the subscription rights' deviation from their fundamental values can be given, there are a number of possible explanations. The results imply that the demand curve for subscription rights is not flat but downward sloping. This can be due to the lack of arbitrageur interest in the offerings, which lowers the demand for the rights. Shleifer and Vishny (1997) argue that certain markets with high volatility do not attract arbitrageurs, which is line with the results of this study; large deviations from fundamental values in OMXH Stock Exchange that has historically been more volatile than many larger stock exchanges.

The study brings added value to existing literature by presenting results of the determination of prices of subscription rights; with the empiric data showing how the market prices can differ significantly from fundamental values. Secondly, the study also presents results of how the subscription price in a rights offering is defined in practice by Finnish companies and their financial advisors. Thirdly, the announcement date effect is illustrated with a Finnish sample to strengthen the theory that the market considers a rights offering to include new negative information about the issuing company's future performance. Finally, the study presents results of the market's underreaction to the de-attachment of subscription rights, which is not covered in studies using the OMX Helsinki Stock Exchange as its source of data.

As this study is limited to one country only, it would be interesting to see if similar results could be obtained from other European stock markets. Also, the results provide foundations for a study, where liquidity, taxes and other costs are included in order to find out if it would have been possible to make abnormal monetary returns in practice in Finnish rights offerings.

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8 Appendices

Appendix 1:

Complete sample

Company	Subscription price	Terms	Announcement date	Ex-rights date	Cash raised, MEUR
Biotie Therapies	0,400	3 per 2	23.5.2003	27.5.2003	10,5
Suominen	2,700	1 per 2	28.10.2003	29.10.2003	4
Atria	5,000	1 per 3	22.10.2003	12.11.2003	26,4
Metsa Board A	3,000	5 per 6	7.9.2004	8.9.2004	447,5
Metsa Board B	3,000	5 per 6	7.9.2004	8.9.2004	
HKScan	4,200	1 per 3	7.10.2004	28.10.2004	36,2
Lassila & Tikanoja	7,500	2 per 5	16.11.2004	16.11.2004	47,6
Norvestia	5,000	1 per 2	21.12.2004	21.12.2004	25,5
Pohjola Bank	7,200	1 per 1	14.10.2005	17.10.2005	300
Citycon	2,750	1 per 5	24.3.2006	27.3.2006	75
Sanoma	0,430	1 per 10	9.3.2006	4.4.2006	1
Tiimari	3,800	1 per 4	28.11.2006	29.11.2006	7,5
Sponda	7,800	2 per 5	9.1.2007	10.1.2007	247
Aspocomp Group	0,840	3 per 2	16.3.2007	19.3.2007	25
Citycon	3,600	1 per 7	10.9.2007	11.9.2007	99
Finnair	6,300	4 per 9	21.11.2007	22.11.2007	248
Technopolis	4,500	3 per 10	28.4.2008	29.4.2008	60
Terveystalo Healthcare	1,100	2 per 5	15.9.2008	16.9.2008	14,2
Nordea Bank	1,810	11 per 20	10.2.2009	13.3.2009	2500
Pohjola Bank	2,650	4 per 7	12.2.2009	31.3.2009	300
Sponda	1,250	3 per 2	25.5.2009	26.5.2009	208,2
Finnlines	5,500	1 per 6	26.5.2009	27.5.2009	34
Stockmann A	12,000	1 per 18	14.8.2009	17.8.2009	44,8
Stockmann B	12,000	1 per 18	14.8.2009	17.8.2009	
Ilkka-Yhtymä 1	3,630	3 per 4	28.8.2009	31.8.2009	39,9
Ilkka-Yhtymä 2	3,630	3 per 4	28.8.2009	31.8.2009	
Amer Sports	3,300	2 per 3	1.9.2009	25.9.2009	150
Kemira	6,600	1 per 4	28.10.2009	24.11.2009	200
HKScan	5,300	3 per 8	24.11.2009	25.11.2009	78
Ixonos	1,150	4 per 7	18.5.2010	2.6.2010	6
Suominen	0,430	1 per 1	1.6.2010	2.6.2010	10
Oral Hammaslaakarit	2,780	1 per 3	17.1.2011	18.1.2011	6
Cencorp	0,120	2 per 19	18.2.2011	21.2.2011	3,3
Cramo	10,500	3 per 10	17.2.2011	25.3.2011	100
Aspo	5,200	1 per 7	5.4.2011	6.4.2011	20
Tiimari	0,090	10 per 1	10.6.2011	31.8.2011	13,1
Bank of Aland A	13,000	1 per 4	13.9.2011	14.9.2011	30,3
Bank of Aland B	8,600	1 per 4	13.9.2011	14.9.2011	
Outokumpu	0,790	7 per 1	1.3.2012	8.3.2012	1000,6
Technopolis	2,700	4 per 21	15.5.2012	16.5.2012	31,8
Tecnotree	0,120	2 per 3	4.5.2012	29.5.2012	5,9
Turvatiimi	0,010	3 per 1	24.8.2012	27.8.2012	4,4
Citycon	1,850	3 per 17	7.9.2012	10.9.2012	90,7
Ixonos	0,210	4 per 3	16.1.2013	17.1.2013	4,2
Citycon	1,750	7 per 20	13.2.2013	14.2.2013	198,3
Talvivaara Mining Co	0,160	6 per 1	8.3.2013	11.3.2013	261
Finnlines	6,150	1 per 10	7.5.2013	8.5.2013	28,8
Technopolis	3,290	2 per 5	4.11.2013	5.11.2013	100
Ixonos	0,070	11 per 1	11.11.2013	12.11.2013	4,82

Appendix 2:**Regression and analysis of variance**

<i>Regression Statistics</i>	
Multiple R	0,5479
R Square	0,3002
Adjusted R Square	0,2846
Standard Error	0,2881
Observations	47

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	1,6015	1,6015	19,2997	0,0000672
Residual	45	3,7341	0,0830		
Total	46	5,3356			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-0,1084	0,0475	-2,2809	0,0273
X Variable 1	-0,0785	0,0179	-4,3931	6,7E-05