Underwriters Put – Evidence from the Norwegian, Swedish and Danish Market

Master Thesis within the main profile of Finance

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Summary

Rights issues are a common way to raise equity in the Scandinavian market (Norway, Sweden and Denmark). We have investigated underwritten rights issues in the Scandinavian countries for the period 2002-2010. Our full sample consists of 101 rights issues. The focus of this thesis is to examine the relationship between risk and reward relating to underwriting services and possible differences within Scandinavia. Based on the suggestion of Galai and Schneller (1978) we have assessed the value of the underwriting service using option pricing framework.

Based on our analyses we found that the underwriting fee charged in the Scandinavian market produces excess returns to the underwriters. The mean underwriting fee charged is proven to be 3.58 %. The underwriters earned on average an excess return of 2.72 %. This means that on average 76 % of the underwriting fee is excess return to the underwriter.

The highest degree of mispricing we observed in the Swedish market, where excess returns to the underwriter are 3.63 %. Norway seems to have the most efficiently priced underwriting market.

The average put values in the Scandinavian market are similar to that of previous research and the higher excess return, ceteris paribus, must thus be explained by higher underwriting fees.

We also had a qualitative approximation to our problem where we interview three investors and three banks. In general it appears that investors and banks have many of the same thoughts in the questions asked regarding the risk and pricing of the underwriting fee.

Preface

This Master thesis is written as a part of the Master of Science program at the Norwegian School of Economics and Business Administration (NHH) and marks the end of five years of higher education.

We have had the privilege to be taught by some of the best professors in their field. This has given us a tremendous learning curve throughout our time as students at NHH.

There are a number of people we would like to acknowledge. First of all we would like to thank our advisor Aksel Mjøs, you have been helpful and patient throughout the whole process and has provided us with constructive feedback and comments. Secondly, we would like to send our thanks to the companies that took the time to manually sending us prospectuses that we were unable to find online.

Third, we would like to thank our interview objects which are to remain anonymous, who took time of their busy schedule to answer our questions.

Finally we would like to thank our friends and family for being who they are.

Kristian would like to send a special thanks to Pia.

Bergen, 20.06.2011

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1. Introduction

Rights issues are a common way to raise equity in Europe. In a rights issue the current shareholders are given a right to buy their pro rata share of the new issued shares at a discounted price. The right is a short lived option contract between the shareholder and the company, known as a warrant. The major difference between an option and a warrant is that if the warrant is exercised the issue price accrues to the company. Hence the company issues new shares and the number of outstanding shares is changes.

The shareholder is not obliged to exercise the right. The rational shareholder will take up their right as long as the share price in the market is higher than the discounted price. The risk left for the company is that the issue is not fully subscribed if the share price falls below the issue price. To hedge this risk the company can buy insurance from an underwriter. The underwriter guarantees to subscribe for a pre-determined amount of the offered in case of a shortfall. For this service the underwriter charges a fee; this fee is known as the underwriting fee.

The issuing company can perceive the underwriter fee as a put premium. The company is buying an option to sell shares to the underwriter if the rights holders do not subscribe for new shares. This option is referred to as the underwriters put. Galai & Schneller (1978) presented a framework that allows us to assess the value of the underwriters put using option pricing framework. The underwriting fee should reflect the risk of a shortfall. Any mispricing between the theoretical underwriters put value and the fee charged is therefore excess return for the underwriter.

Typical underwriters are banks and large shareholders. Recent years after financial breakdown in 2008 bank bonuses have been an issue in both media and politics. It is tempting to ask the question; where do these excess returns come from? We do not believe that the underwriting fee stands for all of the banks excess return, but there might be a trend that investment banking divisions charges too much for some of their services. Therefore is it interesting to investigate the pricing of the underwriter service further.

We have collected data from the Norwegian, Swedish and Danish market in the period 2002-2010 to evaluate the underwriters put values in underwritten rights issues. A total of 278 prospectuses were collected. 101 observations fulfilled our requirements in order to assess the underwriters put properly. Interviews with banks and investors were also conducted to highlight our problem.

1.1. The motivation

First of all it is interesting to see if these excess returns related to underwriting also exists in the Scandinavian market. And if so, how can they it be explained? Rights issues are a common way to raise new equity in the Scandinavian region. Due to the efficiency of today's communication technology one may assume that the findings internationally should correlate with our finding. Comparing our findings for the Scandinavian region with internationally findings allows us to investigate if there is such connection.

It is also interesting to investigate the risk/reward perspective in the underwriters put. The option pricing framework allows us to apply a risk measurement as input and analyze the theoretical risk versus the actual reward. Risk is one of the most uncertain measurements in the economic world, a fact that the market crash in 2008 taught us the hard way. Volatility in the market changed dramatically and the risk measurements were impossible to trust.

Both investigating the excess returns and the risk/reward perspective are classical issues in economics. Investigating these topics further is something that it is always interesting, and we hope we can contribute to the understanding of these issues.

1.2. Existing research

Several international studies have been conducted on underwriting fees and relating problems. We have found reports valuing UK, US, Australian, Japanese and New Zealand underwriting agreements.

Paul Marsh used the Black and Scholes model in 1980 to valuate underwritings fees in the UK for the period 1962-1975. According to Marsh rights issues were a popular way to raise equity in the UK market: "UK companies raise virtually all of their new equity capital via rights issue." Marsh found strong evidence that the underwriting fees in UK were considerable overpriced. Marsh also investigated a small sample from the US market; the overpricing was even more marked here. (Marsh, Valuation of Underwriting Agreements for UK Rights Issues, 1980)

In 1998 Paul Marsh wrote a new article about underwriting fees. The data was collected from 1986 to 1996 and consist of 946 underwritten rights issues in the UK market. He found that

the sub-underwriters earned excess mean value-weighted return of 1.06 % of the issue. The mean value-weighted fee was 1.43 %. In the period sub-underwriters earned £600 million (1.06 % of total raised money in the period). The stock market crash in 1987 is part of the sample. Taking the stock market crash into account, the sub-underwriters still earned an excess return of 0.9 %. This is also a considerable amount of the average value-weighted fee of 1.43 %. (Marsh, Subunderwriting of rights issues: a faillure of competition?, 1998)

John C. Handley wrote an article in 1995 "The Pricing of Underwriting Risk in Relation to Australian Rights Issues". Handley used the Black and Scholes model to calculate the theoretical correct priced fee. In his sample, three years period ending June 30th 1993, he found that the excess returns equaled 0.6 % of the offer price. The mean underwriting fee was 1.22 %. This suggests that 49% of the underwriting fee, on average, represent an excess return to the underwriter. Handley used a multiple regression trying to explain the excess returns to the underwriter. Higher excess return was found in offerings that had low share price volatility and deeper discounts in the subscription price. The reputation of the underwriter was also an explanation factor. Prestigious underwriters earned higher excess returns on the basis of their reputations, but only if there was a prior relationship with the issuer. (Handley, 1995)

In 1985 Michio Kunimura and Yoshio Iihara wrote an article about rights issues in the Japanese market. They also used the Black and Scholes model to value the underwriting fee. They found that the mean excess return to the underwriter in percentage of the subscription price were 1.89 %. The underwriting fee charged was fixed at 2.5 % of the issue. High fixed costs of raising new equity have guaranteed the underwriters excess returns. At the time only fourteen companies engaged themselves in underwriting activities and four of them were standing for 70 % of the underwriting market in Japan. The fixed price and the limited number of players in the underwriting market could explain the excess returns earned by the underwriters. (Kunimura & Iihara, 1985)

In New Zealand there is a requirement from the stock exchange that all equity issues shall be offered to existing shareholder on a pro-rata basis. In 1994 MacCulloch and Emanuel wrote an article where they valued the underwriters put using the Black & Scholes model. They

found a mean put value of 0.082 %. The actual mean fee charged was 0.75 % and thus the excess return amounted to 0.67 %. (Emanuel & MacCulloch, 1994)

In 2000 Hsuan-Chi Chen and Jay R. Ritter presented an article where they analyzed the gross spreads received by the underwriters in Initial Public Offering (IPO) in the US market. They found that 90% of offerings between $20 and $80 million had a spread of exactly 7%. It can therefore seem like there is a fixed fee for IPO underwriting in the US market. (Chen & Ritter, 2000)

The research conducted on underwritings fees indicates that there is consistently overpricing in underwriting fees and hence excess return to the underwriters. Every report and research paper we have found indicates that the underwriter charges a fee that is excessive compared to the risk undertaken. Several of the articles we have presented used the Black & Scholes framework to calculate the theoretical underwriters put. The different articles have tried to explain the excess fees. Handley found that shares with low volatility and a high discounts produced higher excess return to the underwriter. This may be because the fee is a fixed sum and does not take this into account. The existence of fixed fees in the market is underlined by the article written by Chen and Ritter on the US IPO market, where they found the total fees to be fixed at 7 %.

A summary of the evidence from existing research is presented in Table 1.

Author	Country	Time period	Excess returns	N
Marsh (1980)	USA	-	1,08 %	47
Marsh (1994)	United Kingdom	1986-1993	1,23 %	691
MacCulloh & Emanuel (1993)	New Zealand	1976-1984	0,67 %	86
Kunimurra & Iihara (1985)	Japan	1978-1980	1,89 %	148
Handley (1995)	Australia	1990-1993	0,60 %	60

Table 1: Summary of evidence from previous findings on excess return related to underwriting.

1.3. Problem

In a guaranteed rights issue the underwriter charge a fee. Our problem is connected to the underwriting fee and we will investigate if the underwriter is charging the right price for this service. We have defined our problem as:

"Is the underwriting fee charged by underwriters in the Scandinavian market fairly priced in relation to the risk undertaken, and if not, are there differences in mispricing amongst the Scandinavian countries?"

We will try to explain any mispricing between the theoretical put value and the actual fee charged by the underwriter, through different analyses. Further we will analyze of

To highlight our problem even further we have conducted a set of interviews with banks and investors operating in the Scandinavian equity market. The interviews were focusing on risk and pricing of underwriting fee.

1.4. Structure

In section 2 and 3 the concepts of rights issues and underwriting are presented. In section 4 and 5 we present the Black & Scholes model and the warrant pricing model we have used to assess the fair theoretical fee of the underwriters put.

In section 7 we present a random rights issue in which we explains our methodology.

The numerical findings can be found in section 8. Here we analyze Norwegian, Swedish and Danish underwritten rights issues for the period 2002-2010.

A qualitative analysis with interviews can be found in section 9. The general findings in the interviews are presented and analyzed with respect to existing research and our own findings.

Section 10 summarizes our findings and concludes.

2.   Raising new equity

Companies can go in the market to raise new capital. There are primarily two sources of new capital; equity and debt. In this section issues connected to raising new equity will be presented with the main focus being on rights issues, as they are more relevant the problem.

2.1.   Issuing new shares

Companies raise new equity by issuing new shares to investors. Private companies can go public and raise capital through its initial public offering (IPO). Already listed companies can raise money through a seasoned equity offering (SEO). The main difference between and SEO and an IPO is that the company is already listed when it does a SEO. Hence, the most important issue in a SEO is that investors can buy shares in the market instead of buying the new offered shares. If the price of the shares in the issue is too high relative to the market price, investors will not buy the new shares. In an IPO there is no market price and therefore the investor has no alternative price to the offered price.

There are different motivations for raising new equity. Some of the most important are:

-     Cash for investing purpose – takeovers, M&A, asset financing etc.
-     Change in capital structure
-     Urgent need for cash – crisis
-     Compliance

The motivation is important as it may affect the volatility. An article written by Bharath and Wu shows that there is a buildup of volatility 2 years before an M&A event.(Bharath, 2006)

Disregarding the motivation, a SEO is a negative signal for investors and leads to a negative reaction in the share price. There are several reasons to this but the most important is asymmetric information. Table 2 below presents different SEO announcement day returns. Private placements offerings have a positive announcement return. Eckbo suggest that this is probably because the market believes that a new, large shareholder is positive in monitoring the management.(Eckbo, 2008)

Average Market Reaction(AR%) to Security Offerings in U.S. And Internationally		
Type of offering:	U.S.	Foreign
Uninsured rights	-0.59%	-0.70%
	(53; 1963-81)	(484; 1980-99)
Standby rights	-1.33%	-1.32%
	(349; 1963-98)	(1,201;1980-99)
Private placements	2.45%	3.12%
	(2,830; 1979-00)	(691; 1974-99)
Firm commitments	-2.22%	1.10%
	(15,017; 1963-01)	(1,064; 1974-97)
Shelf offerings	-0.66%	N/A
	(1,851; 1980-03)	

Table 2: Average Market Reaction US and Internationally

2.2. Rights issues

There are different ways to raise new equity in the market; private placements, public offerings, open offerings, firm commitment and rights issues. The different flotation methods for raising new equity have different properties but they all have the same goal; to raise new equity. In this section we will focus on rights issues, as this is most relevant for our problem.

A rights issue is an equity offering where the current shareholders get issued a short lived right to buy their pro-rata share of the new issued shares at a fixed price. Hence this is a non-dilutive issue. The price offered is often discounted from the market price. The rights received must be sold or picked up before maturity. If the current shareholders do not do this they will lose the discounted share price. As long as the shareholder buys the new shares or sells their right, the "profit" from the discount is captured by the shareholder. This is of course subject to the existence of a secondary market for the rights. The rational investor will pick up the profit created by the discounted price and will therefore subscribe for shares or sell the rights. This is only true if the market price of the share is above the fixed subscription price. If the market price of the share is below the fixed issue price the rational investor will buy new shares in the market rather than picking up shares in the issue at a higher fixed price.

The rational investors with rights to buy shares at a discounted price will pick up their shares. The company is then only left with one risk of not raising the wanted amount of new equity. If the market price falls below the agreed discounted price, investors will let the option die. The company can use an underwriter and buy "insurance" for this risk. If the rights holder

does not subscribe for their shares, the underwriter agrees to buy all shares that are not picked up by the investors.

Not all investors act rational. In Norsk Hydro´s rights issue in 2010, DnB NOR had trouble in explaining and convincing the shareholders to either pick up their shares or sell their rights. Many of Norsk Hydro´s shareholders were not professional investors and did not understand the concept of a rights issue. To solve this problem they hired DnB NOR as one of the managers, as they are the largest retail bank in Norway with a large distribution network. Hydro was successful in not getting negative publicity in the aftermath of the rights issue because they managed to inform the investors properly. The fact that DnB NOR called all the shareholders in Norsk Hydro is surprising and this is not normal practice in a rights issue. Norsk Hydro is a Norwegian partly government owned company and were probably concerned about negative publicity if they did not properly inform their investors, which consist of many non professional investors. (Sparre, 2010)

Rights issues may also go bad. In 1987 Blue Arrow announced that they would raise new equity through a rights issue. The New York Times wrote about this issue in April 2008:

"But this can be dangerous business. Way back in 1987, the **Blue Arrow** *of the United Kingdom financed its purchase of Manpower with a rights issue. But only 38 percent of Blue Arrow's rights issue was taken up, and the underwriter, National Westminster Bank (which is now owned by Royal Bank of Scotland), was forced to purchase the remainder — at a loss of almost 100 million pounds. In addition, two of National Westminster's investment bankers were charged with fraud in connection with a subsequent attempt by the bank to hide this failure."*(Dealbook, 2008)

As showed in Figure 1 rights offering were the common way to raise equity in the US for the period 1935-1955. A large part of this was standby rights which are underwritten rights. The amount raised through rights is declining for both the industrial and utility issuers. For equity offerings within the financial sector, rights issues represented 16.8 % of all equity offerings in the period 1980-2008 in the US market. In Europe rights offering in the period 1980-2008 continued to be the dominating way to raise equity, but there is an obvious trend going towards other flotation methods. (Eckbo, 2008)

The Percentage Rights Offers of All SEOs

| Period | Industrial Issuers | | | | Utility Issuers | | | | Financial Issuers | |
	Total	Standbys	Pure Rights	All Rights	Total	Standbys	Pure Rights	All Rights	Total	All Rights
1935-55[a]	677	30.7%	13.7%	44.5%	525	41.3%	24.6%	65.9%	-	-
1963-81[b]	473	9.1%	6.1%	15.2%	776	11.9%	3.6%	15.5%	-	-
1980-08[c]	5,890	-	-	2.5%	1,067	-	-	0.9%	1,456	16.8%

a. Source: Stevenson (1957), who lists common stock issues with proceeds over $1 million appearing in Sullivan and Cromwell Issuer Summaries 1933-1950 and in The Commercial and Financial Chronicle 1950-1955.

b. Source: Eckbo and Masulis (1992), who base their sample on the *Wall Street Journal* Index, the *Investment Dealer's Digest*, and Moody's Industrials and Utilities Manuals. Their sample excludes simultaneous offers of debt/preferred stock/warrants, combination primary/secondary stock offerings, cancelled or postponed offers, and non-U.S. issues.

c. Source: Thomson Financial (SDC). The SEO issue dates are between 1/1/1980 and 6/28/2008. The sample is restricted to SEOs of common stock by U.S. domiciled companies, and it excludes combination primary/secondary offerings. SDC does not provide sufficient information to separate uninsured rights offerings from rights with standby underwriting.

Figure 1: The Percentage Rights Offers

2.3. Costs

There are significant costs associated with raising new equity regardless of flotation method. These costs can be divided into direct costs and indirect costs. The direct costs are known and payable. Indirect costs are costs that one does not know exactly the scope of and it is not a given that they are really there. There is not much uncertainty connected to the direct costs because they are known, but there is a lot of uncertainty connected to the indirect costs, which can be significant. For example if the company in a SEO gives the shareholders a discount of 10 % per share in respect of the market price, the company "looses" 10 %. If there is a large SEO, the total discount can be significant. In a rights issue the discount is transferred to the rights attached to the exciting shares, and hence non-existing.

Direct costs:

- Advisory services
- Legal fees
- Stock exchange fees
- Distribution costs
- Underwriting fees.

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Indirect costs:

- Share price discount

- Negative share reaction

The direct cost in a rights issue is often presented and specified in the prospectus. This gives us the opportunity to evaluate the underwriting fee charged by the underwriter. The underwriting fee is often presented as a percentage of the underwritten amount and the actual fee amount. Sami Torstila wrote an article about IPO fees, "The Distribution of Fees Within the IPO syndicate", in 2001. He argues that the fee distribution is becoming more standard, like the 7% standard IPO fee. The standard contract of 20% management fee, 20% underwriting fee, and 60% selling concession have become more common in recent years. (Torstila, 2001)

Figure 2 shows flotation costs for both standby (underwritten) and uninsured rights in percent of offering proceeds. As showed and expected underwritten rights are more costly than uninsured rights.(Eckbo, 2008)

This table uses information from Table 5 in Eckbo and Masulis (1992). The cost of the offer price discount in firm commitment offers is not included, nor is the cost of any "Green Shoe" (overallotment) options. In the standby rights category, the underwriter's compensation is computed using the actual take-up fee based on subscription information.

Flotation costs	Firm commitments		Standby rights		Uninsured rights	
	Industrial	Utility	Industrial	Utility	Industrial	Utility
Number of observations	351	639	42	89	26	23
Flotation costs/gross proceeds (%)	6.09	4.23	4.03	2.44	1.82	0.51
	(5.53)	(3.82)	(3.32)	(2.07)	(0.94)	(0.22)

Source: Bank of America

Figure 2: Flotation costs

In Denmark it is not mandatory to specify the fee distribution. The bank is often both underwriter and advisor in a transaction. Therefore is it seldom that the underwriting fee is stated in prospectuses from Danish companies because the banks do not want to state how much they charge for underwriting.

2.4. Theoretical Ex-Rights Price (TERP)

The new theoretical price for a share after the rights issue is completed is called Theoretical Ex-Rights Price (TERP) and illustrates the theoretical value of a share after dilution. The formula for calculation TERP is presented in the formula below (Pike & Neale, 2006). We have included the total fees related to the issue as an extra variable as opposed to Pike & Neale. The known total fees as stated in the prospectus would have to be subtracted in order to calculate a correct TERP.

$$TERP = \frac{N_i \times p_i + N_n \times p_n - Fee}{N_i + N_n}$$

Where;

$N_i =$ number of shares outstanding prior to the issue;

$N_n =$ number of new shares issued through the rights issue;

$p_i =$ share price one day prior to signing date;

$p_n =$ subscription price for new shares;

$Fee =$ total fees related to the issue i.e. underwriting fee, legal fees, management fee.

3. Underwriting

Typical underwriters are banks, but also private investors, mutual funds, management and other investors can act as underwrites. The underwriter is guaranteeing that the offered shares are subscribed for. The issuer uses a guarantor because they want to secure that the needed equity is raised. The guarantor demand compensation for undertaking this underwriting risk. As we showed in Table 2 on page 15, SEO is a negative signal to the market. The use of an underwriter can allay this reaction. The underwriter is given a lot of information about the company and it is a positive signal to the investors that the guarantor has faith in the issue and the company.

The underwriter is selling (short) a put option to the company. If the share price in the market falls below the fixed issue price the investors will walk away and the company will use their option to sell the offered shares to the underwriter.

The underwriting agreement is an agreement that regulates the responsibility for the underwriter. The most important aspect of an underwriting agreement is that the underwriter has agreed to buy shares that are not bought by other investors in rights issues at a fixed price. To compensate for the risk taken, the underwriter charges a fee known as the underwriting fee. This fee is a premium paid by the company to have the option to sell the shares to the underwriter. The fee can be perceived as the put premium. This fee varies and can range from 0 %-10 % of the underwritten amount. An important note is that underwriting agreements typically prevents the underwriter from selling any shares picked up in the offering until 180 after the first day of trading of the new shares.

3.1. Sub-underwriting

The term sub-underwriter is often used in the prospectuses. This is also an underwriter that is guaranteeing for unsubscribed shares. The lead underwriters often transfer some of their risk by selling the risk to sub-underwriters. The fee paid to sub-underwriters is typically lower than for lead underwriters. This way the underwriter is not taking all the risk and is selling the risk in parts to other parties.

3.2. Underwriters put

As mentioned, the underwriter is selling a put option to the company. The fee charged by the underwriters can be viewed as the put premium. This is known as the "underwriters put". Galai & Schneller (1978) presented a framework that allows us to assess the value of the underwriters put using option pricing framework. This lets use the Black & Scholes model to value the underwriters put.

3.3. Timeline

An important issue in a rights issue is the timeline. The timeline is important because it decides when the risk is transferred. There are no standard timeline in a rights issue, but the order of the events is universal. We have used the rights issue of Billerud AB in 2009 as an example to illustrate how a rights issue timeline may look like. The dates are collected from the prospectus of the rights issue.

Timeline
980 MSEK Rights Issue of Billerud

22.07.2009
Signing date of the underwriting agreement

01.09.2009
Record date for participation In the rights issue

04.09.2009 - 18.09.2009
Trading in subscription rights

09.10.2009
Registration of shares subscribed for without rights

02.10.2009
Registration of new subscription shares

22.07.2009 - 23.09.2009
Risk days

22.07.2009

Subscription period
04.09.2009 - 23.09.2009

Trading in new shares starts
06.10.2009

12.10.2009

All new shares are trading
12.10.2009

Figure 3: Timeline for Billerud AB

The first important date when considering risk for the underwriter is the signing of the underwriting agreement. This is the day that the underwriter is legally bound to take on unsubscribed shares; hence the underwriter has agreed on the risk involved with the issue not being fully subscribed. The subscription period is the period when the rights holders can buy shares. The end of this period is important for the underwriter. If the issue is not fully subscribed at the end of the subscription period, the underwriter is legally bound to subscribe for a pre-determined number of shares specified in the underwriting agreement. On the other hand if the issue is fully subscribed, this is the day that the risk of picking up shares is closing, hence the closing of risk for the underwriter. The period between the opening and closing of the risk for the underwriter, is referred to as risk days and is highlighted with red in the illustration.

3.4.   How do firms and underwriters choose each other?

The article "Wanna Dance? How Firms and Underwriters Choose Each other" starts with the idea that issuing firms and underwriter associate by mutual choice. Both data from IPO and SEO underwritings were collected. The SEO data is most relevant for our problem. The SEO

data was collected from NYSE, AMEX and Nasdaq in the period from 1970 to 2000. The results were that more reputable underwriters underwrite seasoned issues of higher quality firms. Firms with positive earnings immediately after the SEO and firms that pay dividends hire more reputable underwriters. Firms that have greater analyst coverage and a lower standard deviation on returns before SEO are matched with underwriters of higher reputation. (Fernando, Gatchev, & Spindt, 2005)

4. Black and Scholes (1973)

Black & Scholes (B&S) is an option pricing model developed by Fisher Black, Myron Scholes and Robert C. Merton. They were awarded the Nobel Prize in economics in 1997 for their work. The model is used for pricing European options. The B&S formula is given by:

$$C(S, K, \sigma, r, T, \delta) = Se^{-\delta T} N(d_1) - Ke^{-rT} N(d_2)$$

$$d_1 = \frac{\ln\left(\frac{S}{K}\right) + \left(r - \delta + \frac{1}{2}\sigma^2\right)T}{\sigma\sqrt{T}}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

Where;

C = call option value;

S = share price;

K = exercise price;

e = the base of the natural log function, approximately 2.71828;

r = continuously compounded rate of return;

T = time to expiration of option, in years;

σ = annualized standard deviation of the logarithmic stock returns;

Ln = natural logarithm function;

N(d) = the probability that a random draw from a standard normal distribution will be less than d.

Natural logarithm function (Ln)

Ln is the natural logarithm function. This is the logarithm to the base e. e is a constant number which is 2.71828. Ln can be calculated with a calculator or in excel with the function =ln().

N(d)

N(d) is the probability that a random draw from a standard normal distribution will be less than d. The colored area in the figure below is the area which is less than d. The probability for our estimate to be in this area can be calculated using a normal distribution table or a function in excel called =NORMSDIST().(Bodie, Kane, & Marcus, 2008)
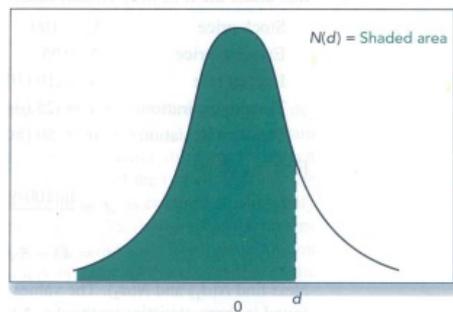
Figure 4: N(d)

Further description of the input variables for the B&S model presented in chapter 6.1: Input variables for B&S calculation.

4.1. Put-call parity

The B&S model presented is valuing European call options. The put-call parity gives us the relation between the call price and the put price; hence it is possible to find the put values. The put-call parity is given by the following formula:

$$P = PV(K) - S + C$$

If one combines the put-call parity with the B&S call formula one can find an expression for valuing a European put option:

$$P = PV(K) - S + \left(N(d_1) * S - N(d_2) * PV(K)\right)$$

$$P = PV(K) - N(d_2) * PV(K) - V + N(d_1) * S$$

$$P = 1\left(-N(d_2)\right) * PV(K) - \left(1 - N(d_1)\right) * S$$

Where;

P = Put price

4.2. Payoff for options

At maturity a call option payoff is the maximum of either zero or the share price less strike price. For a put option the payoff is the maximum of either zero or strike price less the share price.
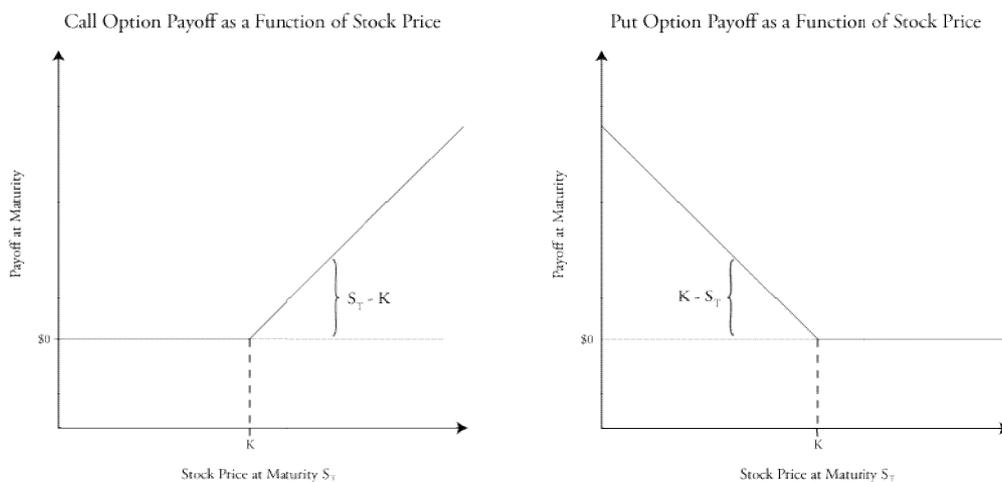
Pay off for a call option at maturity: Pay off for a put option at maturity:

$$Call\ option\ Payoff\ = MAX(0, S_t - K)$$ $$Put\ option\ Payoff\ = MAX(0, K - S_t)$$

Figure 5: Payoff to call and put options

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4.3.   Assumptions for B&S

B&S is only valid under certain assumptions. These assumptions can be divided in to two; assumptions regarding the share price and assumptions regarding the economy. (McDonald, 2006)

Share price

- Continuously compounded returns on the share are normally distributed and independent over time.
- The volatility of continuously compounded returns is known and constant.
- Future dividends are known, either as a dollar amount or as a fixed dividend yield.

The economic environment

- The risk-free rate is known and constant
- There are no transaction costs or taxes.
- It is possible to short-sell costless and to borrow at the risk-free rate.

These assumptions are not consistent with the real economic world.

Modified versions of the model can take into account the assumptions. One of the input variables for the option price is the volatility and it is assumed to be constant. This is a crude assumption and if one calculates the implied volatility for any given option is it unlikely that one find that the volatility is constant. Research has given extended models that can allow the volatility to evolve over time.(Bodie, Kane, & Marcus, 2008)

The B&S model is a simplification of the real world but empirical evidence suggest that the model is giving prices close to the market prices of options. Many economic models have assumptions, but the important thing is that the model works and gives prices that can be used in real life.

4.4.   Criticism of B&S – empirical evidence

There have been an enormous number of empirical tests of the Black & Scholes option pricing model. For the most part, the result of the studies have been positive in that the Black & Scholes model generates option values close to the actual prices at which options trade.

Whaley tested the B&S model relative to other more complicated models that allow early exercise. He found that these models gave more accurate answers. B&S performed worst when the share was paying high dividends(Bodie, Kane, & Marcus, 2008).

Rubinstein has emphasized a more serious problem with the Black & Scholes model. His point was that one should expect that the underlying assets have the same expected volatility for all options as long as maturity date is the same. This is proven not to be true. In the Figure 6 the implied volatility is plotted for the S&P 500 index as function of exercise price. As showed is the implied volatility falling with rising in exercise price.(Bodie, Kane, & Marcus, 2008)

FIGURE 21.13 Implied volatility of the S&P 500 index as a function of exercise price

Source: Mark Rubinstein. "Implied Binomial Trees," Journal of Finance (July 1994), pp. 771–818.
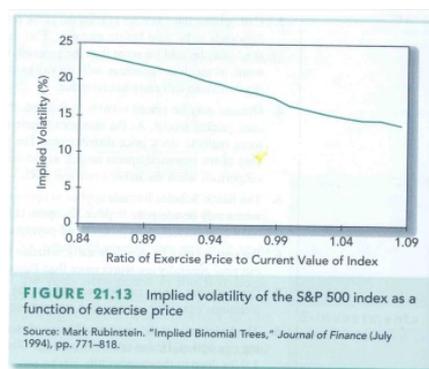
Figure 6: Implied volatility of the S&P500 as a function of exercise price

Rubenstein suggests that the problem with the model has to do with the fear of a market crash like that of October 1987. The further away the options are from expiration, the higher the probability is for the options that are way out-of-the-money to become in-the-money. This gives a higher option price. Investors are afraid of large drops in the market and put a higher premium on this than the B&S model, thus we get a higher implied volatility for out-of-the-money options.(Bodie, Kane, & Marcus, 2008)

5. Warrants

If a firm issues a call option on its own shares, it is known as a warrant(McDonald, 2006). For the investor a warrant has many of the same features as an option but there are some differences. One important difference between options and warrants is that the exercise of a warrant requires the firm to issue new shares, hence the total number of shares outstanding

increases(Bodie, Kane, & Marcus, 2008). Thus there is a dilution factor for excising shareholders. A normal option contract is between two parties and does not involve the company and therefore has no effect on the number of outstanding shares. A warrant is a contract between the company and an investor that wants to have the option to buy new shares in the company at a fixed price. If the warrant is exercised the exercise price is received by the company.

Because the strike price is collected by the firm, the theoretical value of the company's assets changes after the exercise. The new value may be calculated using the formula below (McDonald, 2006).

$$\frac{A + mK}{n + m} - K = \frac{n}{n + m}\left(\frac{A}{n} - K\right)$$

Where,

A = Asset value;

m = number of new share;

n = outstanding shares prior;

K = strike price.

A/n is the asset value for one share outstanding before the warrant is exercised, hence without the warrant. Therefore we can calculate the warrant price in two steps. We can value a B&S option price ignoring the dilution factor. Here one uses A/n as underlying asset and K as strike price. The B&S option price found is then multiplied by the dilution factor; λ. (McDonald, 2006)

$$W(V, t, nK, r, \sigma) = \lambda * C(V, t, nK, r, \sigma)$$

$$W(V, t, nK, r, \sigma) = \lambda * [N(D_1) * V + N(D_2) * PV(nK)]$$

$$\lambda = \frac{mR}{n + mR}$$

Where,

λ=   dilution factor of warrants

n =   number of shares prior

m =   number of warrants

R =   number of shares per warrant

5.1. Assumptions for using B&S on warrants

Dan Galai and Meir I. Schneller wrote in 1978 an article where they showed that option pricing framework could be used to value warrants.(Galai & Schneller, 1978) Handley summarized the assumptions from the article:

- The warrant issuing firm is 100% equity funded;
- The investment policy of the firm is fixed and is unaffected by its financing decisions.
- Perfect capital markets;
- The proceeds from issuing the warrants are immediately distributed to existing shareholders as cash dividends
- (implicitly) If it is optimal for a warrant to be exercised, then it is optimal for all identical warrants to be exercised.

The above assumptions eliminate any leverage considerations, such as the impact on volatility, and ensure that the issue of warrants will not change the probability distribution of future returns on the undiluted share price. (Handley, 1995)

5.2. Payoff for a warrant

As argued a warrant is a fraction of a call option. The payoff for a warrant is therefore somewhat the same as for an option, but there are important differences. Post transaction value of the company changes if the warrant is exercised and will affect when the warrant is exercised. Therefore we need to adjust for this when calculating the payoff for a call warrant. To adjust for payoff for the dilution factor we multiply by λ. The pay off to a call warrant if exercised is(Mjøs, 2011):

$$Call\ Warrent\ payoff = \lambda * (V` + mRK) - mRK = \lambda(v` - nK)$$

Hence we get the payoff to be the maximum of this expression or 0, since the rational investors will exercise solely if payoff is greater than zero.

$$Call\ Warrent\ payoff = \lambda * MAX[V` - nK, 0]$$

Figure 7 illustrates the payoff for a call warrant. As one can see is this a fraction of a normal call option.
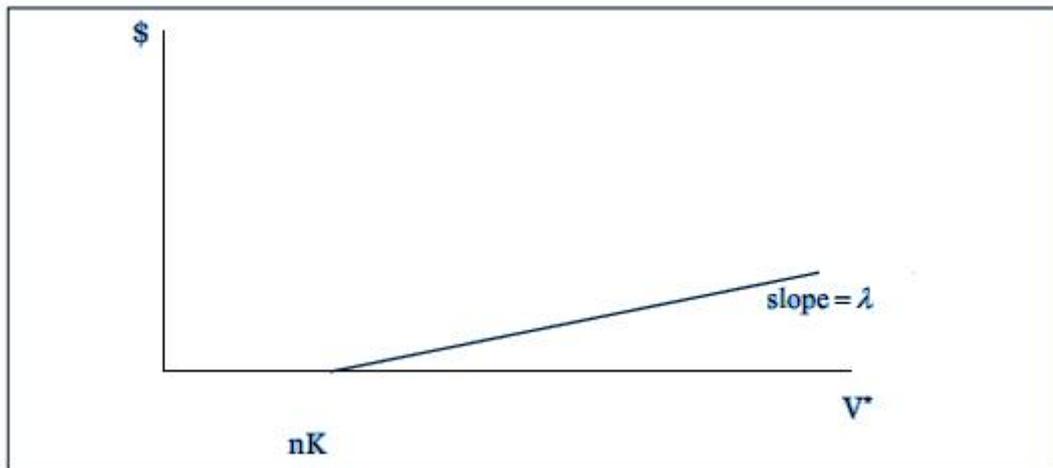
Figure 7: Pay off from a call warrant

5.3. Is the Black & Scholes approach valid for the underwriters put?

The underwriters put are that the underwriter is selling a put option to the company. The B&S model is valuing European options on shares that are already issued and the contract has no effect on the company`s equity.

Galai and Schneller wrote an article where they argued that under the assumptions mentioned the B&S model can be used to value warrants, like presented by us. They showed a warrant's rate of return to be fully correlated with the rate of return of an option with similar terms which is written on an identical firm but without warrants.(Galai & Schneller, 1978)

We believe that the work of Galai and Schneller is valid and will therefore use the B&S model to value the underwriters put.

6. Data collection

We started out by gathering lists from the respective stock exchanges on seasoned equity offerings from year 2002 to year end 2010.

In order to perform our analysis we had to manually gather data for the listed rights issues from the respective prospectuses. On the way to reach our final sample we went through 278 different rights issues prospectuses. The data collection process left us with 102 observations. Only 93 prospectuses provided all the necessary information. By all necessary information we refer to signing date of the underwriting agreement, underwriting fee, amount underwritten, total cost related to the issue and subscription period. All other inputs can be found in the archive of the respective stock exchange.

The remaining 9 observations were lacking the signing date of the underwriting agreement. In order to include these issues we made a proxy based on the average number of days from signing date until subscription end. The average number of risk days in the sample was 49. The median for the same sample was 47. We have used 49 risk days as a proxy for these remaining 9 rights issues.

Further we have excluded the rights issue of Kopylovskoye AB for lack of time series data. Kopylovskoye had only a history of 58 trading days.

We were then left with a total of 101 rights issues which we have conducted our analysis on.

The time-series data has been collected primarily from Datastream. The exception is the Norwegian company PhotoCure, on which we used NHHs Børsprosjektets database.

6.1. Input variables for B&S calculation

This section describes the assessment of the input used to calculate the actual risk associated with underwriting. All inputs except from the volatility are known variables.

Each put value is calculated based on the respective currency and then converted to SEK based on the exchange rate on the day of signing.

The B&S calculations are as if the issue was fully underwritten and then multiplied with the actual portion which was underwritten.

6.1.1. Share price

The share price used in our calculations is the share price less the total fees related to the issue. This is calculated as the market capitalization less total fees divided by the number of shares outstanding one day prior to the signing date.

$$Adjusted\ share\ price = \frac{MCAP_{1\ day\ prior\ to\ signing\ date} - Total\ fees}{Shares\ outstanding}$$

6.1.2. Strike

The strike is equal to the subscription price for new shares in the rights issue and can be found in the prospectus.

6.1.3. Time to maturity

Time to maturity is expressed yearly as the number of risk days divided by 365 days. We use calendar days in order to reflect the fact that interest is calculated on a calendar day basis.

6.1.4. Risk free rate

As the risk free rate we have used a 3-month rate on government bills one day prior to the signing date. The risk free rate is gathered from the respective central banks; Norges Bank, Sveriges Riksbank and Danmarks Nationalbank.

6.1.5. Lambda

Lambda is a key input to account for the dilution effect with respect to the offering of new shares. The lambda formula is simplified to:

$$\lambda = \frac{1}{1 + \frac{number\ of\ new\ shares}{number\ of\ shares\ prior}}$$

6.1.6. Volatility – five years of data

When estimating the volatility we have used time-series in the respective currency of each country.

As mentioned the volatility is the only input variable that is not given. The volatility represents the greatest source of uncertainty in our calculations. We have tried to gather 5 years of monthly, weekly and daily observations for all of our sample issues. We only succeeded in collecting a full five years for 77 rights issues. The remaining 24 rights issues did not have a full five years of share price data, due to less than five years of being listed prior to the issue.

Volatility is calculated as the standard deviation of the shares logarithmic returns. Furthermore, we have annualized the volatility based on the following formula:

$$\sigma_{Annual} = \frac{\sigma_T}{\sqrt{1/P}}$$

Where σ_T is the volatility for the given time period in daily, weekly or monthly observations. P is the time denominator. We use 253 days, 52weeks and 12 months for daily, weekly and monthly observations, respectively. 253 days is the estimated number of trading days in a year.

The table below is showing our findings with respect to volatility for the 77 rights issues with a full five years of data. The complete table is located in the appendix.

	Daily				Weekly					Monthly				
	100 D	200 D	300 D	MAX	52 W	104 W	156 W	208 W	MAX	12 M	24 M	36 M	48 M	MAX
Average	56 %	58 %	58 %	51 %	57 %	57 %	54 %	52 %	51 %	54 %	56 %	53 %	52 %	51 %
Median	47 %	53 %	54 %	48 %	53 %	57 %	54 %	51 %	48 %	51 %	56 %	53 %	51 %	50 %
STDEV	31 %	32 %	28 %	18 %	26 %	22 %	19 %	17 %	16 %	26 %	24 %	21 %	18 %	18 %
Lower 25 Percentile	37 %	36 %	41 %	41 %	36 %	40 %	41 %	42 %	42 %	31 %	35 %	38 %	37 %	39 %
Upper 25 Percentile	66 %	73 %	70 %	58 %	72 %	67 %	65 %	60 %	60 %	69 %	75 %	66 %	64 %	63 %

Table 3: Average annualized volatility.

For daily observations we have analyzed 100 days, 200 days, 300 days and MAX, which is the maximum available observations or up to five years. Weekly observations are analyzed on a yearly basis from 1 to 5 years. The same applies for monthly observations.

In this example MAX represents five years for all time series.

We observe from table 3 that the average volatility for the 77 rights issues is 51 % for daily, weekly and monthly when we analyze the full five years. We also observe that the volatility is somewhat decreasing when using a longer time-period for calculation. The standard deviation of our volatility estimates is decreasing over time, and we believe this can be explained by more observations and less noise. The longer time-period also has a lower interval between the lower and upper 25 percentile. It is noticeable that the percentile interval is lower for daily observations then weekly and monthly observations. This may be caused by the fact that the daily volatility estimates are expressed yearly by using 253 trading days.

Based on our analysis we believe that the 5 year monthly data is the best assessment of the true volatility of the underlying.

6.1.7. Volatility – Less than five years of data

24 of our sample rights issues have less than 5 years of trading history. Repant ASAs rights issue in June 2007 has as little as 85 trading days. The table below shows the different volatilities for the remaining 24 rights issues. In this case MAX expresses the volatility based on the maximum number of observations available for daily, weekly and monthly data.

In order to assess a best estimate for the volatility for the remaining rights issues we have established 3 accept criteria.

1. For time series less than one year, we use daily observations.

2. For time series longer than one year but shorter than 3 years we use weekly observations.

3. For time series longer than three years we use monthly data.

Our volatility estimate used in further calculations is presented in Table 4 and highlighted in yellow.

Company	Daily				Weekly					Monthly				
	100 D	200 D	300 D	MAX	52 W	104 W	156 W	208 W	MAX	12 M	24 M	36 M	48 M	MAX
Aerocrine [200812]	85 %	85 %	77 %	73 %	60 %	#N/A	#N/A	#N/A	57 %	39 %	#N/A	#N/A	#N/A	40 %
AllTele [200806]	52 %	92 %	122 %	122 %	81 %	#N/A	#N/A	#N/A	82 %	90 %	#N/A	#N/A	#N/A	90 %
Eurocine Vaccines [200710]	60 %	#N/A	#N/A	89 %	#N/A	#N/A	#N/A	#N/A	96 %	#N/A	#N/A	#N/A	#N/A	157 %
Hemtex [200905]	76 %	72 %	68 %	50 %	67 %	59 %	52 %	#N/A	50 %	68 %	57 %	56 %	#N/A	56 %
Husquarna AB [200903]	65 %	55 %	52 %	40 %	59 %	48 %	#N/A	#N/A	43 %	52 %	43 %	#N/A	#N/A	40 %
LinkMed [200906]	49 %	52 %	50 %	43 %	56 %	48 %	#N/A	#N/A	45 %	43 %	48 %	#N/A	#N/A	46 %
Morphic Technologies B [200810]	67 %	81 %	77 %	64 %	69 %	68 %	64 %	62 %	62 %	56 %	56 %	60 %	#N/A	63 %
Nordic Mines [201002]	48 %	66 %	66 %	54 %	68 %	64 %	56 %	#N/A	56 %	56 %	55 %	#N/A	#N/A	48 %
Nordic Mines [200806]	38 %	35 %	37 %	36 %	29 %	#N/A	#N/A	#N/A	32 %	25 %	#N/A	#N/A	#N/A	28 %
Swedish Orphan Biovitrum [200912]	20 %	24 %	31 %	28 %	30 %	26 %	25 %	#N/A	25 %	44 %	32 %	28 %	#N/A	28 %
TradeDoubler [200912]	59 %	56 %	67 %	51 %	72 %	68 %	59 %	56 %	56 %	68 %	70 %	61 %	#N/A	58 %
AGR Group [200909]	92 %	119 %	108 %	75 %	103 %	85 %	73 %	#N/A	71 %	123 %	92 %	80 %	#N/A	79 %
Electromagnetic Geoservices [200809]	79 %	83 %	71 %	68 %	89 %	#N/A	#N/A	#N/A	79 %	107 %	#N/A	#N/A	#N/A	98 %
Navamedic [200709]	35 %	47 %	61 %	60 %	53 %	#N/A	#N/A	#N/A	51 %	46 %	#N/A	#N/A	#N/A	53 %
NorDiag [200807]	83 %	72 %	66 %	57 %	60 %	52 %	#N/A	#N/A	51 %	39 %	33 %	#N/A	#N/A	36 %
Norwegian Property [200807]	37 %	34 %	33 %	30 %	40 %	#N/A	#N/A	#N/A	38 %	38 %	#N/A	#N/A	#N/A	36 %
Oceanteam [200909]	135 %	143 %	122 %	87 %	142 %	105 %	#N/A	#N/A	96 %	146 %	115 %	#N/A	#N/A	108 %
PCI Biotech Holding [201006]	167 %	122 %	101 %	101 %	106 %	#N/A	#N/A	#N/A	98 %	104 %	#N/A	#N/A	#N/A	96 %
Renewable Energy Corporation [200907]	88 %	117 %	102 %	77 %	116 %	94 %	81 %	#N/A	81 %	106 %	94 %	80 %	#N/A	80 %
Renewable Energy Corporation [201005]	70 %	65 %	73 %	75 %	64 %	82 %	75 %	#N/A	70 %	82 %	84 %	82 %	#N/A	77 %
Repant [200910]	175 %	148 %	146 %	109 %	160 %	123 %	#N/A	#N/A	110 %	104 %	85 %	#N/A	#N/A	77 %
Repant [200806]	78 %	65 %	64 %	63 %	71 %	#N/A	#N/A	#N/A	65 %	69 %	#N/A	#N/A	#N/A	66 %
Repant [200706]	#N/A	#N/A	#N/A	49 %	#N/A	#N/A	#N/A	#N/A	31 %	#N/A	#N/A	#N/A	#N/A	21 %
Siem Offshore [200706]	30 %	33 %	39 %	40 %	35 %	#N/A	#N/A	#N/A	37 %	44 %	#N/A	#N/A	#N/A	37 %

Table 4: Average annualized volatility for rights issues with less than 5 years time-series data.

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7.   Example Rights Issue

To illustrate our model we selected a random rights issue based on excels RANDBETWEEN formula. We listed rights issues alphabetically by company name and counted from the top. The RANDBETWEEN formula returned 13, which is the rights issue of the Swedish company Billerud AB in September 2009.

We have chosen an example issue in order to describe both the rights issue process and how the input parameters for the B&S model are calculated.   If not stated otherwise the information is found in the prospectus.

Billerud is a world-leading supplier of pulp, packaging materials and packaging solutions with comprehensive knowledge of the whole refinement chain, from conversion of packaging all the way out to the market.(Billerud, 2011)

On July 23rd 2009 Billerud announced that they would raise MSEK 978 of new equity through a rights issue.

7.1.   Overview

The shareholders were given one right per old share. One right gave the opportunity to subscribe for one new share. Thus the shareholders were offered one new share per one old share. The issue price was set to SEK 19. The share was trading at SEK 27.02 one day prior to the signing date of the underwriting agreement. The subscription rights were tradable from September 4th until September 18th.

Prospectus

The prospectus was approved by the Swedish Financial Supervisory Authority (Finansinspektionen) and was published on September 1st 2008.

Lead managers and Underwriter

The joint lead managers were; Danske Bank A/S, Nordea Bank AB, Skandinaviska Enskilda Banken AB and Svenska Handelsbanken AB.

The joint lead managers also acted as underwriters for the issue. In addition to the managers, Apoteket AB's Pensionsstiftelse, which is also a shareholder, have underwritten a part of the issue.

Guarantee and subscription undertakings

The underwriting agreement was signed on July 22nd 2009. This date is the start of the risk period for the underwriter.

If the issue is not fully subscribed, the underwriters are given their pro-rata share of the unsubscribed shares in proportion of the guarantee undertakings.

In the prospectus one can find an overview providing us with information about how the subscription undertakings and guarantee is distributed. This table is presented in Figure 8. As shown the banks are guaranteeing for SEK 713,599,138. Each bank has agreed on guaranteeing for SEK 178,399,784 or 18.2 % of the offered shares. One of the shareholders, Apoteket AB`s Pensionsstiftelse, is guaranteeing for SEK 44,025,292. 77.44 % of the total issue is underwritten. The remaining shares are committed through subscription undertakings.

GUARANTEE AND SUBSCRIPTION UNDERTAKINGS

SUBSCRIPTION UNDERTAKINGS	CURRENT SHARE-HOLDINGS	PERCENTAGE OF SUBSCRIBED NEW SHARES WITH PREFERENTIAL RIGHT PURSUANT TO SUBSCRIPTION UNDERTAKINGS	ADDITIONAL GUARANTEE UNDERTAKINGS	TOTAL COMMITMENT AS PERCENTAGE OF TOTAL RIGHTS ISSUE PROCEEDS
Frapag Beteiligungsholding AG*)	10,810,700	21.0 %		21.0 %
Apoteket AB:s Pensionsstiftelse**)	800,000	1.6 %	SEK 44,025,292	6.1 %
Total undertakings		**22.6 %**	**SEK 44,025,292**	**27.1 %**

*) Frapag Beteiligungsholding AG, Berggasse 7, A-1092, Vienna.
**) Apoteket ABs Pensionsstiftelse, Norrlandsgatan 16, SE-111 43, Stockholm.

GUARANTEE UNDERTAKINGS FROM BANKS	MAXIMUM GUARANTEE UNDERTAKING	TOTAL GUARANTEE UNDERTAKINGS AS PERCENTAGE OF TOTAL RIGHTS ISSUE PROCEEDS
Danske Bank A/S*)	SEK 178,399,784	18.2 %
Nordea Bank AB**)	SEK 178,399,784	18.2 %
Skandinaviska Enskilda Banken AB***)	SEK 178,399,784	18.2 %
Svenska Handelsbanken AB****)	SEK 178,399,784	18.2 %
Total undertakings	**SEK 713,599,138**	**72.9 %**

*) Danske Bank A/S, Norrmalmstorg 1, SE-103 92, Stockholm.
**) Nordea Bank AB, Smålandsgatan 17, SE-105 71, Stockholm.
***) Skandinaviska Enskilda Banken AB, Kungsträdgårdsgatan 8, SE-106 40, Stockholm.
****) Svenska Handelsbanken AB, Blasieholmstorg 11, SE-106 70 Stockholm.

Figure 8: Guarantee and subscription undertakings Billerud AB

Cost/fees

The underwriting fee is specified in the prospectus to be 3 % of the guaranteed amount. Total costs related to the issue are MSEK 50. The underwriters received 22,728,733 SEK in underwriting fee; hence other fees amounted to 27,271,267 SEK. The fees related to the issue are summarized in the table below.

Fees	SEK
Total fee	50,000,000
Underwriting fee(3%)	22,728,733
Other fees	27,271,267

Table 5: Fees Billerud AB

Overview Billerud AB Rights issue

Aspects from the Billerud AB rights issue have been discussed and important data is summarized in the table below:

Company	Billerud AB
Stock exchange	Nasdaq OMX Nordic (Stocholm)
Subscription Price	19 SEK
Record date	September 1, 2009
Subscription period	September 4 - September 23, 2009
Trading in subscription rights	September 4 - September 18, 2009
Number of shares outstanding pre-issue	51,491,570
Number of new shares issued	51,491,570
Amount raised	978,339,830 SEK
Guarantee undertakings from banks	713,559.138 SEK
Guarantee undertakings from shareholders	44,025,292 SEK
Guaranteed in % of amount raised	77.44%
Fee paid to underwriters	22,728,733 SEK
Subscription undertakings	220,715,400 SEK
Underwriters	Danske bank AS, Nordea bank AB, Skandinaviska Enskilda Banken AB, Svenska Handelsbanken AB and Apoteket AB`s Pensionsstiftelse
Signing of underwriting agreement	July 22, 2009
Share price 1 day prior to signing date	27,02 SEK
Total costs related to the issue	50,000,000 SEK

Table 6 Overview Billerud AB rights issue

7.2. Input values

In this section one can find the inputs needed to calculate the theoretical underwriters put value using the B&S model.

n = number of shares

The number of shares prior to the issue is 51,491,570.

m = number of warrants

For each share hold on September 1st (the record date) the shareholders receive one right. Thus the number of warrants is the same as number of shares prior; 51,491,570.

R = number of shares per warrant

The number of shares per warrant is one. For each right held the rights holder can buy one new share.

λ = dilution factor of warrants

The dilution factor of warrants is calculated by formula given in section 5. This gives us a dilution factor of 0.5.

$$\frac{51{,}491{,}570 * 1}{51{,}491{,}570 + 51{,}491{,}570 * 1} = 0.5$$

K = exercise price

The exercise price per new share is SEK 19. The share price one day prior to the signing of the underwriting agreement was SEK 27.02. This gives us a discount of SEK 8.02 or 29.68 % in respect to the market price.

t = time to maturity

Time to maturity is the time the warrant is alive annualized. The number of risk days for the underwriter is the number of days from the underwriting agreement is signed to the date the subscription period is closing. This is 63 days. This annualized is 0.1726.

$$t = \frac{63}{365} = 0.1726$$

r = risk free rate

Risk free rate is given to be 0.21% per annum. The rate used was the 3 month risk free rate obtained from the homepage of Sweden`s central bank; "Sveriges Riksbank".

V = value of assets today

Value of assets today is the number of outstanding shares one day prior to the signing of the underwriting agreement times the closing share price this day. The closing share price one day prior to the signing of the underwriting agreement is SEK 27.02. The number of outstanding shares is 51,491,570. This gives us a market cap of SEK 1,391,302,221.

	SEK
Market cap.	1,391,302,221
Shareprice (S)	27.02
Number of shares (n)	51,491,570

Table 7: Billerud AB market cap

Fees are significant in an issue and need to be deducted from the market cap. The total fees paid are given in the prospectus to be MSEK 50. Adjusted market cap is then SEK 1,341,302,221. Per share value after the fees are deducted is SEK 26.05.

	Before issue	*Changes*	After issue	Units
Market cap.	1,391,302,221			SEK
- less fees paid	-50,000,000			SEK
Adjusted market cap:	1,341,302,221	*978,339,830*	2,319,642,051	SEK
Number of shares	51,491,570	*51,491,570*	102,983,140	
Teoretical value per share	26.05	*19.00*	22.52	SEK

Table 8: Calculations for theoretical per share value – Billerud

Volatility of the value of assets or equity

Historical share prices were collected in order to calculate the volatility. The volatility data was annualized. Five years of daily, weekly and monthly data was collected for the Billerud AB. Max represents five years of time series data. As showed in the table below the volatility estimates varies a lot depending on the time series used. The five years monthly volatility is used as our best estimate ex ante. This volatility is 53.7%.

Daily	Annualized Volatility
100 D	77.9 %
200 D	72.6 %
300 D	67.8 %
MAX D	41.9 %
Weekly	**Annualized Volatility**
52 W	90.0 %
104 W	68.5 %
156 W	57.5 %
208 W	52.3 %
MAX W	48.9 %
Montly	**Annualized Volatility**
12 M	103.4 %
24 M	76.9 %
36 M	63.9 %
48 M	58.5 %
MAX M	53.7 %

Table 9: Volatility Billerud AB

Summary of inputs

We are now ready to calculate the theoretical price of the underwriters put using the adjusted Black & Scholes formula presented in section 5 above. The inputs are summarized in Table 10.

Company	Billerud AB
Subscription Price	19 SEK
Risky days	63 days
Risk free interest at signing date	0.215
5 years monthly volatility	53.70%
Number of shares outstanding pre-issue	51,491,570
Number of new shares issued	51,491,570
Rights per share	1
Number of underwritten shares	39,874,979
Guaranteed in % of amount raised	77.44%
Total costs related to the issue	50,000,000 SEK
Share price 1 day prior to signing date	27.02 SEK
Adjusted shareprice 1 day prior to signing date	26.05 SEK

Table 10: Summary of inputs Billerud AB

7.3.   Results

7.3.1. Price

Given the inputs an underwriter put value can be calculated using the B&S model and the call-put parity. The issue is not fully underwritten. To take this into account we need to multiply our put value found with the amount underwritten (77.44%). This is the key figures from the result:

	λ	n/m	Call-option	d1	d2
Value of 1 right	0.50	1	7.231	1.53	1.30
Sum/Product:	3.62	SEK			

Total value of underwriter's put - using B-S and Put-Call parity:

	%underwritten	λ	n	Call-option	-S	PV(K)	Put:	
Value of underwriter's Put	77.44%	0.50	51,491,570	7.231	26.05	18.99	3,486,730	SEK

The theoretical value of the underwriters put is assessed to SEK 3,486,730. The actual underwriting fee charged was SEK 22,728,733. The result gives us a theoretical overpricing of 19,242,003 SEK or 552%. The theoretical price found is our best estimate pre transaction given our inputs. There can be other reasons why the underwriters have charged a higher price than the theoretical price. The underwriters are also lead managers for the issue and possess significant information about Billeruds's financial and operating risks. The underwriters can also have other calculations on volatility. As showed Table 9, the volatility estimates fluctuate when using different time series.

Sensitivity analysis

In order to conduct a sensitivity analysis we have used Crystal Ball to analyze the impact input variables has on the put value. Risk days, risk free rate, issue price, share price and volatility were set as input variables. The frequency table illustrated in Figure 9 below summarizes the frequency of 100 000 different trials computed in the Monte Carlo simulation. The full report can be found in appendix 3.
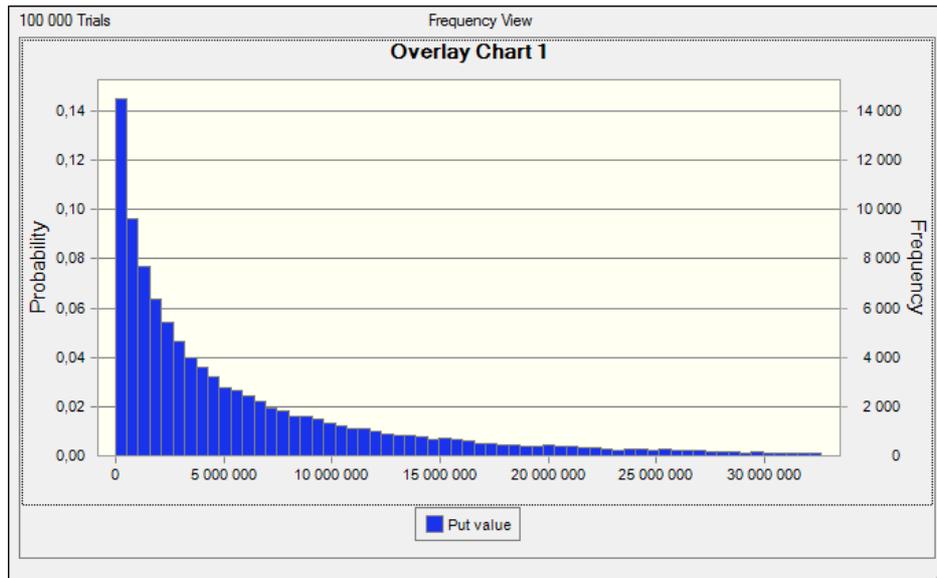
Figure 9: Frequency chart from Monte Carlo simulation.

The tornado chart below shows us witch of the input variables that explains most of the variance in the value of the underwriters put. As expected the underwriters put is most sensitive to changes in the issue price, share price and volatility. The number of risk days is also somewhat important.
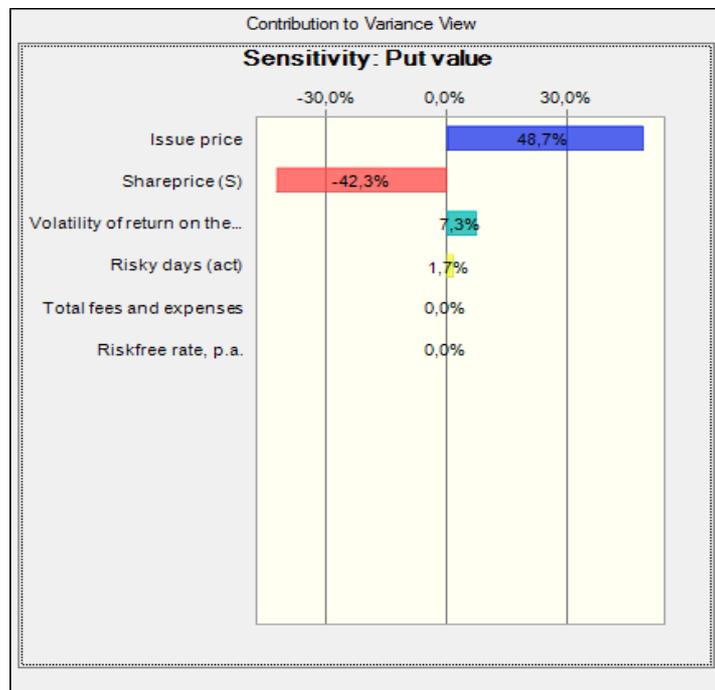
Figure 10: Tornado chart from sensitivity analysis - Billerud AB

We recognize that the issue price and the share price are the most important input variables to the value of the underwriters put. It is important to understand that these two variables are

creating value to the underwriters put, but these variables are set and there is little uncertainty connected to them. The subscription price is given in the prospectus and the share price can be observed in the market (given that one believes in efficient market pricing). Based on this we believe that it is more important to investigate the importance of the volatility.

When the volatility increases, the value of the underwriters put increases rapidly. In our case the underwriters put is out-of-the-money and the put values are extremely sensitive to the volatility. When the volatility reaches 100%, the theoretically put value exceeds the actual fee charged.

Volatility	Put value(SEK)
30%	99,306.59
40%	810,519.69
50%	2,564,555.05
53.70%	3,486,730.05
60%	5,364,553.37
70%	9,030,624.87
80%	13,367,287.41
90%	18,212,342.61
100%	23,441,240.08
110%	28,960,282.29
120%	34,698,896.28

Table 11: Put values given different volatility

If we plot the numbers into a graph we can see that the underwriters put values accelerates with the increase volatility. Out-of-the-money options with short time to maturity are extremely sensitive to the volatility, as showed in Figure 11.
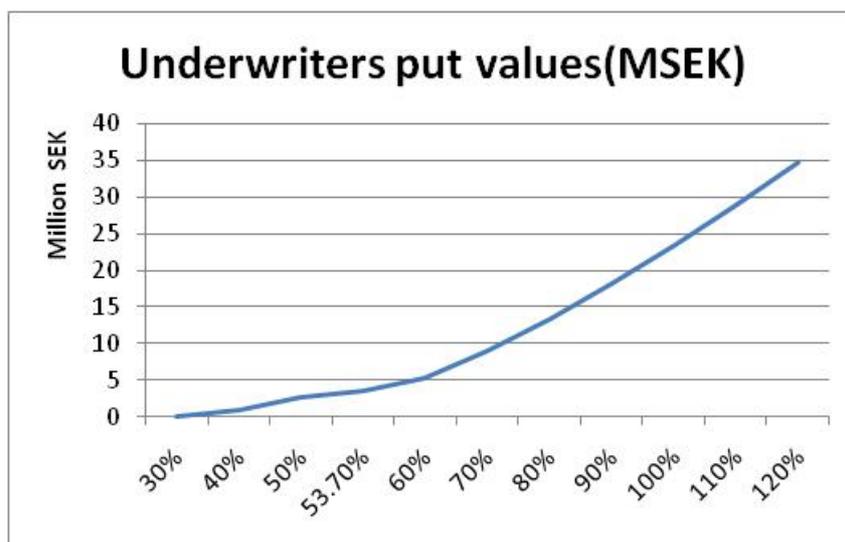
Figure 11: Underwriters put values for different volatility estimates.

Volatility is the only variable that is not observable. Volatility is also the one of the most sensitive variables for the value of the underwriters put. It is therefore possible that the underwriters are charging a volatility premium. When a company is raising new equity is it always a lot of uncertainty regarding how the market will react. In the period after the announcement of an equity issue there might be a change in volatility, and the underwriters will demand a volatility premium to compensate for the fact that they might be forced to subscribe for shares in case of a shortfall.

7.3.2. Volatility

Implied volatility

We have argued that it is important to investigate the volatility closely because there is a lot of uncertainty connected to this input variable. It is therefore interesting to analyze the implied volatility. The implied volatility can be found by solving the B&S formula with the actually charged underwritings fee as put value and the volatility as unknown. On can solve this by using the "goal seek" function in Excel. We found an implied volatility of 98.67 %. The volatility we used in our base case estimates was 53.7 %.

Prices with different volatility

As shown in Table 9 the calculated volatility give different results given different time series. If one uses 12 months monthly data, one gets 103.4% as volatility for Billerud.   The price of the underwriters put is then SEK 25.3 Million.   This volatility is higher than the implied volatility and hence the underwriter put is higher than the true fee charged.

In the table below underwriters put values for the different volatility are calculated.

	Volatility	SEK
100 D	77.9 %	12,423,537
200 D	72.6 %	10,084,449
300 D	67.8 %	8,142,098
MAX D	41.9 %	1,063,630
52 W	90.0 %	18,225,849
104 W	68.5 %	8,421,155
156 W	57.5 %	4,572,518
208 W	52.3 %	3,110,171
MAX W	48.9 %	2,320,730
12 M	103.4 %	25,299,422
24 M	76.9 %	11,945,209
36 M	63.9 %	6,699,180
48 M	58.5 %	4,869,766
MAX M	53.7 %	3,486,730

Table 12: Volatility and put values Billerud AB

The findings in the table above are illustrated in Figure 12 below. It is it important to know the assumptions of the volatility. The volatility assumption has great impact on the put values and the actual underwriter fee charged is almost equal to the theoretical underwriters put if one uses 12 months volatility data. There also seems to be a trend that no matter which time series one uses (daily, weekly or monthly) the annualized volatility falls when one uses longer time series.
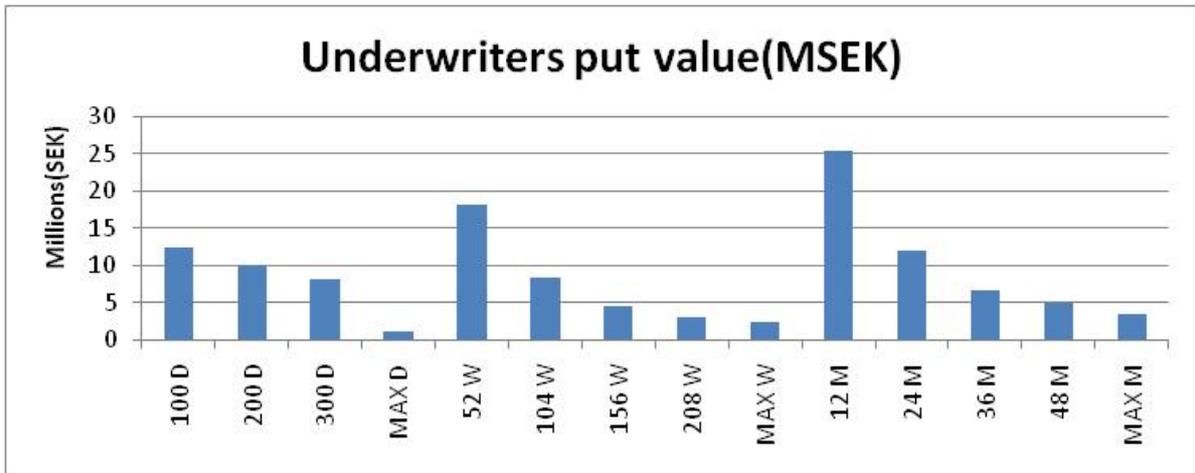
Figure 12: Underwriters put values (MSEK)

True volatility for the period

With hindsight we can calculate the true volatility for the period after the issue. Using daily data for the actual 63 risk days we find an annualized volatility of 43.3 %. This is lower than the volatility we have used as our best estimate ex-ante. The only volatility found ex-ante that is lower than the actual volatility, is the five years daily data volatility of 41.9 %. Knowing that the volatility in the share was going to be this low in the risk period, one may conclude that the underwriter has charged a too high fee.

We have also plotted the share price and the subscription price in a graph below. This way we can see if there has been any risk for a shortfall. As showed has the share moved up and away from the subscription price and thus there has been little or no risk for the underwriters in the period.
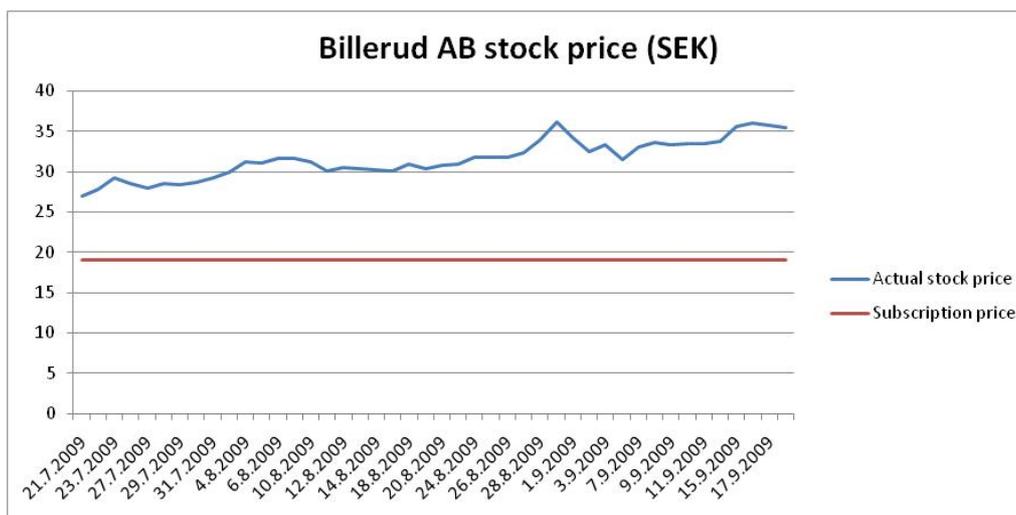
Figure 13: Actual share price and subscription price

Result of the issue

On October 1st Billerud AB released a press release with the final outcome of the rights issue. 50,535,616 shares were subscribed for by rights. This is approximately 98 % of the shares offered. The remaining 955,954 shares were allocated to investors who have applied for subscription of shares without preferential rights and who have also subscribed for shares with subscription rights.

Billerud AB managed to raise the MSEK 978 as planned. The new shares were listed on the OMX Nordic Exchange Stockholm together with the old shares.

Summary of issue

The theoretical value of the underwriters put in the Billerud AB issue is estimated by us to be SEK 3,486,730. The actual fee charged was SEK 22,728.733.

The different inputs were tested in a Monte Carlo simulation. Issue price, Share price and volatility were found to be the most sensitive input variable to the underwriters put value.

The implied volatility was found to be 98.67 %. This volatility gives us a theoretical underwritings fee equal the actual fee charged. The actual volatility for the period was given to be 43.3% and was lower than our best estimate ex-ante, which was 53.7%.

The issue was successful and the company managed to raise the capital they wanted without involving the underwriters.

We have found evidence that the underwriter has charged an underwritings fee that is too high. But there is a lot of uncertainty connected to the results and one can argue that the underwriters fee should have been higher (ref volatility of 103.4%). The underwriting fee can be discussed, but in the end the fee is a compensation for the risk, and risk is difficult to measure ex-ante.

8. Results from Full Sample

8.1. Descriptive overview

The distribution of our sample is affected by the accessibility of the prospectuses. For rights issues prior to 2007, we found it challenging to gather the respective prospectuses as they were rarely accessible online. We have contacted the firms from which we did not succeed in locating the prospectus online, with various responses. All numbers have been converted to SEK by applying the respective exchange rate at the signing date for each issue. The exchange rates have been gathered from Norges Bank and Danmarks Nationalbank.

Our research sample of 101 rights issues are distributed as showed in Figure 14.
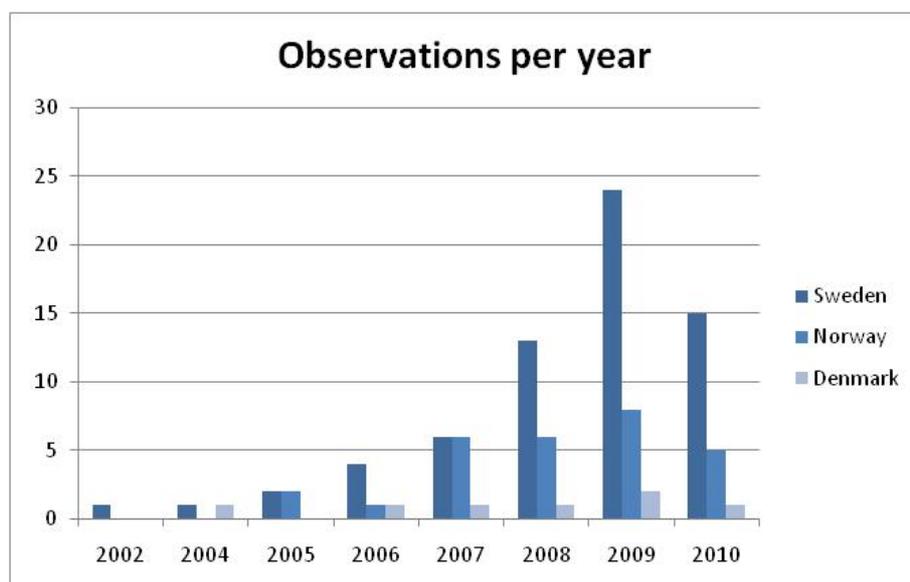
Figure 14: Observations per year for sample countries.

Observations per year				
Year	Sweden	Norway	Denmark	Full Sample
2002	1	-	-	1
2004	1	-	1	2
2005	2	2	-	4
2006	4	1	1	6
2007	6	6	1	13
2008	13	6	1	20
2009	24	8	2	34
2010	15	5	1	21
Full sample	66	28	7	101

Table 13: Observations per year for sample countries.

The total amount raised by our sample issues is SEK 230.46 Billion, with the average issue size beeing SEK 2.82 billion. We observe that Denmark has an average issue size of SEK 6.1 Billion. This is caused by Carlsbergs rights issue in June 2008 of SEK 38.1 billion. If we exclude this rights issue the average size for our Danish sample is reduced to SEK 820 million. The median is reduced to SEK 576 million. We have reason to believe that the Danish median is higher in our sample than it scandinavian peers, due to the fact that Danish companies are not obligated to disclose the underwriting fee and thus most of the Danish rights issues have been excluded when going through our list of prospectuses. It is expected that larger rights issues that attracts a larger crowd of international investors are more inclined to disclose all relevant information in their prospectusese, such as the underwriting fee i.e.

All numbers in MSEK				
Country	Amount raised	Median size	Average Size	N
Sweden	123 315	255	1 868	66
Norway	64 116	270	2 290	28
Denmark	43 030	660	6 147	7
Full Sample	230 460	295	2 282	101

Table 14: Amount raised, median and average size per country. All numbers in MSEK.

The median size is SEK 295 million. Sweden has the lowest average issue size, but if we look at the median it is fairly similar to that of Norway.

All numbers in MSEK				
Year	Observations	Amount raised	Median	Average size
2002	1	425	425	425
2004	2	4 125	2 062	2 062
2005	4	8 043	1 535	2 011
2006	6	3 896	270	649
2007	13	13 256	153	1 020
2008	20	59 254	302	2 963
2009	34	103 417	277	3 042
2010	21	38 045	272	1 812
Full Sample	101	230 460	295	2 282

Table 15: Amount raised, median and average size per year. All numbers in MSEK.

Table 15 describes the amount raised, median and average size for each year we have observations. It is mentionable that in 2002 we only have one observation, which is the rights issue of Hexagon AB in June 2002. In 2004 we only have two observations, thus the median is equal to the average. For the years prior to the financial crisis we just witnessed that both the average and median sizes of the issues are decreasing. An explanation may be that a bull market motivates companies to go public. Shareholders may se this as a good chance to realize the potential of their shareholdings. For the years 2008 and 2009 we observe that the average issue size increases substantially. This may be explained by a number of large rights issues from banks (ref. DnB NOR, Swedbank, SEB and Nordea), all exceeding SEK 10 Billion in size. The financial crisis forced the banks to strengthen their balance in order to comply with regulations from the authorities after massive write-downs of assets.

Figure 15 illustrates how the average issue size varies in line with discount to TERP for the years we have observations. It looks like the discount to TERP increases with the size of the issue.
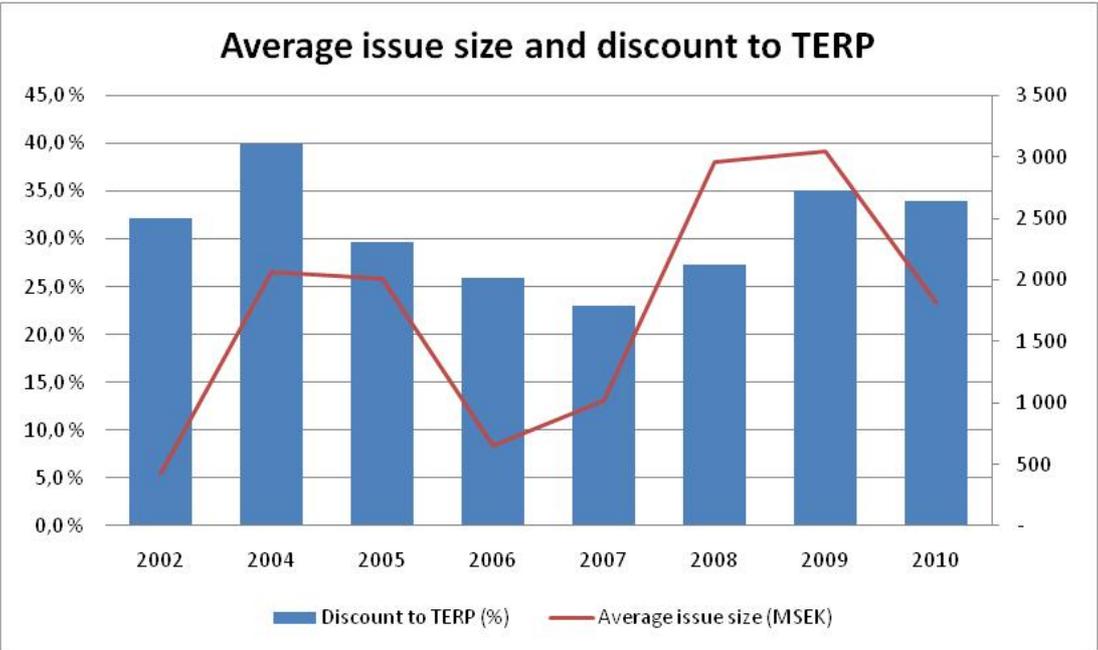
Figure 15: Discount to TERP for sample years.

It looks like the discount is higher for periods after stock market downturns like in 2001/2002 and 2007/2008. An interesting analysis could be to examine the discount to TERP in relation to stock returns and the cost of debt financing. Unfortunately our data does not allow us to conduct such an analysis.

If we compare the discount to TERP with average issue size per country we do not find the same relationship. This could mean that discount to TERP is more cyclical as we observe from Figure 15. Discount to TERP per country is presented in Table 16.

Country	Discount to TERP
Sweden	33,3 %
Norway	24,9 %
Denmark	34,5 %
Full Sample	31,1 %

Table 16: Discount to TERP in sample countries.

8.2. Country differences

If not stated otherwise; when calculating country differences we have used the average or median values retrieved by the observations in each country (i.e. average pre bindings in Denmark is calculated by averaging the actual percentages for each rights issue). We have used this equal weight approach to emphasize the respective rights issue. Another approach is the value weighted average which sums up the total amount of i.e. pre bindings and the total amount raised to get the overall percentage. The latter approach will provide a more overall picture and not allow for the fact that rights issues come in different sizes.
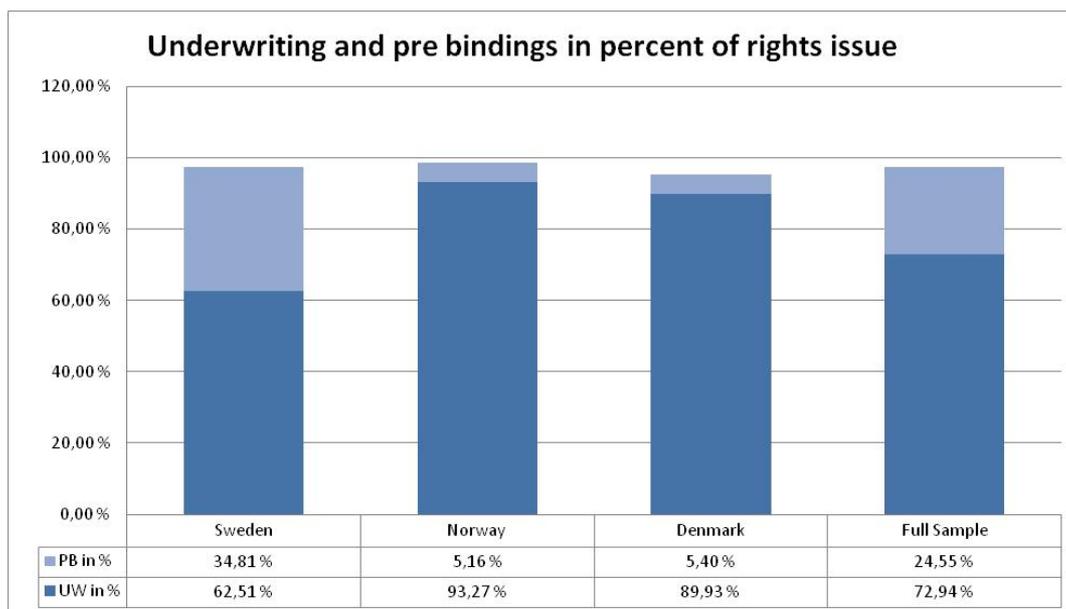
Figure 16: Underwriting and pre bindings in percent of rights issue – equally weighted.

Figure 16 above shows how an average rights issue is completed with respect to underwriting and pre bindings. An interesting observation is the big difference in underwriting and pre bindings in Sweden opposed to Norway and Denmark. This may be explained by the Swedish securities law which states that there shall not be paid any remuneration for subscription of shares within the respective shareholders pro rata share of the issue. The reasoning behind this law is based on equal treatment of shareholders. If a shareholder receives remuneration in exchange for a subscription guarantee within its pro rata share, every shareholder who subscribes for their pro rata share of the issue should receive that same pro rata remuneration.

8.2.1. Underwriting fee

In this section we will try to define factors that may help in explaining the construction of the underwriting fee and why it may differ for the Scandinavian countries.

Table 17 shows the number of observations per type of underwriter for our sample countries. A rights issue may have different types of underwriters. We have categorized the underwriters as either a Bank or a Shareholder.

Type of underwriter					
	Obsevations		in % of N		
Country	Bank	Shareholder	Bank	Shareholder	N
Sweden	23	56	35 %	85 %	66
Norway	9	24	32 %	86 %	28
Denmark	7	2	100 %	29 %	7
Full Sample	39	82	39 %	81 %	101

Table 17: Number of observations for different types of underwriter in sample countries.

We observe that shareholders are the most frequent underwriter in Sweden and Norway with shareholders underwriting 85 % and 86 % of the issues, respectively. In Denmark we observe that all 7 issues are underwritten by a bank, and 2 of the issues have both bank and shareholders as underwriters.

In Table 18 below we make an interesting observation regarding the average issue size for the two types of underwriters. The average issue size for issues where a bank has provided underwriting services is SEK 5.176 Billion. For rights issues where the underwriting is provided solely by shareholders we observe an average issue size of SEK 1.161Billion.

Average issue size and fee for different type of underwriters					
All numbers i MSEK					
	Average issue size		Fee		
Country	Bank	Shareholder	Bank	Shareholder	N
Sweden	4 388	860	4,2 %	4,3 %	66
Norway	6 432	1 919	2,6 %	2,3 %	28
Denmark	6 147	466	1,9 %	1,8 %	7
Full Sample	5 176	1 161	3,4 %	3,7 %	101

Table 18: Average issue size and fee for different type of underwriters.

Another interesting observation is that the average fee is fairly similar for the two types of underwriters and that this applies for all three countries. An independent t-test of the two samples returns a t-statistic of 0.64. This means that we cannot prove a significant difference in the two means. They are thus not significantly different from each other.

A problem with the comparison above is that a many of the observations have both a shareholder and a bank as underwriters. If we consider offerings where a Bank act as an

underwriter as "Bank only" and not Shareholder we get 39 and 62 observations for bank and shareholder, respectively. The full sample mean fee seems unchanged at 3.4 % for banks and 3.7 % for shareholder underwriting, respectively. An independent t-test returns a t-statistic of 0.65; hence we may still not prove a significant difference in the two means. Based on our analysis we can conclude that there is not a statistically significant difference in the mean underwriting fee for bank and shareholder underwriting.

Observed historical underwriting fee			
	Average		
Country	Equally-weighted	Value-weighted	Median
Sweden	4,29 %	3,11 %	3,50 %
Norway	2,34 %	2,64 %	2,00 %
Denmark	1,94 %	1,36 %	1,50 %
Full Sample	3,58 %	2,44 %	3,00 %

Table 19: Observed underwriting fee in sample countries.

Table 19 presents the observed historical average and median underwriting fee for the Scandinavian countries. Sweden is by far the most expensive country for companies seeking underwriting services, according to our sample. This is confirmed by a multiple regression analysis where we regress Sweden and Norway as dummy variables on the underwriting fee. The test is significant at the 1 % level.

Analysis of the Underwriting Fee

(as a % of underwritten amount)

Explanatory Variable	Coefficient	Expected Sign	Value	t-statistic	
Constant	$b0$		0,020	2,348	**
Sverige	$b1$	+	0,023	2,544	**
Norge	$b2$		0,003	0,320	
Adjusted R-square				0,163	
F-statistic				10,719	

Notes: 1. Results from regression model is based on the total sample of 101 issues.
**: Significantly, different from zero at the 5 % level using a two-tailed test.

Table 20: Regression statistics. Country as dummy variable regressed on underwriting fee.

It is uncertain why underwriters in Sweden charge more than underwriters in the other Scandinavian countries. One explanation may be the market structure. The Norwegian stock exchange is dominated by companies operating in large international industries, such as petroleum, shipping and ship building. This is assumed to attract international investors as they may contribute with proven competence from their respective home countries i.e. USA. Another explanation may be the market concentration by providers of underwriting services. A larger amount of potential underwriters is assumed to increase competition amongst its services and thus lower prices. However Chen and Ritter examined the US IPO market and found that as much as 90 % of IPOs between $20-$80 MUSD had a flat total fee of 7 %. 20 percent of this was assigned to the underwriter. Although IPOs and SEOs are not directly comparable it does illustrate the lack of competitiveness within the underwriting fee. Underwriting is proven to be a very lucrative business and it could be that the providers of underwriting services would like it to stay that way.

Another explanatory factor could be that underwriters and pre-binders in Sweden often are the same person or entity and may thus charge a higher fee for the amount underwritten in excess to their pro rata share of the issue.

Analyzing the underwriting fee

In order to try and explain the difference in underwriting fee we will conduct some analyses regarding the difference in our sample countries.

First we will have a look at the difference in number of risk days and volatility. We will also take a look at the average and median underwriting fee with respect to the combined amount of underwriting and pre bindings.

Observed risk days and volatility			
	Risk Days		Annualized
Country	Average	Median	Volatility
Sweden	51	49	53,34 %
Norway	45	44	58,07 %
Denmark	43	26	45,03 %
Full Sample	49	47	54,07 %

Table 21: Average risk days and volatility in sample countries.

The annualized volatility is an average of the annualized volatility, as defined in chapter 6.1 above.

Both the average and median number of risk days is higher in Sweden as opposed to Norway and Denmark. The observed volatility is higher than that of Denmark, but lower than what we observe in Norway. We believe that the risk days may have a small but not conclusive effect on why the fee is higher in Sweden than for its Scandinavian peers. We know from our example of Billerud that the volatility has a great impact on the value of the risk that is undertaken.

It is expected that the lower volatility compared to Norway, would have a greater impact on the fee in a negative matter than what the number of risk days will contribute positively.

If we look at the underwriting fee with respect to the sum of underwritten amount and pre-bindings we observe that the equally-weighted differences lessen. For the value weighted approach we see that Norway has the highest percentage fee with respect to underwriting fee and pre-bindings. Pre-bindings are rarely secured in any way, but still assumed to give the market a sense of confidence in the issue. Even though this is hard to quantify it is assumed that pre-bindings may contribute to a lower initial risk for the underwritten part of the issue.

Table 22 illustrates how the underwriting fee evens out amongst the countries when we assume that the underwriting fee also compensates for pre-bindings. This is based on the assumption that underwriters and pre-binders is a registered shareholder at time of the issue and is often the same person or entity.

UW Fee / (UW amount + Pre bindings)		
	Average	
Country	Equally-weighted Value-weighted	Median
Sweden	2,95 % 1,86 %	2,38 %
Norway	2,24 % 2,16 %	2,00 %
Denmark	1,84 % 1,36 %	1,50 %
Full Sample	2,68 % 1,84 %	2,00 %

Table 22 Observed fee with respect to underwritten amount plus pre bindings.

Table 23 below presents the share of rights issues that have pre-bindings in the sample countries. It is clear that pre-bindings are more frequently used in Sweden with a total of 60

out of 66 rights having pre-bindings. This equals 91 %. For Norway and Denmark we observe 11 % and 29 %, respectively.

Number of issues with pre-bindings			
Country	Observations	Pre-binding	Percentage
Sweden	66	60	91 %
Norway	28	3	11 %
Denmark	7	2	29 %
Full Sample	101	65	64 %

Table 23: Number of rights issues with pre-bindings.
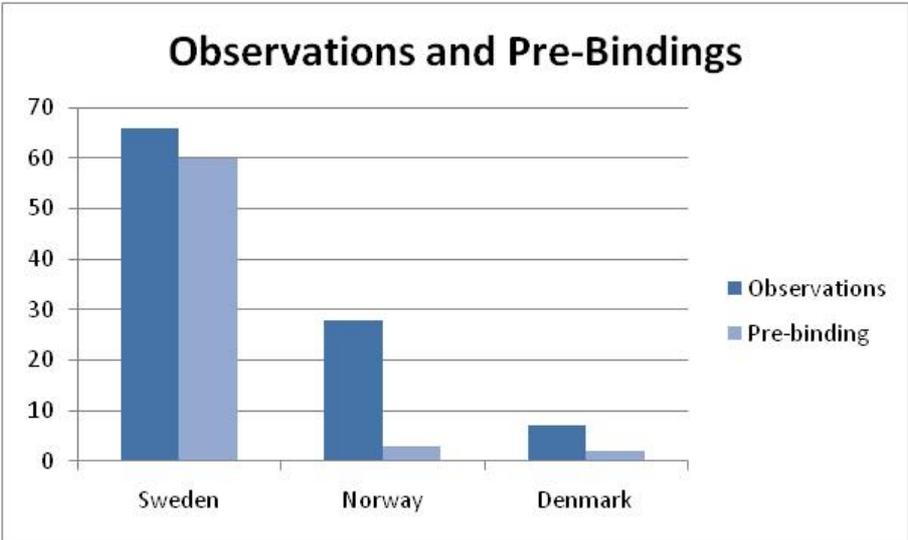
Figure 17: Number of observations and number of issues with pre-bindings in each country.

When regressing pre-binding as a dummy variable on the underwriting fee, we get a model which is significant on the 1 % level. The model, ceteris paribus, states that if you add pre-bindings to a rights issue, the underwriting fee would be 1.457 % higher. The data quality may be a source of error in the model due to the fact that 60 of 65 pre-bindings are Swedish rights issues. Test statistics may be found in the appendix.

Further it will be interesting to test if the share of pre-binding in percent of issue size is an explaining factor for potential excess returns with regards to risk for the underwriter. We will test for this in chapter 8.4.

8.2.2. Risk days

Figure 18 illustrates the observed average fee and number of risk days in the different countries. It is tempting to say that there is a relationship between the fee and the amount of risk days, and that this contributes to the explanation of the difference in fee between the countries. However this is just an illustrative graph which is of no significance.

Figure 19presents a scatter plot for the risk days and underwriting fee. The scatter plot does not give the same indication of a relationship and a regression analysis confirms this.

Underwriting fee and risk days

	Sweden	Norway	Denmark
Average fee in %	4,29 %	2,34 %	1,94%
Avg. Risk Days	51	45	43
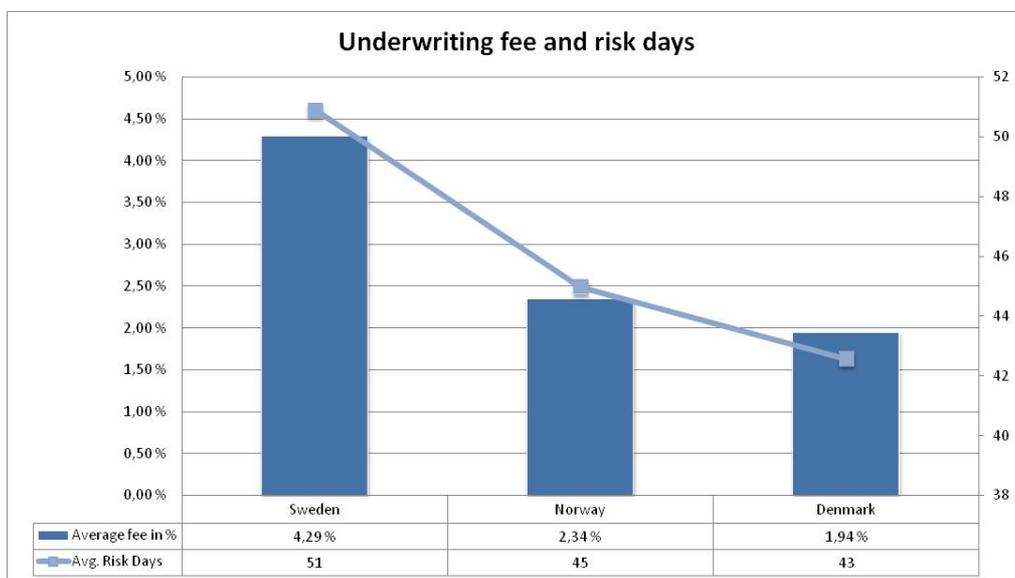
Figure 18: Observed underwriting fee and risk days in Sweden, Norway and Denmark.

When we regress the amount of risk days on the observed fee we can not prove a statistical significant relationship. The model returns an adjusted R-squared equal to -0.003 and an F-value equal to 0.669. Further test statistics may be found in the appendix.
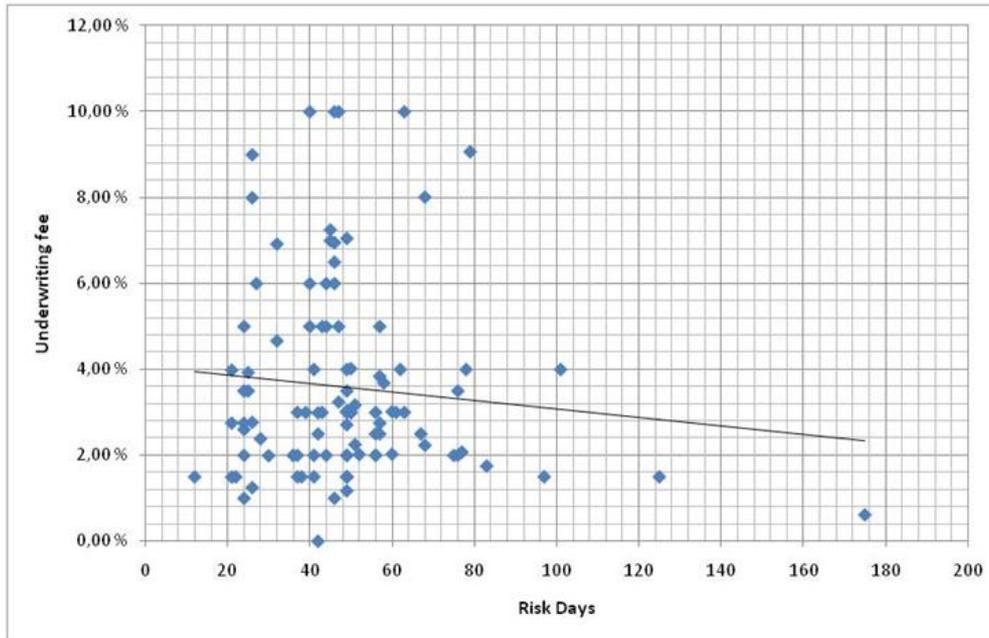
Figure 19: Scatter plot presenting the number of risk days and underwriting fee.

8.2.3. Volatility

The annualized volatility as explained in section 6.1 and the implied excess volatility is presented in Figure 20. Implied excess volatility is the implied volatility less the annualized historic volatility.
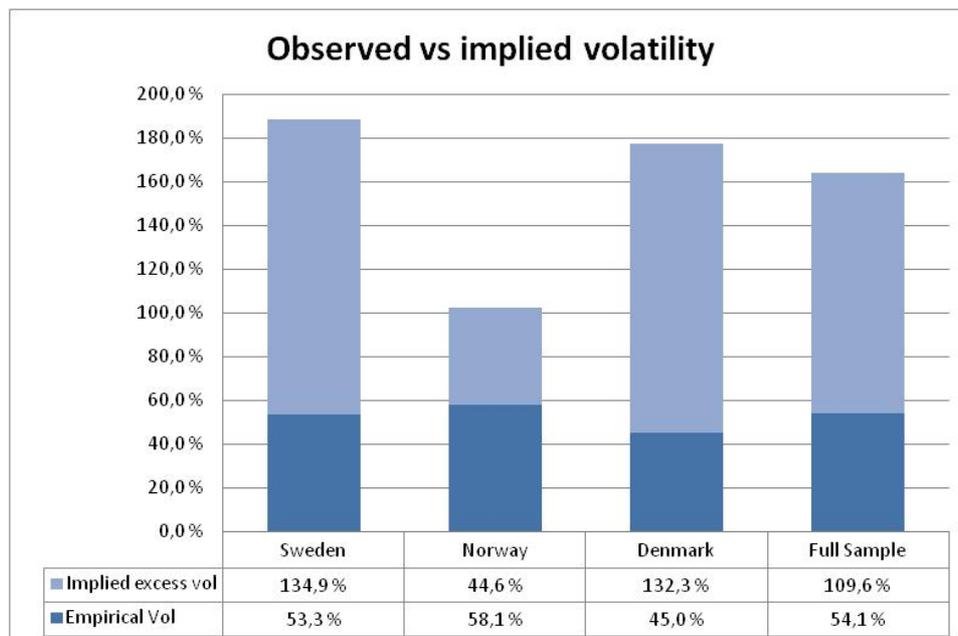
Figure 20: Implied vs empirical volatility as descriped in section 10.1.

We observe that Norway has the lowest implied excess volatility and implied volatility in total. Volatility is the single unobservable input variable and is derived from historical fluctuation in stock returns. A higher implied excess volatility may therefore be interpreted as a higher degree of mispricing in the underwriting fee.

Large corporations attract more international attention and are assumed to have larger equity issues than smaller companies. Market capitalization and issue size is therefore assumed to be highly correlated. Table 24 presents a correlation coefficient of 0.916.

Correlation matrix		
	MCAP	Issue size
MCAP	1	
Issue size	0,916	1

Table 24: Correlation matrix for log normal issue size and market capitalization, both in MSEK.

Because the statistically significant correlation between market capitalization and issue size we must orthogonolize them in order to construct correct regression model. This is conducted in three steps.

1. Regress market capitalization on issue size
2. Collect the residuals from step 1 as a new variable.
3. Let the residuals handle the interaction between market cap and issue size and regress market capitalization and the residuals on implied excess volatility.

All regressions including market capitalization and issue size are conducted using log normal sizes on numbers in MSEK. The rights issues of Rörvik Timber in 2010 and Oceanteam in 2009 has been excluded from our regression model. Rörvik Timber has a very deep discount to subscription price and Excel could not find a feasible solution when calculating the implied volatility. Oceanteam is excluded because the underwriting fee was zero. The results are presented in Table 25. The model returns an F-statistic equal to 16.09 and is thus a strong statistically significant model on the 0.1 % level. The model explains 24.1 % of the implied excess volatility. These are interesting findings as it may be interpreted as the fee is largely affected by the market capitalization of the issuing firm and the size of the issue itself through their impact on implied volatility.

Analysis of the Implied Volatility

Explanatory Variable	Coefficient	Expected Sign	Value	t-statistic	
Constant	b0		2,076	3,760	*
MCAP	b1		-0,056	-0,759	
Residuals	b2		1,098	5,710	*
Adjusted R-square				0,241	
F-statistic				16,588	

Notes:	1. Results from regression model is based on 99 issues.
	*: Significantly, different from zero at the 1 % level using a two-tailed test.

Table 25: Regression statistics. MCAP and orthogonolized residuals on implied volatility.

In section 4.4 we mentioned that Rubinstein found that out-of-the-money options had an increasingly implied volatility for options with the same expiring date. It could be interesting to see if the same relationship exists in our sample. A larger discount in the subscription price reflects a more out-of-the-money option. In Table 26 we present test statistics from our sample where we regressed the discount in subscription price on implied volatility.

Analysis of the Implied Volatility

Explanatory Variable	Coefficient	Expected Sign	Value	t-statistic	
Constant	b0		-2,015	-2,825	
Discount	b1	+	8,793	6,165	*
Adjusted R-square				0,270	
F-statistic				38,008	

Notes:	1. Results from regression model is based onthe full sample of 101 issues
	*: Significantly, different from zero at the 1 % level using a two-tailed test.

Table 26: Regression statistics. Discount in subscription price regressed on implied volatility.

The model proves to be significant at the 0.1 % level. The discount clearly has an impact on the implied volatility with a coefficient t-statistic of 6.1. Higher discount increases the implied volatility and is thus coherent with the findings of Rubenstein. Although the comparison is not identical due to the fact that we use options for different companies and expiration, the findings are still relevant. Rubinstein suggests that increase in implied volatility may be caused by the fear of a substantial market crash.
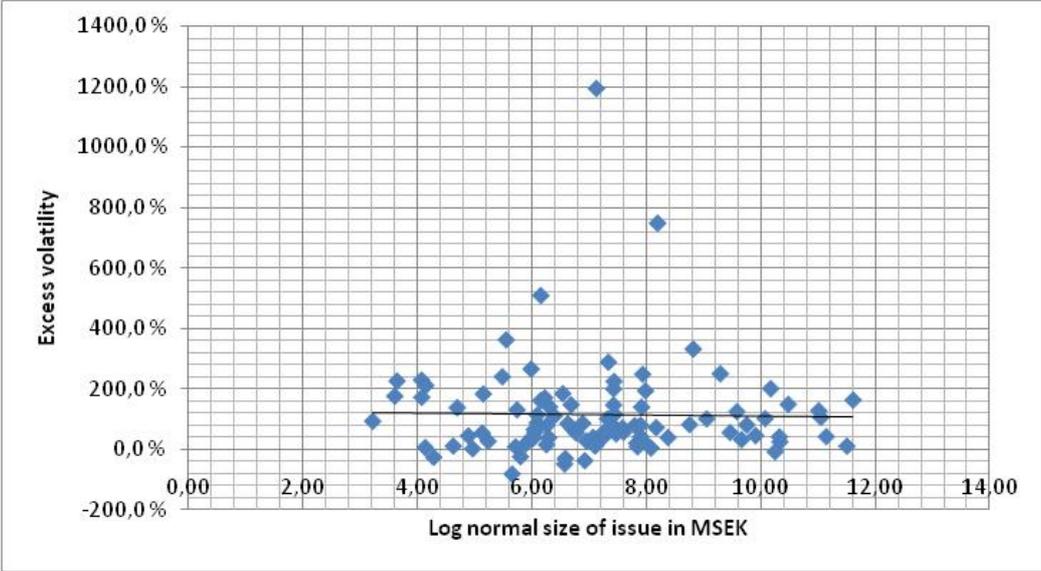
Figure 21: Excess volatility and issue size scatter plot.

8.2.4. Total costs related to the issue

The total amount of fees paid by the issuing companies to bankers, lawyers, underwriters etc. sums up to 6.1 Billion SEK. The underwriting fees represent 59 % of the total fees paid. We observe that Sweden has the lowest underwriting fee in percentage of total costs with 49 %. For Norway and Denmark the total underwriting fee represents 72 % and 73 % of the total fees paid, respectively.

All numbers in MSEK			UW in % of
Country	**Total Costs**	**UW Fee**	**Total costs**
Sweden	3 415	1 674	49 %
Norway	1 918	1 381	72 %
Denmark	802	582	73 %
Full Sample	6 136	3 637	59 %

Table 27: Total costs and underwriting fees paid by the issuing companies.

In Figure 22 below we have illustrated the difference in percentage and average fee if we assume that the fee is supposed to compensate for both the amount underwritten and pre bindings.

Total fees in percentage of amount issued

	Sweden	Norway	Denmark	Full Sample
■ Other fees	3,53 %	3,32 %	3,80 %	3,49 %
■ Underwriting fee	2,83 %	2,18 %	1,77 %	2,57 %

Figure 22: Equally-weighted total fees in percentage of issue size

Sum equally-weighted average costs with respect to amount issued for Sweden, Norway and Denmark is 6.36 %, 5.49 % and 5.58 %, respectively. We observe that the total percentage fee that a company has to pay is not that different in proportion to the underwriting fee.

8.3.   Time of year differences

In this section we will try to analyze if the time of year the issue takes place has an effect on the underwriting fee. We have established a hypothesis that there is a relationship between the underwriting fee and the competitiveness of the investors' money, based on the number of

issues. It is important to bear in mind that we only examine seasoned rights issues. The distribution of issues throughout the year may be different for other issues such as private placements, non-underwritten seasoned equity offerings, initial public offerings etc.

There is reason to believe that the fee is affected by the number of other issues that are competing for the investors' money at the same time. An increasing amount of competing issues is expected to impose a greater risk on the underwriter and thus charge a higher fee.

Figure 23 below illustrates the number of issues and the equally-weighted average fee on a monthly basis throughout our sample. We have used the date for subscription end to determine the time of issue.

We have conducted a regression analysis where we regressed February through December as dummy variables on the average fee per month. The test returned an F-value of 1.296 and is thus not significant. Although the test did not prove to be statistically significant it shows that May, June, October and December has the most impact on the fee. These four months also has the highest degree t-statistics. October returned a t-statistic significant on the 10 % level. The statistics is not satisfying, but it is an indicator that is in line with Figure 23 above.

Analysis of the Underwriting Fee

(as a % of underwritten amount)

Explanatory Variable	Coefficient	Expected Sign	Value	t-statistic
Constant	b0		0,018	1,097
Feb	b1		0,018	0,896
Mar	b2		0,010	0,540
Apr	b3		0,020	1,111
May	b4		0,024	1,366
Jun	b5	+	0,022	1,303
Jul	b6		0,009	0,495
Aug	b7		0,006	0,290
Sep	b8		0,002	0,089
Oct	b9		0,030	1,756
Nov	b10		0,016	0,712
Dec	b11	+	0,022	1,325
Adjusted R-square				0,031587
F-statistic				1,296526

Table 28: Regression statistics. Monthly dummy regressed on underwriting fee.

Further we assembled our observations on a quarterly basis. We believe this is more representative and might provide a better explanation on the relationship between the underwriting fee and the number of issues. Figure 24 shows the observed underwriting fee and the number of observations per quarter.

	Q1	Q2	Q3	Q4
Observations	14	32	18	37
Average fee	2,80 %	3,98 %	2,25 %	4,19 %
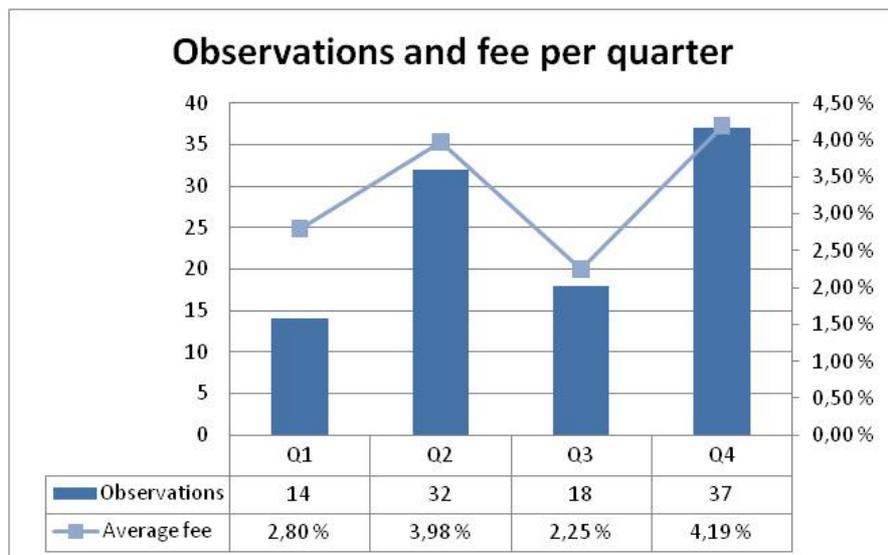
Figure 24: Number of observations and average fee per quarter.

To test for significant relationships between quarter and fee we conducted the same regression for quarters as we did for months but with quarter as dummy variables.

Our regression model produces an F-statistic of 4.097 and is thus significant at the 1 % level. This is of satisfying statistically significance and proves that there is relationship between in which quarter the issue takes place and the underwriting fee. Test statistics is presented in Table 29 below.

Analysis of the Underwriting Fee

(as a % of underwritten amount)

Explanatory Variable	Coefficient	Expected Sign	Value	t-statistic	
Intercept	b0		0,028	4,778	*
Q2	b1	+	0,012	1,677	
Q3	b2		-0,006	-0,704	
Q4	b3	+	0,014	2,017	**
Adjusted R-square				0,085	
F-statistic				4,097	

Notes: 1. Results from regression model is based on the total sample of 101 issues.
*: Significantly, deifferent from zero at the 1 % level using a two-tailed test.
**: Significantly, deifferent from zero at the 5 % level using a two-tailed test.

Table 29: Regression statistics. Quarter as dummy regressed on underwriting fee.

Why the fee is proven to be higher in Q4 is still a question. One explanation could be that companies with a fragile balance sheet containing a high debt-to-equity ratio are in need to strengthen their balance sheet before year-end. Examples of this could be Swedbanks rights issue of SEK 12.3 Billion in December 2008 or DnB NORs SEK 16.6 Billion rights issue in December 2009. Both of these two banks had to strengthen their balance sheet in order to comply with Basel II requirements. The rights issues of Swedbank and DnB NOR had an underwriting fee of 3 % and 2.08 %, respectively. Both are below the average fee for December. An explanation could be that these issues were relatively large in size and thus may be more efficiently priced, due to competition from large international underwriters. We will test for this later in our analysis.

Table 30 shows the average issue size and the total amount raised per quarter. It also presents the number of issues that raised more than SEK 10 Billion.

Average size and total amount raised All numbers in MSEK				
	Q1	Q2	Q3	Q4
Average size	1 640	3 140	1 471	2 177
Sum raised	22 959	100 482	26 484	80 535
Over 10 BN SEK	1	2	1	4

Table 30: Average issue size and total amount raised per quarter.

The average issue size is higher for Q2 and Q4. The amount raised is also substantially higher, but there is also a lot more observations for these quarters. Table 31 presents the average size and total amount raised when excluding rights issues that exceeds SEK 10 Billion in size.

Average size and sum raised amount (less issues over 10 BN SEK) All numbers in MSEK				
	Q1	Q2	Q3	Q4
Average size	607	1 090	835	781
Sum raised	7 889	32 699	14 192	25 784
Average fee	2,79 %	4,11 %	2,25 %	4,36 %

Table 31: Average issue size and total amount raised when excluding issues with proceeds exceeding SEK 10 Billion,

We observe that the average size is more similar when we exclude the largest rights issues. Another observation is that difference in the underwriting fee increases. The average underwriting fee in Q2 and Q4 is now 4.11 % and 4.36 % vs. 3.98 % and 4.19 %, when including all issues, respectively.

8.4. Estimated excess returns to underwriting

The observed fee less the actual put value can be characterized as excess returns related to underwriting. The difference represents excess returns with respect to the subscription price and may be referred to as money-on-the-street.

Previous research has identified excess returns in the range 0.6 % - 1.89 % for different sample countries, periods and number of observations.

In this chapter we will try to identify if there exists excess returns in Sweden, Norway and Denmark. Our analysis will consist of two different approaches. The traditional approach and an approach we have called the Theoretical Ex-Rights Price (TERP) approach. The only difference between the two approaches is the current share price input variable "S" in the Black & Scholes formula. For the traditional approach we use the share price one day prior to signing date. For the TERP approach we use TERP as the input variable. Our reasoning behind the TERP approach is explained in chapter 8.4.3.

8.4.1. Traditional approach

The put values have been calculated as shown in our sample of Billerud showed in chapter 7. We have applied that same methodology on the full sample in order to examine differences in put values for our sample countries and if there exists significant excess returns related to underwriting.

The traditional approach returns an excess return 2.72 % for the full sample. For Denmark we observe an average put value of 0.09 % of the subscription price. The largest excess returns we observe in Sweden, where the excess returns averages 3.63 %, which is 92 % higher than for any previous research. Norway seems to be the most fairly priced of the sample countries with the lowest excess return, 0.79 %. The excess returns observed in Norway are located somewhat in the lower range of evidence from previous research.
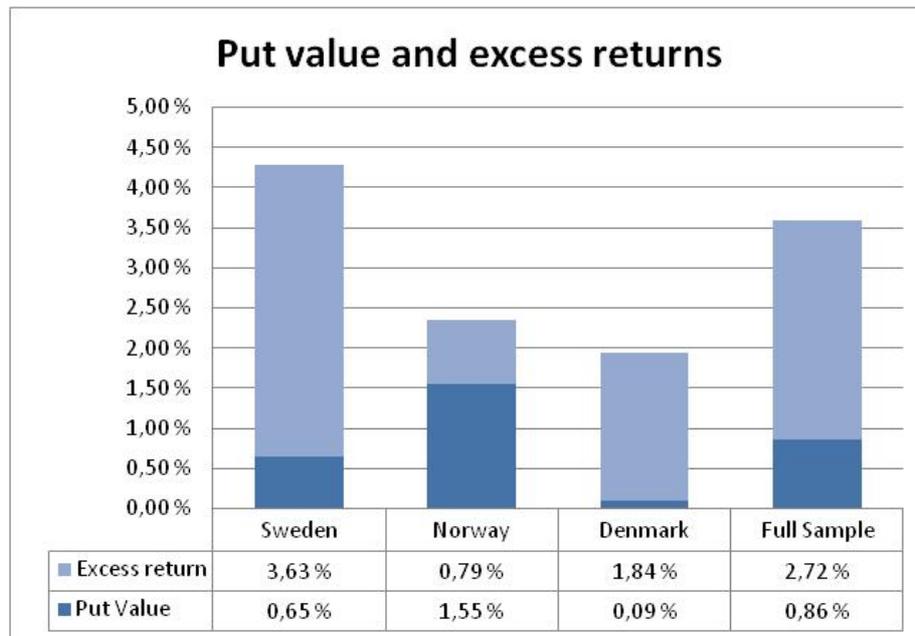
Figure 25: Put value and excess returns in percentage of subscription price.

To test if the excess returns are significantly different from zero we use a T-test.

The full sample t-test returns a t-statistic of 4.4 and is thus significant at the 1 % level. This means that there is a statistically significant difference between the mean excess return and the mean put value. Test statistics is presented in Table 32.

Estimated Returns to Underwriting

(as a % of the Offer Price)

	Underwriting Fee (%)	Value of Put (%)	Excess Return
Mean	3,58	0,86	2,72
Median	3,00	0,01	2,75
Std Deviation	0,02	0,02	0,03
Test for mean excess return:			
t-statistic	-	-	4,40 [*]
Notes:	*: Significantly, different from zero at the 1 % level using a two-tailed test.		

Table 32: Paired two samples T-test full sample for put value in percentage of subscription price and excess returns.

Determinants of excess returns – Traditional approach

In order to assess the excess returns we have constructed a full regression model with variables that is assumed to have an impact on the excess returns. Below we discuss our reasoning for including or excluding supposed determinants.

Pre bindings

In chapter 8.2.1 we found that rights issues with pre bindings had a significantly higher underwriting fee than issues without pre-bindings. In our full model we include pre-bindings as a percentage of issue size. We believe that a higher level of pre bindings has a positive effect on excess returns.

Type of underwriter

Based on our analysis of the mean difference in underwriting fee on page 32 we do not consider the type of underwriter to be a determinant for excess returns.

Issue size

Smaller issues are normally made by smaller and less known companies. This may lead to a higher underwriting fee due to the risk of a shortfall. Contrariwise as the issue size increases, underwriters may find it increasingly difficult to reduce its risk through sub-underwriting agreements. The underwriter may therefore be exposed to a greater risk related to shortfall of the issue. We believe that this may transfer into higher fees and thus, ceteris paribus, a higher excess return. We include this variable in our model, but we are not able to predict the expected sign of this variable due to the conflicting influences.

Market capitalization of the issuing firm

Due to the high correlation between market capitalization and issue size we chose to exclude this variable in our model.

Market state

Marsh (1980) argued that the risk of a shortfall in an issue may be grater during a bear market and that the extra risk associated could require additional compensation in return of a higher underwriting fee. His reasoning suggests that underwriters may believe that market returns are positively serially correlated. Based on this we will include market state as a determinant variable in our model. We have defined bear market periods in our sample to be from starting Q3 2007 until end of Q1 2009. In addition we have also defined the rights issue of Hexagon in 2002 as a bear market issue.

Discount to TERP

A deeper discount to TERP will decrease the probability of the put option to be in the money. This will result in a lower put value and thus a higher excess volatility. We include discount to TERP as a determinant in our model. Discount to TERP is calculated as $\frac{TERP-subcription\ price}{TERP}$. Calculations of TERP may be found in chapter 8.4.3.

Time of year

In chapter 8.3 we examined if there was a difference in the underwriting fee for different parts of the year. We observed that Q2 and Q4 had a higher average underwriting fee than for Q1 and Q3. Although only Q4 had a significant t-statistic, we chose to include both Q2 and Q4 as assumed determinants of excess return.

Volatility, interest rate and risk days

Volatility, interest and risk days are inputs to the Black & Scholes option pricing model and, if appropriately priced, not expected to be significant determinants for excess return.

8.4.2. Full regression model

When analyzing estimated excess returns to underwriting based on our full model the following multiple linear regression was used:

$$EXCESS_i = b_0 + b_1 PRE_i + b_2 SIZE_i + b_3 MARKET_i + b_4 DISC_i + b_5 Q2_i + b_6 Q4_i + b_7 VOL_i + b_8 INT_i + b_9 DAYS_i + u_i$$

where in respect to each issue i for $i = 1\ to\ 101$:

$EXCESS_i =$	excess returns as a percentage of the offer price;
$PRE_i =$	pre-bindings as a percentage of the total issue;
$SIZE_i =$	natural log of the size of the issue in MSEK;
$MARKET_i =$	one if the equity market is a bear market state and zero otherwise;
$DISC_i =$	discount to theoretical ex-rights price;
$Q2_i =$	one if the issue took place in Q2 and zero otherwise;
$Q4_i =$	one if the issue took place in Q4 and zero otherwise;
$VOL_i =$	observed volatility as described in section 10.1;
$INT_i =$	interest rate as described in section 10.1;
$DAYS_i =$	risk days as described in section 10.1;
$u_i =$	error term.

Our full model produces an F-statistic equal to 6.7 and is thus significant on the 1 % level. The adjusted R-square is 0.34 which means that 34 % of the estimated excess returns are explained by our model. An interesting observation is that the risk free rate proved to be a significant determinant at the 1 % level. This interprets as higher interest rates reduce the excess return. Higher interest rates results in lower put values, and it could mean that underwriters do not pay attention to the current interest rate when determining the underwriting fee.

The level of pre bindings did not return a significant coefficient and our hypothesis of compensation for pre bindings being represented in the fee may therefore not be valid.

Analysis of Estimated Excess Returns to Underwriting

(as a % of the offer price)

Explanatory Variable	Coefficient	Expected Sign	Value	t-statistic	
Constant	b0		0,049	2,583	**
Pre Bindings	b1	+	-0,009	-1,370	
Issue Size	b2	?	-0,005	-3,192	*
MARKET	b3	+	0,016	2,003	**
Discount to TERP	b4	+	0,102	5,414	*
Q2	b5	+	0,011	1,682	
Q4	b6	+	0,010	1,611	
Volatility	b7	nil	-0,023	-1,577	
Risk free rate	b8	nil	-0,573	-2,673	*
Risk Days	b9	nil	0,000	-1,467	
Adjusted R-square				0,341	
F-statistic				6,745	

Notes:	1. Results from regression model is based on the total sample of 101 issues.
	*: Significantly, deifferent from zero at the 1 % level using a two-tailed test.
	**: Significantly, deifferent from zero at the 5 % level using a two-tailed test.

Table 33: Results from full regression model analyzing estimated excess returns to underwriting.

The size of the issue returned a negative coefficient significant on the 1 % level. This means that larger issues produce a lower excess return to the underwriter than smaller issues. Our full model favors the latter of our discussion regarding reduced level of sub underwriting for larger issues vs. risk of shortfall for smaller issues by lesser known companies.

If the market is in a bear state as we have defined it the excess returns will be higher than for a normal or bull market state. It returned a positive sign as expected a priori. The risk of a shortfall is assumed to be higher in a bear market due to fear amongst investors.

Discount to TERP returns the highest t-statistic and is thus the most significant determinant for excess returns. Larger discounts are reflected in lower put values and thus a higher excess return. Another approximation in explaining the significance of discount to TERP is that a company desperate for new equity may set a large discount in order to attract the necessary capital.

8.4.3. Theoretical Ex-Rights Price (TERP) approach

In this chapter we replace the actual observed share price with TERP when calculating the put values. Market efficiency theory states that the share market price is always correct. When entering forward contracts on a share the forward value equals today's share price less dividends plus accrued interest. This is assumed to be the theoretical correct price at time of maturity for the contract if we assume that there is no fluctuation in share price related to asymmetric information, announcement of issue and other issues that may affect the share price in relation to the rights issue.

In the case of a rights issue we possess additional information that we know would affect the value of the issuing firm and the per share value. The reasoning for using TERP is that at time of maturity of the option the theoretical correct price is the TERP.
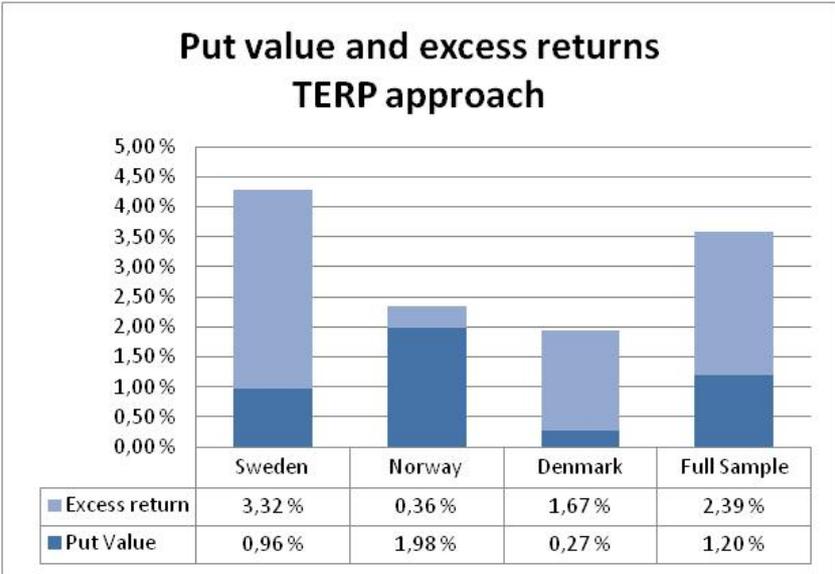
Figure 26: Put value and excess returns in percentage of subscription price – TERP approach.

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The average excess return for the full sample when using TERP is 2.39 %. For the traditional approach we observed excess returns of 2.72 %. The TERP approach reduces the estimated excess return with 0.33 percentage points due to increased put values. A paired two sample t-test confirms the reduction in excess return with a test statistic of 2.36 and is thus significant at the 5 % level. The test statistic for this t-test is lower than for the traditional approach where we observed a t-statistic of 4.4. For Norway we observe that the excess return decreases to 0.36 % and is thus lower than for any evidence from previous research.

Estimated Returns to Underwriting

(as a % of the Offer Price)

	Underwriting Fee (%)	Value of Put (%)	Excess Return
Mean	3,58	1,21	2,39
Median	3,00	0,19	2,60
Std Deviation	0,02	0,02	0,03
Test for mean excess return:			
t-statistic	-	-	-2,36[**]
Notes:	**: Significantly, different from zero at the 5 % level using a two-tailed test.		

Table 34: Paired two samples T-test full sample for put value in percentage of subscription price and excess returns using TERP approach.

Determinants of excess returns – TERP approach

The test statistics from regressing the same explanatory variables as for the traditional approach on the estimated excess returns observed when using TERP as S is presented in Table 35 below.

Analysis of Estimated Excess Returns to Underwriting

(as a % of the offer price)

Explanatory Variable	Coefficient	Expected Sign	Value	t-statistic	
Constant	b0		0,051	2,660	*
Pre Bindings	b1	+	-0,007	-1,080	
Issue Size	b2	?	-0,005	-3,053	*
MARKET	b3	+	0,016	1,989	**
Discount to TERP	b4	+	0,116	6,080	*
Q2	b5	+	0,010	1,531	
Q4	b6	+	0,010	1,573	
Volatility	b7	nil	-0,037	-2,480	**
Risk free rate	b8	nil	-0,589	-2,703	*
Risk Days	b9	nil	0,000	-2,168	**
Adjusted R-square				0,395	
F-statistic				8,251	

Notes:	1. Results from regression model is based on the total sample of 101 issues.
	*: Significantly, deifferent from zero at the 1 % level using a two-tailed test.
	**: Significantly, deifferent from zero at the 5 % level using a two-tailed test.

Table 35: Results from full regression model analyzing estimated excess returns to underwriting when TERP is S.

Our full model when using TERP as S returns a higher F-statistic than for the traditional approach. The variable that proved to be significant in the traditional approach is also significant in our TERP model. In addition we observe that volatility and the number of risk days return significant coefficients at the 5 % level. The adjusted R-square rises to 0.395 from 0.341 and is thus explaining a larger portion of the estimated excess returns than the full model for the traditional approach.

8.5. Put Values

The equally-average full sample underwriter put is assessed to be 0.86 %. The value-weighted approach gives a put value of only 0.15 % of the underwritten amount.

Put value <	Observations	% of total
0,01 %	50	50 %
0,10 %	60	59 %
0,20 %	67	66 %
0,50 %	75	74 %
1,00 %	82	81 %

Table 36: Number of put value observations for given value intervals

Table 36 presents the number of observations for put values less than 1 %. 82 of 101 observations have a put value of less than 1 % of the underwritten amount. 50 observations, or about half our sample returns put values of zero.

A simple OLS regression where we regress the put value as a percentage of the underwritten amount on the actual underwriting fee returns an F-statistic of 0.7. The adjusted R-squared is 0.3 %; hence the put value does not have a significant impact on the underwriting fee.

8.6. Summary of evidence

The total amount raised in our sample was SEK 230.4 Billion. SEK 166 Billion or 72 % of the raised amount was underwritten by an underwriter. The total amount of fees amounted to SEK 4.1 Billion or 2.47 % of the total amount underwritten, whereas the total put value only sums up to SEK 250 Million. This means that 93.9 % of the underwriting fees represented value-weighted excess return.

The equally weighted underwriting fee for the Scandinavian market in the period was 3.58 %. The mean put value was 0.86 % and thus 2.47 % is the average excess return to the underwriter.

In our analysis we found that there exists statistical relationships that participates in the explaining of excess return. The discount in subscription price proved to be the greatest determinant. We were also able to prove that there exists extraordinary excess return in Q4.

One of the most interesting findings is that larger offerings have smaller excess returns and thus seems to be more correct priced. This is in line with our discussion about larger issues gaining international attraction and thus increases the competitiveness.

The portion of excess returns that we did not succeed in explaining through our model may be explained by other factors. As we mentioned in section 3, a typical underwriting agreement prevents the underwriter to sell shares taken up in the issue for 180 days after the first trading day of the new shares. This imposes a greater deal of risk on the underwriter if the offering should shortfall, as the underwriter is left with the equity risk for 180 days. The ending of the "look up period" is also assumed to be widely known by investors, and thus we may expect additional pressure on the share price prior to the ending of the "lock up period". This imposes additional risk and may explain some of the excess returns we observe.

When using the TERP approach we found that the model explained about 5 % more of the excess returns, and is thus not as much as we might have hoped. When referring to on our analysis later in this paper, we are referring to the traditional approach. The traditional approach is more widespread and thus better for comparison.

9. Qualitative findings

In this part different banks and investors are interviewed about aspects in a rights issue. The questions can be found in appendix 1 and 2. Three large institutional investors in Norway and three large Scandinavian banks were interviewed. This is not a large sample, but we believe it reflects the Scandinavian market, which is relatively small and consists of a limited number of players.

The interviews are conducted in order to investigate if there is a correlation between how investors and banks think in a rights issue. We will also investigate the possible correlation between the findings in the interviews and our numerical findings.

The questions were divided into three sections; General, Cost/Pricing and Risk. Our presentation will follow this setup, and we will comment on general findings. The general questions (Part 1) were intended to map out the banks´ and the investors view on their role, experience, the market and advantages with rights issues. The next set of questions (Part 2) is regarding the cost and the pricing of the underwritings fee. Risk is one of the main issues around a guarantee and questions regarding this can be found in the last section (Part 3). It is relevant to ask questions regarding risk and find out how banks and investors relate to this.

The interviews were conducted in Norwegian and are freely translated to English by us.

9.1. Banks

We have interviewed three large scandinavian banks. These banks are all represented as underwriters in our numerical findings and are therefore highly relevant for our problem. The banks have been made anonymous;

- Bank 1 is a Norwegian bank.
- Bank 2 is a Swedish bank.
- Bank 3 is the Danish division of a Swedish bank.

9.1.1. Part 1 - General questions

The first question is regarding their role in a rights issue. The banks all answer that they advise the company in the rights issue. Bank 1 states that in their home market they only choose leading roles in a rights issue:

"In Norway, where our bank the last couple of years has had an approximately 90 percent share of the market, we will exclusively participate in leading positions. (Global Coordinator or Bookrunner)"(Bank1, 2011)

The general answer to question number two is that underwriting is a cyclical business. There are more often use for underwriting when the economy is in a downturn, like in the financial crisis in 2008. Bank 2 states:

"Since the financial crisis all equity issues has in principle been guaranteed in Sweden. This deviates from practice before the crisis."(Bank2, 2011)

Not surprisingly the banks are answering that underwriting is a profitable business for them. They run a business and therefore will not take on unprofitable projects if acting rational. Our own findings and existing research also underlines this point.

There are different opinions concerning the competition in the SEO market. Bank 3 states:

"We do not experience a necessity to pitch in order to get appointed rights issues."(Bank3, 2011)

The two other banks express that both the SEO and rights issue market is a competitive market. This is also the case if the issuer wants the issue to be underwritten.

In the last question in this section all the banks answer that the main advantage using an underwriter is that the company has secured the equity issue. Bank 1 highlights that a guaranteed rights issue secures no speculations against equity issue.(Bank1, 2011)

9.1.2. Part 2 – Costs/pricing

From the answers it seems like there is no specific theoretical background for calculating the underwriter's fee for the banks. It seems like the market decides what the fee should be. The fee is also connected to other fees if the bank holds more than the underwriting role. Hence the total fee income for the bank is more important. This is also underlined by the next question, where the banks respond that if the issuing company has a relationship with the bank, this affects the fees.

"It is clear that if the bank has had a longstanding customer relationship with the company, fees are not discussed in the meeting. Both parties know it will be an ok deal for both parties."(Bank3, 2011)

It seems like there is a connection between the underpricing and the fees charged. The banks all express that there was a connection between the underwritings fee and the underpricing of issue. As we showed in the Billerud AB sensitivity analysis, the issue price had a large impact on the theoretical underwriters put (48.7% contribution to the variance). When the subscription price goes down the risk for the option to be in-the-money is reduced and therefore the fee should be lower. When analyzing the full sample we found statistical evidence which proves that larger discount in subscription produces lower excess returns to the underwriter.

"Yes, a higher discount gives a lower underwriting fee and vice versa."(Bank2, 2011)

All three banks expressed that they believed the underwritings fee was fairly priced given the market conditions. Our own and other existing research have found evidence that the banks are charging a too high fee. Of course the banks will not admit that they earn excess returns. That would be the same as admitting that the fees should be lower and so margins for the banks would be lower.

9.1.3. Part 3 - Risk

The banks have different opinions about the first question. Different banks values different aspects. Bank 1 summarizes it like this:

"Market conditions, the company`s solidarity, investor interest and other matters. The most central aspect will be a robust value of the rights. Good examples where this has been demanding, are the rights issues of Sparebanken Øst (2009) and Eniro (2010), where the underwriters was left holding shares. In this case there also were significant opportunities for arbitrage between the shares and the warrants - which is not desirable."(Bank1, 2011)

None of the banks sell the issue before they take on risk. They check the market conditions and the demand for the share. If the demand and the market conditions are satisfying for the bank, they are also comfortable with the risk they take on.

There is of course no discount in a rights issue for the current shareholders. The difference between the issue price and the market price is transferred to the warrants owned by the shareholders. But as one bank points out is it important to have an underpricing to create a value to the warrant. This way the bank is minimizing the risk for the issue going bad and the risk for picking up unsubscribed shares. Lower issue price means lower risk for the underwriter; hence the underpricing is important for the underwriter's risk.

The banks have no specific guideline for a rights issue, but a timeline between two and four weeks for a rights issue seems normal. Bank 1 comments on the fact that both the bank and the company want a short timeline for an issue to reduce risk. But there are of course restrictions on how fast it is possible to implement a rights issue. The average risk days in our full sample are 49 days. This is about one and a half month, but also includes the period before the subscription period starts.

The banks believe that it is not normal to present any form of underwriting security to the issuing company outside the bank's own balance sheet itself.

9.2. Investors

Three large institutional investors from Norway were interviewed. The investors are all represented in the Scandinavian markets and have been faced with the problems and issues regarding a rights issue. The investors have been made anonymous;

- Investor 1
- Investor 2
- Investor 3

9.2.1. Part 1 - General questions

The investors role in a rights issue are either as a shareholder participating in a rights issue (investor) or/and as an underwriter for the issue.

Regarding the development in guaranteed issues Investor 2 makes some good points:

"The development over the last decade has gone from a large share of the offerings being made as rights issues, to today being a large share made as private placements with shareholders rights evicted." (Investor2, 2011)

Investor 3 states this about the development in the guaranteed issues:

"There is a moderate demand for sub-underwriting now, because of the low volatility in the market. There was a higher demand in 2007, 2008 and partly in 2009. "(Investor3, 2011)

This is a profitable business for the investors. But they care about the risk involved.

"We only act as underwriter in issues where risk/reward is acceptable, meaning that the underwriting fee is attractive in comparison to the risk taken."(Investor2, 2011)

The B&S model that we have used evaluates the risk/reward aspect of an underwriting. Both our own and other existing research have found evidence that the risk/reward is in favor of the underwriter using option pricing framework.

Investor 3 does not care about the profitable underwriting business and characterize the underwriting business as negligible for the fund. (Investor3, 2011)

The investors have different views on why they underwrite. Investor 2 is concerned about the ratio between risk/reward. Investor 1 highlights that they do it because they believe in a higher price after the issue. Investor 3 highlights that there are different factors to why they underwrite; ownership, fee and other strategic reasons.

When it comes to the differences in the Scandinavian countries there are few comments on this from the investors, but investor 1 is claiming that there is much more activity in the Norwegian market for rights issues. The question of fee differences also remains uncommented by the investors. However, investor 2 makes a point worth mentioning regarding the fee:

"No, but there is a big difference between small and large companies and a big difference between high versus low issue price in relation to price before the announcement date."(Investor2, 2011)

The investors are unanimously agreed that the main advantage in using an underwriter is to secure the issue and prevent speculation. This is not surprising and investor 2 put it like this:

"A underwriting consortium secures implementation of the offering by rights issue. It creates security for the companies for financing and avoid any speculation of the financing to fail (shortsale)"(Investor2, 2011)

9.2.2. Part 2 – Cost/pricing

The investors have a more analytical approach than the banks when it comes to the underwritings fee. Investor 3 states that they use the B&S model:

"We have reviewed this theoretically, using option-pricing models. Ie. Black-Scholes."(Investor3, 2011)

How they use the models is not stated, but it is interesting that they especially point out the B&S model and this underlines that the option approach is also used in practice.

The fee is not affected by the ownership the investor already have in the company. The underwritings fee and underpricing is more important. There is a correlation with the price in the market, the issue price and the fee.

"Yes, the lower the subscription-price, the lower fees might be attractive, seen from a risk/reward perspective."(Investor2, 2011)

This is in line with our findings, where we observed that a larger discount had a negative impact on the excess return. Our Bank interviews add additional support to this.

The investors believe that the fees are fairly priced. Investor 2 highlights that guarantees without a set issue price is costly. In our numerical sample we only have issues with a set issue price.

"In issues which are so called guaranteed by bank syndicates, but where the issues is not guaranteed by price, the fees tend to be unreasonably high (example: Norsk Hydro, EDB-Ergo Group etc.). Providing a guarantee without a price should not be confused with guarantees where the underwriter carries the price-risk."(Investor2, 2011)

The fee can vary a great deal. The investors do not have a specific fee they believe to be "standard". The fee is related to the risk profile of the issue and volatility in the market. Investor 2 is very specific about both fee and underpricing:

"1 ½ - 2% of the guaranteed amount based on issue price set at 25-30% below the price prior to the issues announcement."(Investor2, 2011)

Our findings have an average theoretical fee of 0.86 %. The average actually fee charged we found to be 3.58 %. The average discount prior to the signing date in our sample is 45 %. The average discount to TERP is 31 %. Our findings are well above what investor 2 express.

9.2.3. Part 3 – Risk

Two of the investors did not answer the first question regarding which requirements they demanded from the company that issued new shares. Investor 2 answered this question with the following statement:

"An underwriting agreement, a guarantee prospect and in some cases significant and fundamental information regarding the company which is crucial to assess the company´s fundamental position."(Investor2, 2011)

Requiring this information from the company is something we believe to be important. An issue of new shares is a negative signal to the market and investors will follow the company closely. If the underwriter is not well informed, they risk having the wrong information. If the issue should fail, the underwriters have to buy the unsubscribed shares.

Two of the investors did not answer question 2 regarding forward selling the issue before underwriting of the issue. But investor 2 did answer that this is not normal practice.

Underpricing of an issue is demanded to minimize risk for the investors if they are underwriters.

The investors believe that the timeline need to be short for a rights issue. The timeline can be affected by local regulations and laws, but none of the investors have a specific timeline guide. We have also argued in our timeline chapter that there is no special timeline for rights issues, but the order of the events is universal.

In question 5 all of the investor answered that it is not normal to demand security for a guarantee outside the investor´s balance sheet.

9.3. Investors versus Banks

Our sample of interviews is relatively small, but we think that the sample represents the Scandinavian market and some general perceptions can be extracted from the interviews.

The investors have a more analytic approach to the pricing of the fees than the banks. The banks operate in a competitive market and they are more concerned about the total fee income for the bank. Both investors and banks agree that there is a correlation between the underpricing and the fee. This is in line with our findings.

The risk involved in a rights issue is a concern for both investors and banks. Both investors and banks believe that the timeline for an issue should be as short as possible.

Both also answered that they believed that the underwriting fee was fairly priced. Previous research on other markets and our own research provide evidence that this is not true.

In general it appears that investors and banks have many of the same thoughts in the questions asked regarding the risk and pricing of the underwriting fee.

10. Conclusion

This thesis examines the Scandinavian underwriting market for rights issues. Our main problem was to examine if the underwriting fee charged by underwriters is fairly priced in relation to the risk undertaken.

Based on our analyses we found that the underwriting fee charged in the Scandinavian market produces excess returns to the underwriters. The average put value was tested to be 0.86 % of the underwritten amount. The mean underwriting fee is proven to be 3.58 %; hence there exists a mispricing. The underwriters earned an excess return of 2.72 %. This means that on average 76 % of the underwriting fee is excess return to the underwriter. Value-weighted, the excess returns represents 93.9 % of the total underwriting fees paid in the period.

In our full regression model we found that the size of the issue, bear market, discount to TERP and the risk free rate had coefficients with significant explaining power to the excess returns. Discount to TERP returned the highest degree of significance. Several of our interview objects emphasize the discount as the most important factor for setting the underwriting fee.

The highest degree of mispricing we observed in the Swedish market, where excess returns to the underwriter are 3.63 %. Norway seems to have to have the most efficiently priced underwriting market with excess returns of "only" 0.79 %. The Danish sample is too small to be made conclusive stand-alone and could be an interesting topic for further research if one manages to assemble all the necessary data.

The average put values in the Scandinavian market are similar to that of previous research and the higher excess return, ceteris paribus, must thus be explained by higher underwriting fees.

In answer to our problem we have found evidence that the underwriting fee is not fairly priced in relation to the risk undertaken. There is also strong evidence that there exists a difference in mispricing in amongst the Scandinavian countries, with Sweden being the most expensive country for underwriting services.

11. Literature

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12. Appendix

Appendix 1 - Interview questions banks

Part 1 Generally

1. Which role do you play in rights issue?
2. What kind of experience do you have in guaranteeing equity issues?
   a. Has there been any development in the number of guaranteed equity issues?
   b. Is this a profitable business for you?
3. Is the market for equity issue costumers competitive?
   a. Does this change if the company is requesting underwriting?
4. What do you consider to be the advantages of using an underwriter?

Part 2 Cost/pricing

1. Do you make use of a theoretical background for the pricing of underwritings fee before you make a decision whether or not to underwrite? If so, how is this calculated?
2. Is there a correlation between the management fee and the underwritings fee if you hold both roles?
3. Påvirker bankens kundeforhold garantiprovisjonen og management fee?
4. Does the issue price correlate with the underwritings fee? If so, in what way?
5. What are your views on the underwriting fee? Is it fairly priced?

Part 3 Risk

1. Excluding the underwriting fee, what kind of conditions are demanded from the company if you are to underwrite a issue? If any, the most important ones.
2. Does selling the guaranteed amount to sub-underwriters before the underwriters agreement is signed occur in your company?
3. Do you demand underpricing of the issue to minimize the risk of underwriting?
4. Do you have a guideline for the timeline in a rights issue?
5. Is it normal to demand security for the issue outside the banks balance sheet? If so, how will this effect the underwritings fee? (relevant for ICAAP and Basel III)

Appendix 2 – Interview question investors

Part 1 Generally

1. Which role do you play in rights issue?
2. What kind of experience do you have in guaranteeing equity issues?
   a. Has there been any development in the number of guaranteed equity issues?
   b. Is this a profitable business for you?
3. Which reasons do you have for underwriting?
4. Do you sometimes enter into pre binding agreements for you pro rata share of the company in an rights issue?
5. Do you find there to be differences in underwriters fee in the Scandinavian countries?
6. Do you find there to be a difference in the use of rights issues in the Scandinavian countries?
7. What do you consider to be the advantages of using an underwriter?

Part 2 Cost/pricing

1. Do you make use of a theoretical background for the pricing of underwritings fee before you make a decision whether or not to underwrite? If so, how is this calculated?
2. Does your company´s ownership effect the underwriters fee?
3. Does the issue price correlate with the underwritings fee? If so, in what way?
4. What are your views on the underwriting fee? Is it fairly priced?
5. What percentage fee is the most common?

Part 3 Risk

1. Excluding the underwriting fee, what kind of conditions are demanded from the company if you are to underwrite a issue? If any, the most important ones.
2. Does selling the guaranteed amount to sub-underwriters before the underwriters agreement is signed occur in your company ?
3. Do you demand underpricing of the issue to minimize the risk of underwriting?
4. Do you have a guideline for the timeline in a rights issue?
5. Is it normal that you have security for the guaranteed amount outside you balance sheet?

Appendix 3 – Monte Carlo report Billerud AB

Crystal Ball Report - Full
Simulation started on 16.06.2011 at 15:17
Simulation stopped on 16.06.2011 at 15:18

Run preferences:
  Number of trials run   100,000
  Extreme speed
  Monte Carlo
  Random seed
  Precision control on
  Confidence level   95.00%

Run statistics:
  Total running time (sec)   4.32
  Trials/second (average) 23,160
  Random numbers per sec   138,958

Crystal Ball data:
  Assumptions   6
  Correlations   0
  Correlated groups   0
  Decision variables   0
  Forecasts   1

Forecasts

Worksheet: [DATA2(SORT TEST2) (1).xlsx]Billerud

Cell: M26

Forecast: Put value

  Summary:
    Entire range is from 5 to 161 540 555
    Base case is 3 486 730
    After 100 000 trials, the std. error of the mean is 29 161
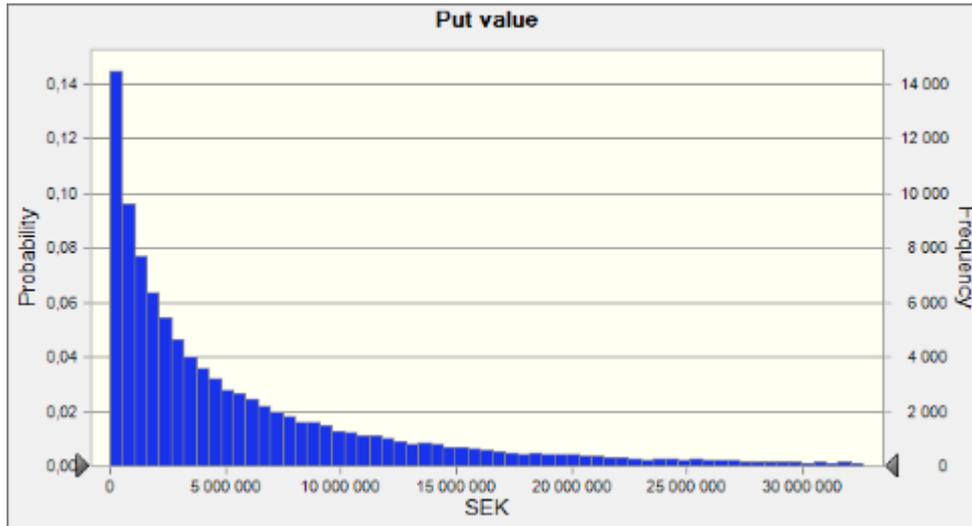
Put value

Statistics:	Forecast values
Trials	100,000
Base Case	3,486,730
Mean	6,785,164
Median	3,435,253
Mode	---
Standard Deviation	9,221,495
Variance	85,035,965,703,957
Skewness	3.08
Kurtosis	18.04
Coeff. of Variability	1.36
Minimum	5
Maximum	161,540,555
Range Width	161,540,550
Mean Std. Error	29,161

Forecast: Put value (cont'd)   **Cell: M26**

Percentiles:	Forecast values
0%	5
10%	337,558
20%	816,062
30%	1,475,330
40%	2,310,384
50%	3,435,105
60%	4,987,156
70%	7,185,071
80%	10,641,349
90%	17,308,470
100%	161,540,555

End of Forecasts

Worksheet: [DATA2(SORT TEST2) (1).xlsx]Billerud

Assumption: Issue price

Lognormal distribution with parameters:
Location   0.00
Mean   19.00
Std. Dev.   1.90
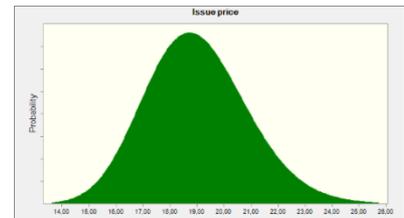
Assumption: Riskfree rate, p.a.

Lognormal distribution with parameters:

Location   0.00%
Mean   0.21%
Std. Dev.   0.02%
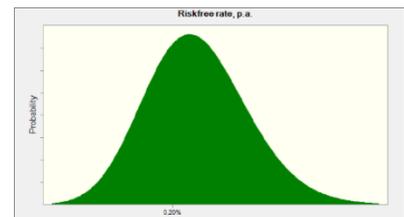
Assumption: Risky days (act)

Lognormal distribution with parameters:
Location   0
Mean   63
Std. Dev.   6
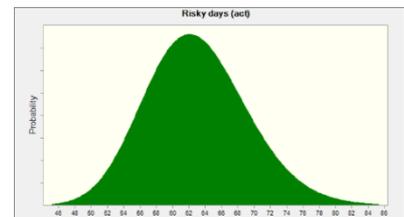
Assumption: Shareprice (S)

Lognormal distribution with parameters:
Location   0.00
Mean   27.02
Std. Dev.   2.70
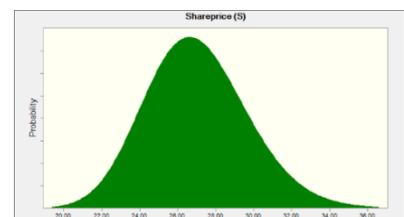
Assumption: Total fees and expenses

Lognormal distribution with parameters:

Location	0
Mean	50,000,000
Std. Dev.	5,000,000
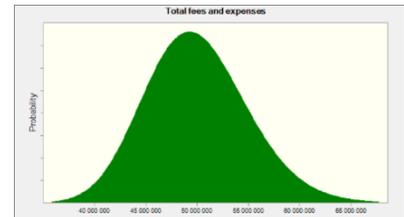
Assumption: Volatility of return on the share

Lognormal distribution with parameters:

Location	0.00%
Mean	53.70%
Std. Dev.	5.37%
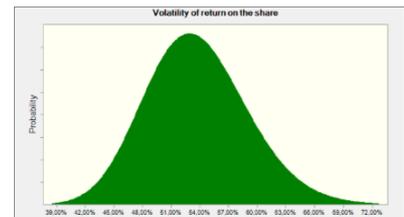
End of Assumptions

Overlay Charts
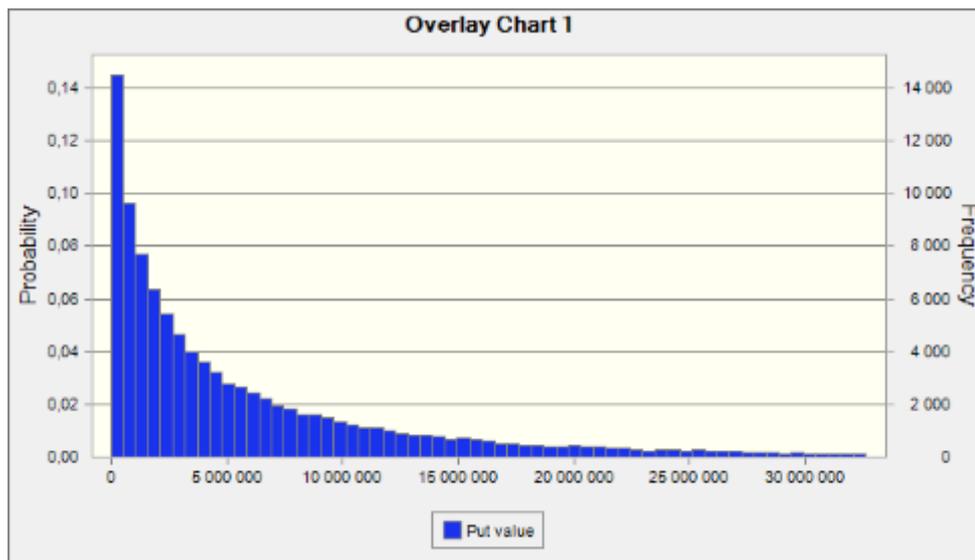
Sensitivity Charts
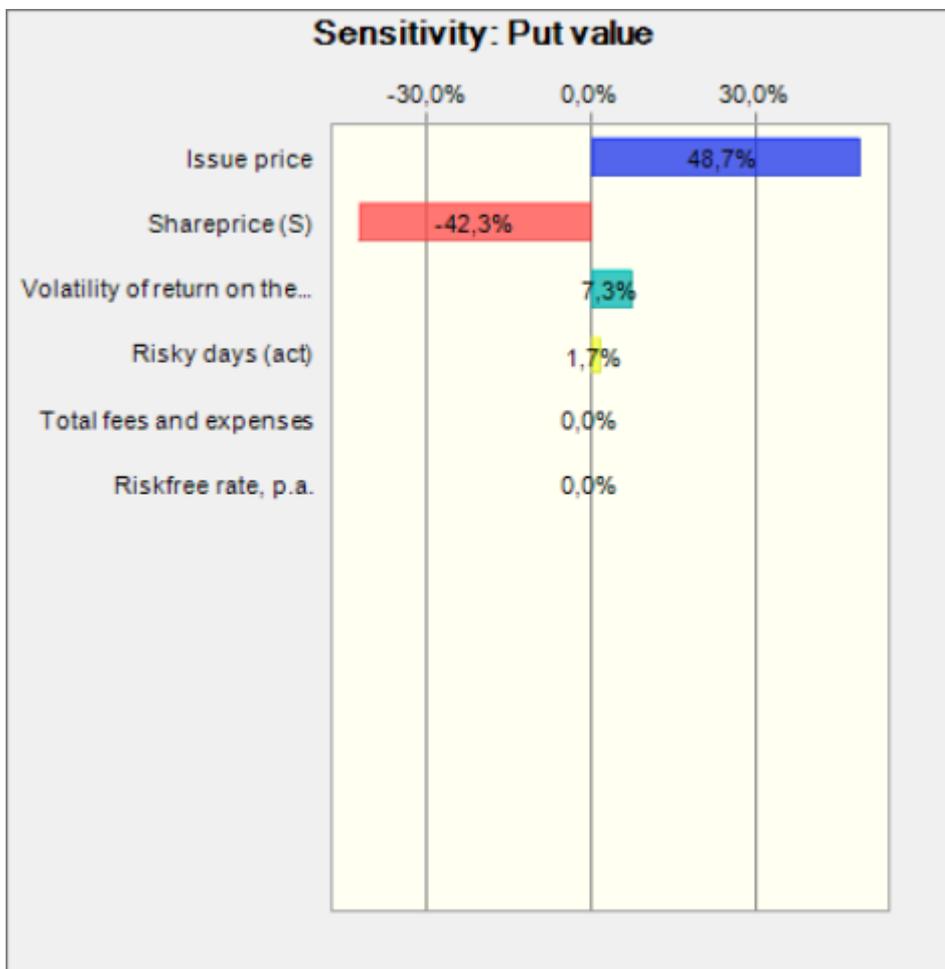
Appendix 4: EXCEL SHEET

| Company	I Price	FX Rate	SEK Price	No Shares	Paid SEK	Sign date	Sub. End	UW Amount	UW Fee	Other fees	Total costs	RPS	Shares prior	S Price	Pre Bind
A-Com [200905]	2,60	1,00	2,60	11 826 436	30 748 734	26.03.2009	12.05.2009	22 900 000	2 290 000	1 610 000	3 900 000	1,667	7 095 862	5,35	7 848 734
A-Com [200912]	0,90	1,00	0,90	23 652 872	21 287 585	14.10.2009	16.12.2009	18 900 000	1 890 000	1 210 000	3 100 000	1,250	18 922 298	1,93	2 387 585
Active Biotech [200702]	60,00	1,00	60,00	4 000 000	240 000 000	15.12.2006	09.02.2007	148 560 000	3 714 000	2 086 000	5 800 000	0,100	40 000 000	81,00	91 440 000
Active Biotech [200806]	40,00	1,00	40,00	3 941 676	157 667 040	03.04.2008	09.06.2008	86 720 240	2 168 006	1 931 994	4 100 000	0,083	47 300 115	54,00	70 946 800
Active Biotech [200906]	20,00	1,00	20,00	12 810 447	256 208 940	24.03.2009	10.06.2009	140 250 000	5 610 000	1 590 000	7 200 000	0,250	51 241 791	39,00	115 958 940
Aerocrine [200812]	4,25	1,00	4,25	22 984 118	97 682 502	22.10.2009	01.12.2008	9 099 998	910 000	3 590 000	4 500 000	0,500	45 968 236	6,75	78 400 002
AllTele [200806]	12,50	1,00	12,50	1 840 800	23 010 000	28.04.2008	12.06.2008	7 000 000	490 000	3 210 000	3 700 000	0,333	5 522 400	13,05	12 300 000
Billerud [200909]	19,00	1,00	19,00	51 491 570	978 339 830	22.07.2009	23.09.2009	757 624 430	22 728 733	27 271 267	50 000 000	1,000	51 491 570	38,20	220 715 400
BioPhausia [200808]	1,35	1,00	1,35	228 317 288	308 228 339	10.07.2008	28.08.2008	165 971 550	5 000 000	9 000 000	14 000 000	2,000	114 158 644	4,11	0
Boliden [200403]	17,00	1,00	17,00	84 129 056	1 430 193 952	11.02.2004	31.03.2004	692 213 873	21 000 000	35 000 000	56 000 000	0,500	168 258 113	37,80	737 980 079
Cision [201004]	3,40	1,00	3,40	74 544 418	253 451 021	14.02.2010	12.04.2010	126 701 711	4 865 345	11 134 655	16 000 000	1,000	74 544 418	7,00	126 749 311
CTT Systems AB [200712]	23,00	1,00	23,00	1 807 786	41 579 078	04.09.2007	14.12.2007	21 798 465	871 939	2 128 061	3 000 000	0,200	9 038 929	39,80	10 362 259
Cybercom Group [200906]	10,15	1,00	10,15	9 833 936	99 814 450	20.05.2009	16.06.2009	47 012 606	2 820 756	5 179 244	8 000 000	0,400	24 584 840	20,50	52 801 844
Diamyd Medical B [200910]	70,00	1,00	70,00	3 131 091	219 176 370	14.09.2009	30.10.2009	210 000 000	14 600 000	4 400 000	19 000 000	0,280	11 182 472	135,00	108 000 000
Digital Vision [201006]	0,10	1,00	0,10	354 415 408	35 441 541	16.04.2010	01.06.2010	27 495 640	2 749 564	250 436	3 000 000	1,333	265 811 556	0,22	7 945 901
Elanders [201009]	22,00	1,00	22,00	9 764 999	214 829 978	15.06.2010	20.09.2010	165 419 083	2 481 286	4 518 714	7 000 000	1,000	9 764 999	31,00	49 410 895
Elanders B [200703]	110,00	1,00	110,00	1 394 999	153 449 890	05.02.2007	29.03.2007	108 974 337	2 200 000	4 600 000	6 800 000	0,167	8 370 000	166,00	44 475 553
Eníro [200906]	5,20	1,00	5,20	484 100 000	2 517 320 000	27.04.2009	16.06.2009	1 890 687 365	76 000 000	104 000 000	180 000 000	3,000	162 271 368	10,35	626 632 635
Eniro AB [201012]	0,52	1,00	0,52	4 847 455 170	2 520 676 688	27.10.2010	17.12.2010	2 520 676 688	80 000 000	45 000 000	125 000 000	30,000	161 581 839	7,70	0
Eurocine Vaccines [200710]	16,00	1,00	16,00	1 692 500	27 080 000	12.09.2007	26.10.2007	20 500 000	1 025 000	2 475 000	3 500 000	0,250	6 770 000	21,10	1 278 384
Fingerprint Cards B [200612]	25,00	1,00	25,00	2 804 475	70 111 875	13.09.2006	01.12.2006	39 006 875	2 700 000	3 900 000	6 600 000	1,000	9 348 258	45,40	31 105 000
Fingerprint Cards B [200812]	2,20	1,00	2,20	12 152 733	26 736 013	12.11.2008	08.12.2008	15 000 000	1 350 000	2 150 000	3 500 000	1,000	12 152 733	4,80	1 900 000
Fingerprint Cards B [200910]	2,50	1,00	2,50	19 834 793	49 586 983	11.09.2009	13.10.2009	46 300 000	4 200 000	4 900 000	9 100 000	0,300	19 834 793	5,50	3 286 983
Getinge B [200803]	120,00	1,00	120,00	12 617 120	1 514 054 400	31.01.2008	17.03.2008	1 241 509 800	12 415 098	9 584 902	22 000 000	0,063	201 873 920	153,00	272 490 200
Geveko B [201003]	13,00	1,00	13,00	12 658 599	164 561 787	24.02.2010	28.03.2010	130 729 209	6 100 000	8 000 000	14 100 000	3,000	4 219 533	61,00	33 832 578
Gunnebo [200912]	16,50	1,00	16,50	30 342 239	500 646 944	21.10.2009	16.12.2009	219 784 008	4 400 000	5 600 000	10 000 000	0,667	45 513 359	36,40	280 862 935
Haldex [200912]	23,00	1,00	23,00	21 919 750	504 154 250	24.11.2009	16.12.2009	281 400 000	4 221 000	10 979 000	15 200 000	1,000	21 919 750	76,75	222 754 250
Hemtex [200905]	14,00	1,00	14,00	11 734 960	164 289 440	31.03.2009	13.05.2009	69 001 567	2 070 047	4 929 953	7 000 000	0,400	29 337 400	17,70	95 287 873
Hexagon AB [200206]	115,00	1,00	115,00	3 698 295	425 303 925	19.04.2002	07.06.2002	211 273 076	1 300 000	12 200 000	13 500 000	0,250	14 793 182	183,50	190 536 158
Hexagon AB [200604]	155,00	1,00	155,00	17 475 027	2 708 629 185	14.02.2006	12.04.2006	85 060 785	1 000 000	5 000 000	6 000 000	0,250	69 900 111	226,00	1 000 726 924
Hexagon AB [201012]	74,00	1,00	74,00	88 122 407	6 521 058 118	24.06.2010	16.12.2010	1 018 589 278	25 464 732	81 535 268	107 000 000	0,333	264 367 223	107,40	2 253 677 686
Husqvarna AB [200903]	16,00	1,00	16,00	191 236 883	3 059 790 128	19.02.2009	30.03.2009	1 964 598 944	58 900 000	41 100 000	100 000 000	0,500	385 136 895	37,80	1 095 191 184
IBS [200806]	9,50	1,00	9,50	41 804 015	397 138 143	28.04.2008	27.06.2008	364 537 800	11 000 000	10 000 000	21 000 000	0,500	83 608 030	12,50	32 562 200
Karo Bio AB [200705]	1,40	1,00	1,40	232 238 383	325 133 736	26.03.2007	08.05.2007	330 000 000	16 500 000	13 500 000	30 000 000	1,500	154 825 589	4,47	0
Karo Bio AB [200912]	4,30	1,00	4,30	38 706 397	166 437 507	23.10.2009	02.12.2009	161 400 000	8 070 000	7 930 000	16 000 000	0,333	116 119 192	7,00	5 037 507
Karo Bio AB [201012]	10,50	1,00	10,50	38 706 398	406 417 174	28.10.2010	16.12.2010	225 000 000	7 875 000	12 125 000	20 000 000	0,500	77 412 795	17,90	164 024 000
LinkMed [200906]	12,50	1,00	12,50	7 300 873	91 260 913	07.05.2009	02.06.2009	60 310 188	4 824 815	5 075 185	9 900 000	0,833	8 761 048	27,40	30 950 725
Meda AB [200503]	160,00	1,00	160,00	3 514 576	562 332 160	25.01.2005	15.03.2005	267 670 080	8 000 000	7 000 000	15 000 000	0,400	8 786 440	277,00	294 662 080
Meda AB [200511]	60,00	1,00	60,00	41 791 743	2 507 504 580	06.10.2005	24.11.2005	62 687 615	1 700 000	16 300 000	18 000 000	0,667	62 687 615	137,00	1 479 427 702
Meda AB [200811]	35,00	1,00	35,00	43 177 580	1 511 215 300	13.10.2008	24.11.2008	1 119 497 365	44 792 421	10 207 579	55 000 000	0,167	259 065 485	50,00	391 717 935
Medivir B [201005]	62,00	1,00	62,00	5 243 878	325 120 436	28.03.2010	28.05.2010	212 999 999	6 390 000	18 610 000	25 000 000	0,250	20 975 515	128,50	54 753 998
Micronic Mydata AB [201005]	7,50	1,00	7,50	32 638 836	244 791 270	25.03.2010	21.05.2010	80 000 000	4 000 000	9 000 000	13 000 000	0,500	65 277 693	15,00	102 812 333
Midelfart Sonesson [200701]	13,00	1,00	13,00	17 749 166	230 739 158	14.11.2006	29.01.2007	124 203 027	2 484 061	4 515 939	7 000 000	0,500	35 498 332	24,50	106 536 131
Midelfart Sonesson [200912]	3,50	1,00	3,50	36 391 665	127 370 828	15.10.2009	14.12.2009	69 034 989	1 400 000	4 100 000	5 500 000	0,667	54 587 498	8,10	58 335 839
Morphic Technologies B [200810]	2,40	1,00	2,40	163 872 022	393 292 853	30.08.2008	13.10.2008	302 000 000	18 120 000	12 880 000	31 000 000	1,000	163 872 022	10,35	91 292 853
Nordea [200904]	20,75	1,00	20,75	1 430 059 525	29 673 735 144	10.03.2009	03.04.2009	18 921 081 868	520 329 751	454 117 762	974 447 514	0,550	2 594 108 227	42,90	11 578 691 453
Nordic Mines [200806]	20,00	1,00	20,00	5 171 428	103 428 560	29.04.2008	17.06.2008	66 644 140	4 700 000	1 700 000	6 400 000	0,286	18 000 000	30,00	36 784 420
Nordic Mines [201002]	26,00	1,00	26,00	2 327 142	60 505 692	21.12.2009	05.02.2010	50 505 692	3 282 870	11 717 130	15 000 000	0,100	23 271 428	32,50	10 000 000
NOTE [201005]	4,50	1,00	4,50	19 248 400	86 617 800	05.03.2010	06.05.2010	58 237 731	2 329 509	4 670 491	7 000 000	2,000	9 624 200	17,90	28 380 069
Opcon AB [200810]	18,00	1,00	18,00	4 081 404	73 465 272	30.09.2008	24.10.2008	35 223 192	1 761 160	3 238 840	5 000 000	0,250	16 325 619	33,50	38 242 080

Company	Price	FX Rate	SEK Price	No Shares	Paid SEK	Sign date	Sub. End	UW Amount	UW Fee	Other fees	Total costs	RPS	Shares prior	S Price	Pre Bind
PA Resources [201006]	3,75	1,00	3,75	469 711 149	1 761 416 809	06.05.2010	16.06.2010	1 715 000 000	68 600 000	41 400 000	110 000 000	2,800	167 753 982	16,70	46 000 000
Precise Biometrics [200612]	3,50	1,00	3,50	24 305 150	85 068 025	19.10.2006	04.12.2006	78 082 900	4 684 974	5 315 026	10 000 000	0,333	72 915 450	5,50	6 985 125
RnB Retail Brands [200809]	6,00	1,00	6,00	57 078 832	342 472 992	23.08.2008	18.09.2008	213 000 000	5 900 000	5 100 000	11 000 000	1,000	57 078 832	14,00	129 000 000
RnB Retail Brands [200910]	6,15	1,00	6,15	16 308 237	100 295 658	09.09.2009	09.10.2009	38 473 414	767 000	2 933 000	3 700 000	0,143	114 157 664	6,25	1 644 849
Rottneros [200912]	0,25	1,00	0,25	901 062 320	225 265 580	28.10.2009	07.12.2009	172 332 455	10 339 947	9 660 053	20 000 000	5,000	180 212 464	2,61	52 933 125
Rörvik Timber B [201004]	0,50	1,00	0,50	499 086 216	249 543 108	07.02.2010	16.04.2010	249 543 108	20 000 000	14 200 000	34 200 000	36,000	13 863 506	9,00	0
SAS [200904]	2,63	1,00	2,63	2 303 000 000	6 056 890 000	12.03.2009	06.04.2009	2 570 846 776	89 979 637	140 020 363	230 000 000	14,000	164 500 000	22,10	3 486 043 224
SAS [201004]	0,67	1,00	0,67	7 402 500 000	4 959 675 000	05.04.2010	29.04.2010	2 105 133 903	73 679 687	146 320 313	220 000 000	3,000	2 467 500 000	2,75	2 854 541 097
SEB A [200903]	10,00	1,00	10,00	1 507 015 171	15 070 151 710	05.02.2009	27.03.2009	7 445 546 755	223 000 000	247 000 000	470 000 000	2,200	687 156 631	38,30	7 645 918 700
Swedbank A [200812]	48,00	1,00	48,00	257 686 706	12 368 961 888	27.10.2008	16.12.2008	7 320 468 912	219 614 067	180 385 933	400 000 000	0,500	515 373 412	59,50	5 048 492 976
Swedbank A [200910]	39,00	1,00	39,00	386 530 059	15 074 672 301	12.09.2009	06.10.2009	10 901 536 347	283 439 945	191 560 055	475 000 000	0,500	773 060 118	79,00	4 173 135 954
Swedish Orphan Biovitrum [200912]	15,00	1,00	15,00	100 792 632	1 511 889 480	04.11.2009	30.12.2009	1 200 000 000	36 000 000	51 000 000	87 000 000	2,000	50 911 901	57,75	311 889 480
SwitchCore [201002]	0,02	1,00	0,02	3 097 000 980	61 940 020	24.11.2009	08.02.2010	61 940 020	2 167 901	1 032 099	3 200 000	5,000	619 400 196	0,04	0
TradeDoubler [200912]	25,00	1,00	25,00	14 225 816	355 645 400	16.11.2009	30.12.2009	120 000 000	2 400 000	9 500 000	11 900 000	0,500	28 581 633	57,00	111 502 000
Trelleborg [200905]	12,00	1,00	12,00	180 714 522	2 168 574 264	22.03.2009	19.05.2009	1 424 000 000	52 455 000	42 545 000	95 000 000	2,000	90 357 261	30,40	744 574 264
ÅF Group [200608]	93,00	1,00	93,00	3 232 164	300 591 252	15.06.2006	11.08.2006	231 800 000	6 374 500	5 625 500	12 000 000	0,250	12 928 656	136,00	0
AGR Group [200909]	3,20	1,19	3,82	54 687 500	209 037 500	04.09.2009	28.09.2009	209 037 500	4 180 750	1 791 750	5 972 500	0,768	71 210 808	8,36	0
Aker Seafoods [200909]	5,00	1,17	5,87	36 000 000	211 320 000	12.08.2009	17.09.2009	187 840 000	3 756 800	939 200	4 696 000	0,740	48 646 016	8,45	0
Apptix [200803]	0,50	1,18	0,59	56 000 000	32 900 000	31.07.2009	14.10.2009	32 900 000	2 385 250	1 139 750	3 525 000	2,202	25 430 178	2,47	0
Apptix [200910]	1,00	1,19	1,19	30 000 000	35 700 000	11.02.2008	27.03.2008	35 700 000	714 000	1 785 000	2 499 000	0,309	97 150 889	1,93	0
DnB NOR [200912]	47,30	1,19	56,07	296 145 246	16 606 092 946	24.09.2009	10.12.2009	10 960 021 325	227 616 000	22 524 500	250 140 500	0,222	1 332 653 615	74,98	5 646 071 622
EDB Ergogroup [201012]	9,45	1,14	10,79	94 862 219	1 023 743 581	29.10.2010	09.12.2010	335 661 026	5 034 916	22 258 884	27 293 800	0,550	172 476 760	20,56	688 082 554
Electromagnetic Geoservices [200809]	15,14	1,18	17,87	16 512 549	294 999 990	05.08.2008	30.09.2008	294 999 991	5 900 000	7 080 000	12 980 000	0,221	74 649 860	33,75	0
Green Reefers [200701]	4,39	1,12	4,91	28 051 188	137 614 219	12.12.2006	19.01.2007	137 614 219	2 064 214	1 511 786	3 576 000	0,200	145 010 777	4,97	0
Hurtigruten [200710]	38,00	1,18	44,94	7 894 736	354 749 962	04.09.2007	11.10.2007	354 749 962	5 321 250	20 102 500	25 423 750	0,404	19 848 394	59,13	0
Kverneland [200512]	66,00	1,22	80,69	3 030 304	244 500 078	31.10.2005	19.12.2005	244 500 078	3 667 500	11 002 500	14 670 000	0,244	12 400 615	97,80	0
Navamedic [200709]	44,90	1,17	52,69	890 868	46 939 969	21.08.2007	27.09.2007	46 939 968	938 799	2 699 051	3 637 850	0,149	5 973 970	55,15	0
NorDiag [200808]	2,00	1,17	2,35	15 113 744	35 456 843	03.06.2008	09.07.2008	35 456 843	709 137	2 575 263	3 284 400	0,652	38 323 815	3,46	0
Norsk Hydro [201007]	26,30	1,23	32,26	381 053 600	12 291 626 923	02.05.2010	09.07.2010	6 956 266 362	155 397 550	29 803 950	185 201 500	0,304	1 240 110 211	56,17	5 335 360 561
Norske Skog [200510]	70,00	1,19	83,23	56 808 538	4 728 174 618	06.09.2005	13.10.2005	4 728 174 618	141 847 700	19 737 400	161 585 100	0,429	133 137 088	129,90	0
Norwegian Air Shuttle [200808]	34,80	1,18	41,03	11 494 252	471 599 964	07.07.2008	25.08.2008	471 599 965	9 431 999	10 611 001	20 043 000	0,551	20 865 526	58,83	0
Norwegian Property [200807]	26,00	1,18	30,71	96 153 846	2 952 499 995	30.05.2008	10.07.2008	2 952 499 995	59 050 000	124 005 000	183 055 000	0,912	105 481 570	41,34	0
Oceanteam [200909]	1,85	1,18	2,18	29 450 616	64 208 969	10.08.2009	21.09.2009	64 208 970	0	4 360 450	4 360 450	1,934	121 337 777	2,35	0
PCI Biotech Holding [201006]	40,00	1,22	48,60	2 250 000	109 350 000	21.04.2010	09.06.2010	109 350 000	1 640 250	5 528 250	7 168 500	0,415	5 416 390	50,45	0
PhotoCure [200602]	46,00	1,18	54,23	4 396 051	238 415 430	02.01.2006	20.02.2006	238 158 000	3 576 231	9 392 769	12 969 000	0,250	17 584 204	57,77	0
Renewable Energy Corporation [200907]	26,50	1,24	32,78	170 453 354	5 587 546 171	22.06.2009	13.07.2009	5 587 546 171	222 660 000	24 740 000	247 400 000	0,345	494 314 725	72,36	0
Renewable Energy Corporation [201005]	12,10	1,21	14,68	332 384 039	4 878 500 256	30.03.2010	20.05.2010	4 878 500 256	109 776 500	53 978 500	163 755 000	0,500	664 768 079	30,39	0
Repant [200706]	6,00	1,13	6,75	4 000 000	27 000 000	03.05.2007	19.06.2007	27 000 000	675 000	2 700 000	3 375 000	1,220	16 772 016	10,07	0
Repant [200806]	1,50	1,17	1,75	21 772 016	38 144 572	04.04.2008	26.06.2008	38 144 572	667 530	3 420 470	4 088 000	1,000	21 772 016	2,86	0
Repant [200910]	0,65	1,19	0,77	68 514 005	53 062 384	07.09.2009	19.10.2009	35 745 000	1 787 250	1 787 250	3 574 500	0,238	82 000 000	1,24	0
Schibsted [201007]	34,00	1,22	41,38	38 753 615	1 603 547 081	11.06.2010	02.07.2010	1 603 547 081	44 097 545	31 599 855	75 697 400	0,600	69 250 000	157,24	0
Siem Offshore [200706]	13,00	1,15	15,00	55 972 966	839 342 612	06.06.2007	18.06.2007	839 342 612	12 590 139	2 883 750	15 473 889	0,330	167 918 900	16,73	0
Storebrand [200712]	45,00	1,19	53,48	200 090 786	10 701 355 462	24.10.2007	10.12.2007	10 701 355 462	346 804 300	104 825 700	451 630 000	0,818	249 819 105	95,50	0
TTS Marine [200907]	6,00	1,18	7,11	42 000 000	298 494 000	27.05.2009	15.07.2009	298 494 000	8 954 820	12 010 830	20 965 650	1,621	25 908 279	17,06	0
Bang & Olufsen B [200905]	19,00	1,462	27,77	24 162 676	670 961 269	16.04.2009	07.05.2009	498 513 663	7 453 650	31 568 400	39 022 050	2,000	12 081 338	127,15	138 236 813
Brøndby IF B [200712]	60,00	1,245	74,67	1 750 000	130 672 500	26.11.2007	20.12.2007	130 672 500	1 306 725	9 147 075	10 453 800	0,500	3 855 000	108,89	0
Carlsberg B [200806]	400,00	1,249	499,60	76 278 403	38 108 690 139	15.05.2008	10.06.2008	38 108 690 139	475 869 000	72 442 000	548 311 000	1,000	76 278 403	831,83	0
H+H International [200912]	54,00	1,401	75,65	8 720 000	659 702 880	02.11.2009	21.12.2009	546 126 253	10 922 525	37 972 375	48 894 900	8,000	1 090 000	364,26	113 576 627
NeuroSearch [200610]	100,00	1,241	124,10	3 970 715	492 765 732	22.09.2006	17.10.2006	492 765 732	19 359 600	13 651 000	33 010 600	0,500	7 941 430	215,93	0
TK Development [201008]	15,00	1,294	19,41	14 021 905	272 165 176	22.04.2010	25.08.2010	197 067 478	2 956 012	12 571 988	15 528 000	0,500	28 043 810	45,94	0
Vestas Wind Systems [200406]	50,00	1,233	61,63	43 727 793	2 694 725 244	11.05.2004	08.06.2004	2 694 725 244	64 336 500	42 521 250	106 857 750	0,333	131 183 379	107,23	0

Appendix 5 – Pricing of underwriters Put

Company	S	K	r	Volatility	T-t	d1	d2	Call	Put	Lambda	Tot Put	Underwriting ratio	Adjusted Put	FX	PUT SEK
A-Com [200905]	4,80	2,60	0,2513 %	39,3 %	0,18577075	3,70796445	3,5386011	2,20	0,00002	0,375	94,06	74,47 %	70,05	1,00	70
A-Com [200912]	1,77	0,90	0,1802 %	39,6 %	0,24901186	3,51094293	3,31322695	0,87	0,00002	0,44444444	215,67	88,78 %	191,48	1,00	191
Active Biotech [200702]	80,86	60,00	3,0310 %	59,5 %	0,22134387	1,23031815	0,9505993	22,61	1,34911	0,90909091	4 905 846,03	61,90 %	3 036 718,69	1,00	3 036 719
Active Biotech [200806]	53,91	40,00	4,2655 %	50,1 %	0,26482213	1,3303775	1,07252799	15,02	0,66229	0,92307692	2 409 714,61	55,00 %	1 325 394,51	1,00	1 325 395
Active Biotech [200906]	38,86	20,00	0,2523 %	48,5 %	0,3083004	2,60595197	2,33687607	18,89	0,01629	0,8	166 957,02	54,74 %	91 393,07	1,00	91 393
Aerocrine [200812]	6,65	4,25	3,5578 %	57,2 %	0,15810277	2,10686866	1,87925952	2,44	0,01039	0,66666667	159 138,75	9,32 %	14 825,20	1,00	14 825
AllTele [200806]	12,38	12,50	4,1967 %	82,0 %	0,17786561	0,16662068	-0,1792376	1,69	1,71510	0,75	2 367 861,22	30,42 %	720 340,22	1,00	720 340
Billerud [200909]	37,23	19,00	0,1802 %	53,7 %	0,24901186	2,6467006	2,37882965	18,25	0,01362	0,5	350 612,32	77,44 %	271 513,49	1,00	271 513
BioPhausia [200808]	3,99	1,35	4,4679 %	52,3 %	0,19367589	4,85789047	4,62771454	2,65	0,00000	0,33333333	8,28	53,85 %	4,46	1,00	4
Boliden [200403]	37,47	17,00	2,4905 %	62,4 %	0,19367589	3,03438109	2,75994885	20,55	0,00375	0,66666667	210 259,59	48,40 %	101 765,64	1,00	101 766
Cision [201004]	6,79	3,40	0,2202 %	66,3 %	0,22529644	2,355281	2,04067918	3,39	0,00735	0,5	274 013,55	49,99 %	136 981,04	1,00	136 981
CTT Systems AB [200712]	39,47	23,00	3,7195 %	64,7 %	0,39920949	1,56177766	1,15301997	17,29	0,48485	0,83333333	730 423,61	52,43 %	382 935,70	1,00	382 936
Cybercom Group [200906]	20,17	10,15	0,5013 %	45,5 %	0,10671937	4,69740167	4,5486934	10,03	0,00000	0,71428571	5,63	47,10 %	2,65	1,00	3
Diamyd Medical B [200910]	133,30	70,00	0,1101 %	62,7 %	0,18181818	2,54475682	2,27753362	63,38	0,06740	0,78125	164 860,33	95,81 %	157 958,03	1,00	157 958
Digital Vision [201006]	0,21	0,10	0,3005 %	93,9 %	0,18181818	2,039033	1,63858947	0,11	0,00074	0,42857143	111 932,55	77,58 %	86 837,56	1,00	86 838
Elanders [201009]	30,28	22,00	0,2804 %	42,8 %	0,38339921	1,34160278	1,07640592	8,68	0,37456	0,5	1 828 770,01	77,00 %	1 408 152,91	1,00	1 408 153
Elanders B [200703]	165,19	110,00	3,3716 %	37,8 %	0,2055336	2,49603023	2,32445797	56,01	0,06061	0,85714286	72 468,75	71,02 %	51 464,58	1,00	51 465
Eniro [200906]	9,24	5,20	0,3005 %	44,8 %	0,19762846	2,98880457	2,78959442	4,04	0,00077	0,25	93 526,53	75,11 %	70 245,11	1,00	70 245
Eniro AB [201012]	6,93	0,52	1,0050 %	79,5 %	0,20158103	7,43533191	7,07824667	6,41	0,00000	0,03225806	0,00	100,00 %	0,00	1,00	0
Eurocine Vaccines [200710]	20,58	16,00	3,6957 %	89,1 %	0,17391304	0,88115128	0,50972375	5,64	0,95807	0,8	1 297 220,73	75,70 %	982 017,17	1,00	982 017
Fingerprint Cards B [200612]	44,69	25,00	2,5346 %	88,0 %	0,31225296	1,44387843	0,95238123	20,79	0,90307	0,5	1 266 319,52	55,64 %	704 519,27	1,00	704 519
Fingerprint Cards B [200812]	4,51	2,20	3,4554 %	80,3 %	0,1027668	2,9339931	2,67668597	2,32	0,00060	0,5	3 650,02	56,10 %	2 047,81	1,00	2 048
Fingerprint Cards B [200910]	5,04	2,50	0,1201 %	90,6 %	0,12648221	2,33846697	2,01628696	2,55	0,00590	0,76923077	89 982,71	93,37 %	84 018,00	1,00	84 018
Getinge B [200803]	152,89	120,00	4,1446 %	21,5 %	0,18181818	2,76939878	2,67769137	33,80	0,01213	0,94117647	144 077,79	82,00 %	118 142,38	1,00	118 142
Geveko B [201003]	57,66	13,00	0,2202 %	31,9 %	0,12648221	13,1746611	13,0610859	44,66	0,00000	0,25	0,00	79,44 %	0,00	1,00	0
Gunnebo [200912]	36,18	16,50	0,2002 %	45,2 %	0,22134387	3,79714481	3,58428717	19,69	0,00014	0,6	2 537,27	43,90 %	1 113,86	1,00	1 114
Haldex [200912]	76,06	23,00	0,1501 %	53,6 %	0,08695652	7,65300727	7,49508459	53,06	0,00000	0,5	0,00	55,82 %	0,00	1,00	0
Hemtex [200905]	17,46	14,00	0,2994 %	55,8 %	0,16996047	1,07744891	0,84735344	3,79	0,32041	0,71428571	2 685 671,45	42,00 %	1 127 982,04	1,00	1 127 982
Hexagon AB [200206]	183,09	115,00	4,3729 %	24,6 %	0,19367589	4,43121036	4,32302523	69,06	0,00002	0,8	58,10	49,68 %	28,86	1,00	29
Hexagon AB [200604]	225,81	155,00	1,9487 %	28,2 %	0,22529644	2,90962502	2,77572098	71,50	0,01644	0,8	229 837,41	3,14 %	7 217,73	1,00	7 218
Hexagon AB [201012]	107,00	74,00	0,2503 %	51,1 %	0,6916996	1,08393435	0,65879584	37,07	3,94493	0,75	260 727 869,51	15,62 %	40 725 693,22	1,00	40 725 693
Husqvarna AB [200903]	37,54	16,00	0,6028 %	43,5 %	0,1541502	5,08550781	4,91476102	21,56	0,00000	0,66666667	28,39	64,21 %	18,23	1,00	18
IBS [200806]	12,25	9,50	4,1967 %	40,4 %	0,23715415	1,44128528	1,24463697	2,93	0,08735	0,66666667	2 434 463,37	91,79 %	2 234 622,73	1,00	2 234 623
Karo Bio AB [200705]	4,28	1,40	3,3148 %	72,6 %	0,16996047	3,89835681	3,59898841	2,88	0,00002	0,4	1 420,59	101,50 %	1 441,85	1,00	1 442
Karo Bio AB [200912]	6,86	4,30	0,1802 %	63,0 %	0,15810277	1,99226891	1,74176248	2,58	0,01628	0,75	472 600,00	96,97 %	458 295,98	1,00	458 296
Karo Bio AB [201012]	17,64	10,50	1,0151 %	63,6 %	0,19367589	2,00196404	1,72225256	7,21	0,04602	0,66666667	1 187 393,94	55,36 %	657 363,06	1,00	657 363
LinkMed [200906]	26,27	12,50	0,4520 %	45,3 %	0,1027668	5,18906659	5,04381654	13,78	0,00000	0,54545455	0,30	66,09 %	0,20	1,00	0
Meda AB [200503]	275,29	160,00	2,0150 %	33,0 %	0,19367589	3,83834473	3,69320484	115,92	0,00060	0,71428571	1 498,36	47,60 %	713,22	1,00	713
Meda AB [200511]	136,71	60,00	1,5113 %	46,4 %	0,19367589	4,15095051	3,94682904	76,89	0,00011	0,6	2 647,54	2,50 %	66,19	1,00	66
Meda AB [200811]	49,79	35,00	3,4502 %	41,8 %	0,16600791	2,18604646	2,01556549	15,03	0,04567	0,85714286	1 690 074,96	74,08 %	1 251 995,31	1,00	1 251 995
Medivir B [201005]	127,31	62,00	0,2303 %	34,7 %	0,24110672	4,30614422	4,13555505	65,34	0,00004	0,8	166,30	65,51 %	108,95	1,00	109
Micronic Mydata AB [201005]	14,80	7,50	0,2303 %	56,7 %	0,22529644	2,6612106	2,39195339	7,31	0,00519	0,66666667	113 009,89	32,68 %	36 932,66	1,00	36 933
Midelfart Sonesson [200701]	24,30	13,00	2,9425 %	35,0 %	0,30039526	3,40471764	3,21296423	11,42	0,00042	0,66666667	4 921,23	53,83 %	2 649,02	1,00	2 649
Midelfart Sonesson [200912]	8,00	3,50	0,1802 %	36,0 %	0,23715415	4,80328031	4,62790222	4,50	0,00000	0,6	4,77	54,20 %	2,59	1,00	3
Morphic Technologies B [200810]	10,16	2,40	4,5557 %	62,7 %	0,17391304	5,67599141	5,41432268	7,78	0,00000	0,5	0,26	76,79 %	0,20	1,00	0
Nordea [200904]	42,52	20,75	0,5043 %	26,3 %	0,09486166	8,91333044	8,83240857	21,78	0,00000	0,64516129	0,00	63,76 %	0,00	1,00	0
Nordic Mines [200806]	29,64	26,00	4,1925 %	31,7 %	0,19367589	1,0683874	0,92890016	4,18	0,32167	0,77777778	1 293 815,98	64,43 %	833 669,67	1,00	833 670
Nordic Mines [201002]	31,86	20,00	0,1802 %	56,2 %	0,18181818	2,06476745	1,82528303	11,92	0,05906	0,90909091	124 937,19	83,47 %	104 288,36	1,00	104 288
NOTE [201005]	17,17	4,50	0,2002 %	48,3 %	0,24505929	5,71784894	5,47853376	12,67	0,00000	0,33333333	0,02	67,24 %	0,02	1,00	0
Opcon AB [200810]	33,19	18,00	4,6342 %	54,0 %	0,09486166	3,7923049	3,62612819	15,27	0,00010	0,8	329,10	47,95 %	157,79	1,00	158

Company	S	K	r	Volatility	T-t	d1	d2	Call	Put	Lambda	Tot Put	Underwriting ratio	Adjusted Put	FX	PUT SEK
PA Resources [201006]	16,04	3,75	0,2904 %	72,3 %	0,16205534	5,13840155	4,84716787	12,30	0,00000	0,26315789	15,36	97,36 %	14,96	1,00	15
Precise Biometrics [200612]	5,36	3,50	2,8087 %	88,6 %	0,18181818	1,33219988	0,95450302	1,98	0,10152	0,75	1 850 619,77	91,79 %	1 698 661,26	1,00	1 698 661
RnB Retail Brands [200809]	13,81	6,15	4,5474 %	63,4 %	0,1027668	4,10084396	3,89744614	7,69	0,00001	0,5	380,97	62,19 %	236,94	1,00	237
RnB Retail Brands [200910]	6,22	6,00	0,1201 %	77,0 %	0,11857708	0,26746257	0,00246736	0,76	0,54048	0,875	7 712 457,56	38,36 %	2 958 498,72	1,00	2 958 499
Rottneros [200912]	2,50	0,25	0,1802 %	42,7 %	0,15810277	13,6387053	13,468828	2,25	0,00000	0,16666667	0,00	76,50 %	0,00	1,00	0
Rörvik Timber B [201004]	6,53	0,50	0,2202 %	64,3 %	0,2687747	7,87267101	7,53907886	6,03	0,00000	0,02702703	0,00	100,00 %	0,00	1,00	0
SAS [200904]	20,70	2,63	0,5023 %	55,5 %	0,09881423	11,9094513	11,7348865	18,07	0,00000	0,06666667	0,00	42,44 %	0,00	1,00	0
SAS [201004]	2,66	0,67	0,2503 %	65,0 %	0,09486166	6,99433202	6,79425978	1,99	0,00000	0,25	0,00	42,44 %	0,00	1,00	0
SEB A [200903]	37,62	10,00	1,1890 %	38,9 %	0,19762846	7,75729502	7,5842756	27,64	0,00000	0,3125	0,00	49,41 %	0,00	1,00	0
Swedbank A [200812]	58,72	48,00	3,3985 %	24,6 %	0,19762846	1,95948787	1,85009991	11,11	0,06312	0,66666667	10 843 178,69	59,18 %	6 417 446,61	1,00	6 417 447
Swedbank A [200910]	78,39	39,00	0,1201 %	53,9 %	0,09486166	4,29198646	4,12610759	39,39	0,00003	0,66666667	6 531,62	72,32 %	4 723,47	1,00	4 723
Swedish Orphan Biovitrum [200912]	56,04	15,00	0,2002 %	28,0 %	0,22134387	10,0671209	9,93528886	41,05	0,00000	0,33333333	0,00	79,37 %	0,00	1,00	0
SwitchCore [201002]	0,03	0,02	0,1501 %	83,2 %	0,30039526	1,44527896	0,9890514	0,02	0,00064	0,16666667	330 666,92	100,00 %	330 666,92	1,00	330 667
TradeDoubler [200912]	56,58	25,00	0,2002 %	58,2 %	0,17391304	3,4858983	3,24300819	31,59	0,00090	0,66666667	8 558,44	33,74 %	2 887,74	1,00	2 888
Trelleborg [200905]	29,35	12,00	0,2553 %	47,8 %	0,22924901	4,02295796	3,79398767	17,36	0,00005	0,33333333	2 747,07	65,67 %	1 803,87	1,00	1 804
ÅF Group [200608]	135,07	93,00	2,2448 %	26,5 %	0,22529644	3,07490736	2,94932633	42,55	0,00513	0,8	13 268,26	77,11 %	10 231,77	1,00	10 232
AGR Group [200909]	6,93	3,20	1,6293 %	78,6 %	0,09486166	3,31824231	3,07608267	3,73	0,00021	0,56562366	6 556,12	100,00 %	6 556,12	1,19	7 831
Aker Seafoods [200909]	7,12	5,00	1,4561 %	57,8 %	0,14229249	1,73757006	1,519438	2,16	0,02812	0,57471264	581 717,13	88,89 %	517 081,89	1,17	607 054
Apptix [200803]	1,98	0,50	1,4250 %	59,6 %	0,29644269	4,41877909	4,09421822	1,48	0,00000	0,31229412	12,39	100,00 %	12,39	1,18	15
Apptix [200910]	1,60	1,00	5,4263 %	66,1 %	0,17786561	1,85568916	1,57679827	0,61	0,00612	0,76405985	140 337,34	100,00 %	140 337,34	1,19	167 001
DnB NOR [200912]	63,09	47,30	1,5983 %	40,9 %	0,30434783	1,41116343	1,1855363	16,58	0,55930	0,81818182	135 518 373,31	66,00 %	89 442 126,23	1,19	106 033 641
EDB Ergogroup [201012]	17,86	9,45	2,2215 %	42,6 %	0,16205534	3,81542789	3,64376618	8,45	0,00005	0,64516129	3 111,11	32,79 %	1 020,06	1,14	1 165
Electromagnetic Geoservices [200809]	28,45	15,14	6,0821 %	79,5 %	0,22134387	1,91020308	1,53627776	13,65	0,13144	0,81886669	1 777 315,40	100,00 %	1 777 315,40	1,18	2 097 232
Green Reefers [200701]	4,43	4,39	3,7272 %	46,5 %	0,15019763	0,16890127	-0,0111446	0,35	0,28514	0,83333333	6 665 397,02	100,00 %	6 665 397,01	1,12	7 448 581
Hurtigruten [200710]	48,92	38,00	4,9032 %	25,5 %	0,14624506	2,71384478	2,61639887	11,19	0,00497	0,71225071	27 926,81	100,00 %	27 926,81	1,18	33 023
Kverneland [200512]	79,03	66,00	2,3060 %	32,5 %	0,19367589	1,36381889	1,22092824	13,80	0,47561	0,80362131	1 158 222,40	100,00 %	1 158 222,40	1,22	1 415 927
Navamedic [200709]	46,48	44,90	4,8639 %	51,0 %	0,14624506	0,31131901	0,11609455	4,57	2,67112	0,87022738	2 070 806,40	100,00 %	2 070 806,39	1,17	2 430 091
NorDiag [200807]	2,88	2,00	5,9736 %	50,7 %	0,14229249	2,04151446	1,8503033	0,90	0,00446	0,60518034	40 805,86	100,00 %	40 805,86	1,17	47 865
Norsk Hydro [201007]	45,68	26,30	2,2628 %	44,1 %	0,2687747	2,55390712	2,32511758	19,56	0,01898	0,76666667	5 544 136,01	56,59 %	3 137 622,64	1,23	3 848 294
Norske Skog [200510]	108,23	70,00	2,1152 %	32,2 %	0,14624506	3,62263522	3,49933802	38,45	0,00049	0,7	19 473,39	100,00 %	19 473,39	1,19	23 154
Norwegian Air Shuttle [200808]	49,09	34,80	6,1556 %	64,0 %	0,19367589	1,40351923	1,1216682	15,26	0,56667	0,64479937	4 199 888,05	100,00 %	4 199 888,05	1,18	4 951 668
Norwegian Property [200807]	33,53	26,00	5,9354 %	38,1 %	0,16205534	1,79757511	1,6441771	7,86	0,07816	0,52312828	3 931 356,20	100,00 %	3 931 356,20	1,18	4 642 932
Oceanteam [200909]	1,96	1,85	1,5621 %	95,7 %	0,16600791	0,34907969	-0,0406958	0,35	0,24024	0,34083258	2 411 505,32	100,00 %	2 411 505,33	1,18	2 841 959
PCI Biotech Holding [201006]	40,43	40,00	2,1454 %	97,8 %	0,19367589	0,24976351	-0,180696	7,14	6,54477	0,70651406	10 403 934,26	100,00 %	10 403 934,26	1,22	12 640 780
PhotoCure [200602]	48,37	46,00	2,2751 %	60,4 %	0,19367589	0,33879909	0,07288284	6,37	3,79661	0,8	13 352 075,12	99,89 %	13 337 658,16	1,18	15 725 099
Renewable Energy Corporation [200907]	58,10	26,50	1,3428 %	80,2 %	0,08300395	3,51688253	3,28577998	31,63	0,00078	0,74358974	98 445,15	100,00 %	98 445,15	1,24	121 777
Renewable Energy Corporation [201005]	24,85	12,10	1,9777 %	77,0 %	0,20158103	2,26467716	1,91878411	12,83	0,03914	0,66666667	8 673 291,03	100,00 %	8 673 291,03	1,21	10 520 702
Repant [200706]	8,77	6,00	4,4782 %	49,0 %	0,18577075	1,94178113	1,73045172	2,84	0,01981	0,45054949	35 693,21	100,00 %	35 693,21	1,13	40 155
Repant [200806]	2,29	1,50	5,1997 %	65,3 %	0,32806324	1,36306669	0,98910163	0,85	0,04001	0,5	435 512,86	100,00 %	435 512,86	1,17	508 679
Repant [200910]	1,00	0,65	1,6353 %	110,2 %	0,16600791	1,19787931	0,7490673	0,39	0,03121	0,80743323	1 726 785,59	67,36 %	1 163 233,66	1,19	1 385 993
Schibsted [201007]	128,30	34,00	2,2994 %	53,3 %	0,08300395	8,73751926	8,58396039	94,37	0,00000	0,625	0,00	100,00 %	0,00	1,22	0
Siem Offshore [200706]	14,42	13,00	4,6582 %	37,3 %	0,04743083	1,34374191	1,26248738	1,50	0,05023	0,7518797	2 113 990,97	100,00 %	2 113 990,97	1,15	2 438 489
Storebrand [200712]	78,83	45,00	5,2199 %	29,1 %	0,18577075	4,61610994	4,49086213	34,26	0,00000	0,55	435,15	100,00 %	435,15	1,19	517
TTS Marine [200907]	13,72	6,00	1,4777 %	60,7 %	0,19367589	3,24166847	2,97461181	7,73	0,00062	0,38151879	9 979,23	100,00 %	9 979,23	1,18	11 820
Bang & Olufsen B [200905]	84,79	19,00	2,0712 %	40,5 %	0,08300395	12,8879712	12,7712523	65,82	0,00000	0,33333333	0,00	74,30 %	0,00	1,46	0
Brøndby IF B [200712]	85,32	60,00	4,7284 %	24,3 %	0,09486166	4,79897171	4,72408787	25,59	0,00000	0,66666667	1,17	100,00 %	1,17	1,24	1
Carlsberg B [200806]	660,24	400,00	4,9695 %	19,5 %	0,1027668	8,14536932	8,08297811	262,28	0,00000	0,5	0,00	100,00 %	0,00	1,25	0
H+H International [200912]	227,98	54,00	1,0555 %	44,1 %	0,19367589	7,53428781	7,34035707	174,09	0,00000	0,11111111	0,00	82,78 %	0,00	1,40	0
NeuroSearch [200610]	170,65	100,00	3,5206 %	57,1 %	0,09881423	3,08595903	2,90642236	71,01	0,00904	0,66666667	23 921,83	100,00 %	23 921,83	1,24	29 687
TK Development [201008]	35,07	15,00	0,7025 %	66,3 %	0,49407115	2,06262627	1,59648818	20,26	0,13848	0,66666667	1 294 472,10	72,41 %	937 292,40	1,29	1 212 856
Vestas Wind Systems [200406]	86,34	50,00	2,1733 %	63,4 %	0,11067194	2,70654187	2,49560404	36,48	0,02010	0,75	659 224,47	100,00 %	659 224,47	1,23	812 494

Appendix 6: Risk days on fee

Risk Days on Fee								
SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0,0434136							
R Square	0,001884741							
Adjusted R Square	-0,008197232							
Standard Error	0,023015882							
Observations	101							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	9,90288E-05	9,90288E-05	0,186941664	0,666414671			
Residual	99	0,052443353	0,000529731					
Total	100	0,052542382						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	0,038000537	0,0055026	6,905923768	4,84558E-10	0,027082185	0,048918889	0,027082185	0,048918889
X Variable 1	-4,44362E-05	0,000102774	-0,43236751	0,666414671	-0,000248363	0,00015949	-0,000248363	0,00015949

Appendix 7: Pre-Binding dummy regressed on fee

Pre-Binding dummie on fee								
Regression Statistics								
Multiple R	0,306080841							
R Square	0,093685481							
Adjusted R Square	0,084530789							
Standard Error	0,021931925							
Observations	101							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0,004922458	0,004922458	10,23360261	0,001852874			
Residual	99	0,047619924	0,000481009					
Total	100	0,052542382						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	0,026456529	0,003655321	7,237813182	9,8943E-11	0,01920358	0,033709479	0,01920358	0,033709479
Pre-Binding	0,014576182	0,00455648	3,199000251	0,001852874	0,005535137	0,023617227	0,005535137	0,023617227

Appendix 8: Full volatility table for issues with 5 years of data.

Company	Daily				Weekly					Monthly				
	100 D	200 D	300 D	</= 5Y	52 W	104 W	156 W	208 W	</= 5Y	12 M	24 M	36 M	48 M	</= 5Y
A-Com	110,8 %	94,1 %	80,5 %	55,4 %	80,0 %	62,4 %	53,9 %	49,0 %	47,7 %	60,6 %	46,2 %	41,2 %	41,1 %	39,3 %
A-Com	39,9 %	72,2 %	86,4 %	56,2 %	62,1 %	58,6 %	51,4 %	48,6 %	45,6 %	37,6 %	42,7 %	38,1 %	40,0 %	39,6 %
Active Biotech	62,2 %	53,3 %	46,6 %	59,4 %	55,1 %	45,6 %	46,5 %	56,1 %	65,6 %	31,7 %	34,7 %	44,1 %	59,2 %	59,5 %
Active Biotech	37,4 %	35,0 %	33,2 %	48,5 %	31,5 %	43,4 %	41,9 %	53,6 %	55,3 %	28,7 %	29,0 %	33,0 %	37,2 %	50,1 %
Active Biotech	51,4 %	54,4 %	51,7 %	43,0 %	49,0 %	40,1 %	45,5 %	43,0 %	42,7 %	61,9 %	45,5 %	54,5 %	50,9 %	48,5 %
Billerud	77,9 %	72,6 %	67,8 %	41,9 %	90,0 %	68,5 %	57,5 %	52,3 %	48,9 %	103,4 %	76,9 %	63,9 %	58,5 %	53,7 %
BioPhausia	36,9 %	47,2 %	50,2 %	62,6 %	52,8 %	52,3 %	50,2 %	55,4 %	60,2 %	27,9 %	47,6 %	41,9 %	52,7 %	52,3 %
Boliden	36,0 %	38,9 %	41,5 %	55,1 %	45,8 %	54,9 %	68,4 %	65,0 %	61,4 %	33,9 %	67,9 %	70,2 %	64,8 %	62,4 %
Cision	39,9 %	38,7 %	54,3 %	59,2 %	55,2 %	100,9 %	84,1 %	75,7 %	69,1 %	51,9 %	94,9 %	79,8 %	71,4 %	66,3 %
Cybercom Group	70,4 %	75,9 %	66,6 %	45,9 %	64,4 %	56,4 %	50,1 %	45,6 %	42,6 %	64,0 %	59,4 %	54,5 %	48,9 %	45,5 %
Diamyd Medical	47,9 %	54,5 %	52,8 %	58,7 %	66,3 %	56,3 %	66,0 %	63,8 %	59,1 %	39,3 %	43,4 %	72,3 %	68,3 %	62,7 %
Digital Vision	54,1 %	68,3 %	70,2 %	86,7 %	54,5 %	114,6 %	98,8 %	91,1 %	84,0 %	62,0 %	136,8 %	115,6 %	103,4 %	93,9 %
Elanders	43,1 %	39,1 %	50,4 %	44,3 %	37,1 %	66,1 %	55,4 %	49,9 %	46,0 %	38,3 %	57,9 %	49,0 %	46,1 %	42,8 %
Elanders	25,2 %	29,6 %	28,0 %	37,3 %	26,9 %	27,4 %	28,2 %	30,0 %	36,5 %	19,0 %	23,6 %	23,7 %	27,4 %	37,8 %
Eniro	98,9 %	83,3 %	74,4 %	42,9 %	84,6 %	64,3 %	54,7 %	48,8 %	44,8 %	73,6 %	57,7 %	51,5 %	47,4 %	44,8 %
Eniro	110,5 %	98,6 %	83,0 %	65,1 %	101,3 %	105,1 %	91,0 %	79,6 %	72,3 %	87,0 %	117,4 %	99,3 %	86,8 %	79,5 %
Fingerprint Card	66,0 %	96,1 %	92,9 %	86,3 %	116,5 %	96,0 %	91,2 %	90,5 %	88,3 %	119,9 %	87,9 %	97,5 %	92,7 %	90,6 %
Fingerprint Card	74,1 %	60,5 %	71,7 %	80,3 %	86,5 %	83,9 %	84,8 %	85,4 %	81,9 %	50,5 %	75,3 %	84,6 %	86,7 %	80,3 %
Fingerprint Card	79,8 %	70,1 %	74,7 %	87,7 %	89,8 %	87,5 %	83,7 %	82,6 %	83,4 %	84,9 %	86,9 %	82,8 %	84,9 %	88,0 %
Getinge	28,3 %	25,5 %	26,3 %	25,7 %	23,3 %	22,1 %	20,5 %	20,4 %	22,1 %	18,9 %	21,4 %	20,1 %	20,3 %	21,5 %
Geveko	33,7 %	31,7 %	37,2 %	35,7 %	28,1 %	33,2 %	31,6 %	30,0 %	28,0 %	32,0 %	36,2 %	36,0 %	34,5 %	31,9 %
Gunnebo	40,8 %	45,8 %	58,2 %	39,1 %	55,4 %	56,9 %	49,3 %	44,2 %	41,8 %	78,5 %	63,7 %	54,1 %	49,0 %	45,2 %
Haldex	41,0 %	59,0 %	65,3 %	40,7 %	57,2 %	64,1 %	55,2 %	50,6 %	45,9 %	77,0 %	76,6 %	64,2 %	58,1 %	53,6 %
Hexagon	37,3 %	34,6 %	43,6 %	48,6 %	36,4 %	60,5 %	55,7 %	50,6 %	48,4 %	21,6 %	68,3 %	57,8 %	52,5 %	51,1 %
Hexagon	26,7 %	28,5 %	27,1 %	28,9 %	28,7 %	28,3 %	25,9 %	29,2 %	28,4 %	17,6 %	24,5 %	22,7 %	29,5 %	28,2 %
Hexagon	25,4 %	33,4 %	32,4 %	30,3 %	30,3 %	25,7 %	25,6 %	29,8 %	28,8 %	31,0 %	23,6 %	22,0 %	25,4 %	24,6 %
Karo Bio	58,5 %	72,0 %	65,5 %	57,1 %	69,8 %	62,0 %	59,7 %	61,4 %	58,8 %	69,4 %	60,4 %	60,4 %	64,4 %	63,6 %
Karo Bio	39,1 %	55,1 %	58,2 %	54,9 %	53,1 %	54,2 %	58,4 %	55,9 %	56,1 %	48,9 %	56,4 %	64,0 %	64,0 %	63,0 %
Karo Bio	43,2 %	42,4 %	42,0 %	56,5 %	42,6 %	52,3 %	54,9 %	59,5 %	62,4 %	53,7 %	58,7 %	60,5 %	69,9 %	72,6 %
Meda	55,5 %	53,4 %	50,3 %	40,5 %	50,7 %	45,4 %	41,2 %	44,9 %	42,5 %	53,8 %	47,6 %	41,4 %	44,8 %	41,8 %
Meda	31,3 %	31,1 %	32,2 %	47,8 %	32,8 %	26,9 %	34,3 %	41,6 %	41,6 %	28,5 %	25,8 %	32,4 %	33,9 %	33,0 %
Meda	56,1 %	46,6 %	41,2 %	45,3 %	53,2 %	43,4 %	38,8 %	40,2 %	41,7 %	49,4 %	42,5 %	42,6 %	46,5 %	46,4 %
Medivir	41,6 %	39,3 %	38,9 %	38,5 %	35,3 %	33,7 %	33,3 %	39,2 %	38,7 %	30,7 %	34,9 %	32,3 %	36,0 %	34,7 %
Micronic Mydata	53,3 %	45,4 %	52,9 %	53,1 %	60,7 %	62,7 %	57,5 %	58,1 %	53,7 %	65,0 %	70,4 %	60,6 %	60,3 %	56,7 %
Midsona	29,9 %	33,7 %	31,9 %	45,3 %	30,7 %	33,5 %	33,2 %	35,1 %	35,6 %	36,8 %	34,1 %	37,8 %	34,2 %	35,0 %
Midsona	46,5 %	53,4 %	66,5 %	45,3 %	51,5 %	45,1 %	44,8 %	41,9 %	41,1 %	49,7 %	39,1 %	38,5 %	36,9 %	36,0 %
Nordea	76,7 %	65,3 %	57,6 %	33,2 %	51,5 %	41,2 %	35,7 %	32,1 %	29,9 %	41,6 %	33,2 %	30,9 %	28,0 %	26,3 %
NOTE	55,0 %	50,5 %	60,0 %	42,0 %	56,4 %	57,0 %	51,0 %	46,1 %	44,2 %	58,8 %	58,6 %	53,2 %	47,6 %	48,3 %

Company	Daily 100 D	200 D	300 D	</= 5Y	Weekly 52 W	104 W	156 W	208 W	</= 5Y	Monthly 12 M	24 M	36 M	48 M	</= 5Y
Opcon	49,7 %	47,7 %	45,4 %	51,7 %	46,0 %	43,3 %	51,6 %	51,8 %	51,6 %	37,2 %	39,0 %	56,9 %	54,2 %	54,0 %
PA Resources	43,3 %	40,4 %	50,5 %	63,7 %	50,2 %	75,3 %	66,4 %	62,5 %	66,5 %	54,3 %	79,9 %	70,0 %	63,8 %	72,3 %
Precise Biometri	62,5 %	55,8 %	52,6 %	86,4 %	58,1 %	62,9 %	60,9 %	69,6 %	76,5 %	51,2 %	53,8 %	57,5 %	83,8 %	88,6 %
RnB Retail Brand	75,7 %	85,0 %	88,6 %	60,6 %	104,1 %	97,7 %	82,5 %	74,4 %	71,4 %	113,9 %	102,3 %	88,0 %	78,6 %	77,0 %
RnB Retail Brand	65,4 %	76,0 %	67,0 %	51,9 %	81,8 %	63,6 %	56,9 %	55,9 %	54,3 %	95,6 %	76,7 %	66,3 %	65,2 %	63,4 %
Rottneros	63,0 %	80,7 %	81,0 %	48,5 %	69,5 %	66,5 %	56,9 %	51,5 %	47,0 %	59,7 %	59,8 %	49,9 %	46,7 %	42,7 %
Rörvik Timber	58,3 %	76,9 %	103,4 %	65,8 %	100,7 %	90,4 %	80,3 %	73,1 %	67,1 %	79,5 %	82,4 %	77,1 %	70,1 %	64,3 %
SAS	82,8 %	92,3 %	80,8 %	49,6 %	86,5 %	69,7 %	59,8 %	54,6 %	51,0 %	94,2 %	76,1 %	66,4 %	59,4 %	55,5 %
SAS	64,6 %	55,3 %	73,9 %	58,0 %	66,8 %	87,3 %	75,1 %	67,6 %	61,5 %	74,2 %	89,2 %	76,8 %	70,0 %	65,0 %
SEB	112,7 %	86,8 %	75,3 %	42,1 %	83,8 %	62,9 %	53,6 %	47,2 %	43,0 %	73,9 %	55,8 %	47,8 %	42,5 %	38,9 %
Swedbank	85,9 %	66,6 %	58,3 %	33,9 %	40,1 %	34,0 %	31,7 %	28,4 %	26,1 %	38,0 %	32,1 %	29,1 %	26,5 %	24,6 %
Swedbank	75,2 %	84,4 %	90,0 %	49,7 %	102,5 %	77,7 %	64,8 %	57,2 %	51,6 %	107,5 %	80,4 %	66,9 %	59,2 %	53,9 %
SwitchCore	243,0 %	267,1 %	229,8 %	141,8 %	144,7 %	116,2 %	121,3 %	108,4 %	99,8 %	107,5 %	84,4 %	96,6 %	85,5 %	83,2 %
Trelleborg	76,5 %	70,5 %	61,8 %	39,0 %	74,8 %	59,6 %	53,2 %	48,1 %	44,2 %	83,5 %	62,7 %	56,6 %	51,3 %	47,8 %
ÅF Group	40,6 %	32,1 %	30,0 %	29,6 %	31,5 %	25,8 %	26,0 %	25,6 %	25,1 %	28,1 %	25,1 %	25,6 %	27,0 %	26,5 %
CTT Systems	34,2 %	57,7 %	53,6 %	81,9 %	44,6 %	50,8 %	78,5 %	71,0 %	73,0 %	38,5 %	75,2 %	65,7 %	61,8 %	64,7 %
IBS	36,4 %	39,9 %	35,7 %	39,2 %	36,3 %	39,8 %	34,8 %	41,9 %	43,6 %	29,8 %	34,5 %	31,9 %	37,3 %	40,4 %
Aker Seafoods	88,7 %	77,2 %	78,7 %	55,2 %	96,7 %	73,3 %	65,2 %	59,5 %	58,8 %	101,4 %	73,7 %	64,5 %	57,7 %	57,8 %
Apptix	47,1 %	84,8 %	89,3 %	68,3 %	90,2 %	84,4 %	71,3 %	68,4 %	65,8 %	66,7 %	74,9 %	65,5 %	65,5 %	66,1 %
Apptix	83,4 %	65,4 %	58,6 %	59,0 %	70,1 %	57,5 %	59,2 %	58,7 %	62,6 %	63,5 %	53,2 %	53,6 %	53,8 %	59,6 %
DnB NOR	56,4 %	76,6 %	87,9 %	47,3 %	97,3 %	70,4 %	58,4 %	51,4 %	46,6 %	85,2 %	60,4 %	50,0 %	44,7 %	40,9 %
Green Reefers	32,2 %	35,3 %	35,5 %	64,1 %	23,9 %	31,4 %	48,1 %	55,3 %	58,1 %	27,6 %	31,3 %	41,5 %	48,6 %	46,5 %
Hurtigruten	30,5 %	34,6 %	38,1 %	36,1 %	31,9 %	31,5 %	30,7 %	29,1 %	28,7 %	27,9 %	26,1 %	26,2 %	25,8 %	25,5 %
Kverneland	31,8 %	27,7 %	30,4 %	33,4 %	21,7 %	24,7 %	25,9 %	28,2 %	30,6 %	18,8 %	23,5 %	22,9 %	27,5 %	32,5 %
Norsk Hydro	31,9 %	35,6 %	43,5 %	47,8 %	39,7 %	53,8 %	50,4 %	48,4 %	44,9 %	37,6 %	59,2 %	49,5 %	46,4 %	44,1 %
Norske Skog	28,2 %	25,6 %	24,1 %	31,8 %	25,9 %	26,4 %	30,8 %	31,4 %	32,8 %	30,3 %	29,3 %	30,3 %	32,4 %	32,2 %
Norwegian Air S	46,7 %	46,7 %	41,8 %	47,9 %	49,1 %	42,1 %	49,2 %	51,5 %	54,4 %	49,5 %	42,4 %	52,5 %	56,3 %	64,0 %
PhotoCure	37,7 %	35,3 %	38,6 %	55,1 %	33,5 %	34,4 %	44,1 %	51,9 %	52,9 %	35,7 %	39,9 %	52,0 %	62,2 %	60,4 %
Schibsted	42,5 %	43,6 %	53,6 %	47,3 %	44,4 %	62,3 %	55,2 %	49,5 %	45,5 %	37,7 %	72,9 %	65,3 %	58,2 %	53,3 %
Storebrand	30,9 %	29,8 %	28,5 %	31,2 %	27,8 %	28,3 %	28,6 %	27,0 %	29,3 %	23,8 %	27,0 %	26,6 %	26,8 %	29,1 %
TTS Marine	56,1 %	79,8 %	68,3 %	46,0 %	69,8 %	61,4 %	56,7 %	51,7 %	49,4 %	100,5 %	82,1 %	72,7 %	64,5 %	60,7 %
EDB Ergogroup	50,1 %	50,2 %	48,2 %	43,9 %	38,9 %	49,5 %	51,7 %	45,9 %	42,5 %	22,6 %	48,9 %	51,4 %	45,4 %	42,6 %
Bang & Olufsen	87,1 %	76,6 %	67,1 %	42,1 %	72,4 %	60,8 %	52,0 %	47,6 %	44,0 %	53,7 %	50,5 %	45,3 %	43,9 %	40,5 %
Brøndby IF	37,8 %	32,8 %	30,1 %	36,6 %	29,8 %	29,9 %	28,2 %	28,0 %	29,3 %	25,2 %	27,5 %	25,3 %	24,4 %	24,3 %
Carlsberg	36,4 %	31,9 %	29,2 %	23,3 %	26,3 %	22,7 %	21,4 %	20,9 %	20,7 %	27,1 %	23,3 %	20,8 %	19,7 %	19,5 %
H+H Internation	94,5 %	84,2 %	85,5 %	50,7 %	88,2 %	77,8 %	66,8 %	58,7 %	54,3 %	64,2 %	53,1 %	51,9 %	46,9 %	44,1 %
NeuroSearch	36,1 %	30,7 %	64,3 %	54,3 %	26,9 %	46,4 %	41,0 %	51,6 %	55,7 %	25,2 %	51,4 %	49,5 %	55,7 %	57,1 %
TK Development	43,1 %	40,6 %	50,8 %	57,1 %	42,1 %	74,3 %	65,0 %	61,1 %	59,2 %	53,5 %	80,1 %	70,1 %	64,5 %	66,3 %
Vestas Wind Sys	35,7 %	54,6 %	55,2 %	61,4 %	57,9 %	66,4 %	64,7 %	65,3 %	64,6 %	64,0 %	68,6 %	65,5 %	60,3 %	63,4 %