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BI Norwegian Business School – Thesis

- The cost of raising equity for firms listed on Oslo stock exchange -

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We hereby declare that this thesis is only our own work:

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2. Abstract

This thesis examines the direct cost of raising equity for firms listed on Oslo stock exchange in the period 2006-2011. US research indicates a cost of raising equity about 4-5% of the total amount issued. According to our panel data analysis the Norwegian cost is 5,62 %. This is significantly lower than the 14,6% earlier studies made on Norwegian initial public offerings in the period 1998-2008.

We do not find a significant time variable that can provide proof of changes in the direct cost level in the period. We do however find support for variations in the cost level, caused by changes in the financial market in Norway. Our findings indicate that the average direct costs falls with 0,00861 percentage points per 100 points the OSEBX increases. Finally we find that the relative cost level decrease with size of the issue. The data indicates a reduction of 0,366 percentage points per billion NOK raised in the issue.

We also find evidence that foreign financial institutions are significantly more expensive managers than the Norwegian ones, in the period 2006-2011. Norwegian specialists cannot charge a higher fee than their competitors in the Norwegian equity market.

3. Introduction

3.1 Motivation

While listed on a stock exchange, a firm incur *running costs* to the exchange, increased demand for documentation, reporting etc. From time to time the firm may need to increase the level of equity through a *seasoned equity offering* (SEO). This process has similarities to an *initial public offering* (IPO), which is the process of taking a firm public and listed for the first time, but the aspect of costs related to a SEO is far less documented. We are not aware of any research on this topic in Norway to date. The reason for reduced focus on the costs for SEOs compared to IPOs may be because the costs seem to fall between two chairs, the firm and the stockholders'. Who carries the actual cost of raising equity through a SEO? In the end the firm pays the fees associated with the issue, and new shares issued with a discount is at the expense of both the firm and the current stockholders. The higher the costs, the lower the rate of the return will be. Hence, we argue that the respective investors incur these costs.

When raising capital for an investment through stock issues, it is essential that the costs of the stock issues are restricted and at an acceptable level, since investments may be discarded if the return does not satisfy the level of the expected return (Miller & Modigliani, 1958). High costs obviously reduce the revenue of the firm, and therefore limit the firm's ability to act in the best interest of the investors, namely to maximize the firm's value and thereby the shareholders return.

This thesis analyses the direct costs of the SEOs that have taken place at Oslo Børs between 2006 and 2011. This implicate that the IPO of the mentioned firms has already taken place. The places where IPOs are mentioned, in theory as well as in the discussion, it is because we find concepts and arguments transferable to SEOs.

3.2 *The research problem*

According to Miller and Modigliani (1958) there is no difference in investor's preferences of funding between debt and equity. We have therefore chosen to focus on equity raised through stock issues, as this is an alternative available for all investors to participate in. The minimum investment amount for a Norwegian corporate bond is normally one million Norwegian kroner, and therefore unavailable to many investors. The investment amount when raising capital through equity is normally proportional to the stake already held. It is therefore more likely that the investor is able and willing to participate in the issue. A study of the cost of raising equity should therefore be of interest to a larger audience than a study of increasing funding through debt.

As the costs of an IPO is proved to be substantial, it should be of interest for both firms and investors to know the level of the costs in an SEO as the costs is at the expense of both the firm and in the end the investors. Also, the fact that the SEO market is substantially larger than the market for IPOs (Bortletti et al., 2008), there can be considerable fees charged by the managers that goes under the radar of the investors. Due to limitations of data and scope we cannot assess all costs. We will focus on the direct costs charged by the managers, as the variable costs are too many and difficult to measure exactly within the scope of a master's thesis. Our goal for this thesis and our main research question to answer is:

How high are the direct costs of a stock issue for a firm listed on the Norwegian stock exchange?

3.3 *Outline of the thesis*

The thesis is organised as follows; first we present a literature review where we lay down the theoretical context. Among other things we clarify some motivations firms have to carry out an SEO and we shed light upon the roles in the credit market. This is followed by a thorough review of the research question and our corresponding hypotheses. Chapter six describes our collected data, before we in the methodology chapter explain the concept of panel data and *the two-sided mean compression test*. Finally, our hypotheses, the development of the actual

costs and the shortcomings to this study are discussed, before we make some conclusions in chapter nine.

4. Literature review

In this section we would like to present a review of relevant literature on the topic. We start with an overview of fundamental economic theory in order to create the necessary context for the thesis. When the context has been established we present a literature review of equity issues and the role of managers.

4.1 *Equity offerings*

To lay a theoretical fundament of this thesis we believe it is relevant to shed light upon what an equity offering is and, more technically, what motivations a firm could have to demand supplementary equity.

Most firms raise equity from a small number of investors. If the investors want to sell their stakes, they generally find the market illiquid. Later on, as the company matures and needs supplementary equity capital, it may become desirable to go public by selling shares to a larger number of investors, i.e. an IPO (Ibbotson and Ritter, 1995). In order to complete such an event, the company need to hire auditing firms, law firms and investment banks to underwrite the offer. Hence, the IPO produce a set of costs. In return, the company raises the funds and improves the liquidity of the stock.

After the IPO, all subsequent issuance of shares by the company are referred to as SEOs. The SEOs can either be used to raise fresh equity or to reduce the positions of the existing shareholders (Geddes, 2005). If the SEO is used to raise fresh capital, the proceeds will benefit the issuing company. In the other case, where the stockholders want to reduce their positions, the proceeds of the sale benefit the shareholders.

SEOs and IPOs follow comparable processes. There are however significant differences between them. One is the degree of information asymmetry, which is

relatively higher in IPOs than in SEOs. Since IPOs involve the sale in closely held firms, in which some of the existing shareholders may possess non-public information (Ibbotson and Ritter, 1995). On the other hand, when a firm is publicly listed it is much easier to get hold of their information. As Dai Kai (2012) points out; SEO issuers have the market closing price prior to the offer. According to the *market efficiency theory* the price of a firm in a perfect market reflects all available information about the firm.

One definition of a SEO is (Ross et al., 2006. p. 454) “[...] a seasoned equity offering is a registered offering of a large block of a security that has been previously issued to the public.” SEOs have a substantially larger market than IPOs. In 2004-2005 the global SEO dollar volume was nearly double the IPO volume, and 2006’s near record IPO volume of \$256,4 billion was still around 80% of global SEO issuance, which was \$317,2 billion (Bortletti et al., 2008).

4.1.1 *Motivations to carry out an SEO*

Kai Dai (2012) has listed five reasons why a firm would have the motivation to conduct an SEO:

- *The pecking-order theory*, where the reason is that all other measures cannot meet cash flows required by the investment opportunities.
- *Tax and leverage cost trade-off model*, where the reason is the change in either equity or debt, or even the debt target ratio itself. In order to keep the target debt ratio, the company has to make equity offerings.
- Market timing, where managers try to sell highly priced shares when stock market conditions permit.
- Corporate lifecycle stage, where young companies with high market-to-book ratios and low operating cash flows tend to sell equity to fund investment, while mature companies prefer to fund investment internally.
- *Near-term cash need*, where issuers have to conduct SEOs in order to avoid running out of cash in the near term.

In general, the first two is the most common. Myers and Majluf’s (1984) pecking order theory suggests that companies tend to rely on internal financing, and prefer

relatively safe debt to more risky equity if the company is in need of external financing. In other words, a company, according to the pecking order theory, if in need of funding will try to retain earnings first. If this is not possible, they will try to issue debt and then equity as sort of last resort. Hence, the pecking order theory suggests that the reason for a SEO is that all other methods for raising capital cannot meet the company's need for funds.

Modigliani and Miller's (1963) trade-off theory is more of a common practice where the debt-equity decision is understood as a trade-off between interest tax shields and costs of financial distress. As a contradiction to the pecking order, the trade-off theory suggests that the firm should balance its debt as to maximize the value of the interest tax shield and the costs of bankruptcy. The trade-off theory suggests that the reason for a firm to conduct an SEO is to change the relation of equity to debt in order to keep the targeted ratio.

4.1.2 *The process of an SEO*

When the management decide to issue a SEO, this needs to be approved by the board. After an approval the firm must choose one or more lead manager(s). Investopedia defines a manager as: "[...] a company or other entity that administers the public issuance and distribution of securities from a corporation or other issuing body. A manager works closely with the issuing body to determine the offering price of the securities, buys them from the issuer and sells them to investors via the manager's distribution network". Thereafter the lead manager gives advice on issuing items, for example price, timing and size. Then it is up to the lead manager to form a managing syndicate. With the help of the syndicate, the firm compose a prospectus on the offering.

Before the issue: In the US, the first step, after the initial announcement, is called a road show (Geddes, 2005). Here the managers travel to major cities to meet with potential investors to discuss the planned offering. Thereafter the managers start the work with *book building*, and use this price to set an offer price (Eckbo et al., 2007). To secure a sale of all the shares, the manager often makes contracts of selling above 100%. This can be done because the contracts are not binding and

can therefore be withdrawn. In the cases where there are more buyers than shares, the managers can determine who is allowed to buy and how much.

After the issue there are still responsibilities for the managers. They are committed to provide analysis for the stocks for a given time period (Corwin and Schultz, 2005). They are also obligated to *market making* and offer *price support*. The market making commitment requires lead managers to be active market makers in a certain period after the offering (Corwin and Schultz, 2005). Price support commits the leading managers to place limit orders to buy shares immediately after an offering without being subject to price manipulation restrictions (Eckbo et al., 2007).

4.2 *The credit market*

Our ambition is to place the managers into a marketing context. Therefore we describe the economy without any external factors, before making room for the banking/managing sector in the second part. We would also like to point out the roles of the market actors, such as the households, banks, investors and firms. Most thoroughly we try to clarify the managers role in the economy, since they play an important role further on in our thesis. Lastly, we attempt to enlighten the methods the managers use to price their services.

4.2.1 *Model economy*

Hellwig (1998) claims that there is no room for financial intermediation in the theories presented in the context of “perfect markets”. In these theories most risk is diversified away, and leaves no room for financial intermediaries, such as banks, insurance companies and finance institutions, to operate in. Hellwig (1980) states that in the situations with no risk and where traders do not affect the price of the equity, relies on the assumption that the number of trades is very large. In turn this leads to flat *demand curves*, which again means that traders have no effect on the price. The assumption of flat demand curves implies that any trader, with limited or full knowledge of the company, can buy as much shares as he likes without affecting price at all. In our abstract illustration below, the capital market

is regulated by supply and demand. The households are typically the suppliers of capital, as they do not spend all their income on consumption, but save part of their income to maintain the level of consumption in the future. Firms are demanders of capital. In a frictionless market, also called model economy or stylized economy, described further below, these mechanisms work directly without any intervention from a middleman or financial institution.

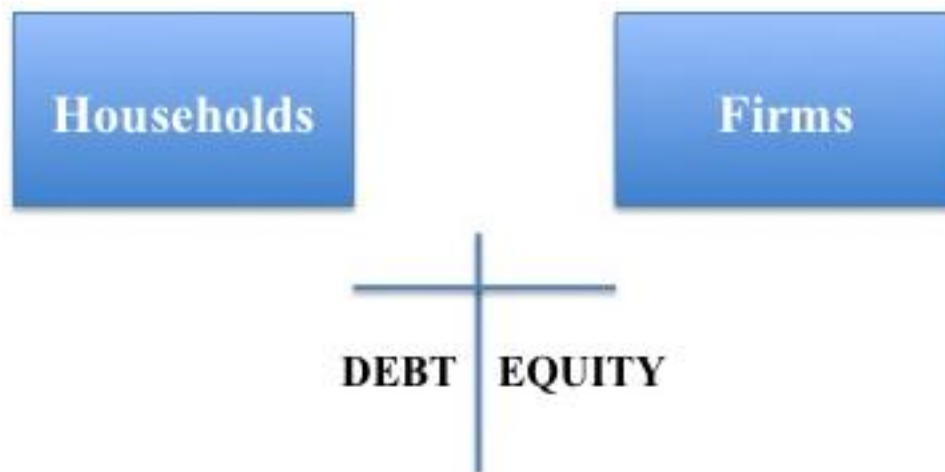


Figure 1: Model economy

We briefly mentioned the work by Miller and Modigliani above and will now look more into their theoretical contribution.

Miller & Modigliani (1958) made three propositions, and proved that investors are indifferent to how the firm is funded, as their returns are not affected. Their proposition that the weighted average cost of capital is constant irrespective of capital structure. For this to be valid they made several assumptions that need to be fulfilled, essentially they assume what we call a *frictionless market*:

- Investors are *rational* and *perfectly informed* and have identical expectations.
- Investors are free to buy/sell securities and borrow capital.
- There are no transaction costs or taxes.
- Securities are infinitely divisible.
- The dividend pay out ratio is 100%. I.e. all profits are paid to the investors in the form of dividend and there are no retained earnings.

- Business risk is equal among all firms within similar operating environment, meaning that all firms can be divided into “*equivalent risk class*”.

Proposition I says: “[...] the market value of any firm is independent of its capital structure and is given by capitalizing its expected return at the rate P_k appropriate to its class.” (Miller & Modigliani, 1958 p. 268) This can be shown with the following formula: $V_i \equiv (S_j + D_j) = \frac{\bar{X}_j}{p_k}$. The interpretation of the formula is that the value of the firm is equal to the market value of the firm’s common stock plus the debt, or equivalently, the expected return on the firm’s asset divided with the expected return on a stock in class k. This can also be stated as the average cost of capital, $\frac{\bar{X}_j}{(S_j + D_j)} \equiv \frac{\bar{X}_j}{V_j} = p_k$. “That is, the average cost of capital to any firm is completely independent of its capital structure and is equal to the capitalization rate of a pure equity stream of its class.” (Miller & Modigliani, 1958 pp. 268-269)

To prove that these two equations must hold and therefore prove the proposition, they showed that in the presence of a mismatch in the pricing of the stock and debt, the investor could buy and sell stocks and bonds to exchange the one income stream to another. By buying the underpriced instrument and selling the overpriced instrument, they can earn money without risk, also called *arbitrage*. Arbitrage will occur until the prices are equal, and the equations hold. (For further proof, see Miller & Modigliani 1958 pp. 268-271)

Proposition II: “[...] the expected yield of a share of stock is equal to the appropriate capitalization rate p_k for a pure equity stream in the class, plus a premium related to financial risk equal to the debt-to-equity ratio times the spread between k and r.” (Miller & Modigliani, 1958 p. 271) This is equal to the formula

$$i_j = p_k + (p_k - r) \frac{D_j}{S_j}$$

This shows that the price per dollar of a levered stream falls as leverage increases (Miller & Modigliani, 1958). The cost of capital is therefore a linear function of

the debt-equity ratio. From proposition I and II it can therefore be concluded: That investors are indifferent as to how a firm funds its operations, as the value of the firm and the investors return are the same. Optimizing managers will therefore use the cheapest option available when funding new investments.

Proposition III states that: “[...] the cut-off point for investment in the firm will in all cases be p_k and will be completely unaffected by the type of security used to finance the investment.” (Miller & Modigliani, 1958 p. 288) In other words, the investment should only be undertaken if the rate of return is equal or higher than the expected return of any other stock in class k.

4.2.2 *Non-frictionless market*

The model economy is only a theoretical model to illustrate the general effects in a market, and the model obviously does not hold in real life. For example, people do not always act rationally and the existence of *asymmetric information*, taxes and *transactions costs* makes the theory of Miller and Modigliani of capital structure in a perfect market insufficient. Their assumptions do not hold, as a perfect capital market does not exist.

Below, the model economy has been extended to include the banking sector and also allow for the existence of managers. Banks and financial institutions work as a link between households and firms in order to reduce the friction and risk for the two parties.

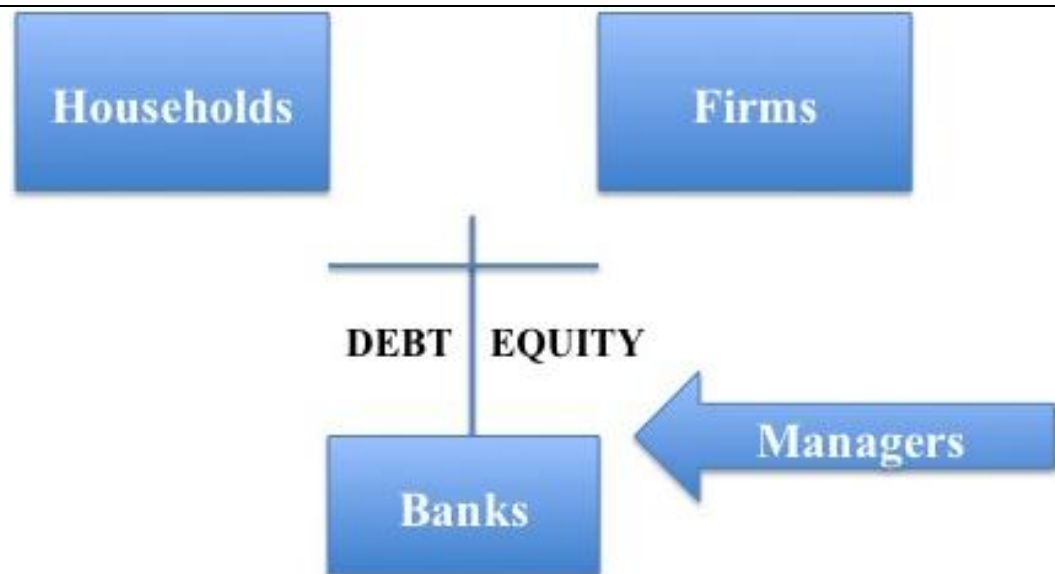


Figure 2: Non-frictionless market

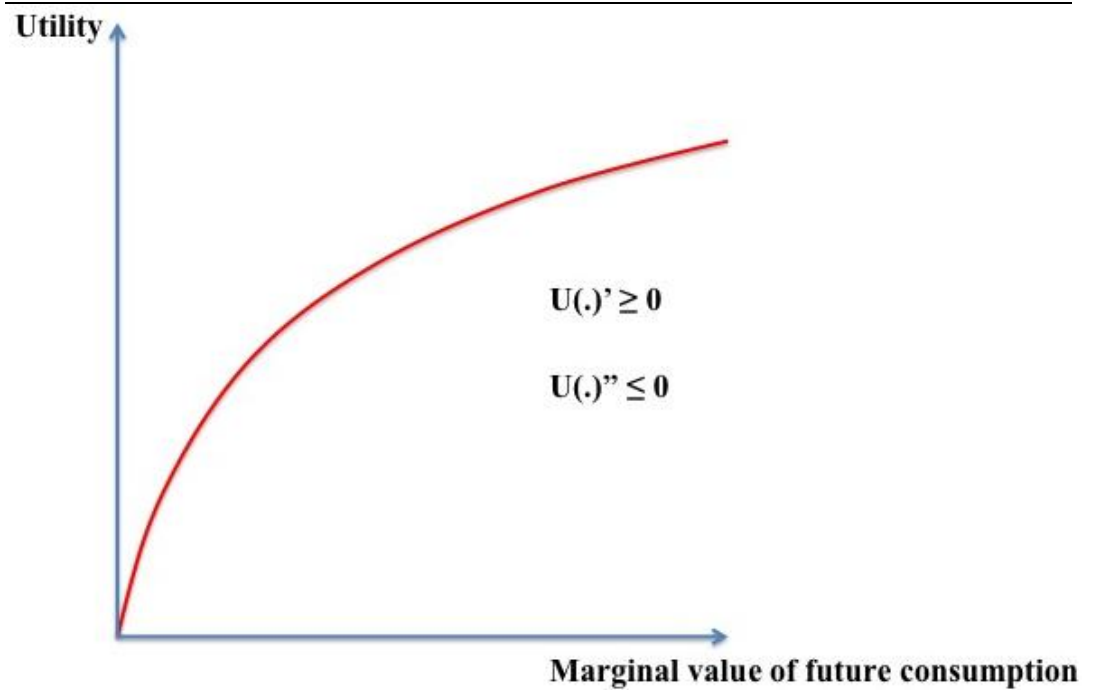
4.2.2.1 Households

According to the Factor pricing model by John H. Cochrane (2000), a household plans how much of its income it should save, what to consume and what portfolio of assets to hold in order to maximize its utility. Since high costs for an SEO reduces the profit of a firm, high costs reduces the utility of the household. The household's basic consumption model can be expressed in the following form:

First we look at the households, which are modelled by a separable utility function defined over current and future value of consumption:

$$U(c_t, c_{t+1}) = u(c_t) + \beta E_t[u(c_{t+1})].$$

The utility function captures the fundamental desire for more consumption since $u(\cdot)$, shown in graph below, is increasing and concave, suggesting that there is declining marginal value of additional consumption. The interpretation of the properties of the utility function is simply that for every unit of wealth the consumer receives, the household's utility increase. However, the increase in utility diminishes in every new unit of wealth it collects as the consumer has desires for spending today and not wait for future consumption.



Graph 1: Utility function

Further on, assuming that the household can freely buy or sell as much of the payoff (x_{t+1}) as it wishes, at a price p_t , denoting the original income level by e and denoting the total amount of the assets it chooses to buy with $(c_t), (c_{t+1})$, yields the following problem:

$$\max_{(c_t), (c_{t+1})} u(c_t) + E_t \beta u(c_{t+1}).$$

subject to two constraints:

$$c_t = e_t - p_t \xi$$

The first says that the consumption level at time t is equal to original income level at time t minus the total amount of assets he chooses to buy at time t times the price at that time.

$$c_{t+1} = e_{t+1} + x_{t+1} \xi$$

The second constraint says that the consumption at time $t+1$ has to equal the original consumption level at time $t+1$ plus the total pay-off of the sold assets.

Substituting the constraints into the objective, and setting the derivative with respect to ξ equal to zero yields the first order condition for an optimal consumption and portfolio choice:

$$p_t = E_t \left[\beta \frac{u'(c_{t+1})}{u'(c_t)} x_{t+1} \right].$$

We can express the stochastic discount factor:

$$m = \beta \frac{u'(c_{t+1})}{u'(c_t)}.$$

Because x_{t+1} is the value of consumption in the next period, and from the formula we get the today asset price, we need to discount this value with some variable, m_{t+1} . The reason why it is stochastic is that both consumption and asset pay-offs are stochastic variables. (John H. Cochrane, 2000)

Hence, the basic pricing formula can simply be expressed as:

$$p_t = E_t(m_{t+1}x_{t+1}).$$

Where p_t = asset price, x_{t+1} = asset pay-off, m_{t+1} = stochastic discount factor.

This is the central asset-pricing formula. Given the pay-off x_{t+1} and given the household's consumption choice c_t , c_{t+1} , it tells you what market price p_t to expect. This is therefore the price the household expect for an SEO.

4.2.2.2 Banks

Schumpeter (1939) assigned banks with a monitoring role in the economy. Asymmetric information and default risks makes it necessary for the households to acquire information about firms before they lend them money or buy stocks, to minimize their exposure to risk. Monitoring the performance and credibility of the various firms in the market is too time consuming and demanding for the households. The banks have the means to gather all necessary information, process it, and supply the households with the information they desire. The banks

have more available access to information about the firms, and they therefore have lower *monitoring costs* than the households.

Besides serving as a monitor of the actors in the economy, the banks operate as *market makers*, reducing the number of transactions in the market and therefore transactions costs (Martin Hellwig, 1998). Banks are financial *intermediaries* that obtain funds from lenders, typically the households, and lend them to firms, households or other institutions with demand for money (Diamond, 1984). The banks reduce the frictions in the market, by reducing risk for both borrower and lender, reducing transaction costs and the number of transactions in the market. Some banks also participate in the stock market by brokering stocks and bonds, or by assisting firms raising capital through bond or stock issues.

4.2.2.3 Investors

We can roughly divide investors into two subcategories, *Informal* - and *Institutional investors*. The informal investor is a person, and is characterized by Reitan and Sørheim (2000 p. 140) as a “[...] middle-aged man with high education, extensive work experience and substantial finances. Most informal investors are successful entrepreneurs. In terms of their investments, informal investors make one investment per year, usually in geographical proximity to their work/home.” The institutional investor is typically investment funds, insurance companies, pension funds and other forms of institutional savings. (Gonnard, Kim and Ynesta, 2008) As table 1 suggests, in Norway 2007, institutional investors raised 61,9% of GDP of financial assets.

		In per cent of GDP (1)													
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
Australia		82.6	90.5	102.4	110.2	122.2	126.1	126.0	118.3	120.6	129.6	141.5	152.3	.	
Austria		43.5	50.2	57.6	65.0	78.6	84.1	87.0	90.7	97.9	105.8	125.3	130.3	128.2	
Belgium		31.0	35.8	44.3	70.5	79.8	83.0	84.6	80.1	87.0	95.6	105.0	110.7	111.1	
Canada		94.0	107.9	118.6	126.2	131.6	128.1	125.2	117.7	122.2	127.5	134.1	144.4	146.4	
Czech Republic		16.7	17.5	15.5	13.5	15.9	16.3	13.8	16.8	17.1	19.5	19.0	18.4	22.4	
Denmark		83.2	89.7	100.0	106.8	120.5	123.3	121.1	118.9	130.4	150.3	172.6	176.6	181.3	
Finland		50.4	59.1	63.7	70.0	90.9	86.1	82.5	83.1	92.9	103.4	120.9	133.1	132.4	
France		75.9	84.6	95.0	104.5	123.5	130.7	129.6	123.9	131.6	147.6	160.2	174.0	171.4	
Germany		56.4	63.4	74.6	84.0	97.0	99.3	99.3	97.2	105.2	107.3	116.0	119.1	117.3	
Greece		11.5	15.4	23.5	26.9	36.2	30.1	25.5	22.2	23.0	22.6	19.3	16.7	15.3	
Hungary ⁽²⁾		3.4	4.3	7.5	8.9	11.0	12.6	14.2	16.2	16.4	19.0	24.5	28.4	32.9	
Iceland		.	.	.	.	.	.	105.5	112.1	129.5	145.0	167.9	180.3	198.1
Ireland		.	.	.	.	.	.	334.1	331.5	362.8	389.3	483.4	549.0	555.3
Italy		25.9	33.4	44.9	65.5	96.8	94.3	90.6	84.8	90.0	90.9	97.1	98.1	86.7	
Japan		98.7	94.5	101.5	102.1	110.8	106.1	104.2	107.4	117.5	123.5	145.2	148.4	.	
Korea		.	.	.	.	.	.	.	67.6	64.9	68.6	73.9	80.1	91.6
Luxembourg ⁽³⁾		37.1	54.8	77.7	93.8	104.2	108.6	114.2	106.9	117.7	129.9	149.6	.	.	
Mexico ⁽²⁾		1.3	1.3	1.3	1.4	5.3	4.6	6.6	7.0	7.4	7.3	8.2	9.7	.	
Netherlands		146.0	158.5	170.4	181.4	197.9	189.5	176.3	159.1	171.3	182.4	201.8	206.4	196.9	
New Zealand		.	.	.	.	.	.	.	.	.	.	.	.	.
Norway		42.8	43.6	46.4	45.4	51.8	44.8	43.3	42.3	48.0	50.3	54.8	58.3	61.9	

Table 1: Institutional investors share of GDP.

Source: Gonnard, Kim & Ynesta, 2008 pp. 4

Further on, Gonnard, Kim and Ynesta (2008) points out that the insurance companies, that used to be the most significant institutional investor, in 2008 have been exceeded by investment funds, which represented 35,7% of total assets in 2005.

The investment possibilities for the investor are typically to deposit money into a bank account and reap a risk free rate in return, he can lend money to persons or companies for a rate above the risk free rate or he can invest in stocks in private or publicly owned firms.

4.2.2.4 Firms

Privately owned firms that perform well over time may need to increase the capital level of the firm in order to be able to continue its growth and increase the return of its owners. One way of raising new capital to the firm is to list the firm on the stock exchange. When the firm is listed on the exchange, the stocks become available to the public for investment. The return must be higher than the risk free rate, such as the return on a savings account due to higher risk for the firm to default than for a bank. Cochrane (2000) showed this by formulating two distinct pricing formulas, one risk free and one with risk. He derived different ps

for the pricing formula we presented earlier $p_t = E_t(m_{t+1}x_{t+1})$. For the risk free rate the present value formula is $p_t = \frac{1}{R_f} x_{t+1}$. And since the gross interest rate normally is larger than one, the payoff x_{t+1} sells at a discount. The present value formula for the risky good is $p_t^i = \frac{1}{R^i} E_t(x_{t+1}^i)$. Since the pay off of the investment x_{t+1}^i now is unknown, the discount factor $\frac{1}{R^i}$ has to be larger than $\frac{1}{R_f}$ in order for the two goods to be equally attractive to invest in. (Cochrane, 2000)

4.2.2.4.1 *Methods of financing*

In the introduction we mentioned different ways a firm can finance its operations. We will here elaborate a bit on the different possibilities.

There are essentially four ways of funding an investment for a firm in a model economy. However, due to the fact that the market is not without frictions, a fifth alternative arises. First and foremost the firm can retain profits, instead of paying out dividend to the investors. An optimizing investor would prefer the profit to be retained as long as the firm can earn a higher return on the capital than the investor could do if he reinvested paid dividend in the market.

The second option, available to most firms and new in the non-frictionless market, is to borrow capital from a bank. This option does not exist in the model economy because in this economy there are no banks. The accessibility and cost of borrowing from a bank depends on the firm's financial position, and the overall market conditions. After the financial crisis of 2007-2009 there has been a severe tightening of funds available from the banking sector, as the liquidity in the banking sector has decreased, and the rules for the banks own level of equity requirements has become more severe. During the financial crisis and in the period immediately following, the cost of borrowing from banks was very high, due to high government interest rates and interbank rates. Therefore this option has been decreasingly attractive the last couple of years. (Deloitte, 2012)

Thirdly, the firm can issue bonds in the market, giving any buyer a fixed return, typically over a period of three months to 30 years. Issuing bonds is not common

for smaller firms, as the risk level of lending to a smaller firm may be substantial. The interest on the bond may simply be too high for the firm to manage. Also, the normal minimum investment amount for the buyer of a bond is very high, often as high as one million Norwegian kroner. Thus, the liquidity for buying and selling bonds is poorer than for stocks, making it less attractive for smaller firms who may already have difficulties finding investors and fresh capital.

The fourth alternative to the firm is to sell stocks, and the fifth and final way of raising capital, and the one we will cover in this thesis, is through issuing stocks. There are many ways of raising equity through stocks; we will here give a brief presentation of the most common methods.

For a firm to be listed on the stock exchange it has to go through an IPO. The firm goes public and issues new stocks and/or sell of the stocks of the current owners. The ownership of the current owners is diluted and new capital is added to the firm.

Under the umbrella SEOs, there are again a number of ways to raise equity through capital, for firms already listed on the stock exchange. SEOs is the issuance of new stocks of a listed firm to its investors as part of equity rising. Dividend reinvestments plans (DRIP) and dividend options are a second way of raising equity to the company. It can be regarded as withholding revenue, as investors normally are given an incentive to reinvest their dividend in return for a discount on new stocks. Each investor is then given the option to receive the dividend in cash, or use the dividend to buy new shares. The firm can choose to buy these shares in the market or issue new shares. This is a common way of raising capital in Australia and Canada (ASX 2010), as it gives the issuing firm a tax relief compared to paying a cash dividend. These events are, however, very rare in Norway, and we will therefore not include dividend reinvestments and dividend options in our thesis.

The most common way of raising equity for a company listed on the stock exchange is through a *private placement*. A private placement is the almost the same as an IPO, with the stocks only being offered to private investors; normally

many of these are current shareholders. Often these are investor banks, pension funds or mutual funds.

Alternatively the firm can issue rights to purchase additional shares in the firm. In a *rights issue*, stockholders are given a right to buy a given number of new shares per share they already own. The rights are issued to the stockholders, and the stockholder can choose to convert the rights into new shares when the subscription period for the rights ends. Some rights are tradable, and if the rights issue does not meet the investor's demands, the investor can sell the rights in the market. The new shares are offered at a price below, or at the current market value, as no rational investor would buy the shares for more in a rights issue than they can in the market. The proceeds from the shares bought are added to the issuing firms equity balance. Since private placement and rights issues are the most common way of raising capital through equity, and the corporate action that the majority of investors will experience, we therefore see this as the most adequate method of raising capital to examine for our thesis.

After World War II (WWII) Eckbo and Masulis (1995) have made a number of observations on the topic of SEOs in the US. They observe that internal equity has remained the dominant funding source after WWII, that debt dominates equity as an external funding source, and in periods with low internally generated equity, the proportion of debt financing tends to increase to finance the shortfall. Further on, they argue that the frequency of equity issues tends to rise during economic expansions. Internationally they found that retained earnings are the major source of finance in all the studied industrial countries, and that the external funding is highest in Finland, France, Japan and Italy.

4.2.2.5 Stock markets

Bernard Baruch (1955) reflected on the stock market functions as an index. He pointed especially out people's confidence in certain businesses, government policies and general world conditions as specific drivers. Further on he stated that no one, not even the most experienced trader, could predict with certainty the development of the stock market. Baruch emphasized that the stock market

registers the judgement of multitudes of buyers and sellers on the many factors that affect businesses, what they are like today and how they will perform tomorrow. Bernard Baruch (1955) portrayed further on the stock market as a thermometer not the fever itself, and clarified that we will be in deep trouble if this instrument is not working properly.

Investments in the stock market are made for two different reasons, the first in hope and confidence that the firm will make good value for money, the second in fear that the value of capital will be lost through inflation.

What the methods of raising capital have in common is the necessity of the stock-and bonds market. Since the issuing firm does not have the knowledge or the means to reach out to a large enough mass of potential investors themselves they must turn to the stock market for investors. The stock market is a very efficient way for investors to trade positions with each other, and eases the process of investing. A liquid market reduces the investors' risk of being stuck with an investment and not being able to liquidate positions when needed.

4.2.2.6 Managers

Some actors specialize in activities that are essential for an efficient stock market. Such agents normally provide a range of services that they can do more efficiently and cheaper than any firm or investor could do on their own, and they help to link buyer and seller, borrower and lender together. They might, for instance, specialize in selling analyzes of firms on the stock exchange, and make prediction of who will outperform the market in the coming period, and who will fail. These actors specialize in exploiting the imperfection of knowledge in the market, exploiting the failure of Miller and Modigliani's (1958) assumption of perfect knowledge to hold in practice. The development of the financial market and information flows over channels, such as the internet, has made it increasingly difficult to possess unique information that will give a competitive advantage. Since all news that can drive the price of a firms stock up or down must be made public the minute it's known, and this is available to everyone seconds after the

news has been released, the value of the analyses has fallen the last years (E24.no, 2012).

Firm analyzes is normally one division of an investment bank, where the *corporate finance* is another. The corporate finance division is specialized in helping firms through mergers, spin-offs, IPOs, issues etc. They have deep knowledge of the firms' structure and finances, the competition, the market conditions, legal requirements and they also have a vast network of existing and potential investors they can approach when making a new issue. As stated on ABG Sundal Colliers home pages: "Our team of experienced M&A experts is responsible for structuring and executing a wide range of complex domestic and international transactions. These include acquisitions, divestitures, mergers, joint ventures, corporate restructurings, shareholder relations, recapitalisations, spin-offs, exchange offers and leveraged buy-outs" (ABG Sundal Collier, 2013).

Very few of the firms listed on the stock exchange have such deep knowledge and experience of doing such corporate actions; they therefore turn to the investment banks in order to maximize the return on their actions. Investment banks that assist in issues are called managers, and their job is to price the shares and decide the number of shares necessary to achieve the amount of capital desired raised in an issue. The manager makes a prospect for each issue, describe the financial state of the company, the competition etc. The manager must make the issue known in the market in order to attract enough investors, and this takes time and money. There are also fixed costs associated with a stock issue, such as listing fees, document fees etc.

4.2.2.6.1 *Managing syndicates*

Syndicate formation begins with the selection of the lead manager by the issuing firm, according to Corwin and Schultz (2005). There has been competition for the largest IPOs and SEOs, especially in the US, as most managers seek top rankings and better reputation to be able to charge a higher managing fee. If numerous managers contribute in the competition to be lead manager, the issuer is very likely to pick a co-manager. Corwin and Schultz (2005) claims that co-managers

is most likely to be chosen because of their ability to provide analyst coverage or simply because their distribution system complements the lead manager well. One can draw parallels from Corwin and Schultz' (2005) study, to the survey made by Brau and Fawcett (2006) on CFOs reasoning for electing a manager for an IPO. They found that 90,6% of the CFOs asked agreed or strongly agreed to the importance of the overall reputation when appointing a manager. Further, 87,5% of the CFOs found the managers expertise and connections important, and 82,5% answered that they also agreed to the importance of the manager's reputation for analyses and research department.

Book-managers may also, on occasion, advise the issuer on a good complementing co-manager, for example they may cover different countries etc. The leading manager is also very likely to limit the number of co-managers, if the issuer has a larger or more extensive syndicate in mind. Further on, both the issuer and the lead manager choose non-managing syndicate members. These are called the underwriters, or simply managers.

In some cases, when the stock is seldom traded, managers are faced with the difficult task of pricing a stock with no former trading record. This is often done by using comparable, already traded companies and trying to define the markets interest in the stock. The valuations with the comparison across comparable stocks are likely to be quite the same, irrespective of manager and size of the syndicate. Corwin and Schultz (2005) elaborate that since different managers have different investor clienteles, then the managers' ability to express the markets willingness to pay might be more accurate with a larger syndicate and supplementary managers. Hence, issuers or lead managers tend to select managers with different client bases. For example, the 1996 IPO of Danish pharmaceutical firm Neurosearch, employed UBS as global coordinator and book manager. Carnegie AB, a Nordic region specialist, acted as Scandinavian lead manager and co-lead manager for the rest of the world, a position shared with the Danish bank, Unibank. This structure ensured coverage of all main Nordic investors, including Danish retail via the two junior syndicate members. UBS, on their hand, concentrated on the larger European and international investors.

Another example is First Energy Capital, a Canadian investments dealer specializing within the energy industry (First Energy Capital, 2013), who was co-manager in the issue of Wentworth Resources Ltd., a firm operating within the oil and gas industry. First Energy Capital was most likely appointed co-manager due to their industry expertise, ability to estimate the value of the firm, their potential and threat etc. and their access to investors with high interest for the industry.

Rock (1986) and Beatty and Ritter (1986) suggest that reputable managers are associated with less uncertainty and thus a higher stock price. Altinkilic and Hansen (2003) findings confirms that the price is higher with a more reputable bank as leading manager. As a consequence, a manager's reputation and ability to certify an SEO is harmed if the manager participates in the syndicate of mispriced or underachieving SEOs. Hence, all managers in a syndicate have incentives to work towards the appropriate pricing of the SEO (Corwin and Schultz, 2005). Corwin and Schultz studied IPOs, but in this specific case their findings are directly applicable in SEOs.

Bowen et al. (2008) analyzed the impact of analyst coverage on the cost of capital, and more specific the effects from a manager with a reputation for superior ability or with lower forecast dispersion on the cost of capital. They based their analysis on 4.766 SEOs in the period 1984-2000, and their results suggested that more analyst coverage is associated with a higher cost of capital. They also found that a firm with a lead manager with reputation for superior ability has incrementally lower SEO *underpricing*. By looking at the trading volume and the market share of the brokers, Jarnecic and Liu (2013) found that broker affiliation had a significant impact on the trading volume. They also found evidence suggesting that broker reputation was one of the primary characteristics that influenced broker performance. Hume and Sharma (2009) studied the importance of the manager and whether the manager influenced the equity market. They found evidence of lower returns for the firms that appointed the more prestigious manager, suggesting that the more reputable the manager is, the more they can charge the issuing firm in a SEO. In contrast, McLughlin et al. (2000) studied the long-term effect from an investment banker reputation and three-year post issue returns. Using a sample of SEOs conducted between 1980 and 1994 they found no

significant relation between reputation and stock prices in the long-run, suggesting that the reputational effects only apply in the short run and evens out as the time goes by.

Jeon and Ligon (2011) examined the effect on expected *flotation costs* of including co-managers in the managing syndicate. Their result showed that the characteristics of co-managers taking part have significant effect on flotation costs while, however, the effect of the number of co-managers is largely insignificant. They, to some extent, explain this by the fact that highly reputable managers - as a part of the syndicate - serve a certification role, reducing information asymmetries and yielding lower flotation costs. Further on, it is shown from Huang and Zhang (2011) that the number of managers for a seasoned equity offer is negatively correlated with the offer price. From the same sample they observe that larger manager syndicates also lower offer price discounts. From a sample of 1.638 IPOs from 1997 through 2002, Corwin and Schultz (2005) have examined the respective managing syndicates. They found strong evidence of information production, meaning that the offer prices are more likely to be adjusted internally when the syndicate has more co-managers. The writers suggest that the tight relationship between managers might help to mitigate problems such as *moral hazard* and *free riding*.

Corwin and Schultz (2005) also suggest that the issuers benefit from an increasing number of managers in the syndicate, but that several factors also speak in favour of limiting the syndicate size. First they mention that the prestigious book managers and co-managers demand significant fees, so that the syndicate size is limited by the issuer's budget. Also they point out that co-managers compete with book-managers for future managing business providing the book-managers with supplementary incentive to constraint the syndicate. Finally, Corwin and Schultz (2005) points out that the *manager spread* tend to increase with the number of co-managers, at least for relatively small issues.

As one would expect, the number of syndicate members varies directly with the size of the offering. However there are some factors that influence syndicate size. Under an IPO, syndicates are normally larger than syndicates for SEO's. This is

typically to ensure a broader distribution of the IPO. In an SEO however, the distribution is already made so that the syndicate can focus entirely on existing clients and markets. From the book runner's perspective, a small syndicate is easier to control and the information flow is more efficient.

An example of a large managing syndicate is the IPO of Prudential Financial Inc. in late 2001 that raised approximately \$3.5 billion through a syndicate of 47 banks and brokers. Appendix 1 describes the syndicate.

4.2.2.6.2 *Book building*

Securities and Exchange Board of India guidelines (1995 p. 676) defines book building as: "A process undertaken by which a demand for the securities proposed to be issued by a body corporate is elicited and built up and the price for such securities is assessed for the determination of the quantum of such securities to be issued by means of a notice, circular, advertisement, document or information memoranda or offer document."

Singh (2008) elaborates further that book building is a process practiced in most developed countries for marketing a public offer of equity shares. Because neither the issuer nor the lead manager has an exact price or knowledge of the demand for the new public issues, book building is used as a tool for discovering the fair price and help the least informed investors, as well as the issuer and manager, to find the true demand for the new stocks.

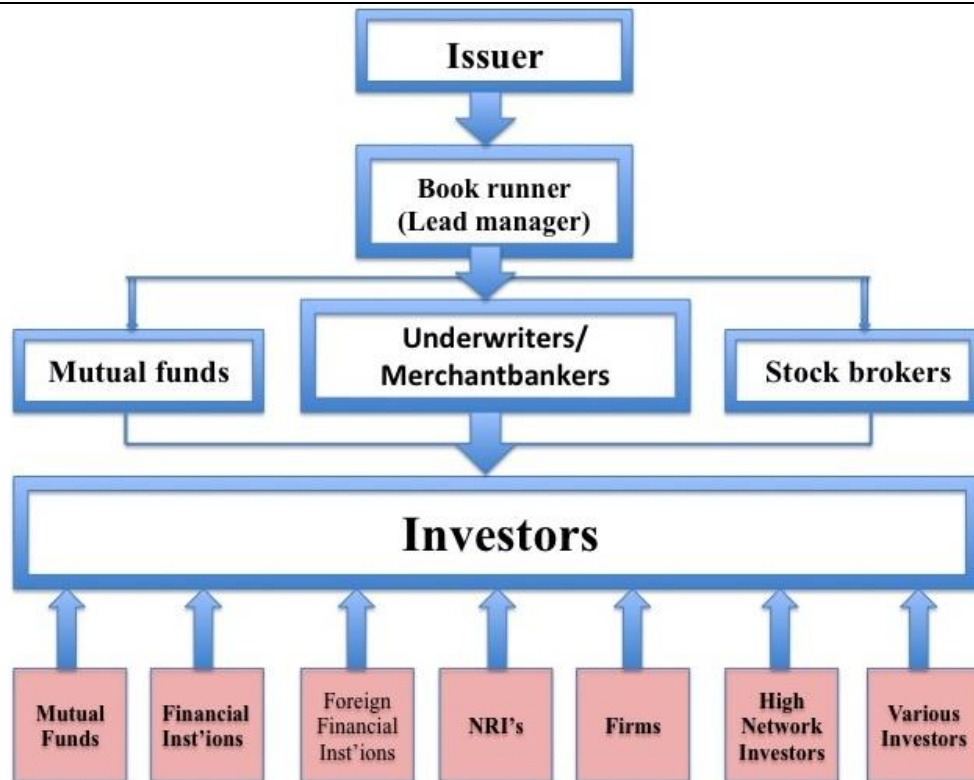


Figure 3: Book building

Source: Singh (2008) p. 8

In the book building the price is determined on the basis of demand received or at a price above or equal to the floor price. Books are built by a Book Runner Lead Manager (BRLM) to know the everyday demand.

Through Figure 3 Singh (2008) explain further how books are built in India, a process comparable to the Norwegian market:

- The issuer appoints an investment bank as BRLM.
- The issuing firm consults with the BRLM in drawing a prospectus, which does not mention the price of the issues, but includes other details about the company.
- A definite period is fixed as the bid period, which implies the BRLM conducts awareness campaigns.
- The BRLM appoints syndicate members, managers, to underwrite the issue, or a “net offer to the public”.
- The syndicate members create demand and ask each investor for a number of shares and the share price.

-
- The BRLM builds an order book based in information received from managers and with the issuing company they determine the issuing price, known as the “market-clearing price”.
 - The book is closed, prospectus is filed and application money is received.

Singh (2008) have also listed some limitations to the book building-phenomenon:

- Appropriate for mega issues only. In the case of the potential investors, the companies can adjust the attributes of the offer according to the preferences to the potential investors.
- The issuing company should be fundamentally strong and well known to the investors.
- The investors are aware of the various parameters affecting the market price of the securities. But, such conditions are very seldom found in practice.
- There are possibilities of price rigging on listing as promoters may try to bail out syndicate members.

4.2.2.6.3 *The managing spread*

As California Debt and Investment Advisory Commission (CDIAC) points out in their article “Understanding the managing spread” (1993), one of the issuers’ primary goals in any public offering is to get their hands on the funds issued at the lowest possible cost. A significant component of this total cost is the managing spread. This spread will of course vary, depending on the characteristics of the issuer, the project and the financing.

CDIAC (1993) defines the managing spread as “[...] the difference between the price at which a manager purchases bonds from an issuer and the price at which the bonds are resold to investors.” This is also true for stocks. (CDIAC, 1993. p. 1)

One may divide the spread into four components: a management fee, expenses, managing fee and takedown. CDIAC (1993) clarifies further that the management

fee compensates the manager for the investment banking services provided to the issuer. This fee may include a development of a financing plan and a maturity schedule suited to the needs of the issuer, origination and marketing tasks, assessment of market conditions, advice on the timing of the sale and preparation of reports on the post-sale results of the transaction. The expense fee reimburses the manager for out-of-pocket costs. This includes usually the counsel fee, and perhaps some travel costs, especially if the manager is located far away from the issuer. The managing fee is due to the fact that the manager cannot always be certain that investors will readily purchase all of the issuers stocks. This fee is to cover the possibility that some of the stocks may have to be reoffered at a lower price or taken into the manager's inventory. According to CDIAC (1993) the size of the fee is directly connected to the market risk involved as in a strong and less volatile market all the stocks could very likely be pre-sold. Hence, the manager's risk would be close to nothing and the manager fee can be dropped. Essentially, the takedown is a sales commission paid to the manager. In order to obtain the most favourable stock price, the issuer has to provide the manager's sales force a sufficient incentive – to work hard at finding investors willing to accept the highest purchasing price.

4.3 Pricing and competition

The market for managers in Norway might best be described as an oligopoly. According to Pindyck and Rubinfeld (2013) an oligopoly has the following characteristics:

- Few but large close rivals.
- *Interdependence*: Firms cannot act independent of each other. Meaning that a firm must take the rivals potential reaction into account when making own decisions.
- *Barriers to entry*: Because it is very costly to enter such a market, the oligopolists often remain in their positions.

We assume that the managers compete in a Cournot competition, which is a competition within a duopoly; the firms compete in quantity, different from the Bertrand competition, where the companies typically compete in prices.

Bertrand (1883) shed light over the competition within an oligopoly, in a response to the Cournot model we will quickly account for Bertrands way of thinking, before explaining the Cournot model further.

In a Bertrand (1883) competition with rational consumers, where two competitors offer homogeneous goods, they will obtain half the market each if they offer the same prices as, the consumers are indifferent to which supplier they buy from. However, if one supplier lowers his price marginally below the competitor's price, he will win the whole market as the consumers maximize their utility by buying at the lowest possible price. Knowing that the competitor is likely to lower its prices to steal the market, the firm lowers their prices as well not to lose their share of their market. According to Bertrand (1883) the firms continue to undercut their opponents' prices as long as the marginal revenue is larger or equal to marginal cost. At the point where marginal revenue equals marginal cost the firms share the market and neither firm makes any profit. By reducing the price below marginal cost, the firm can again supply the whole market alone, but will then lose money on each good sold. Raising the price to increase the revenue per good is not an option, as no consumer will buy those goods if they can get them cheaper from the competitor. This dilemma is a major caveat with a Bertrand competition with homogeneous goods, as one normally ends at the point with equal prices and market shares and no profit. Therefore this model of competition is not applicable to the competition between the managers.

The model of competition in prices by Cournot (1838) preceded Bertrand's model with fifty years. In order for Cournot's model to hold he made several assumptions:

- That there were (n) producers of a homogenous good, implying the same cost curve for all. (n) = 2 in the example below.
- Barriers to entry, for example high set up costs.
- Each producer maximizes profits given output of the other firm.
- Below we have also assumed a constant marginal cost (c) for both firms.

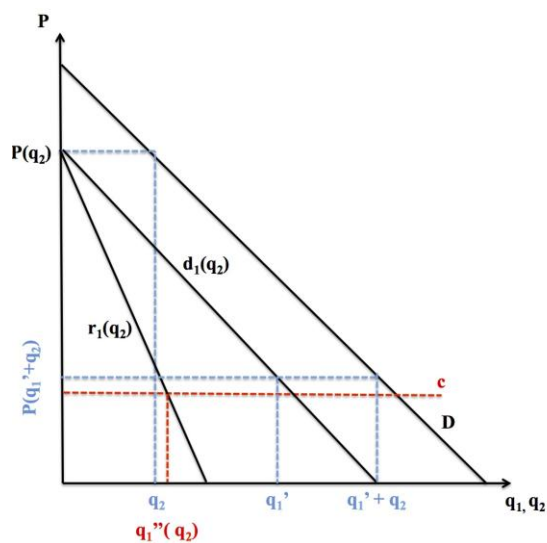
If we assume a firm's profit is given by:

$$\pi_1 = q_1(P(q_1 + q_2) - c),$$

where:

π = profit, q = quantity, p = price, c = cost

Firm 1 believes firm 2 produce the quantity q_2 .

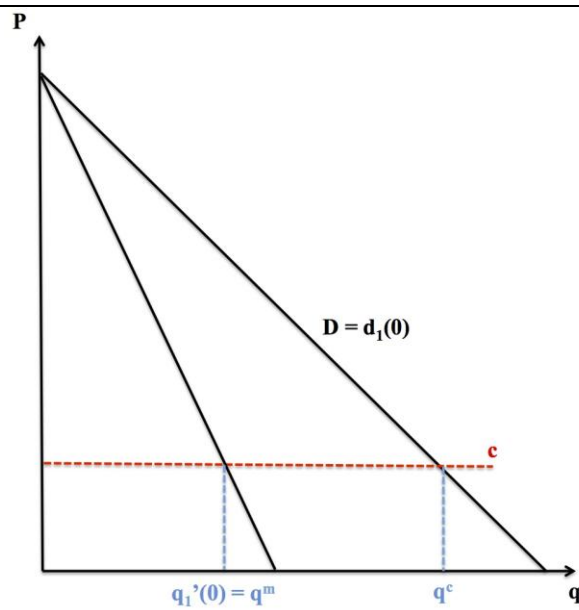


Graph 2: Cournot competition

Source: Pindyck and Rubinfeld (2013)

The curve $d_1(q_2)$ is called firm 1's residual demand. It gives all possible combinations of firm 1's quantity given q_2 .

Optimal output for firm 1 is where marginal cost intercepts with marginal revenue:

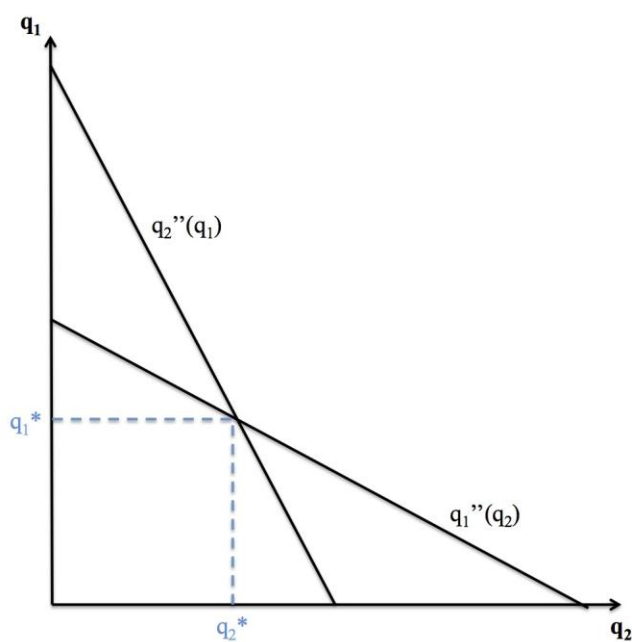


Graph 3: Reaction curve

Source: Pindyck and Rubinfeld (2013)

Given the linear demand and constant marginal cost, the function $q_1''(q_2)$ is also linear. $q_1''(q_2)$ is firm 1's reaction which means that it yields firm 1's best choice in every situation given what he thinks firm 2 is doing.

Equilibrium is found by drawing the two reaction functions in the same graph. Equilibrium is found in the intercept between the two graphs.



Graph 4: Cournot equilibrium

Source: Pindyck and Rubinfeld (2013)

According to Pindyck and Rubinfeld (2013) this relationship applies both to the demand- and the supply side of the managing service, and to the demand- and supply side of the issued stock. If there is a high demand for the stock, there should be less work for the manager in the book building process, and lower risk of not raising enough capital. Therefore attractive firms should pay a lower fee for the stock issue than firms promising lower return and higher risk.

The price of a service, such as a stock issue, is closely linked with the supply and competition in the market. In the case of monopoly, only one provider - the company, is free to set the price to maximize its profit. With increasing competition, as above with two providers called an oligopoly, the price is lowered as the two suppliers compete in quantities to attract customers. By lowering the price below the competitor, the firm can in theory capture the entire market if the goods or service are perfect substitutes, and accessible to all, i.e. Bertrand competition. Most markets are somewhere in between monopoly and free market, very few have indeed monopoly power.

There are typically two measures of the degree of competition in a market, the concentration ratio (CR), such as CR_4 or CR_8 and the Herfindahl-Hirschman Index (HHI). CR_4 measures how much of the market is served by the four actors with the largest market share. Similarly CR_8 measures the market power of the eight largest actors. If the CR_4 or CR_8 is 0%, there is perfect competition, as there are many actors with an infinite small share of the market. Values between 0-50% indicate low market power concentration. 50-80% medium competition, this level is typical for an oligopoly. 80-99% is a highly concentrated market, while 100% typically is a monopoly.

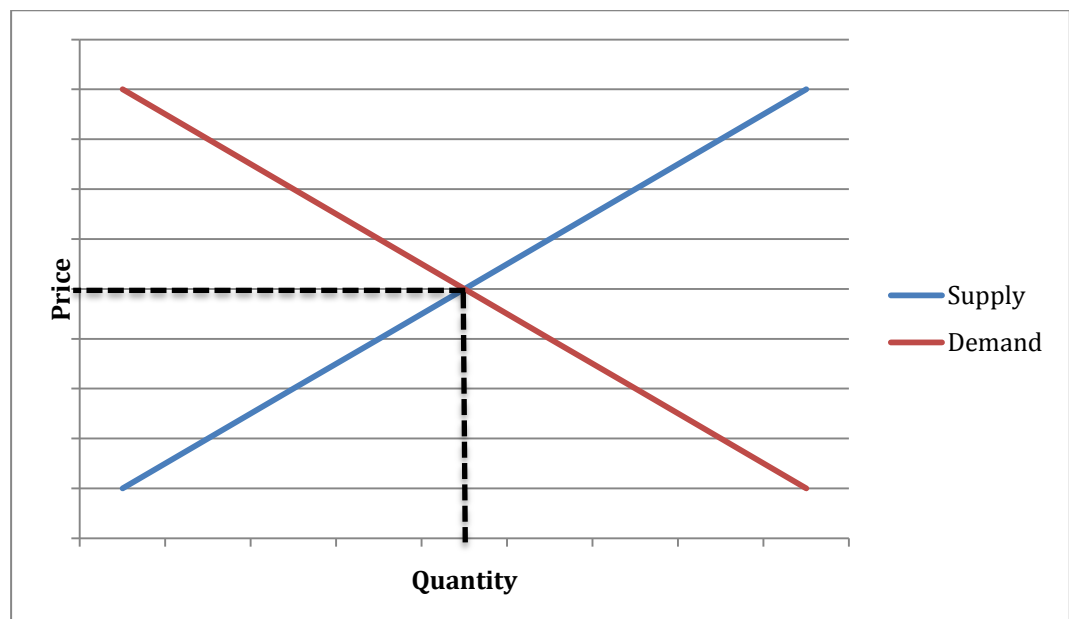
HHI is considered a better measurement of market power, as the HHI reflects the combined influence of a few firms with large market power and unequal firm sizes. The CR_n measurement reflects only a single point on the concentration curve, but the HHI provides a more complete sense of the shape of the curve (Pepall et al., 2008). A HHI of 0-100 indicates a highly competitive market. Values between 100 and 1500 indicate an unconcentrated market, 1500-2500 indicates a moderate concentration of market power and a HHI above 2500

indicates a highly concentrated market (U.S. Department of Justice and Federal trade Commission, 2010).

If the goods or services are imperfect substitutes the firms can charge a different price than the competitor, as their good may be superior to the other goods available. Some managers specialize in raising debt or equity for firms, while others may only have this as a subordinate activity in their operations. As a consequence we do expect, in our analysis, to find evidence of managers taking a larger share of the market and charging a different price than the competitors.

4.3.1 *Supply and demand*

When the manager has solved the optimal level of service supply to the equity issue market, then the demand for these services will determine the price. Normally supply is an increasing function of price, the higher the price the more willing the producers will supply the market as profits rise with increased price assuming constant marginal costs. Demand, on the other hand, is described with a downward sloping curve, i.e. demand decreases with increasing prices. The optimal price and quantity is found at the intersection of the two lines. (Pepall et. al, 2008)



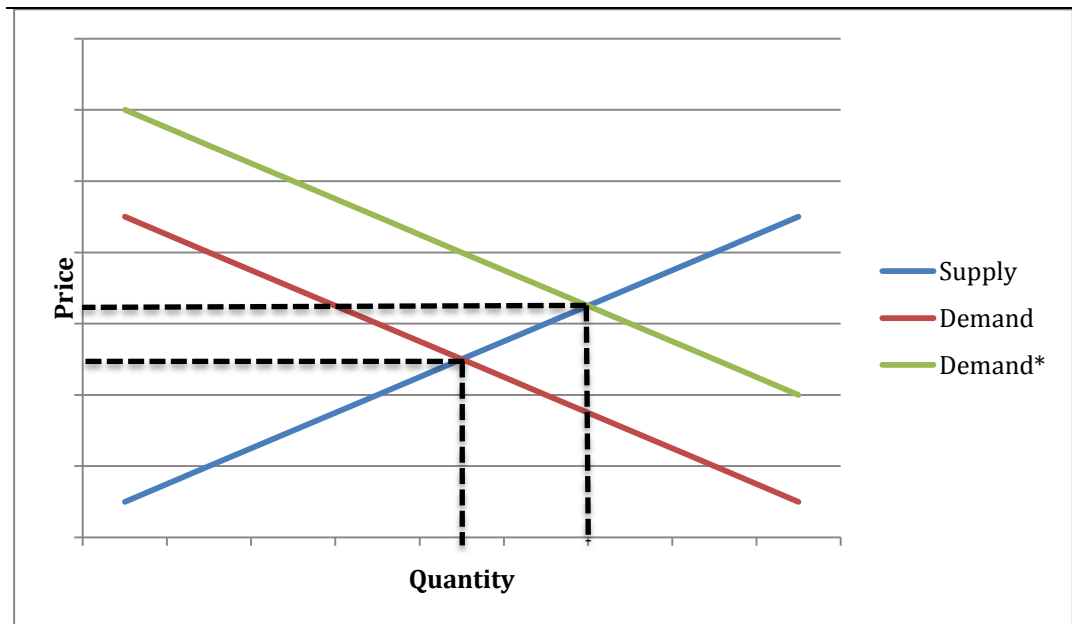
Graph 5: Supply and demand

Source: Pindyck and Rubinfeld (2013) pp. 25

Armstrong et al. (2010) states that imperfect competition is generally characterised as every investor's conviction that he faces a descending demand curve or an inclining price curve for equity in the market. Armstrong et al. (2010) elaborates further that this scenario occurs when the number of demanders is finite. Each investor identifies the effect he has on price. Hence, the price curves are upwards sloping in demand. The fact that price increases in demand has another implication, namely the fact that for investors that are better informed, the curve is likely to be steeper, relative to the curve for the investors that is less informed. Established from the fact that the trades of the well informed investors have a greater impact on price than the trades of the less well informed traders (Lambert and Verrecchia, 2010).

In the case of equity issues, the relationship between supply and demand must be considered twice. At first it is the supply of the service of managing equity issues, and firms demand for such issues. Secondly, the firms demand for equity issues are also the supply of newly issued stocks to the market, and the price and liquidity of these stocks depends on the investors demand for stocks. Hence, it may, in periods, be a high demand from the firms of raising new capital through issuing equity. But the market may not be interested in the stocks, and the manager runs a risk of failing the goals of the issue. Also the issue itself may take longer time because both effects would increase the price of the issue.

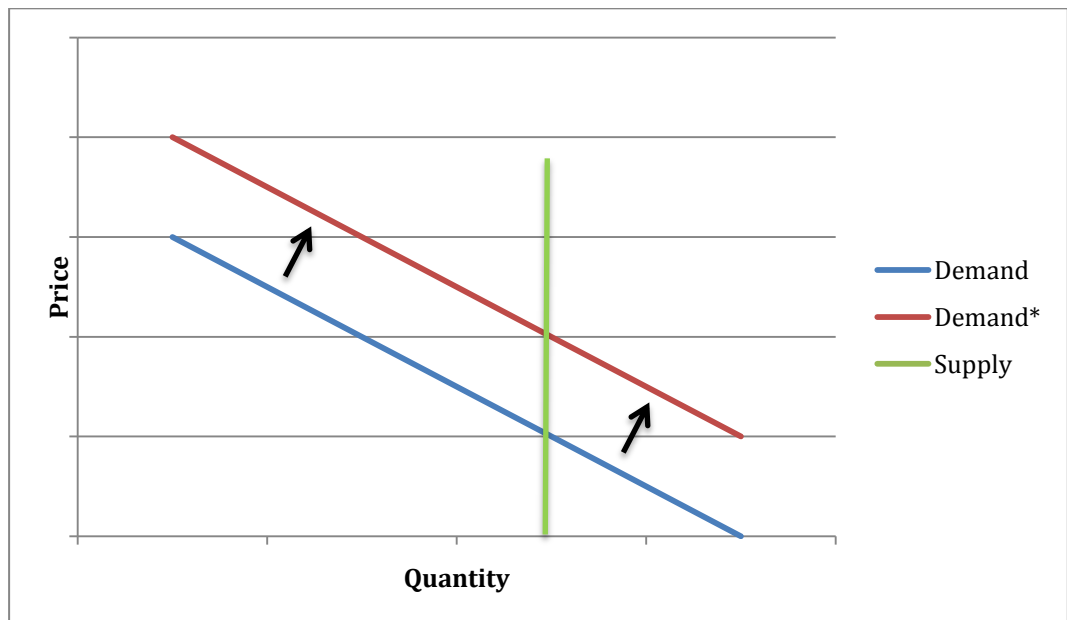
In times with a high demand from investors for new investment opportunities and the firms have a high demand of increased liquidity which can be illustrated with a shift outwards of the demand curve, the managers can theoretically charge a higher price as the firms and investors willingness to pay increase and there is a pressure on the managers capacity.



Graph 6: Increased demand

Source: Pindyck and Rubinfeld (2013) pp. 26

The fact that increased demand leads to increasing prices is even more evident if we assume that the manager’s capacity is fixed in the short run, due to long hiring and training periods etc. This can be illustrated with a fixed vertical line representing supply, and an outwards shift of the demand curve.



Graph 7: Increased demand with fixed supply.

Source: Pindyck and Rubinfeld (2013) pp. 26

4.3.2 *Price clustering*

Several studies have suggested that the pricing of an SEO have been subject to price clustering, which means that the price is expected to be set as a common integer. Lee et al. (1996) observe a trend to set the offer price to the nearest integer rate. Corwin (2003) found strong evidence that offer price tend to be rounded to even dollar amounts. Mola and Loughran (2004) did further studies within this topic and concluded that big banks are taking more market shares and have more pricing power than the smaller ones. Loderer, Sheehan and Kadlec (1991) examined 1.600 SEOs for the years 1980-1984 from the US. Oppose to the above findings, their study reveals very little evidence that managers systematically set offer price below the market price.

4.3.3 *Information asymmetry*

Loderer et al. (1991) point out that information asymmetry is likely to be a smaller problem for SEO pricing than for the pricing of an IPO. Corwin (2003) measured the information problem by firm size and the bid-ask spread, and found little evidence of a reliable relationship between information asymmetry and the spread. Altinkilic and Hansen (2003) used three pricing measures to consider if the information during the book-building period was taken into account in the price. They found that expected discounting increased when more positive private information was released during the book-building period. Hence, former studies insinuate that information asymmetry is not essential in SEO pricing.

4.4 *Economies of scale*

In the production of most goods and services, the supplier of these goods and services is applied with both *fixed and variable costs*. If the *marginal cost* of producing a good is below the *average cost*, then the average cost is falling (Pepall et al., 2003). For instance, if the firm has high fixed cost and low variable costs, then the products will on the average become cheaper to produce with increasing quantity. This effect is called *economies of scale*. Economies of scale are crucial to the existence of many financial institutions such as fund manager etc. A financial institution can benefit from the fact that it is relatively cheaper to

deal in larger quantities than in several smaller ones as you only pay the fixed fee once. Many financial institutions therefore offer to invest on the behalf of savers and buy large bulk transactions on behalf of many customers at the same time to a much smaller cost than they would have been able to achieve if they traded one by one.

It is not only high fixed cost that gives rise to economies of scale. In his book, “Wealth of Nations” from 1776, Adam Smith introduced the fact that large firms could divide tasks into smaller assignments. This is not possible for smaller firms, as there are too many assignments and too few people. When workers could specialise in only one or two assignments, instead of the production of the whole good, each worker became more efficient. As a consequence of this specialisation the overall productivity of the large firm increases. This means that the workers are more profitable for the larger firm, relative to the workers of the small firm.

Since larger firms have the possibilities to specialise assignments and produce more goods that reduces the average cost, the large firm has a competitive advantage over the smaller firm. It can produce more goods and it can produce them cheaper than the small firm, therefore the larger firm can charge a lower price than the competitor.

4.4.1 Types of costs

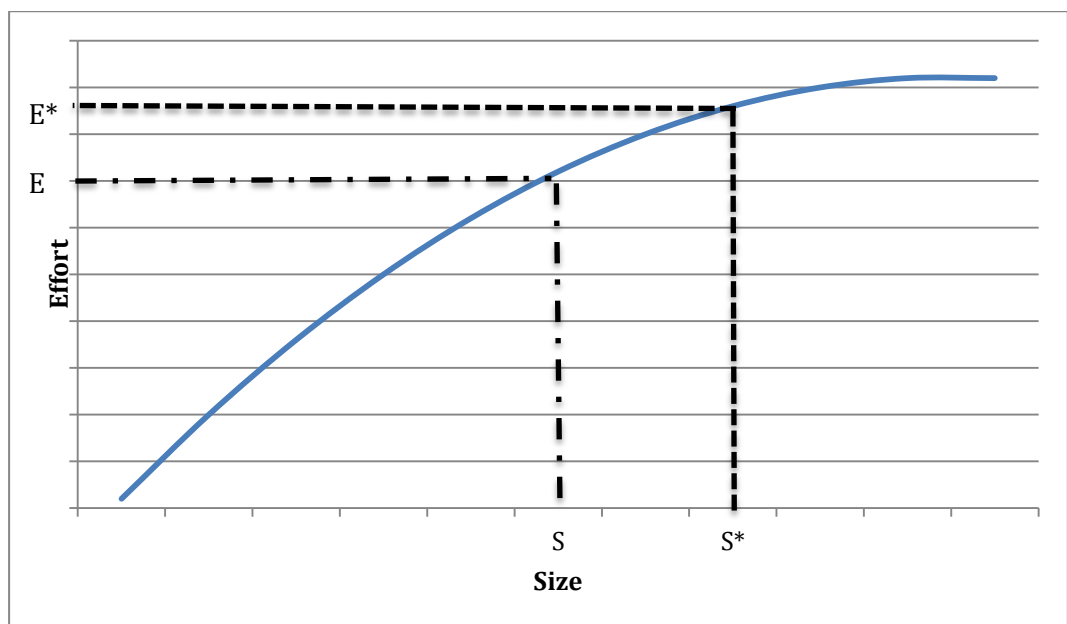
There are two types of costs in an equity issue, direct and indirect. The direct costs are the fees paid to the manager, guarantor, lawyers, the stock exchange, printing and distribution of prospects etc. Corwin (2005) used the bid-ask spread of the newly issued shares and the existing shares in order to measure the level of asymmetric information. This spread i.e. the discount at which the new shares are issued are borne by the existing owners of the firm, and this discount is thus an indirect cost for them (Smith, 1977). Another indirect cost is that in a private placement some investors are offered to purchase new shares from the firm. This increases the number of shares issued by the firm, diluting the current position of the other stockholders. The shares will only be diluted if the new shares are issued at a too large discount, and if the firm does not perform a repair issue to mitigate

the dilution. Since there are more shares that will distribute the cash flows generated by the firm, the value of each stock decreases. (Berk & DeMarzo, 2007)

4.4.2 Economies of scale in equity issues

In an equity issue there are for instance fixed fees to Oslo Børs, Verdipapirsentralen (VPS) and more or less fixed fees such as fees to lawyers, printing of documents etc. The variable fee, the main driver of cost, is the fee charged by the managers for their performance. For managers, the work associated with raising capital is a decreasing function of size. The manager does rarely have to put in twice as much effort into raising 100 million NOK as he has to do with 50 million NOK, since the prospectus is roughly the same, the lawyers do the same work etc.

This can be illustrated graphically with a concave function of effort and size:



Graph 8: Economies of scale

Source: Pindyck and Rubinfeld (2013) pp.

We can clearly see that the distance size $S^* - S$ is larger than distance in effort $E^* - E$. Less effort means that wage cost to the employers of the manager is a decreasing function of the size of the issue. Hence, the relative cost should also decrease with size.

Smith (1977) studied manager fees and other expenses across issue size and found that the issue size was negatively related to the manager fee, which he explains with economies of scale. Lee et al. (1996) found nearly the same when they studied SEO issuing in the period 1990-1994. They found a direct cost average of 7,1%. As a partly contradiction, Altinkilic and Hansen (2000) found that the issuers were facing what they called a “u-shaped spread”. At first, the spread decreases, as the fixed costs are baked into the proceeds. When more capital is issued, above a given amount, the spread will increase again due to what Kai Dai (2012) refers to as diseconomies of scale and the increase in variable cost. This effect is due to managerial inefficiencies (Emmons et al., 2001), increased *adverse selection* and *agency problems* that lead to higher placement costs, and due to increased difficulty of finding investors willing to participate (Altinkilic and Hansen, 2000). (Hansen (2001) and Kim et al. (2010) also verifies this finding of a “u-shaped spread”.

4.5 *The timing of a SEO*

A number of theories have been published on the topic of the timing of an SEO. Several of these theories takes into account the phase of the business cycle that exists or is expected according to Eckbo and Masulis (1995). One can argue that CFOs and board of directors that are able to plan ahead and raise capital in advance of any liquidity squeeze have a stronger position to discuss price and timing with the managers than firms with a immediately need for capital, i.e. firms with *a near term cash need* as Kai Dai (2012) called it. According to Chloe, Masulis and Nanda (1993) an adverse selection argument is pointed out where firms choose between issuing debt and equity across business cycle expansions and contractions.

Myers and Majluf (1984) claims that managers tends to issue stock when it is overvalued and avoid issuing when its undervalued, yet profitable business projects exists that otherwise would have been lost if equity issue is delayed or forgone. Furthermore, Cloe, Masulis and Nanda (1993) observe that since expansion periods imply more beneficial investment opportunities, firms are less likely to forgo investments as a consequence of the stock being underprized.

Empirical backing for this is found in Moore (1980) who argues that the frequency of equity offers relative to debt offers rises in periods of economic upturn.

Under Myers' (1984) "pecking order" hypothesis, firms are believed to prefer internal finance projects if available, before issuing low risk debt and then finally issue equity as sort of a last resort. If we assume that a business cycle downturn reduces internal resources of funds, then the equity offerings will become relatively more attractive.

In the model by Stultz (1990), debt issuance becomes more appealing when free cash flow increases. In an economic contraction, if the earnings fall less than capital spending, which is typical in such situation, Stultz (1990) argue that free cash flow might increase and by that also increase the desirability of debt offers. He also argues that the cost of the debt offers is an underinvestment in profitable project, which seem to be less of a problem in economic downturns.

Eckbo and Masulis (1995) observe from reviewing all these theories that the timing of the equity issues predict that the occurrence of equity and debt offers vary with the business cycle. They pointed out that the frequency of equity issues tends to increase during economic expansion. They also found that the degree of the negative market reaction to firm commitment offers of equity decreases in expansions.

5. Research question and hypotheses

In this subsection we would like to present our hypotheses, which we find interesting to test based on the theory, presented above and our research question:

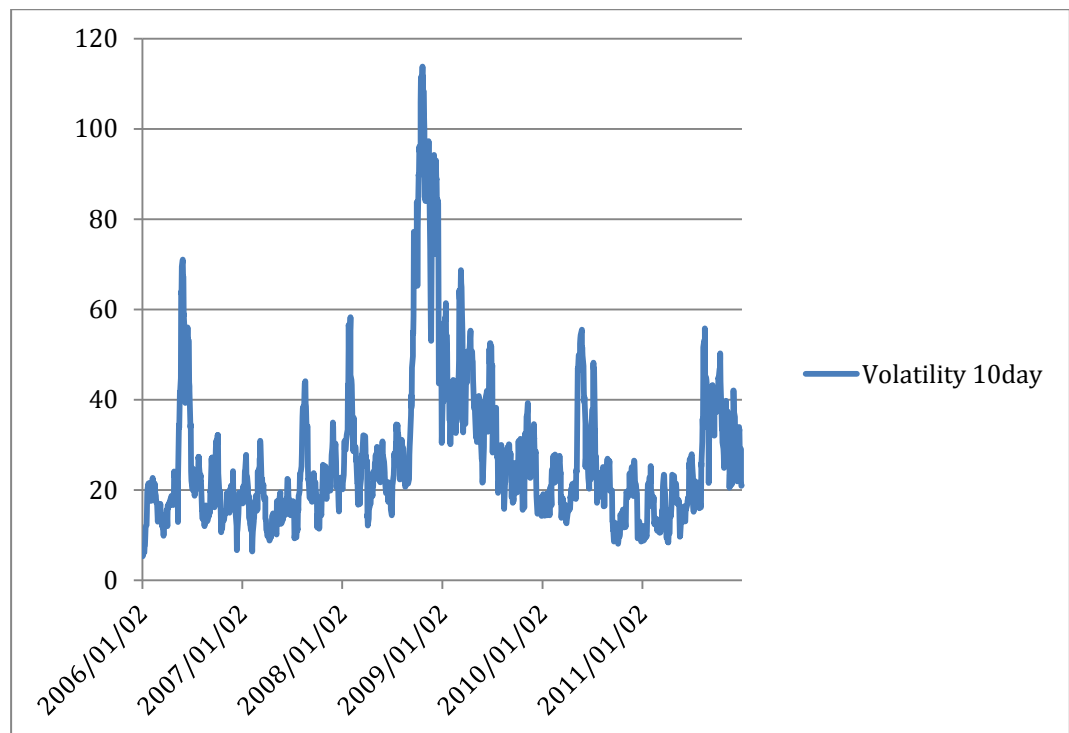
<p><i>How high are the direct costs of a stock issue for a firm listed on the Norwegian stock exchange?</i></p>

5.1 Development of costs

Miller and Modigliani made several assumptions in order for their theory on constant *weighted average capital cost* to be valid. It is obvious the case that these do not hold in real life. First of all, there are normally transaction costs for majority of financial transactions as institutions demand compensation for any work and risk associated with the transaction. Secondly, taxes do exist and since debt is tax deductible. This lowers the cost of debt making it more attractive (Modigliani and Miller, 1958). More crucial is the assumption of perfect information.

Perfect information means that all information is available to everybody immediately, and that the public has complete knowledge of all the firm's financials, plans etc. Due to frictions, lags and capacity limitations of both systems and individuals there will, however, never be perfect information. Unique information is crucial in the financial market in order to earn abnormal returns on investments. Hence, if everybody had the same information and acted rationally, it would be impossible to outperform the market. A large part of the job for a manager is to produce and spread information to investors as they can do this more efficiently than the issuer itself due to its networks, as we have argued above. Thus, in more efficient markets managers can charge lower fees for issues. However, we might assume that with technological development, information spreads faster, cheaper and is more easily available to the public. Therefore more technological inventions will bring the market closer to perfect information over time. As a consequence one may assume that the direct cost for issues should decrease over time as the markets become more efficient. Finally Miller and Modigliani (1958) assumed that investors are rational and behave thereafter, optimizing their utility. This is a very common assumption in economics, making generalization easier. However, in recessions and periods with descending stock markets, investors may be driven by fear, reducing exposure and making irrational decisions. Also in increasing stock prices, investors may be blinded by the thought of ever rising prices and therefore overinvest in overvalued assets. Such over-optimism may be one of the reasons for the housing bubble in the United States that arguably lead to the financial crisis that started the summer of 2007 (CNBC, 2012).

Elaborating further on the assumption by Miller and Modigliani (1958) of perfect information, one can argue that the reduced creditability between financial institutions during a recession such as the financial crisis of 2007-2009 can be thought of as reduced flow of information. With reduced information flow, the potential for managers to exploit the asymmetric information increases. We should consequently see increased fees during the financial crisis, but that the cost level returns to a “normal” level in the period after. This is very much in line with the observations by CDIAC (1993), that the size of the fee is directly connected to the market risk. As the risk or perceived risk during the financial crisis rose to extreme levels we should see that the fees charged by the managers increases during the financial crisis. Graph 9 below shows the increased risk in the period 2007-2009 on Oslo Børs.



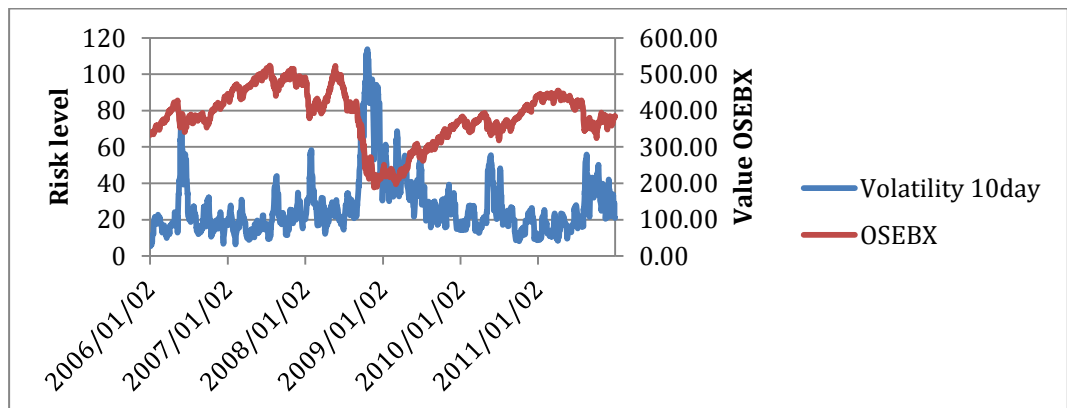
Graph 9: 10-day volatility OSEBX 2006-2011

Source: Bloomberg

Eckbo and Masulis (1995) proved that frequency of equity issues increases in periods of expansion. Therefore there will, in periods of expansion, be a higher demand for managers' assistance in equity issues. We assume that the managers have limited capacity and can only take on a limited number of issues at once. Thus, the supply is fixed in the short run. As we argued earlier, this will lead to

increased prices. Antithetically, in recessions there should be lower demand for equity issues and correspondingly, opposite to the example above, prices will fall. With fewer issues being made, the competition to lead the issues increase, pressuring prices downwards.

The effects of a recession on the fees charged by a manager are therefore ambiguous and dependent on the strength of each push and pull factor. As our period extends from 2006 and through the financial crisis of 2007-2009, we get one and a half year of normal market conditions, before two years of recession and then the final two years of recovery. In his speech at London School of Economics, Sir Mervyn King, governor of the bank of England, argued that the financial crisis is “[...] far from over[...]”, and that “[...] fundamental changes are needed to the international system before confidence can be regained.” (The Guardian, 2013) Following the same pattern Bloomberg argue in their article “Sorry, but Europe’s Economic Crisis Is Not Over”, that the financial crisis was followed by the Euro crisis of 2010-2012. (Bloomberg, 2013) In this thesis we will argue that the crisis ended in the second quarter of 2009, where the bottom of Oslo Børs was reached and the volatility fell back to 2006 levels, as graph 10 shows.



Graph 10: Value and volatility on Oslo Børs

Source: Oslo Børs and Bloomberg

We will therefore investigate if there were significant changes in fees charged by managers during the period 2006-2011.

Hypothesis I: There have been significant changes in the direct costs of an equity issue in the period 2006-2011.

To test this, we form a null hypothesis (H_0) and an alternative hypothesis (H_1) representing the case to be proven. Where the (H_0) says that the level of the direct costs (DCL) is identical in each period, and the (H_1) claims that they are not equal.

(H_0): DCL Q1 2006 = DCL Q2 2006 = ... = DCL Q4 2011

(H_1): DCL Q1 2006 \neq DCL Q2 2006 \neq ... \neq DCL Q4 2011

5.2 *Economies of scale*

In section 4.3 we described economies of scale and its' importance in the economy. Since economies of scale especially as a significant driver of financial institutions' value creation in general, we would like to investigate if economies of scale are present in the process of raising equity in Norway. We will also measure to what extent they affect the cost level of an issue. The findings of Smith (1977), Lee et al. (1996) and Altinkilic and Hansen (2000), which we presented earlier, are indications and partly supportive evidence on the presence of economies of scale in Norwegian economy. Ledaal (2009) also found clear evidence of benefits of scale in Norwegian IPOs.

The number of managers varies directly with the size of the offering, i.e. the larger the issue the more managers there are, cooperating in the issue. This is mostly due to the need of reaching a large enough mass of investors and the fact that one have to utilize complementary market knowledge and networks of the managers. The reasoning is that using two or more complimentary managers is a more efficient way of raising the capital. According to Singh (2008) the need for a time-consuming book building-process only applies for mega issues. This is due to the fact that Miller and Modigliani's (1958) assumption of a frictionless market, with perfect knowledge and no friction does not hold. The managers needs time to make the issue know in the market and reach all potential investors. Hence managers of smaller issues need less time and work to run their books and therefore they incur lower costs.

Due to the findings of previous studies we have mentioned, of the costs IPOs and SEOs, we believe that the benefits of complimentary managers and the economies of scale are stronger than the cost of a book running process. Hence, we believe that we will find evidence of economies of scale in Norwegian equity issues. We would also like to measure to what degree the economies of scale affect the cost level of an equity issue in relation to the amount raised.

Hypothesis II: There are economies of scale in equity issues in Norway, and they are increasing with the size of the issue.

We formulate the following H_0 and H_1 :

H_0 : DCL of raising 1 mill NOK = DCL of raising 5 mill NOK = ... = DCL of raising 15 billion NOK

H_1 : DCL of raising 1 mill NOK \neq DCL of raising 5 mill NOK \neq ... \neq DCL of raising 15 billion NOK

5.3 *Specialists*

In section 4.1.2.6.1 Managing Syndicates, we presented several views from different studies on the importance and implications of the managers reputation and abilities. The reputation of the manager is an important factor when the issuer is selecting manager for the equity issue. As there are several factors the issuer must take into consideration when appointing a manager or several. Some of them are:

- Will the manager, or managers, be able to raise the amount of capital the issuer needs?
- To what extent can the manager deliver the analyst coverage needed and reduce the under pricing of the new stocks issued?
- Which signals will the manger and the issue send to the market?

As Hume and Sharma (2009) found, a better reputation for the manager is a competitive advantage, meaning that the service they provide is inhomogeneous to the competitors and they can charge a higher price relative to the case of homogeneous services, as we rationalized in section 4.2. A manager with a good record and references reduces the risk of failing to raise capital or that the market

will misinterpret the issuer's intentions for the issue. And as Altinkilic and Hansen (2003) found; more reputable managers leads to a higher price for the new issued stocks, reducing the indirect loss of the current shareholders. Hence, we can argue that a manager that specialises in asset analysis, trading and issues will have a larger share of the market if prices offered are identical. And they will, on average, charge a higher fee for issues than non-specialists, such as consultancy firms, other banks etc. We therefore use Norwegian financial institutions as a proxy for a specialist for raising equity for firms listed on Oslo Børs.

Hypothesis III: Specialists charge a higher fee for an equity issue than a non-specialist.

Again we form a H_0 and H_1 :

H_0 : DCL manager type 1 = DCL manager type 2 = ... = DCL manager type 4

H_1 : DCL manager type 1 \neq DCL manager type 2 \neq ... \neq DCL manager type 4

6. Data description

We have investigated the direct costs of equity issues in Norway, and have gathered data on all equity issues made in the period 2006-2011 through the prospectuses of the issues. Oslo Børs provided the prospectuses to us, and the sample is complete for the period. Due to legal requirements and changes in the requirements for prospectuses, the availability of older prospectuses is limited, and we therefore decided to analyse a shorter period with a complete sample instead of a more longitudinal study with less accuracy. The sample consists of 177 issues over a period of 24 quarters. Two are excluded from the sample as they are not issues made to raise equity for the firm, but are a result of a large number of newly issued shares to management, shareholders etc. as bonuses, realised stock options and so on. One of these is the issue managed by Fearnley Fonds for Scorpion Offshore Ltd. in February 2008:

“The purpose of the Prospectus is to increase the number of shares available for trading on Oslo Bourse to 54,131,928, since the number of shares issued within

the last 12 months amounts to more than the 10% threshold to issue a prospectus.” (Fearnley Fonds, 2008. p.6)

One issue is left out because it mostly consisted of a convertible bond, without the possibility to identify the costs related to the equity issue. This leaves us with a sample of 174 observations.

The period includes the phase just before, under and after the financial crisis of 2007-2009. We have grouped the data into quarters in order to take account for seasonal shifts in demand and supply for equity. Also the data obtained elsewhere is arranged quarterly.

The date of the issue, unless explicitly stated in the prospectus, is set to the date when the investor receives the ownership of the new stocks. In some issues there has been made two separate offers, i.e. to stockholders and employees for instance in two quarters. As the fees for these issues are stated net, we have set the date to the first issue. For the rights issues we have set the date to the end of the subscription period, as this is the ultimate date the stockholders can elect to participate in the issue and therefore is the day they obtain a legally binding right for the new shares.

Some firms on Oslo Børs originate from countries such as Canada, Sweden etc. In the prospectus for some of these issues, the equity raised and fees are stated in their native currency. Unless any exchange rate to Norwegian kroner is stated in the prospectus, we have converted it to NOK by using the historical exchange rate on the day the shareholders received their share. The exchange rates are gathered from the national bank of Norway, Norges Bank.

The prospects for the placements contain both the level of equity raised, and the direct costs of the placement. For rights issues the prospects are made ahead of the issue and distributed to the investors. The price range and number of stocks issued are therefore not known. In cases of uncertainty we have estimated the mid range of the size of the issue and the management fee. For the private placements, many of the prospects are made after the placement, and they state the actual amount

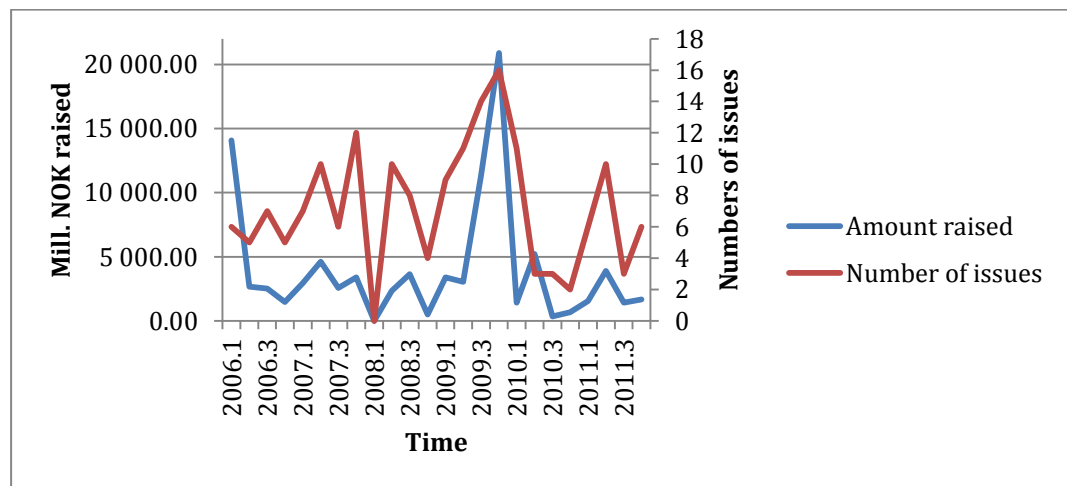
raised and the direct costs. We have, as far as possible, used the gross proceeds presented in the prospects as the “amount raised” in the placement or issue. If the gross or net proceed is not explicitly stated in the prospect, we have calculated the gross proceeds as: (number of shares issued x the subscription amount). In several of the prospects the fixed costs of printing and distributing the prospects, listing fees etc. are not included in the overall cost but comes in addition. We have not made any attempt to estimate such costs and add them to the total cost of the event, but instead noted that the true cost may be slightly higher than what we found.

There have not been any significant changes in the fixed costs to Oslo Børs, VPS etc. in the period. Any changes in the price level are therefore attributed to changes in the fee to the managers.

In the 174 placements and issues, there have been a total of 40 managers assisting with the events. Seven of the issues have been without any managers, as the issuers themselves have handled the event. On average there has been 1,68 managers assisting in the placements or issues as they both compete and cooperate in raising the capital. Especially in the events where the firms headquarter is located abroad there are several managers, where foreign managers are brought in to focus on the foreign market and the Norwegian managers work with Norwegian investors. At most there were seven managers assisting in the same event. In order to measure market power and competition we use the same method as Megginson and Weiss (1991) used when analysing the IPO market. We measure the manager’s amount of capital raised in the various events and divide that amount with the total capital raised in the period. In the cases of two or more managers assisting in an event, we split the amount raised evenly between the managers for simplicity. This is not realistic, as a manager only assisting in one event, most likely, will not have the same network of investors as the more experienced managers. Thus, the market power of the largest managers may be larger than what we have estimated. By dividing the amount raised evenly between the respective managers, we limit the disturbance to the data with biased estimations of their contribution in events. Measuring market power in this manner might over

estimate the importance the manager has of contributing in large events, relative to several small ones.

Graph 11 shows the amount raised in equity issues per quarter and the number of issues in the corresponding quarter. In Q1-2008 there were not any equity issues in our sample. Besides this quarter, the remainder of the financial crisis had approximately the same activity in raising equity through issues as the period immediately before the crisis and after. Q1-2006 and Q3-2009 are extreme observations, and the amount raised in Q3-2009, immediately after the financial crisis is driven by the 14 billion NOK issue in DNB.



Graph 11: Amount raised and number of issues

Source: Prospects (Oslo Børs)

We have summarized the observations for all managers in groups, depending on what kind of firm they are. This is necessary in order to make use of panel data for testing, which requires at least two observations of the same group at two different periods of time. There are too few managers participating in issues in every quarter for the panel data to give valid results. More on panel data will follow in the methodology section. The managers are grouped after their sector code found at Brønnøysundregistrene as:

1. Financial institutions; firms that mainly operate in brokering stocks and bonds, corporate finance etc.
2. Banks; if the manager is part of a corporation that has banking as their main activity.

-
3. Issuers; are the cases where the issuer performs the whole issuing themselves.
 4. Other foreigners; if the manager is a foreign firm not registered at Brønnøysundregistrene, and their main activity is different from a financial institutions.
 5. Foreigns; if the manager is a foreign financial institution, not registered in Brønnøysundregistrene through a Norwegian subsidiary.

This grouping gives us five quarterly observations for “other foreign”, which is the lowest number of observations, up to 22 observations for “financial institutions”. This grouping simplifies the testing if, for example, financial institutions that specialize in SEOs can charge a higher price than other firms due to their expertise.

In several of the issues there have been managers or stockholders guaranteeing to participate for an agreed amount in the issue. Thus, the issuer has been guaranteed a minimum amount that will be raised in the equity issue. As the guarantor takes on a lot of risk by guaranteeing in advance, without knowing the markets response to the issue, they demand compensation from the issuer to justify the additional exposure. The compensation is often a few percent of the amount they guarantee for. In many of the prospects the manager fee was inseparable from the other fees, and since this is a cost for the other investors, we have included these costs in our data.

To control for inflation over the period, we use the inflation published by Statistics Norway and calculated the real values with first quarter 2006 as the base.

In order to estimate the macro economical effects from changes in market conditions to the cost of raising equity, we have included the GDP, unemployment and the key rate set by Norges Bank. We have calculated the LOG, i.e. the change in the variables from quarter to quarter to control for the changes in the costs. All data in this purpose is gathered from Statistics Norway’s homepages.

Finally, we have included the LOG of the value of Oslo Børs (OSEBX), in order to control for specific financial changes. As Malkiel (2003) points out: an efficient

market with free information reacts immediately to changes in the economic conditions and macro economic variables normally lag with some months. By including the stock exchange we can test hypothesis I; if there have been any changes in the level of costs in the period, and to what extent this is due to the financial crisis. The data on the stock index is gathered from Oslo Børs' homepages.

7. Methodology

In this section we will describe the different methods we will use to test our hypothesis and why we have chosen these methods.

7.1 Panel data

Panel data is a set of data with repeated observations over the same units. In our specific thesis: groups of managers over a number of periods. We are interested in finding how the units behave, how their behaviour change over time, and if the units respond different to the same impulses, such as a shock to the economy. We compare the observations of the units over time with observed variable factors that we do believe have a significant impact on the unit's behaviour. If there are systematic and significant covariance and correlations between the unit's behaviour and the explanatory factors one can conclude that the factors have a systematic influence on how the units behave.

The benefit of using multiple observations over a period of time is the possibility to estimate more realistic and complicated models than a cross-section or a single time series would do. However, with repeated observations one can usually not assume that the observations are independent of each other. Another flaw of panel data is the increased likelihood of missing data, because there normally will be periods without observations for some of the units (Verbeek, 2004).

In order to perform a panel data test one needs to have at least two observations of a sample, and there cannot be more than one observation at any period of time. But then again, repeated observations of a unit lets us estimate changes on unit

level, and can explain why units behave differently in the different periods and why a unit behaves differently in two different periods of time (Verbeek, 2004).

There are several variations of a panel data test available, depending on the data that is to be analysed. Especially the unobserved effects of the observed explanatory variables are important to evaluate before testing. The unobserved effects model (UEM), for a randomly drawn sample, can be written as follows:

$$y_{it} = x_{it}\beta + c_i + u_{it}, T = 1, 2, 3, \dots, T$$

Where x_{it} is a $1 \times K$ matrix that can contain observable variables that change over time (t) but not over units (i), variables that change over i but not t or variables that change over both i and t. c_i is the unobserved effects of each individual and is often called the individual effect or individual heterogeneity. u_{it} Are the idiosyncratic errors as they across t as well as i (Wooldridge, 2002).

c_i can have both random and fixed effects depending on whether c_i is treated as a random variable or as a parameter to be estimated. With random effect it is meant that there is zero correlation between the unobserved effect and the observed explanatory variables, whereas with fixed effect one allows for correlation between the unobserved effects and the observed explanatory variables (Wooldridge, 2002).

We follow Verbeek (2004) and test our variables for heterogeneity with a Hausman test in order to find out if the unobserved effects are random or fixed. What the Hausman test does is that it tests if the fixed effect estimator and random effects estimator are significantly different, and if they are not, it is safe to use random effects. The Hausman test is calculated as:

$$\xi_H = (\hat{\beta}_{FE} - \hat{\beta}_{RE})' [\hat{V}\{\hat{\beta}_{FE}\} - \hat{V}\{\hat{\beta}_{RE}\}]^{-1} (\hat{\beta}_{FE} - \hat{\beta}_{RE})$$

Where \hat{V} is the estimate of the true covariance matrices, $\hat{\beta}_{FE}$ is the fixed effects estimator, $\hat{\beta}_{RE}$ the random effects estimator. Under the null hypothesis, which implicitly says that $\text{plim}(\hat{\beta}_{FE} - \hat{\beta}_{RE}) = 0$, the statistic ξ_H has an asymptotic

Chi-squared distribution with K degrees of freedom, where K is the number of elements in β (Verbeek, 2004).

We find that the effects are not significantly different from each other, and conclude that we can use the random effects method. Random effects is a more efficient way of using the data than fixed effect, and is normally better for smaller samples such as ours, since the random effects use the between variation ($\bar{x}_i - \bar{x}$) in the data. However this only applies if $= \frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + T\sigma_\alpha^2} > 0$ (Verbeek, 2004).

The random effects model is written:

$$y_{it} = \mu + x'_{it}\beta + \alpha_i + \varepsilon_{it}, \quad \varepsilon_{it} \sim IID(0, \sigma_\varepsilon^2), \alpha_i \sim IID(0, \sigma_\alpha^2),$$

α_i is the individual specific component that does not change over time, and ε_{it} is a remainder component. α_i and ε_{it} are assumed to be uncorrelated over time. Therefore, all correlation in the error terms over time is attributed to the individual effects of α_i . One assumes that α_i and ε_{it} are mutually independent and independent of x_{it} . This implies that the ordinary least squares (OLS) for μ and β are unbiased and consistent. However, OLS is not the best way to compute the standard errors, as the error term $\alpha_i + \varepsilon_{it}$ exhibits a special form of autocorrelation, unless $\sigma_\alpha^2 = 0$. It is therefore more efficient to calculate the generalized least squares (GLS) (Verbeek, 2004). See appendix 2 for more information about GLS.

We divide the period into two, 2006-2008 and 2009-2011, in order to test if there has been any changes in the cost level that is due to development of processes, tools etc. We use dummy variables to separate the two time periods.

We will use panel data to test if we can find explanatory variables for the cost level of issues in Norway for the period 2006-2011. We start by running a test with several macro variables; GDP, unemployment, the interest rate, the value of the stock market (OSEBX) and more issue specific variables such as the size of the amount raised. The formula we start by testing is:

$$\begin{aligned} \text{DCL} = & \mu_{\text{fixed costs}} + \text{GDP}'_{it}\beta + \text{Unemployment}_{it}\beta + \text{Interest rate}'_{it}\beta + \\ & \text{OSEBX}'_{it}\beta + \text{ammount raised}_{it}\beta + \text{time}'_{it}\beta + \alpha_i + \varepsilon_{it} , \\ \varepsilon_{it} \sim & \text{IID}(0, \sigma_\varepsilon^2), \alpha_i \sim \text{IID}(0, \sigma_\alpha^2) \end{aligned}$$

In order to conclude which of explanatory variables have a significant impact on the direct cost level, we must look at the t- and p-values of the panel data regression. The t-value is the value of the *test-of-significance*. “Broadly speaking, a test of significance is a procedure by which sample results are used to verify the truth or falsity of a null hypothesis. The key idea behind the test of significance is that of a test statistics (estimator) and the sampling distribution of such a statistic under the null hypothesis. The decision to reject the H_0 is made on the basis of the value of the test statistic obtained from the data at hand.” (Gujarati, 2003. p. 129)

The t-value is calculated by the formula:

$$t = \frac{\hat{\beta}_2 - \beta_2}{se(\hat{\beta}_2)} = \frac{(\hat{\beta}_2 - \beta_2) \sqrt{\sum x_i^2}}{\hat{\sigma}}$$

This value follows the t distribution with n-2 degrees of freedom (Gujarati, 2003).

The degrees of freedom for a panel data regression is calculated as:

Degrees of freedom = NT – N – k, where k = # of x (Roberts, 2009).

One then finds the corresponding critical value in a t-table, if the t-value of the test is larger than the critical value, then the explanatory factor is significant.

“[...] the p-value (i.e. probability value), also known as the observed or exact level of significance or the exact probability of committing a Type I error. More technically, the p-value is defined as the lowest significance level at which the null hypothesis can be rejected.” (Gujarati, 2003. p. 137) As we test with a 95% confidence level, the p-value must be lower than 0,05 for us to conclude that the explanatory factor is significant. STATA reports the p-values in the results, but the value can also be found by looking it up in the t-table.

We start by testing several variables at once, then remove the variables with the poorest fit, and rerun the test with reduced variables until we are left with only statistical significant explanatory variables.

7.2 *The endogeneity problem*

An explanatory variable is said to be endogenous if it is correlated with the disturbance term. Generally, in applied econometrics, the issue with endogeneity arises in one of three ways. First, it can be due to *omitted variables*. Omitted variables emerge as a consequence of data unavailability when one wants to control for one additional variable, but cannot include it in the regression. Second, endogeneity may occur as a *measurement error*. The measurement error arises when one tries to measure the partial effect of a variable, but we can only measure the effect imperfectly. Econometric endogeneity can also arise as *simultaneity*. This occurs when at least one of the explanatory variables is determined simultaneously along with your left-hand side variable (Wooldridge, 2003). According to Wooldridge (2003) the distinctions among the three possible occurrences are not always sharp. In some occasions you might even have more than one source of endogeneity.

7.3 *Two-sided mean comparison test*

To test whether there are types of managers that charge a statistically significant higher price than the others, we will run a two-sided mean comparison test with the quarterly aggregated mean fee in percent of amount raised. For each type of manager the test is done towards each other, in order to test if one or the other managers charge a lower fee in percent of the issue.

A t-test is a test of significance, or the truth or falsity of a null hypothesis (H_0). The first step of a t-test is to calculate the value t for a sample:

$$t = \frac{\hat{\beta}_i - \beta_i}{se(\hat{\beta}_i)} = \frac{(\hat{\beta}_i - \beta_i) \sqrt{\sum x_i^2}}{\hat{\sigma}}$$

The variable t follows the t distribution with $n - 2$ degrees of freedom, under the normality assumption. Since the variable follows the t distribution, we can make a confidence-interval statement:

$$\Pr \left[-t_{\alpha/2} \leq \frac{\hat{\beta}_i - \beta_i^*}{se(\hat{\beta}_i)} \leq t_{\alpha/2} \right] = 1 - \alpha$$

β_i^* is the value of β_i under H_0 , and $-t_{\alpha/2}$, $t_{\alpha/2}$ are the critical t values that decides the validity of the H_0 (Gujarati, 2003).

We form a $H_0: \beta_i = \beta_j$, i.e. that the fees charged by every type of manager is identical to the others. Our alternative hypothesis is therefore $H_1: \beta_i \neq \beta_j$. In the cases where the H_0 does not hold, we must reject it and conclude that the fees are not identical.

7.4 Concentration of market power

The procedure of calculating CR_4 , CR_8 and HHI is straightforward. To calculate CR_4 and CR_8 one simply adds together the market shares of the four or eight largest actors. HHI is calculated by squaring actors' market share and add them together (Pepall et al., 2008). The calculation of each actor's market share is explained in the data section.

We do all our testing in Stata12, as it can handle both panel data and t-test. For simpler calculations, such as for competition, we use Excel.

8. Empirical evidence and discussion

In this section we will present and discuss the results of our tests.

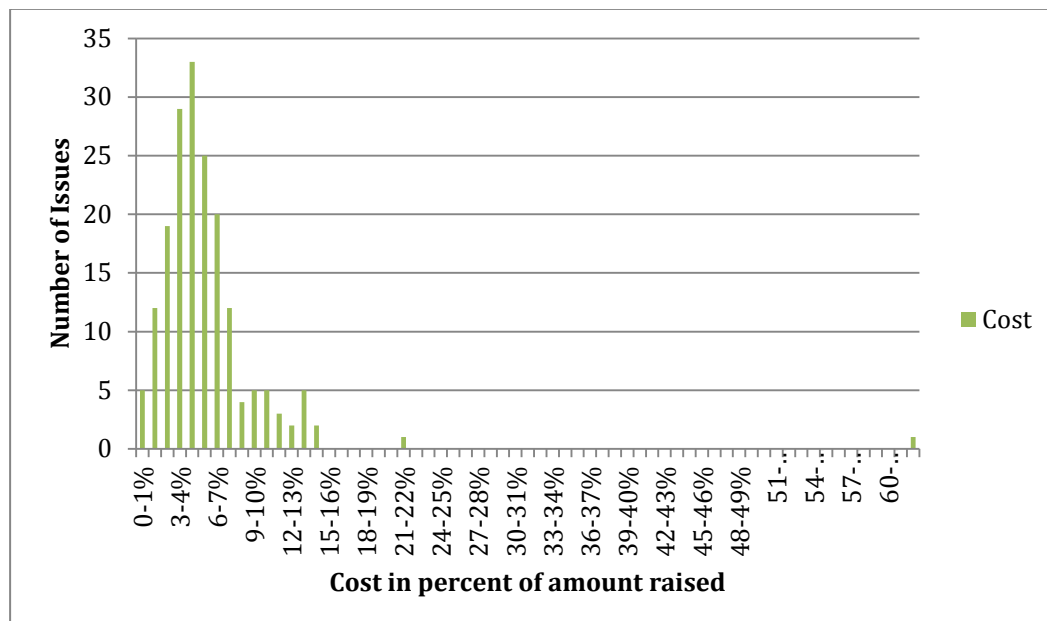
The results from our tests can be seen in appendix 3-8.

8.1 The direct costs of equity issues

The descriptive statistics of the complete sample can be seen in appendix 3. We see that the average cost in percent of the amount raised in the issue is 5,62 %. This means that for every million NOK the manager raise during the issue, the issuer must pay 56.200 NOK in fees to the manager, lawyers, Oslo Børs etc. The median of the sample is 4,67%.

Graph 12 illustrates the distribution of the cost level. 86% of the issues lie within 1-8% of the total amount raised. The minimum is 0,06%, which was only fixed

costs for an issue where the firm raised 543.600.000 NOK by themselves. The max is 62,5% of the amount raised, in that particular case only 800.000 NOK was raised.



Graph 12: Distribution of cost in percent

Source: Prospects (Oslo Børs)

The average costs we find are significantly lower than the average cost (14,6%) Ledaal (2009) found for Norwegian IPOs in the period 1998-2008. There was however some shortcomings to his study, such as a small sample over a longer period. The median Ledaal found, 7,3% is probably a better measure than the average, as he had two observations with 100% cost. As there is more uncertainty and work for the manager with assisting in an IPO, as the pricing and book building process is more complex, it is reasonable that the cost of a SEO is lower than for an IPO.

Smith (1977), who is believed to be the first to analyse the gross fee of an SEO in an empirical environment, studied 578 US offerings from 1971 to 1975 and found an averaged fee of 5,02%. Small issues averaged at nearly 10%, whereas very large issues had an average of less than 4%.

Eckbo and Masulis (1992) followed up with the analysis of 1.249 US offerings from 1963 to 1981, and found an average of 6,09% for industrial issues and 4,23% for utility issues.

Gao and Ritter (2010) analysed 3.276 US offerings from 1996 to 2007, and reports a gross fee average of 4,82%.

The cost level for Norwegian SEOs lies somewhat above the results in the studies mentioned above. Several factors may contribute to this. For instance as the US studies we have found are getting out of date, and as we argued in section 5.2, developments made in communication and processing may have caused changes in the cost level. This should however lead to lower costs in our sample, than in the studies from 1970-1980s. Secondly, the financial crisis of 2007-2009 may skew our sample with abnormal equity issues, increased competition and increased risk. Third, the competition in the Norwegian market may be weaker than in the US. In our sample we get a CR_4 -estimate of 54,37% and a CR_8 -estimate of 72,99%, both indicating a medium concentrated competition. The HHI of the sample is 914,92, and indicates an unconcentrated competition. As we presented in section 4.2, the profit of the actors in a Cournot competition decreases with the number of competitors. Therefore, if the competition in the US is higher than in Norway, this may pressure the managers to claim lower fees than in Norway. Fourth, the size of the issues in the US may on average be higher than in Norway, as it is reasonable to assume due to the size of the US market and US firms. In the presence of economies of scale, this will lead to a lower degree of direct costs in percent of the amount raised. Fifth, as the US economy is the largest in the world (CNN, 2013 and Economy Watch, 2013) the numbers of investors, both national and foreign, are significantly higher than in Norway. And therefore many of the largest managers in the US have a vast global network and customers. This may make the process of raising similar amount of equity in the US relatively more efficient than in Norway, explaining the difference in the cost level.

8.2 *Development of costs*

Hypothesis I: There have been significant changes in the direct costs of an equity issue in the period 2006-2011.

In our panel data, the time variable is not a significant explanatory variable for how much of the amount raised is charged as fees. We have also tested with a dummy variable, dividing the period in two, 2006-2008 and 2009-2011. This dummy variable is not significant either. Hence, we cannot conclude that there has been changes in the cost level due to development of markets, tools etc. The results can be seen in table 2 below.

```
. xtreg Feein OBXprQ Raisedreal Time, re
```

Random-effects GLS regression
Group variable: Managertype

Number of obs = 65
Number of groups = 5

R-sq: within = 0.1831
between = 0.1097
overall = 0.1817

Obs per group: min = 5
avg = 13.0
max = 22

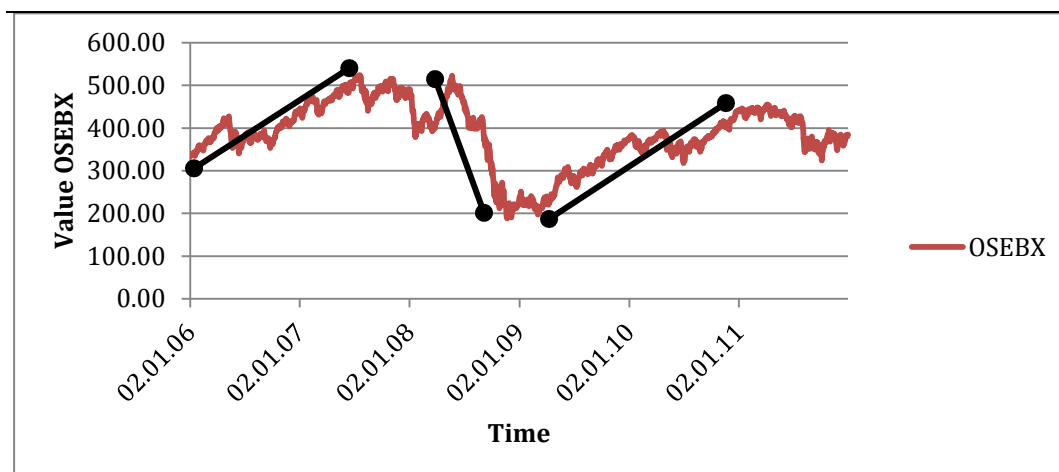
corr(u_i, X) = 0 (assumed)

Wald chi2(2) = .
Prob > chi2 = .

Feein	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
OBXprQ	-.0000943	.0000417	-2.26	0.024	-.0001761	-.0000125
Raisedreal	-3.82e-12	1.30e-12	-2.95	0.003	-6.36e-12	-1.28e-12
Time	.0025463	.0063212	0.40	0.687	-.0098431	.0149357
_cons	.0865199	.0152829	5.66	0.000	.056566	.1164739
sigma_u	.00312099					
sigma_e	.02226262					
rho	.0192744 (fraction of variance due to u_i)					

Table 2: Panel data test: Time variable

We do, however find that the level of OSEBX is a significant variable on the amount charged in percent of the amount raised. As there have been large fluctuations in the value of OSEBX over the period, this may corrupt the test of the time variable. Our result suggests that the average fee charged drops with 0,00861 percentage points per 100 points the OSEBX rises with. The result is shown in table 2 above. Graph 13 shows the development of OSEBX over the period.



Graph 13: Value OSEBX 2006-2011

Source: Oslo Børs

The black line to the far left in the graph shows that the OSEBX increased with approximately 100 points in the period Q1-2006 until Q2-2007. In this period the average cost of an equity issue did therefore fall. During the financial crisis, there was a fall of roughly 200 points on the OSEBX. Our result tells that the cost of raising capital increased in this period, and should have increased by nearly twice as much as the fall in the period Q1-2006 – Q2-2007. From the end of the financial crisis, the OSEBX rose with approximately 100 points, and the costs of raising equity fell.

This fact, that there are increasing costs in a period with an increasing volatility, fits well with our postulation that Miller and Modigliani's (1958) assumption of rational investors and perfect information does not hold, as presented in section 4.1.2.6.3 and argued in section 5.2. The increased fees charged by the managers might suggest that they exploit the imperfections in the market, or it can be that the managers demand a higher risk premium for the issue. The risk of not being able to raise enough capital in a recession or misprice the stocks is severe. As Corwin and Schultz (2005) argued, damaging their reputation can be costly for the managers, and the managers may therefore have increased their prices to justify their participation in the issue.

One can argue that there was approximately the same level of equity raised during the financial crisis as both before and after, if one disregards Q1-2006 and Q3-2009. There were however a larger number of issues in Q3-2009. This indicates a

lower amount raised per issue, meaning that any economies of scale are lower and that the issues therefore are somewhat more expensive in that period. If we assume that the investors demand for equity issues was unchanged during the financial crisis, as well as the capacity of the managers to assist in issues, the increasing amount of issues can explain the increased price in the period, ref graph 6 and 7. This effect is amplified if we assume that the investors are risk averse and reduced their demand for stocks during the most volatile periods. This can be illustrated with an outward shift of the supply curve and an inward shift of the demand curve in graph 5.

As mentioned, Q3-2009 was an extreme case of equity being raised through SEOs, and was a direct consequence of the financial crisis. Our finding of a slightly higher activity during the recession contradicts the findings of Eckbo and Mausalis (1995) to some degree. We do find the same effect, namely that increased demand for issues leads to higher prices. However, in our sample the activity increased during the recession and in their sample it was during the expansion period. As we mentioned in section 5.2, consensus has not been made, if the recession really is over. This can therefore suggest that our period consists of mainly a recession, and this may affect our findings, as we cannot compare within the sample.

8.3 *Economies of scale*

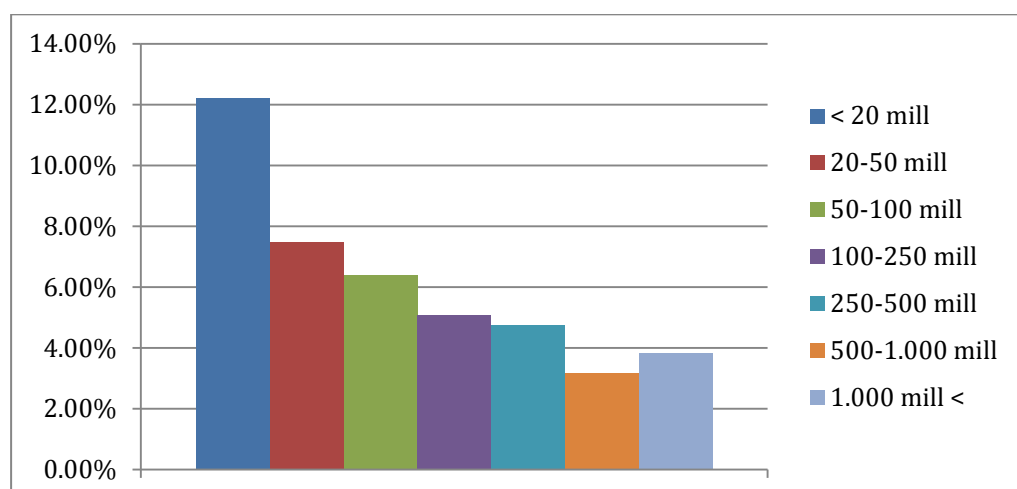
Hypothesis II: There are economies of scale in equity issues in Norway, and they are increasing with the size of the issue.

Our results confirm that fees in percent of amount raised falls with the size of the issue. In fact, our test indicates that the fees in percent falls with 0,366 percentage points per billion NOK raised in the issue. This indicates a relative savings for the issuer, of 36.600 NOK per billion raised, due to economies of scale. This result can be seen in table 2 above.

The existence of economies of scale in SEOs in Norway is supported by the previous findings of Smith (1977), Lee et al. (1996) and Altinkilic and Hansen (2000) in other markets.

We do find some support for a u-shaped spread in Norwegian SEOs. If we group our findings by size and take their average costs we find a falling relationship between size and cost, but issues over 1 billion NOK are somewhat more expensive than issues between 500 million to 1 billion NOK. The average number of managers for issues over 1 billion NOK is 2,87. For the total sample the average is 1,68. Also, the presence of foreign managers is higher for the issues over 1 billion NOK, than for the smaller ones. This indicates that the market and network of the managers in Norway is too small for such issues. As Corwin and Schultz (2005) found, the manager spread tends to increase with the number of managers. One reason for this is diseconomies of scale, as each manager competes between themselves for the same investors etc. As the market is small and the competition for the investors increase, then the book building necessarily takes longer time and become more costly.

The intervals of equity raised we have made are asymmetric, as more than 1/5 of all issues in the period were smaller than 50 million NOK. Further, 1/3 is below 100 million NOK, and 3/5 is below 250 million NOK. Making more (fewer) intervals with smaller (larger) range would not illustrate the effects as clearly as the intervals we have set up. Graph 14 clearly illustrates the presence of economies of scale in Norwegian SEOs.



Graph 14: Average direct cost of raising capital

Source: Prospects (Oslo Børs)

8.4 *Specialists*

Hypothesis III: Specialists charge a higher fee for an equity issue than a non-specialist.

By running a two-sample mean comparison test of the average cost charged by the different types of managers we get the following results:

- Foreign financial institutions and other foreign are significantly more expensive managers than financial institutions, banks and issuer.
- We cannot clearly reject the H_0 , that the cost other foreign is equal to foreign financial institutions, but there are indications of other foreign being more expensive.
- We cannot reject the H_0 , for the cost level charged by a bank, financial institution or for the firm performing the issue themselves.

```
. ttest Financial == Foreign, unpaired
```

```
Two-sample t test with equal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Financ~l	22	.0398128	.0033262	.0156015	.0328955	.0467301
Foreign	12	.0563558	.0090948	.0315054	.0363382	.0763734
combined	34	.0456515	.0040226	.0234553	.0374675	.0538354
diff		-.016543	.0080321		-.0329039	-.0001821

```
diff = mean(Financial) - mean(Foreign)          t = -2.0596
Ho: diff = 0                                     degrees of freedom = 32
```

```
Ha: diff < 0          Ha: diff != 0          Ha: diff > 0
Pr(T < t) = 0.0238    Pr(|T| > |t|) = 0.0476    Pr(T > t) = 0.9762
```

Table 3: Two-sample mean comparison test: Financial institutions = Foreign financial institution

Foreign firms have been a significantly more expensive manager than Norwegian managers, in the period 2006-2011. The results from this test can be seen in table 3 above. We characterised Norwegian financial institutions as specialists for raising equity for firms listed on Oslo Børs. Contradicting to hypothesis III, Norwegian financial institutions are less expensive than their foreign counterparties. We presented Corwin and Schultz (2005) claim, that co-managers are included in the issue due to their complementary abilities of the lead manager,

in section 4.1.2.6.1. The foreign financial institutions and other foreign managers are most likely brought in as co-managers due to their size of and complementary network of global investors or their specific industry expertise, such as in the examples we presented on page 19.

Further, in the light of the findings of Rock (1986) and Beatty and Ritter (1986) that we presented in section 4.1.2.6.1, we see that besides having a larger network and therefore easier access to capital and/or desirable industry knowledge, many of the foreign financial institutions are highly reputable worldwide. Take for instance Bank of America Merrill Lynch, Citibank, J.P. Morgan or Morgan Stanley, all some of the largest financial institutions in the world and a reputation for being the biggest and best within their fields. All of the above, co-managed one equity issue each in Norway in the period 2006-2011. Besides their undisputable access to capital, these institutions reputation can be interpreted as a solid guarantee for the quality of any firm. This applies specially for a Norwegian firm that is relatively small in the global context.

The findings above indicate that although the foreign managers are not considered specialist for raising equity in Norway, many of them are so in their market. That, together with their desirable complementary attributes to the Norwegian specialists, brings them a position where they can charge a higher fee, than the Norwegian managers.

There is no significant difference between the cost levels of Norwegian managers and the issuer. This is puzzling, why would the issuer raise all the money themselves if they cannot do it any cheaper than the banks or financial institutions? The firm would be better off focusing on its main activities, as this is where they generate profit. We believe that the reason is due to economies of scale. Financial institutions that specialize in this type of activity should clearly outperform the issuer. In the period 2006-2011, financial institutions raised 68,93 billion NOK through equity issues. This is 2/3 of the equity raised in the period. Banks raised 16,55 billion NOK, approximately 17,3% of all the equity raised. The average equity raised for a financial institution in an issue is 318 million NOK, and 250 million NOK by banks. The issuer only raised an average of 100

million NOK, with a median of only 23,8 million NOK. Running a two-sample mean comparison test, we conclude that the issuer raise statistical significantly less than the specialists per issue. We therefore draw the conclusion that due to the proven existence of economies of scale in SEOs, firms can manage the issue relatively cheaper themselves, than through a bank or financial institution. At least under certain conditions, such as experienced board of managers, good profitability forecast, good knowledge and communication with the stockholders.

As we can see in table 4 below, we do not find any significant difference in the cost level between Norwegian banks and Norwegian financial institutions.

```
. ttest Financial == Bank, unpaired
```

```
Two-sample t test with equal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Financ~l	22	.0398128	.0033262	.0156015	.0328955	.0467301
Bank	20	.0428044	.0041181	.0184169	.034185	.0514238
combined	42	.0412374	.002601	.0168564	.0359845	.0464902
diff		-.0029916	.0052514		-.013605	.0076218

```
diff = mean(Financial) - mean(Bank) t = -0.5697
Ho: diff = 0 degrees of freedom = 40
```

```
Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.2860 Pr(|T| > |t|) = 0.5721 Pr(T > t) = 0.7140
```

Table 4: Two-sample mean comparison test: Financial institutions = Banks

8.5 Shortcomings

We are aware that our study has several shortcomings. First of all the time period is only six years, which often is considered too short a period to be able to generalize. We feel confident that our choice of shortening our period to be able to cover all issues in the period gives more reliable results than a more longitudinal with a more random sample. Second, the period includes the recession during the financial crisis, which leads to extreme results as the market was in distress.

Third, the way we group our managers into units to perform our panel data is not optimal, as it would be of more interest to have a finer diversification of the managers. Preferably we would have investigated each manager separately, that

way we could have tested for overpricing by the managers with the highest market powers, and if any managers specialize in raising capital for certain industries and therefore can charge a higher price for issues in that sector. Due to too few observations on each manager, this was not possible.

Fourth, the fact that we do not know how much each manager was able to raise when there were several managers cooperating in an issue or how much each manager charged in fees, but we simply divided it equally among the managers means that some managers may have been credited for too much capital raised and/or too little fees charged. This only affects our hypothesis regarding specialists, but the main research question and the other two hypotheses are valid.

Finally, we have the problem of endogeneity. There are obviously many variables that affect the cost level of equity issues. Due to the scope and availability of the data we could not test for more variables. We do however believe that we have tested for the most relevant and important factors. Similarly, in most time series analyses there are problems of *autocorrelation*. Many of the variables we have used in our testing are correlated with the development in the preceding periods, and this leads to measurement errors. Correlation between the variables and the error terms could also lead to measurement errors. In the end, this could lead to over/underestimation of the effect from the different variables. As a consequence the test results may have led us to discard explanatory variables, which should have been included.

9. Conclusion

As for the answer to our main research question: “*How high are the direct costs of a stock issue for a firm listed on the Norwegian stock exchange?*”? We have found the direct costs of raising equity to be 5,62% of the amount raised. This is somewhat above what similar studies have found in the US-market. A likely explanation for this is that there are more potential for economies of scale in the US, due to the size of the firms, issues and the market.

We conclude that there have been significant changes in the fees charged for an equity issue in the period 2006-2011. The economy has moved from expansion to recession and to a recovery stage in the period. We have proved that the cost level changed due to changes in the economic conditions, and not due to increased efficiency in managing the issues. We found that the cost of raising equity is *negatively correlated* with the changes in the value of Oslo Børs. When the stock index raises the cost of an equity issue falls and vice versa. Our analyses suggests that the direct cost in percent of the amount raised, falls with 0,00861 percentage points per 100 points increase in the OSEBX.

There are economies of scale when raising equity through a SEO. We found that there are positive economies of scale up to a certain level. For the largest issues, we found increasing costs indicating diseconomies of scale. We measured the effect of the economies of scale to be a fall of 0,366 percentage points per billion NOK raised, of the degree of direct cost to the amount raised.

The three results above give us the following formula for the percentage direct cost of the amount raised:

$$DCL = 0,085 - 0,0000861 \Delta 100 \text{ OSEBX}'_{it} - 0,0036 \Delta 1 \text{ billion NOK raised}_{it} \beta + \alpha_i + \varepsilon_{it} ,$$

$$\varepsilon_{it} \sim IID(0, \sigma_\varepsilon^2), \alpha_i \sim IID(0, \sigma_\alpha^2)$$

We found evidence that the issuer raises smaller amount of equity cheaper themselves, than any of the manager types. Raising the capital themselves is only logical for the investors if they can do so by more efficiently than the market. We also found that foreign managers have desirable attributes that compliment the Norwegian managers. Due to their specialities they charge a higher fee than the Norwegian managers. We did not find any support for the hypothesis that managers specialising in raising equity for firms listed on Oslo Børs charge a higher fee than their competitors.

One can understand that the cost of raising equity in Norway is more expensive than in the US. It is not surprising that the cost level of raising equity through an SEO behaves as predicted by theory, i.e. that there are scale economies and that

the cost level moves up and down with changing market conditions. We do however leave it up to the reader to decide whether the cost level in the Norwegian market is at an appropriate level.

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11. Appendices

Appendix 1

Prudential's IPO syndicate

Bank	Shares underwritten	Role
Goldman, Sachs & Co.	19 109 063	Book runner and lead manager
Prudential Securities, Inc.	8 175 000	Co-lead manager
Credit Suisse First Boston Corp	6 450 000	Senior manager
Deutsche Bank	6 948 750	
Lehman Brothers	5 722 500	
Merrill Lynch	6 540 000	
Morgan Stanley	5 559 000	
Salomon Smith Barney	5 559 000	
The Williams Capital Group	6 131 250	
Bank of America Securities	2 248 125	Junior manager
Bear, Stearns & Co	2 145 937	
Blaylock & Partners	2 248 125	
First Union Securities	1 635 000	
Ramirez & Co	1 962 000	
UBS Warburg	1 226 250	
ABN AMRO	500 000	Major bracket manager
Allen & Co	500 000	
BNY Capital Markets	500 000	
A.G. Edwards & Sons	500 000	
.	500 000	
.	500 000	
.	500 000	
.	500 000	
.	500 000	
Advest Inc.	250 000	Manager
M.R. Beal	250 000	
Chatsworth Securities	250 000	
City National Bank of New Jersey	250 000	
.	250 000	
.	250 000	
.	250 000	
.	250 000	
.	250 000	
.	250 000	
.	250 000	
.	250 000	

Appendix 2

Generalized least squares

A generalized least squares (GLS) estimator is the best linear unbiased estimator for β in an ordinary least squares (OLS) regression. The advantage of deriving a GLS-estimator is that one does not need to estimate a new covariance matrix or estimator for σ^2 , but one can simply use the OLS results and replace the variables. The covariance matrix for the GLS is smaller than for the OLS, since the GLS estimator has a smaller variance than its OLS counterpart. (Marno Verbeek, 2004)

To derive the GLS-estimator one should first note that the error terms for unit i can be stacked as $\alpha_i l_T + \varepsilon_i$ ¹. The covariance matrix of the vector is;

$$V\{\alpha_i l_T + \varepsilon_i\} = \Omega = \sigma_\alpha^2 l_T l_T' + \sigma_\varepsilon^2 I_T^2$$

If we multiply from the vectors in the random effects model with Ω^{-1} from the left we get:

$$\Omega^{-1} = \sigma_\varepsilon^{-2} \left[\left(I_T - \frac{1}{T} l_T l_T' \right) + \psi \frac{1}{T} l_T l_T' \right]$$

$I_T - \frac{1}{T} l_T l_T'$, transforms the data in deviations from individual means while $\frac{1}{T} l_T l_T'$ takes individual means, and therefore the GLS estimator can be derived as follows;

$$\hat{\beta}_{GLS} = \left(\sum_{i=1}^N \sum_{t=1}^T (x_{it} - \bar{x}_i)(x_{it} - \bar{x}_i)' + \psi T \sum_{i=1}^N (\bar{x}_i - \bar{x})(\bar{x}_i - \bar{x})' \right)^{-1} \times \\ \left(\sum_{i=1}^N \sum_{t=1}^T (x_{it} - \bar{x}_i)(y_{it} - \bar{y}_i) + \psi T \sum_{i=1}^N (\bar{x}_i - \bar{x})(\bar{y}_i - \bar{y}) \right)$$

(Marno Verbeek, 2004)

¹ $l_T = (1, 1, \dots, 1)'$ of dimension T and $\varepsilon_i = (\varepsilon_{i1}, \dots, \varepsilon_{iT})'$

² I_T is the identity matrix of dimension T

Appendix 3

Descriptive statistics

Max raised	14 007 670 135,80
Min raised	800 000,00
Average	548 841 642,47
Median	182 250 000,00
Std dev	1 407 789 252,34
Kurtosis	59,19
Skewness	7,09
Sum	95 498 445 789,68
Max total fee	211 000 000,00
Min total fee	140 000,00
Average	18 285 269,11
Median	8 050 000,00
Std dev	31 537 544,04
Kurtosis	16,80
Skewness	3,81
Sum	3 181 636 825,45
Max fee %	62,50 %
Min fee %	0,06 %
Average	5,62 %
Median	4,67 %
Std dev	5,38 %
Average +/- 2*std dev	16,39 % -5,14 %
Kurtosis	72,42
Skewness	7,16

Appendix 4

Hausman test

	Coefficients		(b-B) Difference	sqrt(diag(V _b -V _B)) S.E.
	(b) fixed	(B) random		
LOGBNP	-.6606232	-.6168279	-.0437953	.
LOGunempl	.0045405	.0112271	-.0066866	.
OBXprQ	-.0000775	-.0000671	-.0000104	.
LOGKeyRate	-.0030305	-.0039012	.0008707	.0005268
Raisedreal	-4.26e-12	-4.18e-12	-7.90e-14	6.19e-13

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)⁽⁻¹⁾](b-B)
 = -2.38 chi2<0 ==> model fitted on these
 data fails to meet the asymptotic
 assumptions of the Hausman test;
 see suest for a generalized test

Appendix 5

Test result, fixed effects

```
. xtreg Feein LOGBNP LOGunempl OBXprQ LOGKeyRate Raisedreal, fe

Fixed-effects (within) regression                Number of obs   =          65
Group variable: Managertype                      Number of groups =           5

R-sq:  within = 0.2140                          Obs per group:  min =           5
          between = 0.1624                          avg =          13.0
          overall = 0.2144                          max =           22

                                                    F(5, 55)        =          2.99
corr(u_i, Xb) = -0.0295                          Prob > F         =          0.0184
```

Feein	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
LOGBNP	-.6606232	.5009021	-1.32	0.193	-1.664453	.343207
LOGunempl	.0045405	.0337672	0.13	0.894	-.0631305	.0722115
OBXprQ	-.0000775	.0000523	-1.48	0.144	-.0001823	.0000272
LOGKeyRate	-.0030305	.0116165	-0.26	0.795	-.0263104	.0202494
Raisedreal	-4.26e-12	1.45e-12	-2.94	0.005	-7.16e-12	-1.36e-12
_cons	.750649	.5249778	1.43	0.158	-.30143	1.802728
sigma_u	.01201836					
sigma_e	.02227052					
rho	.22554206	(fraction of variance due to u _i)				

F test that all u_i=0: F(4, 55) = 2.11 Prob > F = 0.0915

Appendix 6

Test result, random effects

```
. xtreg Feein LOGBNP LOGunempl OBXprQ LOGKeyRate Raisedreal, re
```

```
Random-effects GLS regression           Number of obs   =           65
Group variable: Managertype             Number of groups =            5

R-sq:  within = 0.2118                   Obs per group: min =            5
        between = 0.2080                                     avg =           13.0
        overall = 0.2163                                     max =            22

                                                Wald chi2(4)     =            .
corr(u_i, X) = 0 (assumed)                Prob > chi2      =            .
```

Feein	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
LOGBNP	-.6168279	.5154668	-1.20	0.231	-1.627124	.3934684
LOGunempl	.0112271	.0345049	0.33	0.745	-.0564012	.0788554
OBXprQ	-.0000671	.0000539	-1.24	0.213	-.0001729	.0000386
LOGKeyRate	-.0039012	.0116045	-0.34	0.737	-.0266456	.0188433
Raisedreal	-4.18e-12	1.31e-12	-3.19	0.001	-6.75e-12	-1.61e-12
_cons	.6975927	.5396712	1.29	0.196	-.3601433	1.755329
sigma_u	0					
sigma_e	.02227052					
rho	0	(fraction of variance due to u_i)				

```
. xtreg Feein OBXprQ RaisedRBill, re
```

```
Random-effects GLS regression           Number of obs   =           65
Group variable: Managertype             Number of groups =            5

R-sq:  within = 0.1319                   Obs per group: min =            5
        between = 0.1421                                     avg =           13.0
        overall = 0.1391                                     max =            22

                                                Wald chi2(2)     =           9.46
corr(u_i, X) = 0 (assumed)                Prob > chi2      =           0.0088
```

Feein	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
OBXprQ	-.000086	.0000375	-2.30	0.022	-.0001595	-.0000126
RaisedRBill	-.0036608	.0016386	-2.23	0.025	-.0068723	-.0004492
_cons	.0850837	.0160351	5.31	0.000	.0536554	.116512
sigma_u	.01540548					
sigma_e	.02279048					
rho	.31362214	(fraction of variance due to u_i)				

. xtreg Feein OBXprQ Raisedreal Time, re

```

Random-effects GLS regression           Number of obs   =       65
Group variable: Managertype             Number of groups =        5

R-sq:  within = 0.1831                  Obs per group:  min =        5
        between = 0.1097                  avg =       13.0
        overall = 0.1817                  max =       22

                                           Wald chi2(2)    =        .
corr(u_i, X) = 0 (assumed)              Prob > chi2     =        .
    
```

Feein	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
OBXprQ	-.0000943	.0000417	-2.26	0.024	-.0001761	-.0000125
Raisedreal	-3.82e-12	1.30e-12	-2.95	0.003	-6.36e-12	-1.28e-12
Time	.0025463	.0063212	0.40	0.687	-.0098431	.0149357
_cons	.0865199	.0152829	5.66	0.000	.0565566	.1164739
sigma_u	.00312099					
sigma_e	.02226262					
rho	.0192744	(fraction of variance due to u_i)				

Appendix 7

Test result, two-sample mean comparison fee

. summarize

Variable	Obs	Mean	Std. Dev.	Min	Max
Period	24	2008.75	1.748291	2006.1	2011.4
Financial	22	.0398128	.0156015	.0095777	.0627342
Issuer	6	.0413629	.0333537	.0005519	.0833771
Bank	20	.0428044	.0184169	.0104917	.0916619
Foreign	12	.0563558	.0315054	.0161653	.1428572
OtherForeign	5	.0704775	.0408264	.0242041	.1307677

```
. ttest Financial == OtherForeign, unpaired
```

```
Two-sample t test with equal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Financ~l	22	.0398128	.0033262	.0156015	.0328955	.0467301
OtherF~n	5	.0704775	.0182581	.0408264	.0197848	.1211702
combined	27	.0454914	.0047155	.0245025	.0357986	.0551843
diff		-.0306647	.0107539		-.0528127	-.0085167

```
diff = mean(Financial) - mean(OtherForeign)          t = -2.8515
Ho: diff = 0                                         degrees of freedom = 25
```

```
Ha: diff < 0
Pr(T < t) = 0.0043
```

```
Ha: diff != 0
Pr(|T| > |t|) = 0.0086
```

```
Ha: diff > 0
Pr(T > t) = 0.9957
```

. ttest Financial == Issuer, unpaired

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Financ~1	22	.0398128	.0033262	.0156015	.0328955	.0467301
Issuer	6	.0413629	.0136166	.0333537	.0063603	.0763655
combined	28	.0401449	.0037595	.0198934	.0324311	.0478588
diff		-.0015501	.0093318		-.0207319	.0176318

diff = mean(Financial) - mean(Issuer) t = -0.1661
 Ho: diff = 0 degrees of freedom = 26

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.4347 Pr(|T| > |t|) = 0.8694 Pr(T > t) = 0.5653

. ttest Financial == Foreign, unpaired

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Financ~1	22	.0398128	.0033262	.0156015	.0328955	.0467301
Foreign	12	.0563558	.0090948	.0315054	.0363382	.0763734
combined	34	.0456515	.0040226	.0234553	.0374675	.0538354
diff		-.016543	.0080321		-.0329039	-.0001821

diff = mean(Financial) - mean(Foreign) t = -2.0596
 Ho: diff = 0 degrees of freedom = 32

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.0238 Pr(|T| > |t|) = 0.0476 Pr(T > t) = 0.9762

. ttest Financial == Bank, unpaired

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Financ~1	22	.0398128	.0033262	.0156015	.0328955	.0467301
Bank	20	.0428044	.0041181	.0184169	.034185	.0514238
combined	42	.0412374	.002601	.0168564	.0359845	.0464902
diff		-.0029916	.0052514		-.013605	.0076218

diff = mean(Financial) - mean(Bank) t = -0.5697
 Ho: diff = 0 degrees of freedom = 40

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.2860 Pr(|T| > |t|) = 0.5721 Pr(T > t) = 0.7140

. ttest Bank == Foreign, unpaired

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Bank	20	.0428044	.0041181	.0184169	.034185	.0514238
Foreign	12	.0563558	.0090948	.0315054	.0363382	.0763734
combined	32	.0478862	.0043464	.0245871	.0390216	.0567508
diff		-.0135514	.0087846		-.0314919	.0043891

diff = mean(Bank) - mean(Foreign) t = -1.5426
 Ho: diff = 0 degrees of freedom = 30

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.0667 Pr(|T| > |t|) = 0.1334 Pr(T > t) = 0.9333

. ttest Bank == Issuer, unpaired

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Bank	20	.0428044	.0041181	.0184169	.034185	.0514238
Issuer	6	.0413629	.0136166	.0333537	.0063603	.0763655
combined	26	.0424717	.0042996	.0219239	.0336165	.051327
diff		.0014415	.0104113		-.0200463	.0229293

diff = mean(Bank) - mean(Issuer) t = 0.1385
 Ho: diff = 0 degrees of freedom = 24

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.5545 Pr(|T| > |t|) = 0.8910 Pr(T > t) = 0.4455

. ttest Bank == OtherForeign, unpaired

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Bank	20	.0428044	.0041181	.0184169	.034185	.0514238
OtherF~n	5	.0704775	.0182581	.0408264	.0197848	.1211702
combined	25	.048339	.0051921	.0259606	.037623	.059055
diff		-.0276731	.0119381		-.0523689	-.0029773

diff = mean(Bank) - mean(OtherForeign) t = -2.3181
 Ho: diff = 0 degrees of freedom = 23

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.0148 Pr(|T| > |t|) = 0.0297 Pr(T > t) = 0.9852

. ttest Issuer == Foreign, unpaired

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Issuer	6	.0413629	.0136166	.0333537	.0063603	.0763655
Foreign	12	.0563558	.0090948	.0315054	.0363382	.0763734
combined	18	.0513581	.0075364	.0319743	.0354577	.0672586
diff		-.0149929	.0160472		-.0490115	.0190257

diff = mean(Issuer) - mean(Foreign) t = -0.9343
 Ho: diff = 0 degrees of freedom = 16

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.1820 Pr(|T| > |t|) = 0.3640 Pr(T > t) = 0.8180

. ttest Issuer == OtherForeign, unpaired

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Issuer	6	.0413629	.0136166	.0333537	.0063603	.0763655
OtherF~n	5	.0704775	.0182581	.0408264	.0197848	.1211702
combined	11	.0545968	.0114976	.0381331	.0289786	.080215
diff		-.0291146	.0223213		-.0796089	.0213797

diff = mean(Issuer) - mean(OtherForeign) t = -1.3043
 Ho: diff = 0 degrees of freedom = 9

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.1122 Pr(|T| > |t|) = 0.2245 Pr(T > t) = 0.8878

. ttest Foreign == OtherForeign, unpaired

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Foreign	12	.0563558	.0090948	.0315054	.0363382	.0763734
OtherF~n	5	.0704775	.0182581	.0408264	.0197848	.1211702
combined	17	.0605092	.0082001	.0338097	.0431259	.0778926
diff		-.0141217	.0182257		-.0529688	.0247253

diff = mean(Foreign) - mean(OtherForeign) t = -0.7748
 Ho: diff = 0 degrees of freedom = 15

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.2252 Pr(|T| > |t|) = 0.4505 Pr(T > t) = 0.7748

Appendix 8

Test result, two-sample mean comparison equity raised

```
. summarize
```

Variable	Obs	Mean	Std. Dev.	Min	Max
Period	24	2008.75	1.748291	2006.1	2011.4
Financial	22	2.91e+09	2.90e+09	1.43e+08	1.20e+10
Issuer	6	1.17e+08	2.11e+08	1.10e+07	5.44e+08
Bank	20	8.28e+08	7.30e+08	2.45e+07	2.36e+09
Foreign	12	9.62e+08	2.75e+09	3.00e+07	9.66e+09
OtherForeign	5	5.55e+08	6.62e+08	1.04e+07	1.41e+09

```
. ttest Financial == OtherForeign, unpaired
```

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Financ~l	22	2.91e+09	6.19e+08	2.90e+09	1.62e+09	4.19e+09
OtherF~n	5	5.55e+08	2.96e+08	6.62e+08	-2.67e+08	1.38e+09
combined	27	2.47e+09	5.36e+08	2.78e+09	1.37e+09	3.57e+09
diff		2.35e+09	1.33e+09		-3.78e+08	5.08e+09

```
diff = mean(Financial) - mean(OtherForeign)          t = 1.7741
Ho: diff = 0                                         degrees of freedom = 25
```

```
Ha: diff < 0                Ha: diff != 0                Ha: diff > 0
Pr(T < t) = 0.9559          Pr(|T| > |t|) = 0.0882          Pr(T > t) = 0.0441
```

```
. ttest Financial == Issuer, unpaired
```

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Financ~l	22	2.91e+09	6.19e+08	2.90e+09	1.62e+09	4.19e+09
Issuer	6	1.17e+08	8.61e+07	2.11e+08	-1.04e+08	3.38e+08
combined	28	2.31e+09	5.32e+08	2.82e+09	1.22e+09	3.40e+09
diff		2.79e+09	1.20e+09		3.16e+08	5.26e+09

```
diff = mean(Financial) - mean(Issuer)                t = 2.3183
Ho: diff = 0                                         degrees of freedom = 26
```

```
Ha: diff < 0                Ha: diff != 0                Ha: diff > 0
Pr(T < t) = 0.9857          Pr(|T| > |t|) = 0.0286          Pr(T > t) = 0.0143
```

```
. ttest Financial == Bank, unpaired
```

```
Two-sample t test with equal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Financ~1	22	2.91e+09	6.19e+08	2.90e+09	1.62e+09	4.19e+09
Bank	20	8.28e+08	1.63e+08	7.30e+08	4.86e+08	1.17e+09
combined	42	1.92e+09	3.68e+08	2.38e+09	1.17e+09	2.66e+09
diff		2.08e+09	6.69e+08		7.27e+08	3.43e+09

```
diff = mean(Financial) - mean(Bank) t = 3.1089
Ho: diff = 0 degrees of freedom = 40
```

```
Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.9983 Pr(|T| > |t|) = 0.0035 Pr(T > t) = 0.0017
```

```
. ttest Financial == Foreign, unpaired
```

```
Two-sample t test with equal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Financ~1	22	2.91e+09	6.19e+08	2.90e+09	1.62e+09	4.19e+09
Foreign	12	9.62e+08	7.93e+08	2.75e+09	-7.84e+08	2.71e+09
combined	34	2.22e+09	5.08e+08	2.96e+09	1.19e+09	3.25e+09
diff		1.94e+09	1.02e+09		-1.40e+08	4.03e+09

```
diff = mean(Financial) - mean(Foreign) t = 1.9001
Ho: diff = 0 degrees of freedom = 32
```

```
Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.9668 Pr(|T| > |t|) = 0.0665 Pr(T > t) = 0.0332
```

```
. ttest Bank == Issuer, unpaired
```

```
Two-sample t test with equal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Bank	20	8.28e+08	1.63e+08	7.30e+08	4.86e+08	1.17e+09
Issuer	6	1.17e+08	8.61e+07	2.11e+08	-1.04e+08	3.38e+08
combined	26	6.64e+08	1.40e+08	7.12e+08	3.76e+08	9.51e+08
diff		7.11e+08	3.06e+08		7.96e+07	1.34e+09

```
diff = mean(Bank) - mean(Issuer) t = 2.3244
Ho: diff = 0 degrees of freedom = 24
```

```
Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.9856 Pr(|T| > |t|) = 0.0289 Pr(T > t) = 0.0144
```

```
. ttest Bank == Foreign, unpaired
```

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Bank	20	8.28e+08	1.63e+08	7.30e+08	4.86e+08	1.17e+09
Foreign	12	9.62e+08	7.93e+08	2.75e+09	-7.84e+08	2.71e+09
combined	32	8.78e+08	3.07e+08	1.73e+09	2.52e+08	1.50e+09
diff		-1.34e+08	6.43e+08		-1.45e+09	1.18e+09

```
diff = mean(Bank) - mean(Foreign)          t = -0.2085
Ho: diff = 0                               degrees of freedom = 30
```

```
Ha: diff < 0                               Ha: diff != 0           Ha: diff > 0
Pr(T < t) = 0.4181                         Pr(|T| > |t|) = 0.8363   Pr(T > t) = 0.5819
```

```
. ttest Bank == OtherForeign, unpaired
```

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Bank	20	8.28e+08	1.63e+08	7.30e+08	4.86e+08	1.17e+09
OtherF~n	5	5.55e+08	2.96e+08	6.62e+08	-2.67e+08	1.38e+09
combined	25	7.73e+08	1.42e+08	7.12e+08	4.79e+08	1.07e+09
diff		2.73e+08	3.59e+08		-4.70e+08	1.02e+09

```
diff = mean(Bank) - mean(OtherForeign)      t = 0.7596
Ho: diff = 0                               degrees of freedom = 23
```

```
Ha: diff < 0                               Ha: diff != 0           Ha: diff > 0
Pr(T < t) = 0.7724                         Pr(|T| > |t|) = 0.4552   Pr(T > t) = 0.2276
```

```
. ttest Issuer == Foreign, unpaired
```

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Issuer	6	1.17e+08	8.61e+07	2.11e+08	-1.04e+08	3.38e+08
Foreign	12	9.62e+08	7.93e+08	2.75e+09	-7.84e+08	2.71e+09
combined	18	6.80e+08	5.30e+08	2.25e+09	-4.39e+08	1.80e+09
diff		-8.45e+08	1.14e+09		-3.26e+09	1.57e+09

```
diff = mean(Issuer) - mean(Foreign)        t = -0.7407
Ho: diff = 0                               degrees of freedom = 16
```

```
Ha: diff < 0                               Ha: diff != 0           Ha: diff > 0
Pr(T < t) = 0.2348                         Pr(|T| > |t|) = 0.4696   Pr(T > t) = 0.7652
```

```
. ttest Issuer == OtherForeign, unpaired
```

```
Two-sample t test with equal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Issuer	6	1.17e+08	8.61e+07	2.11e+08	-1.04e+08	3.38e+08
OtherF~n	5	5.55e+08	2.96e+08	6.62e+08	-2.67e+08	1.38e+09
combined	11	3.16e+08	1.51e+08	4.99e+08	-1.97e+07	6.51e+08
diff		-4.38e+08	2.83e+08		-1.08e+09	2.04e+08

```
diff = mean(Issuer) - mean(OtherForeign)          t = -1.5434
Ho: diff = 0                                     degrees of freedom = 9
```

```
Ha: diff < 0          Ha: diff != 0          Ha: diff > 0
Pr(T < t) = 0.0786    Pr(|T| > |t|) = 0.1571    Pr(T > t) = 0.9214
```

```
. ttest Foreign == OtherForeign, unpaired
```

```
Two-sample t test with equal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Foreign	12	9.62e+08	7.93e+08	2.75e+09	-7.84e+08	2.71e+09
OtherF~n	5	5.55e+08	2.96e+08	6.62e+08	-2.67e+08	1.38e+09
combined	17	8.42e+08	5.60e+08	2.31e+09	-3.45e+08	2.03e+09
diff		4.07e+08	1.27e+09		-2.29e+09	3.10e+09

```
diff = mean(Foreign) - mean(OtherForeign)          t = 0.3217
Ho: diff = 0                                     degrees of freedom = 15
```

```
Ha: diff < 0          Ha: diff != 0          Ha: diff > 0
Pr(T < t) = 0.6240    Pr(|T| > |t|) = 0.7521    Pr(T > t) = 0.3760
```

Preliminary Thesis Report

- The cost of raising capital for Norwegian firms noted on Oslo stock exchange -

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Introduction

In our thesis we will explore the question: *“How high are the cost charged by an underwriter, for raising equity for a Norwegian company noted on Oslo Stock Exchange and how does this compare to other markets?”*

In this preliminary thesis report we will present the research question and motivate it. We will present our hypotheses related to the research question, we will review the existing literature considering this topic and discuss the next steps in our thesis.

The report is structured as follow; first we motivate our research question and discuss why this is a relevant topic, we will present findings from other countries for comparison and then give a short literature review before presenting our hypothesis. Furthermore we present some data found on one of the hypothesis so far, and end off with a discussion of how we will continue forward.

Background

Over the last ten years there has been a substantial development in how to book stock and bond trades over internet. Trading has been made easier, faster and cheaper due to more efficient systems and easier access. Since many investors now book the trades themselves online, the need for expensive brokers has decreased dramatically. Also brokers cannot compete with the speed of the automated computers who continuously look for mispriced stock and books a trade within a few milliseconds. When the brokerage firms lose their exclusivity in trading stocks they must lower their costs to face the competition. The brokerage firm's incomes have decreased considerably due to this fact and have suffered from a decrease in trading as well. Hence, we believe that the brokerage companies must to a larger degree rely on income from corporate finance projects, such as rights issuance, open offers and placing to supply firms with new capital.

Studies from the US have shown that the total cost for a firm of calling money from its stockholders amounts to 3-4% in Europe (da Silva et al. 2006) and 6-7% in the US (Jurin 1993), of the total amount called. High fees for such corporate

actions means that money is withdrawn from the firms, money that could have been spent to improve the value added for the stockholders. It is important in a sustainable and efficient market that the price of raising capital is not too high, as this will reduce the possibilities for swift funding of new projects and investments.

After the finance crisis and the upcoming Basel III framework, which increases the requirement for banks equity ratio, the supply of bank loans has decreased. (Deloitte 2012) This makes other ways of funding, such as placements and issues more current. This is an issue, which has not received much attention, but can have an impact on investors return over time.

Research question and literature review

The focus and research question of our thesis will be: *“How high are the costs charged by an underwriter, for raising equity for a Norwegian company noted on Oslo Stock Exchange and how does this compare to other markets?”*

We will make an estimation of the costs of raising capital and compare this to studies in relevant countries, such as the US, the UK and Germany. We do not know of any previous studies exploring this subject in Norway. There has not been many studies pinpointing the exact costs of raising capital in different markets so the available data for comparison is poor but present, for the larger markets.

There are several costs-aspects of raising capital, examples are: fixed costs, variable costs such as performance fee, warrants to the underwriter, discount/under pricing, the bid-ask spread, transactions fees, tax. (Clifford W. Smith jr., 1978) We will focus on the explicit fees charged by the underwriter for an issue or an initial public offering (IPO), as the scope of the thesis does not permit us to include all costs. Costs of raising equity through issues and IPOs will let us estimate the costs of raising capital for firms noted or to be noted on the stock exchange, thus larger firms which are of interest to the majority of investors.

Not only are there many ways to measure costs of raising capital, there are also many ways of raising it. The most common methods are: initial public offering,

private and public placements, rights issues and SEOs, convertible bonds. (Inmoo Lee et al., 1996) Other ways are: dividend reinvestment plans, share purchase plans and accelerated issues. (ASX, 2010)

Again, due to the scope of the thesis, we will focus on issues and IPOs made on Oslo Stock Exchange in the period 2001-2011.

We would like to group the issues and IPOs into industrial sectors, to see if there are higher costs in industries with high risk and/or with low liquidity. Clifford W. Smith jr. (1978) describes the work of underwriters as an insurance to eliminate the uncertainty of an offerings' success. Therefore we would expect to find that the more risky and less liquid the stocks and industry, the higher the underwriter fee will be, with analogy to insurances. Similarly, in the 2012 study by Deloitte finds that financial risk decreases with turnover, as firms with higher turnover have easier access to external funding. We therefore expect larger firms with high turnover, raising larger amounts in each issue will have lower costs of raising capital.

We hypothesize that the lower the amount rose in an issue, the costs are proportionately higher than larger issues due to high fixed costs for the underwriters. We would therefore group the issues into ranges according to size to test this hypothesis. In the study of Inmoo Lee et al. (1996), they found clear evidence of economies of scale for all types of securities, which is in line with our hypothesis.

As presented earlier, we hypothesize that reduced profitability from brokerage of stocks due to increased competition from low cost-competitors such as internet-brokers, has led to increased fees charged in the corporate finance sector as a counterweight. We therefore expect to see lower income from stock brokerage, i.e. lower fees for the investors and increased costs for the companies raising capital from the market. This hypothesis is very much in line with Norges Bank's hypothesis that the new trading-system put in place on Oslo Stock Exchange in 1999, would increase the available market and therefore competition thereby reducing commissions and the possibility to dominate the trade in single stocks. (Sindre Weme, 1999)

Dependent on our results we would like to discuss reasons for why raising capital is more/less expensive in Norway than other countries. This may be explained by more/less competition between underwriters or it might simply be a result of differing demand in the market. However, a possible way of measuring this may be to compare number of issues and underwriters from country to country.

Finally we would like to discuss if the costs of raising capital can be defended with respect to stockholders demand for return. The alternative cost of not being able to make a new investment due to insufficient funding, the access to fresh capital for struggling firms may be considerably larger.

Methodology

As we want to explore how high the actual costs charged by the corresponding underwriters are, we will make use of simple statistics to shed light upon our research questions. As the data we have collected is from various sources, one important job is to get the data aligned so that the comparisons and the results in general yield meaningful information.

As described earlier some of the research done earlier regarding this topic states the costs as a percentage of the total amount of capital issued. Hence, we will reformulate the costs Norwegian firms listed at Oslo Stock Exchange have at raising capital as: $\frac{\text{The fee charged}}{\text{The total amount issued}} * 100$.

In other parts of our thesis we want to examine whether there are similarities across industrial sectors. This can be explored by a statistical model, in accordance to Marie Davidan (2006). This can be of the pattern:

Y_{ij} = costs for firm i at time t

If we compare between industries we can further on include that

G_i = industry indicator = 0 if oil-related, 1 if non-oil related.

Hence, for firm i at time t :

$Y_{ij} = \beta_{0(oil)} + \beta_{1(oil)}t_{ij} + \varepsilon_{ij}$ if i is oil

$Y_{ij} = \beta_{0(non-oil)} + \beta_{1(non-oil)}t_{ij} + \varepsilon_{ij}$ if i is non-oil

$$Y_{ij} = \beta_{0(oil)}(1 - G_i) + \beta_{0(non-oil)}G_i + \beta_{1(oil)}(1 - G_i) + \beta_{1(non-oil)}G_i + \varepsilon_{ij}$$

This can be fitted into the OLS, and tested for $\beta_{1(oil)} = \beta_{1(non-oil)}$.

Further on we want to check for evidence of economies of scale in our sample, as Inmoo Lee et al. (1996) found evidence of in their study. One possible solution is to check for u-shaped spreads, similar to what is done in Altinkilic and Hansen (2000). Here we consider the spread as the total cash compensation paid to the underwriter (fee), relative to the gross proceeds (P):

$$\text{Spread}(P) = \frac{fee}{P}$$

this can be written as the sum of fixed and variable costs

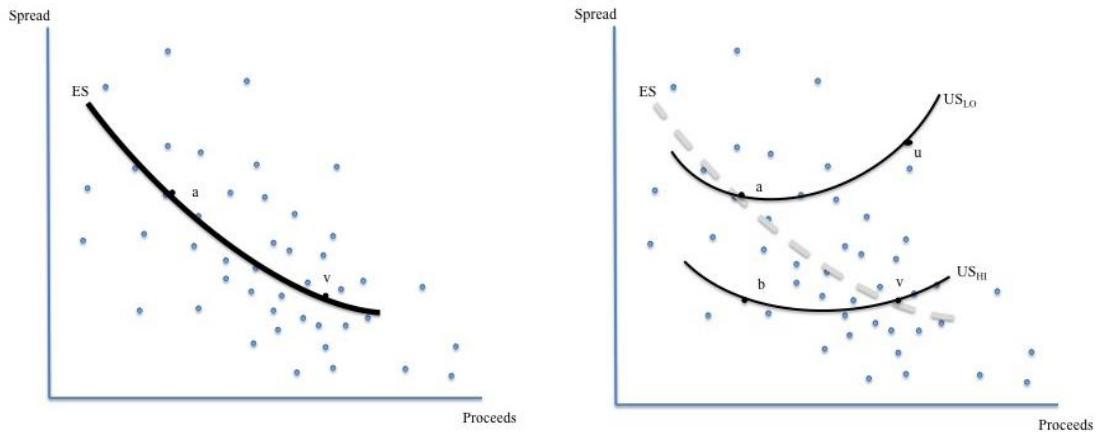
$$\text{Spread}(P) = \frac{K}{P} + \text{unspread}(P) \mid K = \text{fixed costs, unspread}(P) = \text{var. costs pr. dollar proceeds.}$$

Further on the marginal spread, $\text{mspread}(P)$ is obtained by multiplying the spreads by the proceeds. Obtaining the total fee, and differentiating the total fee wrt. to the proceeds

$$\text{mspread}(P) = \frac{\Delta fee}{\Delta proceeds} = \frac{\partial [\text{spread}(P)*P]}{\partial P} = \frac{\partial [\text{unspread}(P)*P]}{\partial P}$$

$$\text{Thus we can write: } \frac{\partial \text{spread}(P)}{\partial P} = \frac{\text{mspread}(P) - \text{spread}(P)}{P}$$

The latter equation depicts a potential trade-off between the decline in the syndicate's average fixed cost and an increase in its average variable cost. Hence, there is no a priori reason to rule out that some issuers will experience scale economies, while others experience diseconomies. However, as Altinkilic and Hansen (2000) points out, under the popular view the economies of scale predominate and the spread is falling. And from above we see that if spreads are falling this imply that the marginal spread must be smaller than the average spread.



Scale economies

B) U-shaped spreads

Interpretation

The graphs above describe the differences between pure economies of scale and the view of u-shaped spread curves.

From figure A the regression ES is fitted to the sample and suggests a clear trade off between spread and proceeds. If a firm choose allocation a in the figure they can clearly expand their offer to v and pay a lower spread.

Figure B shows that issues that require lot of service (low type) and issues of high quality (high type) follow a pattern. It can easily be seen that firms face a u-shaped spread and thus rising marginal cost of capital within a quality group. A firm at allocation (a) cannot trade a higher bid against lower spread, but will in fact face higher spreads if increasing bid.

The correlation between income from brokerage and issues and counseling is 0,74. This indicates that the incomes move together and are mainly influenced by economic conditions. We may therefore run a regression analysis as this will help us explain why costs have changed over time, i.e. if it changes with activity or value on the stock exchange etc.

Data

We will in our thesis use Norwegian data only. We will use data from 2001 to 2011 if available, as this will give us a rich statistical foundation and we can investigate development in costs. It may be necessary to look at such a long time period as the financial crisis which started 2008 may give skewed results.

The income from brokerage and issues are given to us by the Financial Supervisory Authority of Norway (Finanstilsynet), these are quarterly data from January 2001 to October 2012. Data from issues made on Oslo Stock Exchange are readily available on Oslo Stock Exchanges homepages, from 1997 and is continually updated with new events. Key figures about activity on Oslo Stock Exchange are also available on their homepages, but only back to January 2006.

For data about the fees charged for each issue, we plan on using the prospects issued by the underwriters before the issue. Some underwriters, such as DnB Markets, have these prospects available on their homepages. We do not expect to find detailed information in the prospects, such as the division between fixed costs and variable fees, for instance performance fees for the underwriter. If such detailed information is needed for our survey, we might have to contact the underwriters directly.

So far we have looked at how income from equity brokering and issues have developed, to see if there is any support for our hypothesis that reduced income from brokerage, due to lower costs and volume has led to increased costs and therefore income from issues. The figure below shows the yearly income from both activities from 1st quarter 2001 to 4th quarter 2011. We see that the incomes are at the same level in 2001, but that income from issues/consulting are rising to a higher level in the midst of the period, and in 2006-2007 are in fact approximately 2.5 times larger than income from brokerage. In 2008 when the financial crisis hit, the income in both sectors fell sharply, and in 2011 income from brokerage was below the income from 2001 while the income from issues/consulting was approximately one milliard NOK higher than in 2001.

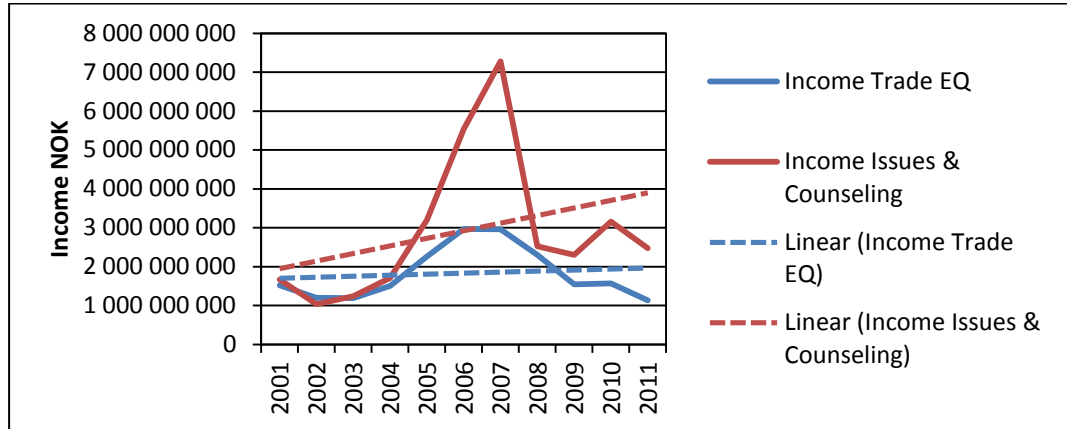


Figure 1: Income from brokerage vs. issues and counseling, yearly aggregate.

The linear line of the period indicates that the income from issues/consulting has increased twice as much as income from brokerage. This effect however stems much from the years 2006 and 2007, which were very good years for the underwriters.

The income from brokerage did increase in the period, but suffered a blow from the financial crisis. We have therefore compared the income from brokerage with the activity level on Oslo Stock Exchange to see if the reduces income come from reduced activity. As we currently only have the key figures from Oslo Stock Exchange from 2004, we have looked at the period 1st quarter 2004 to 4th quarter 2011. The income from brokerage has been reduced to a quarter over the period, from approximately 800 million NOK to 200 million NOK. The amount of trades however has doubled, from 3 million trades in 1st quarter 2006 to 6 million trades in 4th quarter 2011. This proves that the income per trade has been significantly reduced over the period.

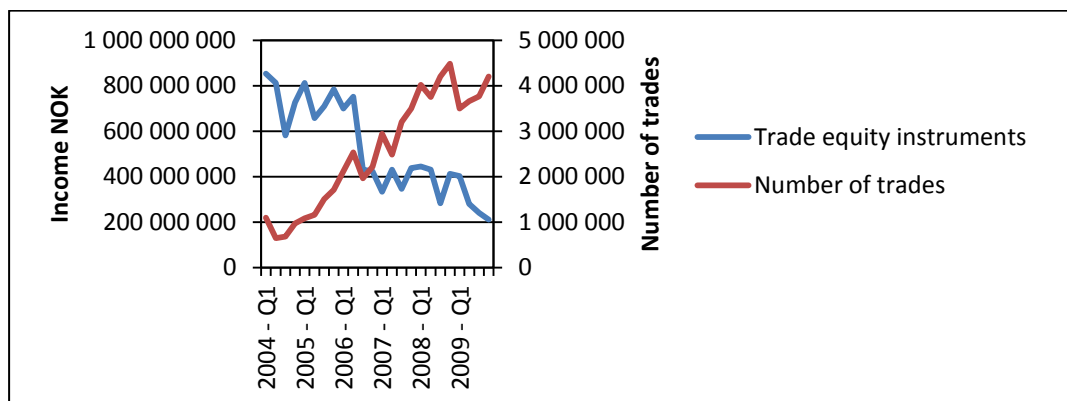


Figure 2: Income from brokerage vs. number of trades in the period.

Similar results appear if we compare the market value of the trades made on Oslo Stock Exchange with the income from brokerage. The two follow each other closely until the finance crisis in 2008, where they both fall. However, as the income from brokerage continue to fall in the remainder of the period, the market value of the trades increase, again indicating lower income per trade for the brokerage companies.

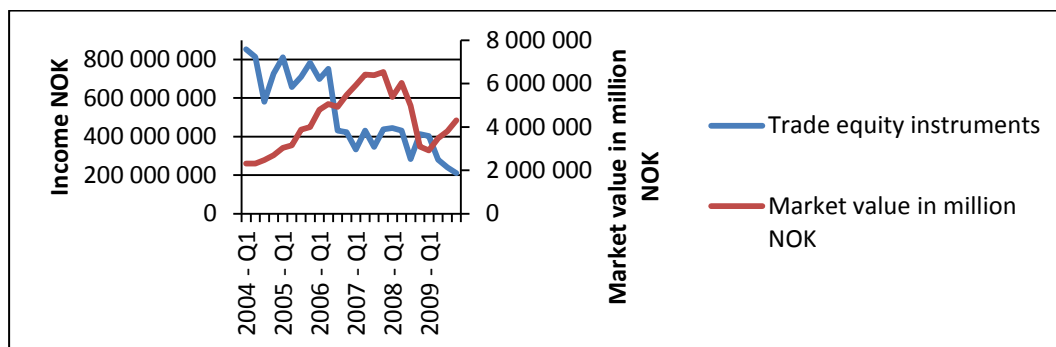


Figure 3: Income from brokerage vs. market value of traded equity.

Income per equity traded is approximately halved from 1st quarter 2004 to 4th quarter 2011. Which is quite interesting as in 2004 we see the income from issues and counseling rising much higher than income from brokerage in Figure 1.

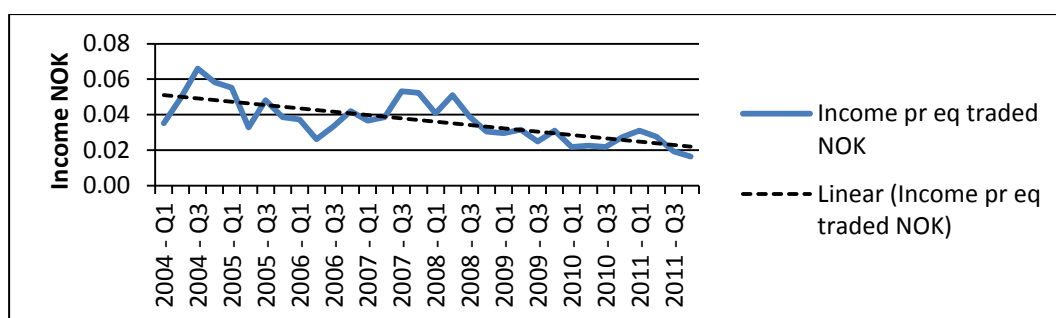


Figure 4: Income per traded equity.

It is more difficult to make a valid conclusion regarding the income from issues and counseling. There is no clear pattern of changes in the cost levels of issues. There does however seem to be a consistency that in periods with little amount being raised, the income of the underwriters are proportionally higher than in period with large amounts being raised. This may indicate high fixed costs for the underwriters, but also the fact that we only have data for issues *and* counseling. Fixed fees for standing counseling services may explain why incomes does not move more in sync with amount raised. We need to look at the prospects for each

issue to be able to make a clearer picture of the development, and to be able to discuss the research question and hypothesis.

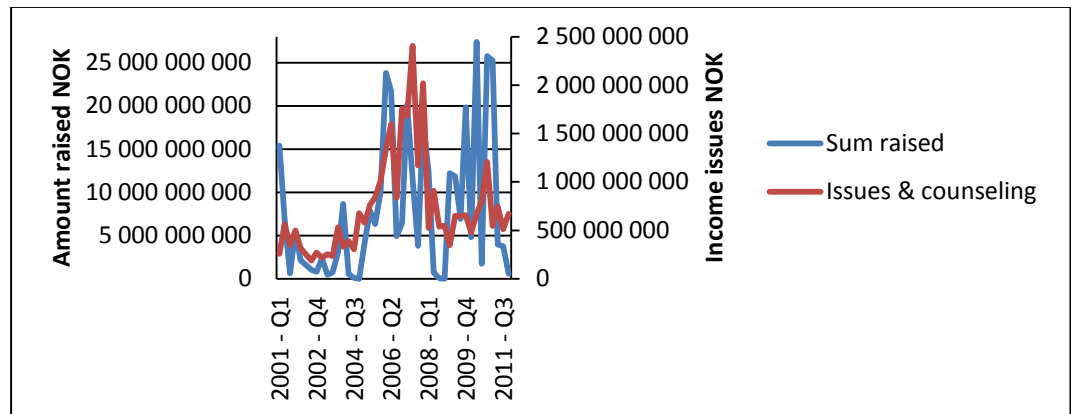


Figure 5: Equity raised vs. income from issues and counseling.

Next steps

The next step of our project will be gathering information from prospects of each particular issuance made in our chosen time period. First when this data is gathered we can start grouping the material into sub categories, such as industries, size etc. As we see it now, our major challenge might be to gather information on issues made a while back, as these are not easily electronically available. However the larger and more recent ones should be accessible at the respective underwriters.

When this is done we should be able to analyze the material and hopefully discuss our findings. This said, we do not expect any problems analyzing our data, as this not require any intricate methodological processes.

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