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Determinants of Stock Price Dynamics Following Seasoned Equity Offerings on the Oslo Stock Exchange

An Empirical Analysis

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Abstract

We provide evidence of a significant underperformance following Seasoned Equity Offerings (SEOs) conducted on the Oslo Stock Exchange (OSE) in the period 2000-2010. In an attempt to explain the low stock returns for SEO firms, we examine whether the market under-reacts to the negative information implicit in the SEO announcement, or if the underperformance is better explained by more rational means such as lower risk or model misspecification. Specifically, we test whether the underperformance can be explained by ex-ante mispricing and trace whether changes in risk due to decrease in leverage and higher investment level may give a better explanation of the low stock returns. Our results show that SEO firms that are considerably overvalued prior to announcement, as measured by their book-to-market ratio, experience a significantly larger decline over the three years following the issue. We also find that firms time their SEOs to periods with favorable conditions in the market when their stock is overvalued. The results are consistent with the mispricing hypothesis and inconsistent with purely risk-based explanations. Analyzing the underperformance per cohort year, we find large fluctuations in the magnitude of the abnormal returns. This pattern can be caused by the relatively higher risk of SEO firms compared to non-issuers. Although our results suggest an explanation based on mispricing, we cannot rule out all rational explanations. We therefore argue that both rational and mispricing explanations are needed to fully understand the stock price dynamics following SEO events.

Sammendrag

Vi finner at selskaper som utførte egenkapitalutvidelser på Oslo Børs i perioden 2000-2007 hadde en unormalt lav avkastning over en treårs periode etter emisjonen. I et forsøk på å forklare denne negative avkastningen undersøker vi først om dette kan skyldes at aksjen er feilpriset på emisjonstidspunktet, og at markedet ikke oppfatter dette fullt ut ved annonsering. Deretter undersøker vi om den lave avkastningen bedre kan forklares ved endringer i risiko for emitterende selskaper som følge av redusert gjeldsgrad og høyere investeringsnivå. Vi tester også for om modellen vi bruker kan være dårlig spesifisert, og at dette fører til at resultatene våre viser en lavere avkastning enn det som i realiteten er tilfellet. Resultatene våre viser at selskaper som er mer overpriset, målt ved bokverdi i forhold til markedsverdi før annonsering, opplever en betydelig lavere avkastning i treårsperioden etter emisjonen enn andre selskaper som er mer "riktig" priset i markedet. Videre finner vi at selskaper gjør flere egenkapitalutvidelser i perioder med gunstige markedsforhold, noe som tyder på at de utnytter muligheten til å hente inn billig kapital når aksjen er overpriset. Disse funnene støtter opp om hypotesen om at overprising og en forsinket markedsreaksjon, er årsaken til den lavere avkastningen. Vi finner derimot ingen tegn til at den dårlige avkastningen skyldes at emitterende selskaper får en lavere risiko. Ved å analysere avkastningen til emitterende selskaper på årlig basis, finner vi store variasjoner fra år til år. Dette ser ut til å kunne forklares ved den relativt høyere risikoen til emitterende selskaper sammenlignet med tilsvarende ikke-emitterende selskaper. Selv om resultatene våre peker i retning av en forklaring basert på feilprising, kan vi likevel ikke utelukke alle rasjonelle forklaringer. Vi konkluderer derfor med at både risiko og overprising må tas til vurdering for fullt ut å kunne forklare dynamikken i aksjeprisen i forbindelse med egenkapitalutvidelser på Oslo Børs.

PREFACE

This thesis is written as the final contribution to our Master's degree specializing in Investment, Finance and Accounting at the Department of Industrial Economics and Technology Management at the Norwegian University of Science and Technology (NTNU), spring 2012.

We thank our academic advisor Adjunct Associate Professor Einar Belsom at the department of Industrial Economics and Technology Management at NTNU for assistance and feedback throughout our work with this thesis. We also thank "Børsprosjektet" at the Norwegian School of Economics (NHH) for providing us with financial data.

Trondheim, May 30th, 2012

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1. INTRODUCTION

A still unsolved mystery in empirical finance is the apparent negative relation between Seasoned Equity Offerings (SEO) and future stock returns. Earlier, this negative effect was thought to be related solely to announcement, but newer empirical research shows that issuing firms experience unusually low stock returns not only at announcement, but also in the years following the equity issue. Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) show that US firms conducting SEOs generate surprisingly low returns over holding periods of 2–5 years following the issue date.

The proposed explanations for the long-run SEO underperformance generally fall under three categories:

> The mispricing explanation argues that there exists an over-optimism among managers and investors about the issuing firms' future prospects which leads to initial overvaluation, under-reaction to the SEO announcement, and subsequent slow reversion to intrinsic value (Loughran and Ritter, 1995, Spiess and Affleck-Graves, 1995).
>
> Followers of risk-based explanations argue that issuing firms become less risky after the issue and accordingly earn lower returns (Eckbo, Masulis, and Norli, 2000, Lyandres, Sun, Zhang, 2005, Carlson, Fisher, and Giammarino 2004).
>
> Others argue that in reality, the low stock returns are due to model and test misspecifications in measuring risk-adjusted abnormal returns giving rise to "spurious underperformance"(Fama, 1998, Barber and Lyon, 1997, Kothari and Warner, 1997).

A striking consequence of the existence of a long-run underperformance is that market efficiency as we know it would not hold. In an efficient market the market would correctly react to the SEO announcement and lower the value of the SEO firm to its intrinsic value. Believers of market efficiency therefore state that the observed long-run underperformance must be due to either lower risk or model misspecification. On the contrary, believers of an inefficient market argue that the market under-reacts to the initial announcement (that is, the SEO stock does not fall sufficiently after the SEO announcement) and therefore continues to fall also in the long-run perspective.

Even though the SEO literature is extensive, there are few analyses that specifically study the Oslo Stock Exchange (OSE) and surprisingly little is known about the true long-run risk-return characteristics of SEO stocks on the OSE. In this paper, we provide an extensive empirical analysis of the SEO market in Norway to detect the true relationship between SEOs and future stock returns. As far as we are aware, this kind of study has not been done before on the OSE.

OSE is a closely held capital market with relatively small firms. As Loughran and Ritter (1995) show that long-run underperformance is more pronounced among

smaller firms, we expect to observe significant underperformance also in the Norwegian context.

The scope of our thesis surpasses existing research on SEO stock price dynamics in a number of ways. Using the multi-factor model of Næs, Skjeltorp and Ødegaard (2009) we present new evidence on the SEO long-run underperformance. To assess whether the SEO long-run underperformance is unique to SEO firms, we investigate a sample of non-issuing firms and compare the systematic risks of the two groups of firms.

We investigate whether the low SEO returns on the OSE can be explained by standard financial theory and risk-based explanations in accordance with an efficient market view, or if they are better explained by mispricing, indicating that market efficiency as we know it should be discarded. Since both the mispricing and the risk-based explanations predict long-run underperformance, it is difficult to distinguish between the two explanations. We argue that the only way to differentiate between the two is to study the cross-sectional variation in SEO long-run returns. Instead of comparing issuers to non-issuers, where the results are highly dependent on finding perfect matching firms, we compare issuers to other issuers.

Finally, we analyze to what extent firm and deal specific factors such as industry, flotation method, and offer size can help explain differences in the cross-section of SEO returns.

To be able to determine which factors truly drive the SEO returns, and to investigate whether in reality there is a long-run underperformance, we begin with a thorough overview of the SEO process, the OSE, and in particular the Norwegian issue market over the past twelve years. We focus on Rights Offerings and Private Placements, which are the dominating flotation methods on the OSE.

The remaining part of the thesis is structured as follows: Section 2 contains a descriptive analysis of the SEO process and different flotation methods. Section 3 describes the OSE and the Norwegian issue market in particular. Section 4 begins with the theoretical motivation for our study and describes the hypotheses that form the basis for our analysis. This section also describes the measurement methodology we use to analyze our sample. Section 5 reports our empirical results. Section 6 gives a thorough discussion of our findings, and Section 7 our concluding remarks.

2. THE SEO PROCESS AND ALTERNATIVE FLOTATION METHODS

To understand SEO firms and what drives their subsequent returns, it is important to fully comprehend the dynamics of the SEO process and what factors influence the decisions taken in the process.

In a SEO, shares can be sold using many different mechanisms, such as firm commitment underwriting contracts, Rights Offerings or Private Placements. On the OSE the dominating flotation methods are Rights Offerings and Private Placements, or a combination of these. Given the prominence of these flotation methods, we start this section by describing in detail how Rights Offerings and Private Placements are done in practice.

2.1 Rights Offerings

In a Rights Offering, current shareholders are given short-term warrants to purchase newly issued shares on a pro-rata basis at a discount relative to the current market price. Because the value of the right increases with the subscription price discount, a deep discount makes it prohibitively costly not to exercise the right. On the other hand, if the market price falls the Rights Offering can end up being at a premium, which is likely to result in under-subscription or offer failure. In uninsured Rights Offerings the issuer carries this risk of offering failure. To avoid the risk of offering failure, Rights Offerings may be underwritten and are then called standby Rights Offerings. The role of the underwriter is to guarantee that the funds sought by the company will be raised. The agreement between the underwriter and the company is set out in a formal underwriting agreement. Typical terms of an underwriting require the underwriter to subscribe to any shares offered but not taken up by shareholders. The underwriting agreement will normally enable the underwriter to terminate its obligations under specific circumstances. Underwriters may be financial institutions, stockbrokers, major shareholders of the company or other related stakeholders (Eckbo, et al., 2000). Issuers sometimes conduct a partial standby Rights Offerings where the underwriter guarantees for less than 100% of the issue.

Before announcement the lead underwriter offers the issuing firm help on corporate and deal specific issues such as performing due diligence, registering the issue, and providing necessary documentation to key investors and clients. When the issue is approved, the firm meets with the underwriter syndicate and sets the final offer price. The SEO is then ready for execution when the Board of Directors approves the conditions. Figure 1 illustrates the different phases in a SEO process.

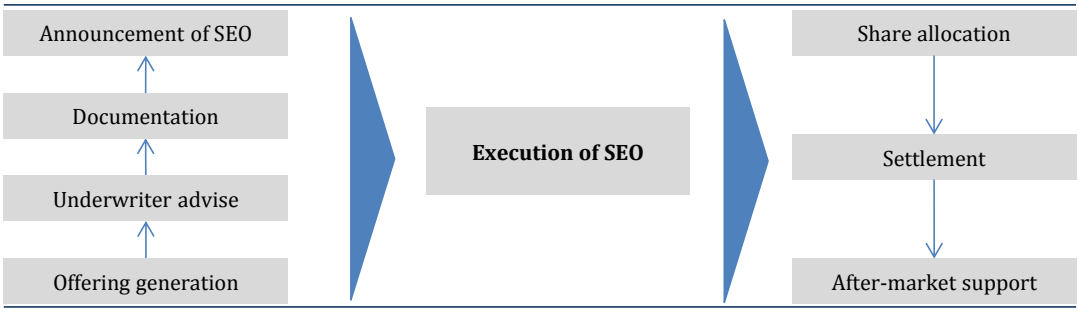

Figure 1 The phases of a SEO process

2.2 Private Placement

A Private Placement is the sale of securities directly to a small group of investors. Buyers of Private Placements include banks, specialized investors, and large institutional investors, such as insurance companies, mutual funds, and pension funds. In a negotiated Private Placement, shares are sold in blocks and the investor that is willing to pay the most for a block of shares is awarded that block. This means that negotiated Private Placements are more suitable to transfer blocks of shares. It is possible to stage the equity sales by first selling blocks and then selling the remaining shares. Many companies that use Private Placements also sell shares publicly afterwards. To conduct a Private Placement, the issue must be approved by existing shareholders through resolutions at the General Meeting.

2.3 Factors Affecting the Choice of Flotation Method

The flotation methods described above differ in terms of direct costs as well as in their potential for creating wealth transfer. To understand what lies behind the decision to issue, we discuss different factors affecting the choice of flotation method. The choice between Rights Offerings and Private Placements cannot be seen isolated from more general corporate issues, and selecting flotation method is therefore a decision taken based on the company's total financing needs and corporate strategy.

The flotation costs undoubtedly play an important role in selecting flotation method. The cost varies between Rights Offerings and Private Placements, but also varies within each type, depending on how the issue is organized. Typical direct flotation costs include underwriter fees, assistance from lawyers and accountants, registration fees, expenses for printing and handling, and any government taxes and fees. Of particular importance for the direct costs is whether the issue is underwritten. Traditionally, Private Placements have been underwritten, but also standby Rights Offerings have become more common. Comparisons of direct issue costs show, not surprisingly, that uninsured offerings are cheaper than underwritten offerings, regardless of flotation method. In order to understand the increasing preference for underwritten offerings, researchers have investigated various factors that tend to make the use of uninsured offers relatively expensive.

A possible reason for firms to choose an underwritten offering, despite higher direct costs, is the existence of asymmetric information and the potentially large adverse

selection costs. For example, external market participants may have the impression that insiders know more about the issuing firm, and since this hidden information could potentially be negative they require a major issue discount to compensate for the risks. Insiders in the issuing firm can in turn recognize that such an offering discount does not reflect the real conditions. In such a "lemon's market" situation, it may be rational for all parties to pay an underwriter to endorse the "right" issue price (Hertzel & Smith, 1993). Firms with higher asymmetric information about firm value tend to involve underwriter certification in a Rights Offering, and to choose a Private Placement when the information asymmetries are extreme. Eckbo and Masulis (1995) argue that underwriters can reduce adverse selection costs by providing a certification of firm value when the expected current shareholder participation ("take-up") is less than 100%.
Figure 2 shows characteristics for firms choosing the different flotation methods.

The most important indirect cost associated with SEOs is the typical underpricing costs associated with selling a security at a discount relative to both its prior trading day's closing price and its closing market price immediately following the offering. In contrast to Rights Offerings in the US, Norwegian issuers are required to set the offer price a minimum of three weeks prior to the beginning of the Rights Offering period. With a minimum period of two weeks, this means that the issuer (and standby underwriter) must forecast the issuer's secondary market price at least five weeks ahead when they determine the optimal offer price. The longer prediction period increases the risk of offering failure, which may explain why almost all Rights Offerings in Norway are underwritten.

The market reaction, which follows when the market becomes aware of the offering, is also potentially an important indirect cost. A drop in share price at the announcement of the issue represents a loss and is therefore an additional cost to shareholders. If underwriters had the ability to fully reveal the true quality of the issuer, only the highest-quality (undervalued) firms would select underwriting. This in turn implies that the market reaction to standby Rights Offerings and Private Placements should be more favorable than the market reaction to uninsured rights. However, evidence on the US market (Eckbo & Masulis, 1995) does not support this theory showing a more negative market reaction for Private Placements than for Rights Offerings. This evidence suggests that Private Placements do not completely eliminate the information asymmetry between the issuer and the market.

There is reason to believe that many issuing firms also consider how the offering will affect the ownership and control of the firm. Private Placements may be undesirable because they often lead to concentration of ownership, and thus impose a risk for more owner control. For example, a management-controlled company could avoid flotation methods that create owner constellations, which may reduce the management's privileges. Certain owner-controlled companies, where the controlling interests oppose the dilution of influence, also avoid Private Placements. Cronqvist & Nilsson (2005) show that Swedish family-controlled companies have a preference for uninsured rights issues, and that this is attributable to the family's strategy to maintain control.

The choice of flotation method may be influenced by the firm's exposure to potential moral hazard costs. Firms that establish a new strategic alliance or another product market agreement tend to choose a Private Placement to the new business

partner rather than a Rights Offering. In a product market agreement each firm has incentives to change the stipulations to its own advantage and it is impossible to contractually establish all of them. In that manner, Private Placements can reduce moral hazard costs like contracting and ex-post holdup costs in joint ventures.

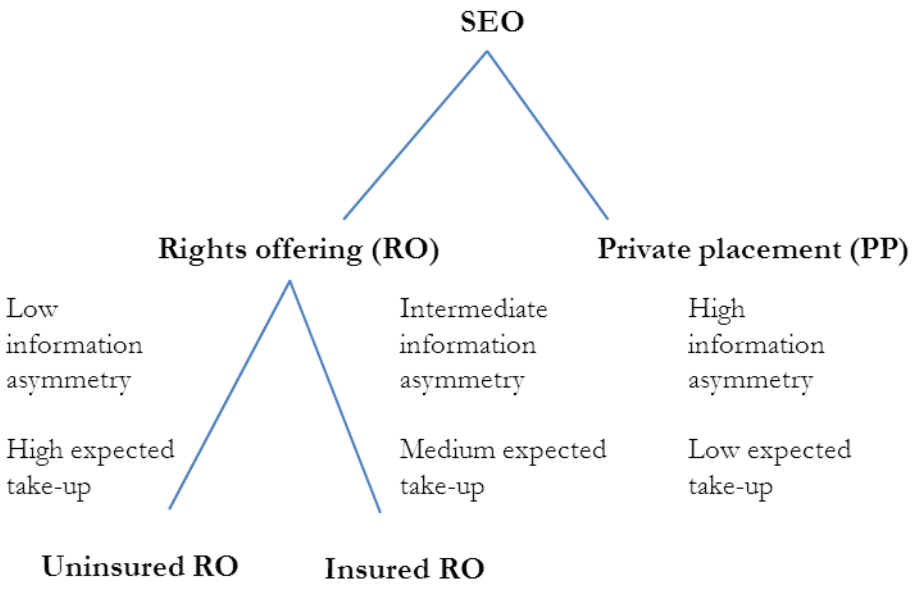

Figure 2 The choice between Rights Offerings and Private Placemen

3. OSLO STOCK EXCHANGE AND THE NORWEGIAN ISSUE MARKET

In this section we analyze the OSE, and the Norwegian issue market in particular, to detect trends apparent over the last decades. To help us determine factors affecting long-run SEO stock price dynamics on the OSE, we look for patterns concerning activity, size, and which companies raise capital.

3.1 The Oslo Stock Exchange

The OSE is a relatively small and closely held market. The exchange's value first became substantial in the period after 1980. Since 1980, the OSE has been growing steadily both measured in trading volume and values. Figure 3 shows how the total market values for all listed companies on OSE have increased through the period 1980-2012. In 1980, the OSE constituted 93 companies with a total market value of NOK 16.5 billion. At the end of 2011, the exchange had 239 listed companies and a total market value of approximately NOK 1.3 trillion. The value of OSE in relation to the GDP has also increased substantially from 5% in 1980 to 80% in 2011. (Ødegaard, 2012)

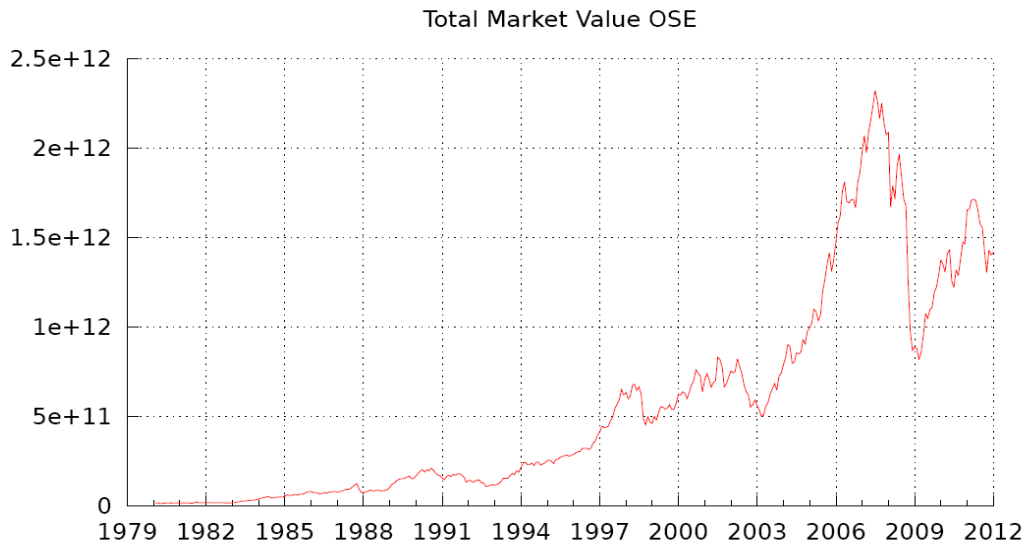

Figure 3 Aggregated market values the OSE. Values are in nominal (current) NOK
Source: Ødegaard (2012)

The OSE has many characteristics distinguishing it from other stock exchanges, which again may affect the stock performance of SEO firms in the Norwegian market differently from other markets.

The exchange is dominated by a few large companies, which in terms of market capitalization have a dominant position on the OSE. In 2011, the three large state-dominated companies Statoil, Telenor and DNB accounted for more than 56% of the total market value.

Companies on the OSE are concentrated in a few sectors. Before 1990, the two dominating sectors were Industrials and Financials. This pattern has changed over the last 21 years, and in 2011 Energy and IT were among the dominating sectors on the OSE. In terms of market weights, the IT sector is still relatively small. Even though the IT companies constituted almost 12% of all companies on the OSE in 2011, the sector had a market weight of only 2.15%. This indicates that Norwegian IT companies are typically small firms.

Today the dominating sector, both in terms of market weights and number of companies, is the energy sector. The sector consists largely of companies related to exploration and production of oil and supply to the oil industry. It has shown a significant increase in market weight over the last decade as Norway has become one of the world's leading countries within the oil and gas industry. From approximately 10% in 2000, the sector aggregated almost half of OSE's market value in 2011 with 46%.

With the energy sector expanding and increasing its share of the total market value, the OSE has become more exposed to fluctuations in oil and gas prices. The Norwegian market is clearly an oil-dependent market and oil prices significantly affect cash flows of most industry sectors on the OSE. An example of this occurred in the fall of 1998 when oil prices fell sharply, and oil traded at under USD 10 per barrel. The OSE market index fell by around 50% between April and October the same year. The oil business is known to be unpredictable, and factors such as business cycles, production capacities, and the current oil price highly affect oil companies' profitability. The OSE's sensitivity to the change in oil prices makes the exchange highly volatile compared to other exchanges.

When analyzing the returns of SEO firms it is interesting to compare with the overall average returns in different industry sectors on the OSE. Table 1 shows historical returns for equally weighted industry portfolios over the period 1980-2010. We see that the energy sector and the IT sector have earned the highest average monthly returns over the period, with 2.24% and 2.45%.

Table 1 Historical return by sector on OSE 1980-2010

Sector (GICS)	First year	Last year	Mean monthly return (%)	Standard deviation	Mean # firms in portfolio
10 Energy	1980	2011	2.24	9.55	20.6
15 Materials	1980	2011	1.77	11.94	6.9
20 Industrials	1980	2011	1.72	6.30	32.5
25 Consumer Disc.	1980	2011	1.62	7.34	11.2
30 Consumer Staples	1980	2011	1.88	6.67	7
35 Health Care	1980	2011	2.00	11.91	4.4
40 Financials	1980	2011	1.18	5.22	29
45 IT	1980	2011	2.45	11.16	12.1
50 Telecom	1987	2011	1.27	10.63	1.4
55 Utilities	1996	2011	0.84	6.78	2.6

Source: Ødegaard (2012)

3.2 Offering Frequency and Volume

In terms of offering frequency and volume, the SEO market has been subject to large variations. Figure 4 shows aggregated numbers of the amount of capital issued on OSE and number of issues conducted during the period 2000-2011. We see that the importance of OSE as a source of capital has varied through the period, with a peak in 2000 and a substantial drop in the years following. From 2005 companies again started to raise more capital until the financial crisis hit the Norwegian market in 2008. It is easy to see that the amount of capital raised on the OSE follows the overall economic climate. In growth periods companies raise significantly more capital than in downturns. This is also the case for the number of issues conducted. 2000, 2006 and 2010 were periods with high issue activity and 2002-2004 and 2008 periods with low issue activity.

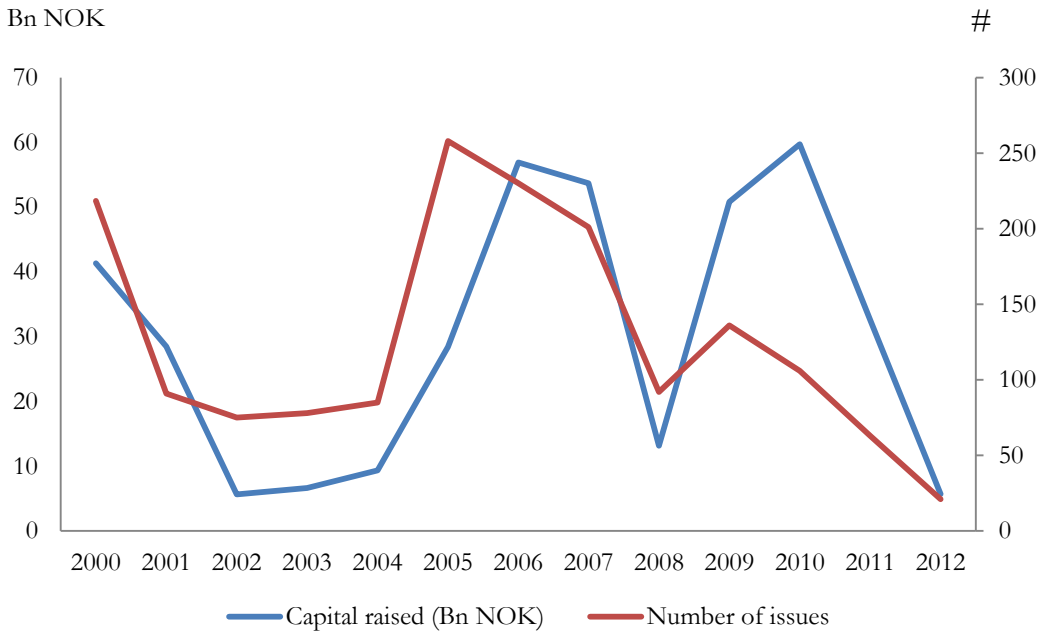

Figure 4 Capital raised and number of issues conducted on the OSE 2000-2012
Source: Oslo Børs (2012)

3.3 Capital Raised by Sectors of Industry

Looking at the relative size of each sector in the issue market, we clearly see a dominance of energy companies. The sector constitutes almost 40% of the total capital raised over the period. This is not surprising considering the prominence of this sector in the Norwegian market. In addition, the sector is very capital intensive due to the dependency of expensive equipment and large investments. To see how the distribution of equity offerings corresponds to the sectors' relative importance of trade on the OSE, Table 2 shows the amount of capital raised in each sector and the corresponding market weights. For most sectors we see a clear correlation between the importance on the OSE and how much capital is raised. However, there are some exceptions. IT, Materials and Consumer Staples raise relatively large amounts of capital, while Industrials and Telecom raise smaller amounts of capital compared to their market weights. Industrial companies are typically mature, self-sufficient companies, while IT companies typically are high growth firms in need of external cash.

Table 2 Sector distribution of Equity Offerings on OSE 2000-2010

Sector (GICS)	Market weight (%)	Capital raised (%)
10 Energy	41.7	39.9
15 Materials	2.7	5.3
20 Industrials	13.9	6.6
25 Consumer Discretionary	6.2	5.5
30 Consumer Staples	2.7	7.8
35 Health Care	4.1	3.9
40 Financials	12.6	12.8
45 IT	6.1	11.7
50 Telecom	9.7	5.7
55 Utilities	1.1	0.8

Source: Kvaal and Ødegaard (2011)

3.4 Dominating Flotation Methods on OSE

As mentioned earlier, nearly all equity issues on the OSE are conducted through a Rights Offering or a Private Placement. In terms of frequency, Private Placements heavily surpass Rights Offerings. Figure 5 and Figure 6 show the distribution of equity offerings of the two types, both by the aggregated value and by number of issues during the period 2000-2011. An interesting observation is that the number of Rights Offerings conducted over the period seems to be relatively more stable than the number of Private Placements. It looks as if relatively more Private Placements are conducted in economic upturns than in downturns. Choe, Masulis and Nanda (1993) argue that the higher volume of equity issues in periods of economic growth is related to lower adverse selection costs.

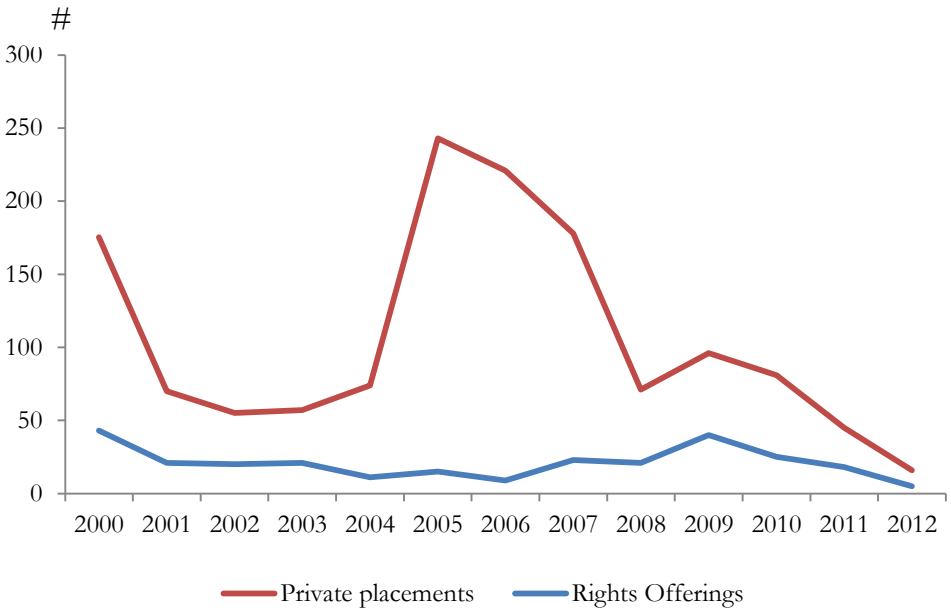

Figure 5 Number of offerings per flotation method

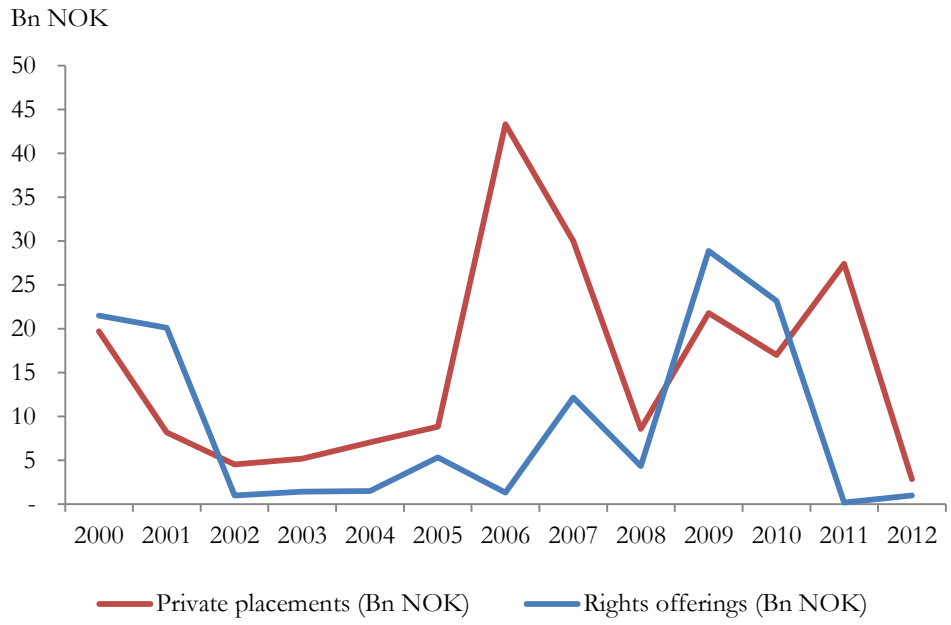

Figure 6 Capital raised per flotation method

The observed variation in frequency for Private Placements across the business cycle suggests that the companies that are exposed to adverse selection choose to issue equity through Private Placements more often in economic upturns when the adverse selection costs are low.

Although Private Placement is the dominant flotation method in terms of frequency on the OSE, companies raising large amounts of capital still tend to use standby Rights Offerings. This is illustrated in Table 3 where all offerings at OSE are divided into three groups based on offer size as percentage of firm equity. Small offers are defined as less than 5% of firm equity, a medium offer as between 5% and 25% of firm equity and large as more than 25% of firm equity. It is very clear that Rights Offerings on average tend to be relatively larger than Private Placements. Most of the Rights Offerings are over 5% of firm equity, while the majority of Private Placements are small, less than 5%. Table 4 shows how much equity SEO firms typically issue, calculated as newly issued shares as percentage of the existing shares. This confirms that Private Placements are smaller in offering size. Looking at the offering size relative to company size, we see that there are some differences between large companies (above median) and small companies (below median), but they are not striking.

Table 3 Number of issues conducted by Rights Offerings and Private Placements distributed by firm size and offer size

	2000-2009		
	All	Rights Offerings	Private Placements
All equity offerings	1087	154	933
Small firms	507	90	417
Large firms	580	64	516
Large firms			
<0.05	307	10	297
0.05<x<0.25	191	20	171
>0.25	81	33	48
Small firms			
<0.05	187	11	176
0.05<x<0.25	219	30	189
>0.25	102	50	52

Source: Kvaal and Ødegaard (2011)

Table 4 Offer size as percentage of existing shares

	Offer size as percentage of existing shares	
		Average
Total	Rights Offerings	60 %
	Private Placements	17 %
Small companies	Rights Offerings	34 %
	Private Placements	15 %
Large companies	Rights Offerings	29 %
	Private Placements	14 %

Source: Kvaal and Ødegaard (2011)

3.5 Historical Events on OSE 2000-2010

Our sample period ranges from 2000 to 2010, a period characterized by large fluctuations in the economy. The fluctuations were caused by financial events that highly affected the cash flows and returns for all firms on the OSE.

3.5.1 Internet Bubble

During 2000-2003 the OSE lost half its value, which can largely be explained by the dot.com-bubble. In 1999 and the early part of 2000 information technology appeared to offer explosive growth, and prices for Internet shares skyrocketed. The fact that many of these companies were burdened by heavy debt and offered no prospect of profits for many years was ignored. At the most optimistic time the market "priced" IT consultants at NOK 20 million completely ignoring traditional theories (Oslo Børs, 2012). However, some months into 2000 the dot.com bubble burst and global equity markets embarked on a long-lasting downturn. By February 2003 the OSE was back to its 1996 price level. The turnover had shrunk and the market for shares as an investment alternative had suffered a major setback. As we saw from Figure 4, total capital raised on the OSE and the number of offerings significantly decreased in the years following 2000.

3.5.2 Financial Crisis and its Influence on Capital Markets

The Norwegian market recovered relatively quickly after the dot.com bubble and experienced an astonishing exponential growth all the way through 2007, peaking at all-time-high of 510 points. However, in late 2007 the financial crisis hit the world financial market and the OSE. The oil price as well as the stock market plummeted by more than 50%. Before the financial crisis, many large companies pursued investment and financial strategies that depended on the continued availability of cheap external capital. However, with the global recession and credit crunch, companies had to reassess their liquidity situation and adjust their investments, distribution and financing strategies. Companies universally focused more on preserving capital and building financial flexibility after 2008. In 2007, companies mainly relied on external capital to fund capital expenditures, dividends and share repurchase, but by 2009, they were largely "self-sufficient" and even generating substantial free cash flow. As a consequence of the financial turmoil, companies started to hold more cash as a buffer. These trends were apparent in all financial markets including the OSE. As with the internet bubble this can be seen by the low levels of issues in 2008. Figure 4 shows a significant peak in 2007, both in capital raised and the number of issues conducted, representing the massive growth in the market that year.

4. ANALYZING LONG-RUN SEO PERFORMANCE

An important question yet to be answered in the literature studying SEOs is whether there really exists a long-run underperformance following SEOs, or if the stock price dynamics should be explained by other rational means. In this section we form various hypotheses in an attempt to explain the stock price dynamics following SEOs. As the SEO literature is extensive and many different explanations for the low stock returns have been proposed, we start this section by describing in detail the most discussed and conflicting explanations that form the basis for the following analysis. Further, we describe and discuss the measurement methodology applied in our analysis and specify the model we use to measure the "normal" performance. Lastly, we present potential biases and discuss their implications for our results.

4.1 Theoretical Motivation

Myers and Majluf (1984) pioneered the behavioral explanations on stock price behavior following equity offerings with their model of an adverse selection effect in equity financing due to information asymmetry. They claim that managers have inside information about the firm's performance, and that they use this information to issue equity when the stock is overvalued. In an efficient market, investors are aware of this asymmetric information and rationally lower the market price to the intrinsic value at announcement. However, empirical research on the US market (e.g. Loughran and Ritter (1995), Spiess and Affleck-Graves (1995)) shows that issuing firms experience unusually low stock returns not only at announcement, but also in the years following the equity issue.

The evidence of a long-run underperformance contradicts the hypothesis of market efficiency, and has motivated the development of behavioral asset pricing models. Supporters of a behavioral explanation argue that the abnormal return can be explained by a model such as that of Daniel, Hirshleifer, and Subrahmanyam (1999). In their model they suggest that the low stock returns are be due to investors' overconfidence about the SEO firm's future growth opportunities which would lead them to overreact to their private information and under-react to the public signal of overvaluation implicit in the SEO. If the market under-reacts to the SEO announcement, then the stock prices of the overvalued SEOs should experience a smaller decline at announcement but keep on falling in the long-run as the market becomes aware of the initial overvaluation.

Followers of an efficient market view propose other more rational explanations for the low SEO returns. The two explanations most commonly discussed in literature are that the apparent underperformance is either due to lower risk or due to model misspecification.

The investment-based hypothesis argues that the long-run underperformance is related to the issuer's investment activity, and arises from the negative association between capital investment and expected returns. Two different approaches have been used to develop this negative relation; the real option theory and the Tobin's q-theory.

In the real options model of Carlson, Fisher, and Giammarino (2004), expansion options are riskier than assets in place. The pre-SEO price run up reflects an increase in issuers' growth opportunities and accordingly the lower post-issue returns reflect a decrease in risk as risky growth options are converted into less risky assets in place. In particular, they show that the riskier the expansion opportunity, the larger the decrease in risk upon optimally timed option exercise.

Using a different but equivalent approach, Zhang (2005) derives the negative investment-return relation from the q-theory of investment. Intuitively, investments increase with the value of positive NPV-projects. The NPVs of new projects decrease as the cost of capital goes up. Further, the flow of funds constraint implying that the sources of funds must equate the uses of funds, suggests that issuers must invest more than non-issuers.

A different risk-based explanation is proposed by Eckbo, Masulis, & Norli (2000) who argue that the low stock returns are due to lower risk as a consequence of deleveraging. As equity issues lower a firm's level of leverage, the exposure to unexpected inflation and default risk decreases, thus decreasing the stock's expected return relative to non-issuing firms.

Some researchers claim that the low stock returns found for SEO stocks in reality are due to model and test misspecifications. Fama (1998) argues that all models of expected returns are incomplete descriptions of the systematic variation of expected returns across firms, and failure to use the correct model and test statistics could result in systematic biases and misspecification. He finds that the abnormal returns tend to become marginal or disappear when exposed to different models for expected (normal) returns or when different statistical approaches are applied. Further, he argues that even if there was a true model, any sample period produces systematic deviations from the model's predictions due to sample-specific patterns in returns that appear by chance. Spurious anomaly can thus arise even with risk adjustment using the true asset model.

The many conflicting views in literature make it difficult to assess the true power of the various explanations. We will in the following analyze empirically which theory holds the strongest explanatory power in explaining the SEO stock price dynamics on the OSE.

4.2 Hypothesis Development and Explanatory Variables

To investigate whether the long-run underperformance can be explained by an initial mispricing and under-reaction at announcement we use the ex-ante book-to-market (B/M) ratios of the SEO firms in our sample. The B/M ratio is a direct measure of a firm's "true" value relative to its market price and thus represents a good proxy for mispricing. However, the B/M ratio can also be interpreted as an indication of a firm's future growth opportunities (implicit in the firm's market value).

If the B/M ratio is a measure of pre-SEO mispricing then, in efficient markets, the prices of more overvalued SEO firms (low B/M) should experience a larger drop at announcement, but no further drop. However, if the market under-reacts at

announcement (indicating a non-efficient market) the stock price of low B/M SEO firms should decline more in the long-run than the stock price of otherwise equal high B/M SEO firms.

If the B/M ratio is a proxy for growth opportunities and not mispricing, a low (high) B/M ratio could be an indicator of a firm with more (less) valuable growth opportunities. The risk-based model of Carlson, Fisher and Giammarino (2004) predicts that both the high value firm and the low value firm should earn the same rate of return in the long run because the two types of firms would have the same risk and the same value after the equity is issued and the investment takes place. Thus, an implication of a purely risk-based explanation of SEO returns is that low B/M SEO firms should not underperform high B/M SEO firms. This is the opposite of what is predicted in the mispricing explanation where low B/M SEO firms should underperform high B/M SEO firms.

Even though the hypotheses are mutually exclusive, the SEO research is highly contradicting. To add further power to our analysis we investigate the two alternative risk-based explanations, arguing that the long-run underperformance respectively can be explained by SEO firms' higher investment level and decrease in leverage as a result of the SEO event.

We form a proxy for SEO firms' investment activity by taking the average of the firm's capital expenditures (capex) in the three-years following the issue divided by the size of the company's common equity the year before the issue (capex ratio). We include the issue year and the two years that follow because firms may use the proceeds to invest at different stages after the issue. By doing this we focus on the size of capex following the issue relative to pre-issue firm size. If the low SEO returns are due to an increase in investment activity, SEO firms with a high capex ratio should underperform SEO firms with a low capex ratio.

To analyze whether the low SEO returns can be linked to the decrease in leverage, we form a proxy using the percentage shares issued relative to outstanding shares before the issue. This is an indirect measure of the decrease in leverage following the SEO as more shares issued imply lower leverage after the issue. If the low SEO returns can be explained by a decrease in risk as a result of deleveraging, SEO firms with a high ratio should underperform SEOs with a low ratio.

There are a number of suggested bad model problems that may lead to spurious underperformance hence it is difficult to completely rule out the possibility of model misspecification. However, one way to test for this problem is by examining the persistence of abnormal returns. If there is a persistence of abnormal returns for the entire three-year tracking period this is, unless the mispricing lasts beyond the tracking period, consistent with the misspecification explanation of underperformance. Fama (1998) suggests that the common factor driving the results is test statistic misspecification and argues that reports of persistence do not imply long-lived mispricing. We investigate the underperformance over various time intervals during the three-year tracking period following the issue to look for signs of misspecification.

4.3 Measurement Methodology

There is considerable variation in the measures of abnormal returns and the statistical tests used by empirical researchers to detect long-run abnormal stock returns. The most frequently used approaches in literature are the matched firm technique using buy-and-hold returns (BHR) and factor pricing regression models. The matched firm technique employs the abnormal return by matching sample firms to control firms on specific firm characteristics known to be related to average returns. Following the evidence of Fama and French (1992) that average returns are related to a firm's size and book-to-market ratio, it is common to estimate abnormal returns by matching SEO firms with non-issuing firms based on these characteristics. On the other hand, the factor model approach is an application of factor pricing regressions, which uses a set of pre-specified portfolios as proxies for pervasive risks.

The followers of the factor pricing method argue that the matched firm technique is insufficient to control for important risk exposures of the issuing firms because they only include size and book-to-market ratio. They argue that the empirical asset pricing approach allows a more consistent and plausible way of identifying and correcting for the true risk exposures of issuers. Followers of an efficient market argue that the buy-and-hold method can yield spurious underperformance, even if it only occurs in a single period, due to the nature of compounding single-period returns. In addition, the factor model approach offers the advantage that it does not require size or book-to-market data for the sample firms. Firms can be included even though there are no available data on book-to-market ratios. The model also allows for the possibility that large firms, or firms with low book-to-market, may have returns that mimic the returns of small firms and/or high book-to-market firms (characteristics often held by SEO firms). Based on these arguments we will use the factor model approach in our analysis to measure long-run performance for SEO firms on the OSE.

Factor model procedures assume that expected returns are generated by a set of pre-specified risk factors. The average monthly abnormal return is estimated as the constant term ("Jensen's alpha") in a regression of the portfolio return on the risk factors. The expected value of alpha is zero for passively held portfolios provided that the specified factor model adequately captures the pervasive risk factors underlying the economy. In a theoretical factor model it is assumed that the expected excess return (the return of the stock less the risk free rate) can be expressed as

$$E\left[er^{i}\right]=\sum_{j}\lambda_{j}\beta_{j}^{i}$$

where $E(er^{i})$ denotes the expected excess return for stock i, j is the number of risk factors affecting the returns, β^{i}_{j} is the exposure to risk factor j for stock i, and λ_{j} is the risk premium for risk factor j common to the whole market.

4.4 Model Specification

To be able to detect the true long-run stock price dynamics for SEO firms, we are dependent on finding the theoretically motivated and empirically parsimonious factor structure that best explain anomalies in the cross-section of returns present in the Norwegian market. Fama and French (1993) find that US stocks are best priced using a factor model consisting of a market factor, the book-to-market ratio, and a size factor. However, research has shown that this is not necessarily applicable for stocks on the OSE. Analyzing return patterns and determinants on the exchange over the period 1980-2006, Næs, Skjeltorp, and Ødegaard (2009) find that a three-factor model containing a market factor, a size factor and a liquidity factor provides a more reasonable fit for the cross-section of Norwegian stock returns. They find that the two other CAPM anomalies, book-to-market and momentum, do not seem relevant in the Norwegian market.

The model can be defined as

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + l_i LIQ_t + \varepsilon_{it}$$

where R_{it} is the simple return on the common stock of firm i, R_{ft} is the three-month NIBOR, R_{mt} is the return on the OSE market index, SMB_t is the return on a portfolio of small stocks less the return of a portfolio of big stocks, and LIQ_t is the return of a portfolio with the least liquid stocks less the return of a portfolio with high liquid stocks. The regression yields parameter estimates of α_i, β_i, s_i, and l_i. The error term in the regression is denoted ε_{it}.

Based on their research, we will in our analysis of the SEO returns apply Næs, Skjeltorp and Ødegaard's (2009) multi-factor model to our sample of 895 Rights Offerings and Private Placements over the period 2000-2007. We assess the power of our results by conducting simple t-tests. The power is reported as p-values throughout our analysis. We choose a three-year tracking period to capture the total impact of the issue. Earlier research has shown that extending this period to five years show little additional effect. Our sample period is therefore defined as to allow for a three-year return for all the companies in our sample, leading up to 2010.

Næs, Skjeltorp and Ødegaard (2009) estimate the multi-factor model by investigating the importance of anomalies on the OSE using portfolio sorts and constructing factors based on the identified priced risks. An understanding of the analysis and how the factors are constructed is important, and we therefore give a more thorough description below.

4.4.1 Size Factor

The size effect is an empirical regularity first discovered during the 1980's on the US market, where one found that large companies on average had lower returns than smaller companies.

To investigate the size effect on the OSE Næs, Skjeltorp and Ødegaard (2009) use a portfolio sort method constructing portfolios based on companies' market

capitalization at the end of the previous year. The portfolio compositions are fixed throughout the year, and re-balanced at the end of the year. This results in 10 portfolios where portfolio 1 contains the smallest companies and portfolio 10 contains the largest companies. The portfolios show a positive differential return and thus a size effect in the Norwegian stock market. This suggests that there is a size effect which should be captured in the factor model.

The size factor in the model is calculated using a portfolio SMB ("small minus big") based on firm size with long positions in small companies and short positions in large companies. SMB is constructed as a zero investment portfolio, meaning that the investments combined create a zero net value. The portfolio is constructed ex-ante using available information about characteristics of the companies at the time of construction. Specifically, the factor is constructed by first sorting the companies at OSE into three book-to-market portfolios (high, medium, low), and thereafter the companies in each portfolio are sorted into two size portfolios (small, big). SMB is defined as

$$SMB = (\frac{1}{3}SH + \frac{1}{3}SM + \frac{1}{3}SL) - (\frac{1}{3}BH + \frac{1}{3}BM + \frac{1}{3}BL)$$

4.4.2 Liquidity Factor

Liquidity is a factor often related to CAPM anomalies. A number of empirical studies ((Brennan, et al., 1998), Eckbo & Norli (2002), (Pastor & Stambaugh, 2003)) suggest that greater stock liquidity reduces risk.

To investigate the liquidity effect Næs, Skjeltorp and Ødegaard (2009) construct a portfolio sort based on relative spread. The relative spread is a commonly used measure of liquidity, and calculated as the difference between the closing bid and ask prices, relative to the midpoint price. This results in 10 portfolios where portfolio 1 contains stocks with the most liquid companies, while portfolio 10 contains companies with the least liquid companies.

The liquidity factor is constructed as follows: Stocks are constructed into three portfolios based on average relative spread the previous month. Returns are calculated holding these portfolios constant throughout the month. The liquidity factor is calculated as the difference between the return of the least liquid portfolio and the most liquid portfolio.

4.4.3 Market Factor

The CAPM predicts that companies with high market beta have high returns. It is therefore common to sort portfolios using stock beta. Næs, Skjeltorp and Ødegaard (2009) use CAPM as shown below to estimate betas and construct portfolios based on the companies' market risk.

$$E[r_i] - r_f = (E[r_m] - r_f)\beta_m^i$$

where $E(r^i)$ denotes the expected return for stock i, $E(r_m)$ is the expected return on the market portfolio, r_f is the risk-free rate, and β_m^i is stock i's exposure to market risk.

Market beta for each stock is estimated using returns data for the three previous years. The beta portfolios are constructed at the end of each year and held constant through the following year. Næs, Skjeltorp and Ødegaard (2009) find that the market portfolio is a priced risk factor which must be included in the model.

The excess return on the market portfolio is computed as the market index on OSE (as a proxy for the market portfolio) less three-month NIBOR (as a proxy for the risk free rate).

4.5 Biases and Bad Model Problems

There are various potential biases and "bad model" problems associated with the use of factor models in general and also specifically for how we use the model, which are important to be aware of when analyzing the result. We will now discuss them in more detail.

4.5.1 Survivorship Bias

As discussed by Kothari and Warner (1997) there are several aspects of survivorship biases when measuring long horizon stock performance. First, data requirements in sample formation impose detectable biases in mean abnormal returns and standard deviation of returns for long-horizon studies. Second, the long tracking period raise the possibility of parameter shifts, affecting both abnormal return measurement and variances. Third, when measuring long-run stock performance the issue of how to weight firms that do not survive the period can potentially affect the specification of test statistics. To minimize the effect of a survival bias on our results, if a firm does not survive 36 months, abnormal performance is estimated for as many months as data is available.

4.5.2 Time-varying Factor Loadings

The factor model regression method assumes that the regression estimates are stable over the estimation period. In the presence of time-varying expected returns, an estimate of Jensen's alpha derived from an unconditional model is a biased measure of the true abnormal performance. Eckbo and Norli (2004) attempt to correct for this bias using a conditional factor model. Their motivation for this conditional model framework is the growing evidence that expected returns are predictable using publicly available information. However, when testing their time-varying beta model they cannot reject the hypothesis that betas are constant over time. We therefore consider an unconditional model as a good model for deriving expected returns.

4.5.3 Benchmark Contamination

Another bias with the factor regression model is the inclusion of the issuing firm in the stock universe and benchmark construction. Loughran and Ritter (2000) argue that the inclusion of equity issuers in the estimation of factors results in the factor regression having the same firms on both sides of the regression and that this substantially reduces the power to detect abnormal returns. Eckbo, Masulis and Norli (2000) and Lyandres, Sun and Zhang (2005) report zero abnormal returns when using purged factors. Since we use un-issue-purged factors in our analysis, this may be a bias and cause the abnormal return to be negatively skewed. However, other researchers (e.g. Brav, et al., 2000) using both issue-purged and un-issue-purged factors report significant underperformance in both cases, and we therefore believe that using purged factors will not considerably change our results.

4.5.4 Multiple Issuing Firms

Long-run performance measures might be sensitive to the treatment of multiple issuing firms, which may give an inaccurate result. In our analysis we have included firms that issue equity multiple times over our sample period. This may lead to biases if the result of one issue is affected by the result of an earlier issue by the same firm.

However, research has shown that this effect is insignificant in the long-run perspective. Brown, Gallery and Goei (2006) assess the sensitivity of their results to the inclusion of multiple issuers, by re-estimating their regression model for the subsample with only one issue over the holding period, or with an issue number variable included as an additional model regressor using the full sample. Neither approach changed their main finding of long-run underperformance. We therefore believe that including all issues gives a good picture of the stock price dynamics following SEOs.

4.5.5 Value-weighted vs. Equal-weighted Issue Portfolios

Another bias is related to the difference between using equal and value weighted portfolios. Loughran and Ritter (2000) point out that the choice of weighting scheme is important for power considerations of statistical tests. The literature is fairly unanimous when it comes to the fact that alphas with value-weighted issuer portfolios appear less negative than for equal-weighted portfolios. If the goal is to quantify investors' average wealth change subsequent to an event, then it follows that value weighting is the most correct method. However, as OSE is dominated by a few large companies, Næs, Skjeltorp and Ødegaard (2009) argue that a value weighted approach would bias the results giving rise to large standard errors and low t-statistics. We therefore use equal-weighting in our analysis.

4.5.6 Calendar-time vs. Event-time Regressions

Loughran and Ritter (2000) express their concern that the time-series regression approach, which weights each period equally, understates the severity of the underperformance following equity issues. If there are time-varying misvaluations that firms capitalize on by issuing equity, there will be more events involving larger misvaluation in some periods than others. This time-varying misvaluation will be washed out when weighting each period equally. Mitchell and Stafford (2000) show that the SEO anomaly disappears when the calendar-time abnormal return (CTAR) method is used to measure returns. In our analysis, averages are therefore calculated with weights on individual firms rather than on calendar periods.

5. EMPIRICAL ANALYSIS OF OSE SEOS 2000-2007

In this section we present our main findings. We begin by documenting an underperformance for SEO firms on the OSE. We assess the concept of market timing and look for indications of SEO firms taking advantage of windows of opportunity. To analyze whether the low SEO returns can be explained by mispricing or if they are better explained by risk-based explanations we conduct cross-sectional studies with appropriate proxies. Specifically, we test whether a negative abnormal return can be explained by ex-ante overvaluation, and trace whether changes in the risks proposed in literature may play a vital role in explaining the abnormal returns. We also investigate if our results may suffer from model misspecification. Finally, we propose and investigate deal and firm specific factors we believe might explain some of the differences in the cross-section of returns in our sample.

5.1 Data

Data on the SEOs in our sample and market prices for SEO firms in the time period 2000-2010, are obtained from the database of the OSE. We have gained access to the database through NHH's "Børsprosjektet". In our sample, we have included all equity issues defined by OSE as either a Rights Offering or a Private Placement. The Fama-French factors and the additional factors in the model of Næs, Skjeltorp and Ødegaard (2009) calculated on the Norwegian market we obtained from Bernt Arne Ødegaard's website. The three-month NIBOR was collected from the website of Norges Bank. Additional accounting figures are from Bloomberg.

The raw sample consists of 895 SEOs conducted on the OSE between January 2000 and December 2007. The period was chosen as to permit at least three years of price data for each SEO company in our sample (leading up to 2010). The SEOs had to meet the following criteria: (1) the company must be listed on the OSE, and the transaction registered on the OSE at the time of the issue, (2) the offer must be a Rights Offering or a Private Placement, and (3) the company undertaking the SEO cannot be a financial company or regulated utility (the capital requirements governing financial corporations make their equity issues more predictable and we therefore leave them out of the general population of issuers).

We filter out cases where the issue price is extremely different from the market price. This is cases where it is likely that there are errors in the rate registered in the database of OSE. We therefore filter out cases where the difference between market price and the issue price represents more than 90% of the current market price. In our sample we find two such cases.

5.2 Documenting SEO Underperformance

Estimating the following regression on the 895 issues in our sample using three-year monthly data, our result yields an alpha of -1.22%, statistically significant at all levels (p-value ≈ 0). Alpha is interpreted as the mean monthly abnormal return.

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + l_i LIQ_t + \varepsilon_{it}$$

To investigate if the returns are constant over the sample period or if the documented underperformance is concentrated only in parts of the sample period we calculate the average abnormal returns per cohort year. Table 5 shows the three-year average abnormal return, the standard deviation, p-value, and the number of issues per cohort year. We find consistently negative alphas for all cohorts except for 2005 (0.26%, p-value = 0.28) and 2006 (0.07%, p-value = 0.42). This indicates that the profound long-run underperformance reported on the US market also is present for SEO firms on the OSE.

Even though almost consistently negative, we find annually large variations ranging from -2.41% in 2003 to 0.26% in 2005. This suggests that period-specific factors and the overall macroeconomic environment somewhat affect the long-run performance. As shown in Table 5 we find one of the most negative alphas for the SEOs conducted in 2000. With a standard deviation of 6.30% SEO firms significantly underperform by a monthly average of -2.16% (p-value ≈ 0). The large underperformance in 2000 leads us to believe that SEO firms were affected by the dot.com bubble. The issue market was hot with a large need for external capital. IT stocks were at a peak level in 2000 before they experienced a large drop in the years following. A lot of investors rode the IT wave in the years leading up to 2000 with no concern for a possible crash. The result was that many IT firms went bankrupt or suffered from financial distress up until 2003 when the market again stabilized. If we isolate the IT sector, we find an alpha of -2.88% (p-value ≈ 0), thus below the overall average. The IT sector accounted for 45 of the 166 issues in 2000, 27% of our total sample that year.

Table 5 Mean abnormal return, standard deviation, p-value and number of issues distributed annually

Year	Mean abnormal return	Standard deviation	p-value	Number of issues
2000	-2.16%	6.30%	≈ 0	166
2001	-1.91%	3.73%	≈ 0	79
2002	-1.33%	5.26%	0.03	60
2003	-2.41%	5.25%	0.0003	61
2004	-1.23%	3.46%	0.0016	74
2005	0.26%	5.46%	0.28	153
2006	0.07%	3.97%	0.42	150
2007	-2.08%	3.48%	≈ 0	152
2000-2007	-1.22%	4.90%	≈ 0	895

5.3 Market Timing

The level of SEO activity in the Norwegian market has fluctuated over the last decade displaying time-clustering correlated with prior market movements. We clearly see from Figure 7 that more capital is raised during favorable periods in the market (represented by a high market index). The graph clearly shows a peak in the amount of capital raised in 2000 and also in 2006-2007, years characterized by extreme growth.

Several empirical studies try to connect the financing frequency to "windows of opportunity" in which capital can be raised at more favorable terms in hot markets. The behavioral timing, or windows of opportunity, theory suggests that companies time their equity issues to these periods to take advantage of time-varying misvaluations.

Choe, Masulis and Nanda (1993) show that the volume of equity offerings is higher during periods of economic growth, and argues that this is due to lower adverse selection costs. In periods with high growth investors are generally more optimistic about firms' future prospects and firms have the opportunity to raise relatively cheap capital. The IT sector in the end of the 90's and beginning of 2000 is a prime example of this. We also see that in 2007 large amounts of capital were raised at favorable terms. In a cold market investors are more risk averse and it is therefore generally more expensive to raise capital in such markets. Since no firm wants to issue undervalued equity less capital is raised in economic downturns. Due to the generally worse conditions equity offerings in cold markets are often motivated by the need for restructuring and down-payment of debt, as opposed to offerings in hot markets often motivated by overvaluation or available investments.

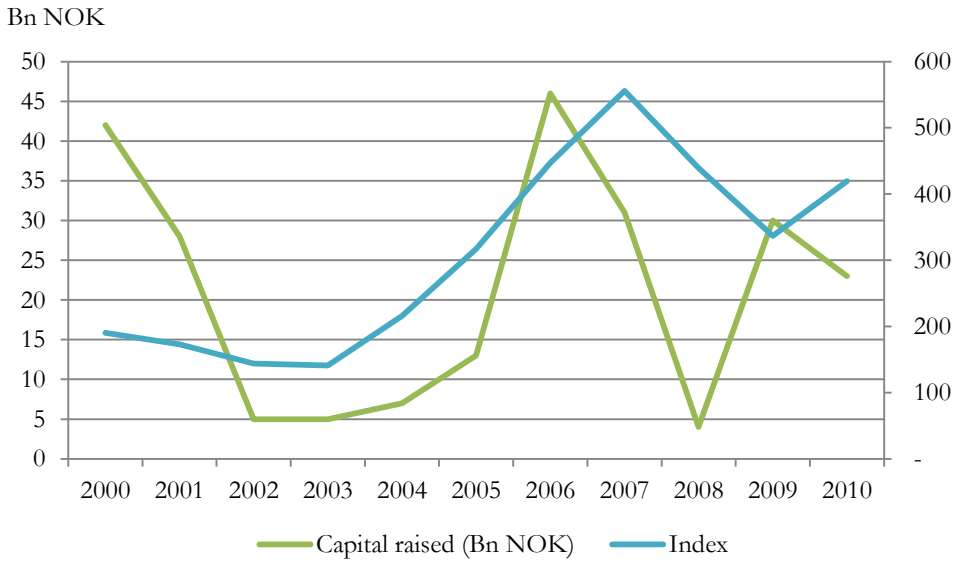

Figure 7 The amount of capital raised and the OSE market index 2000-2010

We see clear signs of firms taking advantage of windows of opportunity in 2000 and 2007. These are years characterized by a significant upturn in the market and high issue activity. At the same time, firms issuing in these years experience a subsequent larger underperformance compared to other years (see Figure 8). This indicates that these firms may have issued overvalued equity and that the market has slowly anticipated this overvaluation in the following years. The low SEO returns following these years must also to some extent be due to the financial turmoil that followed. The macroeconomic climate should however affect all firms and not just issuing firms. We will analyze this further in Section 5.4.

In 2005 and 2006, we observe positive alphas, however not significant. These are years characterized by strong issue activity and economic upturn in the overall market. SEO issuers in these years were not significantly affected by the financial crisis that hit the market in 2008. Since the whole period 2005-2008 was characterized by economic growth, even though SEO firms took advantage of issuing overvalued equity during this period, the market may not have become aware of the initial overvaluation during the three-year tracking period, but rather in a longer perspective.

Although there is obvious correlation between the current market state and the abnormal returns, we see that the differences in abnormal returns cannot solely be driven by macroeconomic conditions. Instead of identifying periods when issue conditions might vary based on macroeconomic conditions as done by Choe, Masulis, and Nanda (1993) and Bayless and Chaplinsky (1996) use the aggregate volume of equity issues to identify the periods when conditions are most favorable or unfavorable for issuing. Bayless and Chaplinsky relate hot issue markets to periods of low information asymmetry and define windows of opportunity as time periods where information costs are reduced for all firms, meaning that the observed differences in abnormal return are not attributable to differences in market conditions. We observe that the number of issues is not fully correlated with the market index. In 2000 the OSE market index was at a low 200 points while the number of issues was at its highest peak throughout the period (see Figure 9). In addition, we clearly see a high issue market from 2005-2007 with a peak in 2005. However, the index is at its highest first in 2007. This means that the market conditions alone cannot explain the lower abnormal return in hot markets, as no macroeconomic or market variable consistently distinguishes hot and cold issue markets.

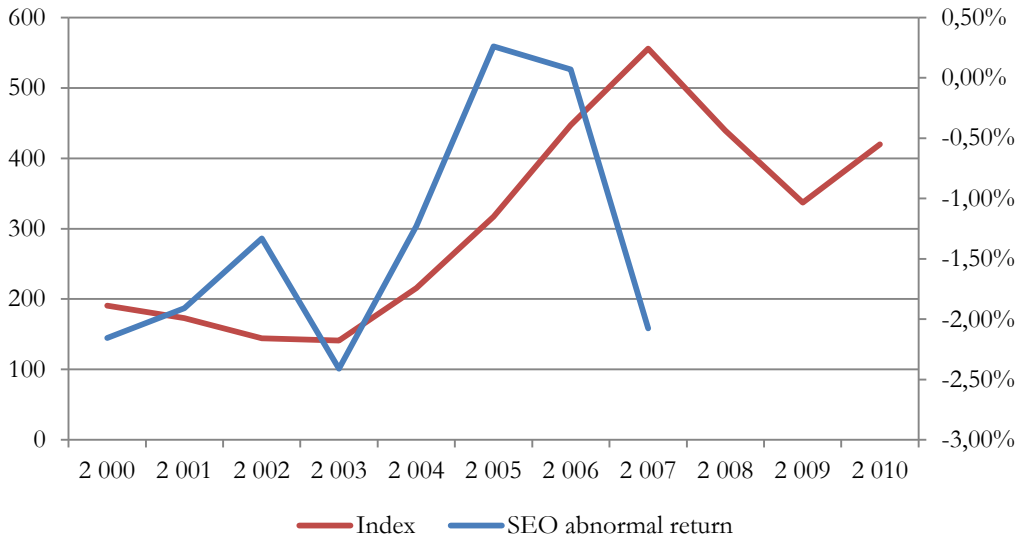

Figure 8 The OSE index and the abnormal returns of SEO firms

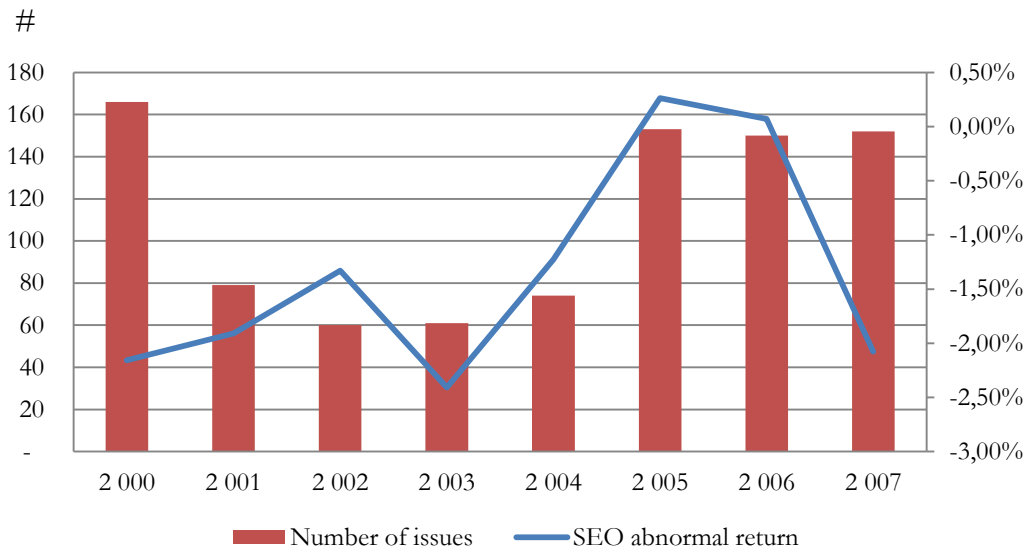

Figure 9 Number of issues and the abnormal return of SEO firms

5.4 Uniqueness of SEO Returns – Comparing to Non-issuing Firms

To assess whether SEO timing and the lower long-run underperformance is unique to SEO firms, we create a control sample of 178 comparable, non-issuing firms for the same sample period. We compare the systematic risks of SEO firms to those of non-issuing firms by re-estimating the Næs, Skjeltorp and Ødegaard (2009) factor model for our sample of non-issuing firms. To see whether SEO firms are outperformed by non-issuing firms, we test whether the average difference in alpha is significantly different from zero. Table 6 shows the factor model regression results for both issuing and non-issuing firms.

Interestingly, we find an alpha for non-issuing firms of approximately zero (p-value = 0.62), as opposed to what was found for SEO firms. These results increase the credibility of the model of Næs, Skjeltorp and Ødegaard (2009) indicating its ability to correctly price companies on OSE. Further, we find a difference in alpha between SEO firms and non-issuers of -1% (p-value ≈ 0). If the same negative alpha observed for SEO firms had been found for non-issuing firms this could indicate model misspecification and that pervasive risks affecting both issuers and non-issuers were not properly captured in the model. However, the fact that the negative alpha is observed solely for SEO firms indicates that the abnormal return must be somewhat related to the SEO event or specific characteristics for the SEO firms in our sample.

The values for the other coefficients also confirm that there are differences between the systematic risk of SEO firms and non-issuers. Interestingly, the market beta is significantly larger for SEO firms than for non-issuing firms (p-value ≈ 0). For SEO firms, we find a market beta of 1.4 (p-value ≈ 0) and for non-issuers this value is only 0.89 (p-value ≈ 0). This suggests that SEO firms are generally more risky than non-issuers. This is inconsistent with the risk-based explanations of Carlson, Fisher and Giammarino (2006) and Eckbo, Masulis and Norli (2000). According to these risk-based explanations, SEO firms become less risky after the issue indicating that they should have a lower market beta compared to non-issuers. We observe that SEO firms are more sensitive to both the size factor and liquidity factor compared to non-issuing firms (p-values ≈ 0 and 0.00001). These observations lead us to believe that our sample of SEO firms may hold characteristics that affect their return pattern. Brav, Geczy and Gompers (2000) find that SEO underperformance is concentrated primarily in small issuing firms with low book-to-market ratio. They suggest that many of the long-run anomalies found in the finance literature are manifestations of the same return pattern in the data. Various types of corporate decisions or subsamples of firms may be more heavily weighted by the types of firms that underperform without the decision or event being the cause of underperformance.

Barber and Lyon (1996) and Kothari and Warner (1996)) have also shown results indicating that the direction and magnitude of the abnormal return in studies testing long-run performance can be sensitive to sample characteristics, such as size, book-to-market, exchange listing, and time period.

Table 6 Factor regression results for issuing and non-issuing firms

		Alpha			MRK			SMB			LIQ		
	#	α	std	p-value	β1	std	p-value	β2	std	p-value	β3	std	p-value
SEO firms	895	-0,01	0,05	≈ 0	1,40	1,27	≈ 0	0,28	1,59	≈ 0	-0,23	1,34	≈ 0
Non-issuing firms	178	0,00	0,02	0.62	0,89	0,95	≈ 0	-0,10	0,79	0,11	0,16	1,01	0,04
Difference		-0,01	0,00	≈ 0	0,51	0,08	≈ 0	0,37	0,08	≈ 0	-0,39	0,09	0,00001

To examine whether the differences in alpha are due to sample specific characteristics, we match each SEO firm with a non-issuing firm of similar size and liquidity. By doing this we control for possible market-wide shifts in individual firm's systematic risks which may not be related to the SEO event. Specifically, we do a three-way sort based on size and liquidity. We construct three portfolios corresponding to each characteristic based on a 30-40-30-percentile grouping, the top 30%, middle 40%, and the bottom 30%, for a total of 9 portfolios. Then we sort the sample of non-issuing firms into portfolios based on the same size/liquidity breakpoints as for the SEO firms. This matching procedure allows us to create a control sample, which has a similar risk profile as that of our SEO sample and in that way we are able to identify if SEO returns are correlated with the returns of non-issuing firms with specific characteristics. Our sample of non-issuing firms is relatively small which could potentially limit the value of a comparison. However, the non-issuing firms are distributed quite evenly across the different size/liquidity portfolios, which make the results somewhat comparable.

We find that none of the portfolios of non-issuing firms have significant alphas and that issuing firms underperform compared to non-issuers across all size and liquidity categories. The results indicate that the abnormal returns for SEO firms are not linked to the characteristics size and liquidity. If the abnormal return for SEO firms were driven by these characteristics, we would have observed the same abnormal returns for non-issuing firms with the same characteristics.

Even though we find no significant alpha for non-issuing firms over a three-year period, there may be a time-variation in alphas over the period. To check whether any sub-period abnormal performance is washed out in the average of returns over the three-year period, we examine abnormal return over holding periods of one and two years. We perform similar regressions as we did to obtain a three-year abnormal return. We find no significant difference in means between the one-year, two-year, and three-year abnormal returns for our sample of non-issuing firms. This further emphasizes our belief that the abnormal returns detected for SEO firms are driven by issues related to the SEO event.

In the last section, we argued that the macroeconomic environment should affect all firms and not just issuing firms. To examine whether the calendar effects observed for SEO firms are unique or if non-issuing firms are sensitive to the same calendar effects, we report in Table 7 abnormal returns for non-issuing firms per cohort year. In 2000, which is one of the years where the average abnormal return for SEO firms is most negative, non-issuing firms also have a weakly negative abnormal return of -0.49% (p-value = 0.054). As for SEO firms, we find positive abnormal returns in the period 2005-2006 (p-values = 0.051, 0.665), characterized as a high growth period. This confirms that SEO firms are somewhat more sensitive than non-issuers to calendar period effects over the sample period.

Table 7 Mean abnormal return, standard deviation, p-value non-issuing firms annually

Year	Mean abnormal return	Standard deviation	p-value	Number of issues
2000	-0.49 %	1.40 %	0.054	33
2001	-0.70 %	2.89 %	0.215	28
2002	0.07 %	2.13 %	0.874	24
2003	-0.53 %	4.10 %	0.548	22
2004	1.04 %	1.48 %	0.013	16
2005	1.16 %	2.19 %	0.051	16
2006	0.26 %	2.53 %	0.665	19
2007	-0.53 %	1.34 %	0.093	20

5.5 Mispricing and the Effect on Abnormal Returns

By looking at the economic environment at the time of the SEO, we see that companies somewhat time their offerings to economic upturns. We also observe that companies issuing equity in hot periods also experience significantly negative abnormal returns. However, it is not evident whether these firms are actually overvalued at the time of issue. To analyze whether the SEO firms are overvalued at the time of issue, we estimate the firms' book-to-market ratio as a measure of mispricing.

To investigate the relationship between book-to-market ratios of SEO firms and their alpha we do a three-way independent sort based on size, liquidity, and book-to-market (B/M) ratio. Size and liquidity are defined as in Næs, Skjeltorp and Ødegaard (2009). We construct three portfolios corresponding to each characteristic based on a 30-40-30-percentile grouping, the top 30%, middle 40%, and the bottom 30%, for a total of 27 portfolios. We compute the equal-weighted average returns of all 27 portfolios based on the prior year-end market cap. We then average the returns of nine low B/M portfolios corresponding to nine (3 times 3) size and liquidity portfolios to construct the return of the low B/M portfolio. We construct the return of the high B/M portfolio in a similar manner by averaging the returns of the nine high B/M portfolios corresponding to the nine size and liquidity portfolios.

In accordance with our hypothesis of an initial mispricing we find that low B/M SEO firms underperform otherwise equal high B/M SEO firms. The difference in abnormal returns between low B/M SEO firms and high B/M SEO firms is 0.81% a month or almost 9.7% annually (p-value = 0.15). Low B/M SEO firms have an alpha of -1.40% (p-value = 0.001) while high B/M SEO firms have an alpha of -0.58% (p-value = 0.05).

Although only weakly significant, our results confirm a cross-sectional relationship between SEO firms' B/M ratio and their accompanying alphas. Using B/M ratio as a proxy for overvaluation, this is consistent with the mispricing hypothesis.

As described in section 4.2 the B/M ratio may also be a measure of a firm's growth opportunities rather than mispricing. Thus, the low B/M ratio could be an indicator of a firm with more valuable growth opportunities. However, Carlson, Fisher and Giammarino's (2004) model predicts that high growth firms and low growth firms should have the same risk and the same value after the issuance. Thus, low B/M SEO firms should not underperform high B/M SEO firms according to their theory. As we find that low B/M SEO firms underperform high B/M SEO firms our results are inconsistent with their model predictions.

5.6 Risk-based Explanations of Abnormal Returns

There are several theories in support of a risk-based explanation of the SEO long-run underperformance. They all argue that SEO firms become less risky after the issuance, either because of decrease in leverage, or due to optimally timed execution of growth options into assets in place (see section 4.1).

We start this section by analyzing whether the low SEO returns can be linked to the decrease in leverage. Then, we investigate whether the unusual low stock price performance in the years following SEOs is a result of the issuing firms' investment activity.

5.6.1 Deleveraging and Abnormal Returns

As described in 4.2 we use the percentage of shares issued relative to the number of outstanding shares before the issue as a measure of the decrease in leverage after the SEO.

To investigate the relationship between the decrease in leverage and abnormal return, we do the same three-way independent sort based on size, liquidity, and number of shares issued as a percentage of pre-issue outstanding shares as we did in Section 5.5. SEOs in the lowest percentile are termed low deleverage, and SEOs in the highest percentile are termed high deleverage. The return of the lowest percentile is calculated as the average returns of the low deleverage portfolio corresponding to nine size and liquidity portfolios, and the return of the highest percentile is calculated as the average return of the high deleverage portfolio corresponding to the nine size and liquidity portfolios.

When analyzing the difference in means between the two portfolios we find a difference of 0.32% (p-value = 0.52). We find an alpha of -1.11% for low deleverage SEO firms and an alpha of -1.43% for high deleverage SEO firms. The insignificant difference between low deleverage SEO firms and high deleverage SEO firms makes it unlikely that the decrease in leverage is the underlying factor driving our results. Our findings are inconsistent with Eckbo, Masulis, and Norli's (2000) explanation that risk reduction is caused by lower financial leverage. We argue that changes in leverage have any effect on the overall risk, through decreased exposure to unexpected inflation this would affect market risk as well and should already be interpreted in our model through the market factor.

It can be questioned whether the percentage shares issued is a good proxy for the decrease in leverage after the issue. Walker and Yost (2008) investigate the SEO firm's post-issue leverage ratio measured by long-term debt to total asset (LTD/TA) and find that it appears to return to the firm's pre-issue debt level by the end of the second year after the SEO. They find that in the year of the issue, SEO firms experience a significant decline in leverage reflecting the large inflow of equity. Over the next two years, however, the firms increase their median leverage, resulting in a debt ratio similar to before the issue. Even though we fail to find evidence that the abnormal performance is related to the decrease in leverage, we cannot completely rule out the possibility that the abnormal SEO underperformance is related to risk.

5.6.2 Capital Expenditures and Abnormal Returns

As mentioned earlier, Carlson, Fisher and Giammarino (2004) find that SEO firms invest relatively more than non-issuers and that this in turn leads to low returns. We test whether a higher investment level among SEO firms can be linked to their underperformance by examining the relationship between SEO firms' investment activity and abnormal returns. The investment activity is represented by the level of post-issue capex. We do the same independent sort based on size, liquidity, and capex ratio as we did in the other analyses. The capex ratio is defined as the post-issue three-year average capex divided by the firms' pre-issue common equity. We calculate the average abnormal returns for two portfolios consisting of nine low capex portfolios corresponding to nine size and liquidity portfolios, and nine high capex portfolios corresponding to nine size and liquidity portfolios, respectively. According to the investment based theory, we expect to find a negative relationship between a firm's level of investment and abnormal return (as shown in Figure 10).

Surprisingly, we find a significant positive correlation of 15.3% between the issuers' capex ratio and abnormal returns (p-value = 0.0033). When testing the difference in alphas between the portfolios, we find a difference of -1.56% (p-value = 0.0022). Low capex SEO firms have an abnormal return of -1.94% (p-value ≈ 0), while high capex SEO firms have an abnormal return of -0.38% (p-value = 0.17).

Interestingly, we find only weak evidence of an underperformance for SEO firms with a high investment level, while low investment firms clearly underperform. This finding, along with the positive correlation between SEO firms' capex ratio and abnormal returns are the opposite of what was predicted by Carlson, Fisher and Giammarino (2004) and Zhang (2005), and therefore inconsistent with the risk based explanation of abnormal returns. Instead, our results indicate a more severe underperformance for SEO firms that do not use the proceeds for capital investment (low capex ratio) than those that invest the proceeds (high capex ratio). This is consistent with the findings of Autore, Bray and Peterson (2009), which show that SEO firms intended to be used to pay down debt and for other general corporate purposes underperform SEOs intended to be used to finance new investments. They argue that if the funds are used for alternative matters such as debt repayment and for general corporate purposes this indicates that the SEO firm has no profitable investment projects at the time of the issue. The fact that a firm issues equity despite zero investment prospects further indicates motivations related to market timing or, alternatively financial distress.

Together with our earlier results on the relationship between book-to-market ratios and abnormal returns, this further strengthens our hypothesis of mispricing and suggests that differences in investment levels are not likely to help explain the underperformance following SEOs.

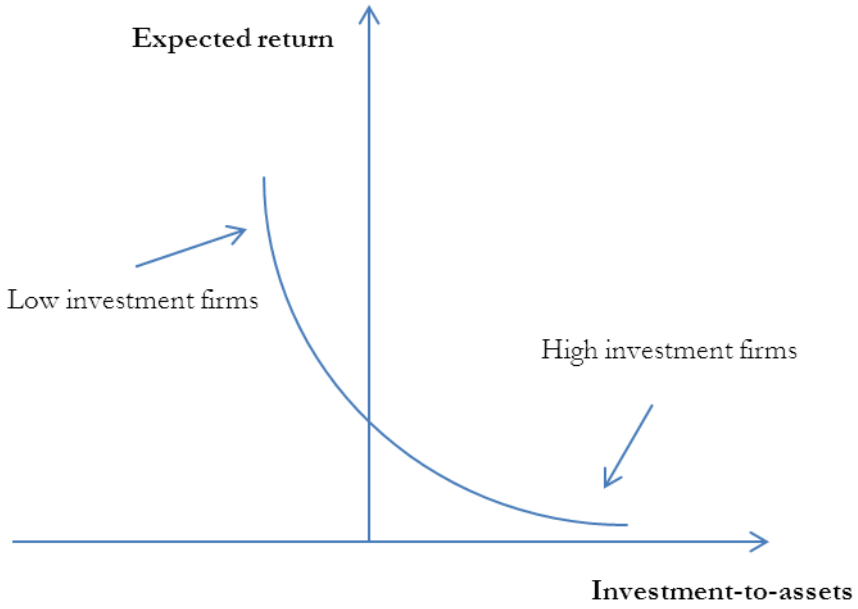

Figure 10 The relationship between expected return and investment level

5.7 Testing for Model Misspecification

As discussed in Section 4.1, many researchers suggest that the SEO long-run underperformance may be due to model and test misspecifications. Over a long period, the variation in expected return estimates across different benchmark models can be large (Ball, 1978, Fama, 1991). Thus, long-run results are potentially very sensitive to the assumed model for generating expected returns. The failure to use the correct model and test statistic could result in systematic biases (see section 4.5) and misspecification. In addition, as all asset pricing models are incomplete descriptions of the systematic variation of expected returns across firms, any model can to some extent suffer from misspecification in measuring risk-adjusted expected returns giving rise to spurious underperformance (Fama, 1998).

According to Kothari and Warner (1997) an indication of model misspecification is the persistence of the abnormal performance throughout the horizon following a simulated event. In event studies one should expect the effect of the event to decrease with time. A constant alpha would therefore indicate other factors affecting the stock price movements not related to the actual event. In a true asset pricing model, these factors should be captured in the estimation of expected returns and accordingly, a constant alpha would indicate model misspecification.

We perform similar regressions as we did to obtain a three-year abnormal return, to calculate abnormal returns for holding periods of one and two years. Our results show that the underperformance is decreasing as the tracking period increases (see Figure 11).

The abnormal return averages -1.42% for the first year after the SEO, but it decreases to -1.34% when measured over a two-year holding period, and finally reaches -1.22% in three years, all statistically significant. The results are shown in Table 8. However, we find no significant difference in means between the one-year, two-year, and three-year abnormal return.

In accordance with the mispricing hypothesis and the risk-based explanations the underperformance should carry the largest weight in the period immediately following the issue, and decline as time passes by. We therefore also investigate the prominence of the alpha over other time intervals in our three-year tracking period.

To do this, we define three periods relative to each offer. The first period begins in the month of the offer and continues for 12 months following the offer. The second period begins in the 12th month following the SEO and lasts for 12 months until 24 months after the offer. The last period begins in the 24th month following the offer and ends 36 months following the offer. For each of the periods, we conduct similar regressions as we did over the whole three-year period following the SEO. In that manner, we are able to get an understanding of what time period after the SEO event the underperformance is most prevalent.

Table 8 1, 2, and 3-year mean abnormal return, standard deviation, p-value, and number of issues

Year	Mean abnormal return	Standard deviation	p-value	Number of issues
1-year	-1.42 %	7.13 %	≈ 0	895
2-year	-1.34 %	5.77 %	≈ 0	895
3-year	-1.22 %	4.90 %	≈ 0	895

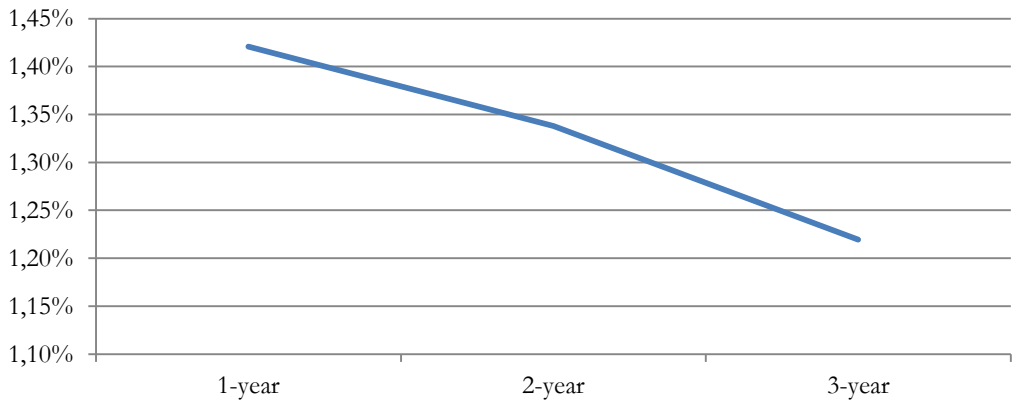

Figure 11 Underperformance measured over a 1-year, 2-year, and 3-year perspective

We find significantly abnormal returns for all sub-periods. Over the first 12 months the mean abnormal return is -1.52% (p-value ≈ 0). This abnormal return decrease to -1.11% (p-value = 0.0002) over the period between 12-24 months after the issue, before it decreases even further to an average of -0.79% (p-value = 0.0068) over the last 12 months of our tracking period (Table 9).

As predicted, we observe larger underperformance for the period immediately following the offering than the periods starting in the 12th or 24th month. Similarly, we find a larger underperformance for the period starting in the 12th month than the 24th (illustrated in Figure 12). When analyzing the difference in means we find a significant difference of -0.73% (p-value = 0.045) between the first period and the third period, consistent with the mispricing hypothesis. The significant difference between the first and third period indicates a more prominent underperformance immediately following the issue, and a decrease as we move away from the event. The strong underperformance early on may also be the reason for why we couldn't find a significant difference when comparing the one-year, two-year, and three-year abnormal return, as the first period is represented in all the sub-periods.

Another indication of test misspecification is that the results show frequently negative and positive abnormal performance (Fama, 1998). This indicates that under-reactions as well as over-reactions happen by chance, as proposed by the market efficiency hypothesis. The expected abnormal return may be zero, but chance generates apparent anomalies that split between over-reaction and under-reaction. In our sample 60.7% show negative abnormal returns, indicating a strong preponderance of negative values.

Our sample has an excess kurtosis of 2.06 indicating a leptokurtic distribution. This means that more of the variance is the result of infrequent extreme deviations, as opposed to frequent modestly sized deviations. Further, a leptokurtic distribution indicates a higher peak with more values concentrated around the mean. Our sample has a negative skewness of -1.27, indicating a left-tailed distribution. This can also be seen from the median value of our sample of -0.86%, as a median value above the overall mean indicates a left-tailed distribution.

The significantly negative returns over the whole tracking period can be a sign of misspecification. However, our results show that the underperformance is weaker the longer the horizon. The decreasing abnormal returns and the high frequency of negative values do not suggest model misspecification as the primary explanation for the low stock returns. Further, the cross-sectional distributions of alphas are positively skewed, so skewness is not the cause of the negative mean alphas. This is in support of our hypothesis of an initial mispricing.

Table 9 Mean abnormal return, standard deviation, and p-value over sub-periods

Period	1-12 months	12-24 months	24-36 months
Mean abnormal return	-1.52 %	-1.11 %	-0.79 %
Standard deviation	6.74 %	8.49 %	8.83 %
p-value	≈ 0	0.0002	0.0068

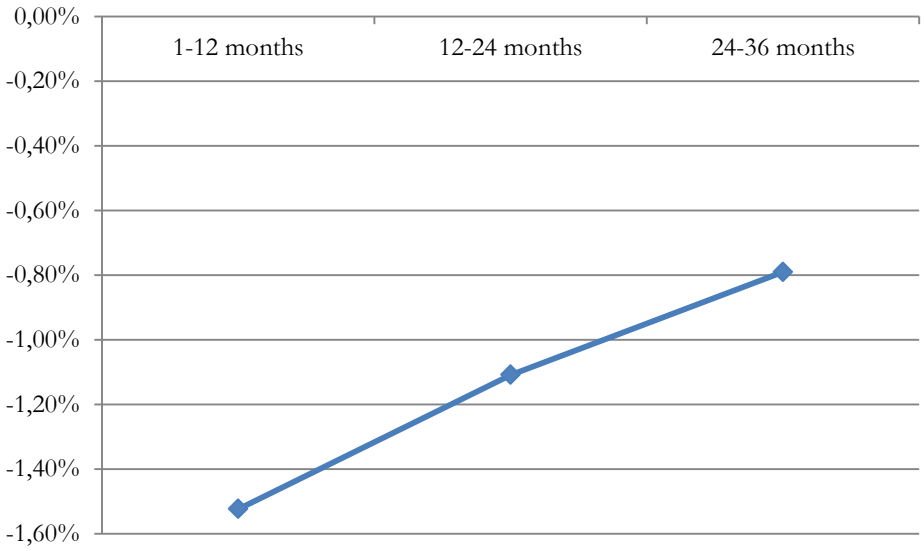

Figure 12 Mean abnormal returns over the sub-periods 1-12, 12-24, and 24-36 months

5.8 Other Factors Affecting the Returns

Even though we find a significantly negative alpha for our sample, we observe large cross-sectional differences. In this section, we test to what extent firm and deal specific factors such as industry sector, flotation method, and offer size can help explain some of these cross-sectional differences in returns.

5.8.1 Industry Sector

Previous studies by Choe, Masulis and Nanda (1993) and Masulis and Korwar (1986) have shown large variations in abnormal returns depending on industry. On the US market they find that industrial firms underperform utility firms significantly, and explain this by less adverse-selection risk for utility firms due to tighter regulations. To analyze to what extent the differences in abnormal returns are related to industry sector, we divide our sample of 895 equity offerings into the eight subsectors from the GICS standard: Energy, Consumer Discretionary, Consumer Staples, Healthcare, Industrials, IT, Materials and Telecom. Table 10 shows mean abnormal return, standard deviation, p-value, and the number of issues conducted within the various sectors.

Table 10 Overview of mean monthly abnormal returns and number of issues per sector

Industry	Mean monthly abnormal return	Standard deviation	p-value	Number of issues
Energy	-0.43 %	5.64 %	0.11	255
IT	-1.75 %	3.61 %	≈ 0	257
Industrials	-0.92 %	3.18 %	0.001	131
Health care	-1.17 %	3.20 %	0.01	39
Consumer D.	-0.02 %	2.77 %	0.49	29
Consumer S.	-2.53 %	5.06 %	0.001	44
Materials	-2.41 %	4.66 %	0.004	30
Telecom	-3.00 %	7.27 %	0.02	29

As found on the US market, our results clearly confirm an industry effect on the OSE. We see large variations between the different industries both when it comes to abnormal returns and issue frequency. Our results are consistently negative across all industries over our sample period, all however not significant. Not surprisingly, the dominating industries in the Norwegian SEO market are the energy, industrial, and IT sector with respectively 255, 131 and 257 issues in the period 2000-2007.

Of the three industries, the largest abnormal return is found for IT stocks with a monthly average of –1.75% (p-value ≈ 0). As described in section 3.5.1, IT stocks were heavily affected by a crash in the IT sector in 2000 resulting in financial distress or even bankruptcy for many firms in the industry. As shown in Table 11, IT stocks show consistently negative returns over the entire sample period, all significant. The IT sector is also the sector with the largest issue frequency of 257 equity issues over the entire sample period. The large variation in returns shows that the IT sector is a

volatile industry, and extremely affected by the macroeconomic environment. Interestingly, as shown in Section 3.1, the IT sector in general has earned the highest average returns over the last decades.

As mentioned, the most prominent industry on the OSE is the energy sector. The sector has experienced massive growth over the last two decades with new discoveries and higher exposure internationally. As shown by Table 12, we find a mean abnormal return of -0.43% (p-value = 0.112) for the energy stocks in our sample. This is the least negative abnormal return observed for the dominating industries and may be an indication of the growth in that sector. Some of the largest and most traded stocks on the OSE (Statoil and Norsk Hydro among others) belong to the energy sector. Annually, the abnormal returns range from significantly negative (2000) to significantly positive (2005). As mentioned, energy stocks are particularly dependent on the oil price and are therefore relatively volatile. This can explain the large variations in returns over the sample period.

Industrial firms have a mean monthly abnormal return of -0.92% (p-value ≈ 0) over the sample period. Table 13 shows the annual distribution of returns for the sector. Interestingly, industrial stocks show a positive abnormal return in 2000 as opposed to IT stocks and energy stocks. This may indicate that the industry was less affected by the current financial turmoil than the others. The results for industrial firms seem somewhat more stable than for the two other industries with a standard deviation of 3.18%.

Table 11 Annual distribution of mean abnormal returns for the IT sector

Year	Mean abnormal return	Standard deviation	p-value	Number of issues
2000	-2.88 %	4.31 %	≈ 0	45
2001	-3.40 %	3.22 %	0.0004	16
2002	-2.22 %	3.09 %	0.0092	14
2003	-3.13 %	3.60 %	0.0001	24
2004	-2.29 %	3.27 %	0.0003	30
2005	-0.86 %	3.51 %	0.0437	51
2006	-0.80 %	2.82 %	0.0319	45
2007	-1.96 %	2.89 %	0.0003	32
2000-2007	-1.75 %	3.61 %	≈ 0	257

Table 12 Annual distribution of mean abnormal returns for the energy sector

Year	Mean abnormal return	Standard deviation	p-value	Number of issues
2000	-3.30 %	8.39 %	0.008	41
2001	-1.78 %	4.09 %	0.016	27
2002	-0.92 %	7.16 %	0.286	20
2003	0.17 %	5.83 %	0.459	13
2004	0.69 %	4.20 %	0.260	16
2005	2.17 %	4.56 %	0.002	40
2006	1.04 %	4.89 %	0.055	59
2007	-0.71 %	2.78 %	0.059	39
2000-2007	-0.43 %	5.64 %	0.112	255

Table 13 Annual distribution of mean abnormal returns for the industry sector

Year	Mean abnormal return	Standard deviation	p-value	Number of issues
2000	0.29 %	3.87 %	0.3200	39
2001	-1.98 %	3.58 %	0.0678	9
2002	-2.42 %	1.41 %	0.0009	8
2003	-1.54 %	3.56 %	0.2257	4
2004	-0.17 %	2.63 %	0.4077	14
2005	-0.28 %	2.23 %	0.3117	16
2006	-1.86 %	2.30 %	0.0088	12
2007	-1.69 %	2.23 %	0.0002	29
2000-2007	-0.92 %	3.18 %	0.0006	131

We have seen large variations across the different industries in our sample. Among the dominating industries IT stocks clearly present the most negative returns. A reason for this, besides the dot.com bubble, may be due to adverse selection. In accordance with Myers and Majluf's (1984) adverse selection model Choe, Masulis and Nanda (1993) predict larger adverse selection effects for firms and industries with greater uncertainty about assets in place. The IT sector operates largely with intangible assets as opposed to the other sectors, and are therefore relatively harder to price. This leaves more room for uncertainty, and thus larger adverse selection effects, and more negative abnormal returns. On the contrary, industrial and energy firm operate largely with tangible assets.

5.8.2 Flotation Method and Equity Returns

We believe that the factors affecting the choice of flotation method discussed in Section 2.3 may lead to differences in abnormal returns between Rights Offerings and Private Placements. A determining factor for the choice of flotation method is the level of information asymmetry concerning firm value. Cronqvist and Nilsson (2005) find that due to the lower direct costs a firm with low levels of information asymmetry uses uninsured Rights Offerings. Firms with intermediate levels of asymmetric information about firm value involve underwriter certification in a Rights Offering, and choose a Private Placement when information asymmetries are high or extreme to minimize adverse selection costs. The apparent higher information asymmetry for companies choosing Private Placements over Rights Offerings lead us to believe that Private Placements should earn lower returns due to higher adverse selection costs also on the OSE.

To investigate whether there is a significant difference in abnormal returns for Private Placements and Rights Offerings we do the same three-way independent sort based on size and liquidity, as we did in the other analyses. We end up with a total of nine different portfolios. We then calculate the difference in abnormal return for each separate portfolio. In that manner we are able to obtain an abnormal return for Private Placements and Rights Offerings that are independent of the risk factors size and liquidity. To obtain the overall difference in mean between the two flotation methods, we take the average of difference in means across all nine portfolios.

We find that both Rights Offerings and Private Placements lead to negative abnormal returns of -1.17% (p-value = 0.007) and -1.23% (p-value ≈ 0), respectively. Even though slightly more negative for Private Placements than Rights Offerings, we find no significant difference in mean for the two methods (p-value = 0.91).

As mentioned earlier it looks as if relatively more Private Placements are conducted in economic upturns than in downturns. Choe, Masulis and Nanda (1993) argue that the higher volume of equity issues in periods of economic growth is related to lower adverse selection costs. The observed variation in frequency for Private Placements across the business cycle suggests that the companies that are exposed to adverse selection choose to issue equity through Private Placements more often in economic upturns when the adverse selection costs are low, which may explain the insignificant difference in alpha between Rights Offerings and Private Placements.

5.8.3 Offer Size

Asquith and Mullins (1986) show that the announcement effect is negatively related to the size of the equity issue. Their findings are consistent with the strongly held belief by managers and investment bankers that large equity offerings have a larger price drop at announcement because it signals overvaluation. Asquith and Mullins (1986) suggest that managers increase the amount of capital raised when they believe the market is incorrectly overvaluing the firm. If the SEO firms issuing large amounts of capital are taking advantage of windows of opportunity these firms should consequently earn lower returns in the long-run than firms issuing smaller amounts of equity. Further, if firms issue equity to take advantage of windows of opportunity in hot markets, the average amount of capital raised per SEO should be substantially higher in hot issue markets than in cold issue markets.

To investigate if the abnormal return for the SEO firms in our sample is related to the size of the offer we do the three-way independent sort based on size, liquidity, and offer size (proceeds divided by the pre-announcement value of the firm's equity), resulting in 27 portfolios. We compute the equal-weighted average returns of all 27 portfolios based on the prior year-end size and liquidity. We then average the returns of nine small offer size portfolios corresponding to nine size and liquidity portfolios to construct the return of the small offer size portfolio. We construct the return of the large offer size portfolio in a similar manner by averaging the returns of the nine large offer size portfolios corresponding to the nine size and liquidity portfolios.

We find that the difference in alpha for the small offer size portfolios and the large offer size portfolios is not significantly different from zero (p-value = 0.71). Thus, we find no evidence that the abnormal returns of the SEO firms in our sample are related to the size of the offer. Nor do we find an obvious pattern in offering size over the sample period suggesting that hot market issuers issue larger amounts of capital than cold market issuers.

6. DISCUSSION

We find evidence of a significant long-run underperformance for SEO firms on the OSE over the period 2000-2007. However, the underperformance largely fluctuates over the sample period with significantly more negative values in some cohort years. When analyzing the overall economic environment we find that macroeconomic factors somewhat affect the long-run performance. But, as the macroeconomic conditions apply to all firms and not just SEO firms, there must be some others factors specific for SEO firms, or the SEO event that drive the differences in abnormal returns.

The SEO literature attempting to explain the low stock returns is extensive and many conflicting views are proposed. The underlying issue forming the foundation for the various explanations is whether the theory of market efficiency as we know it holds.

Our results clearly support the mispricing hypothesis and suggest that firms time their SEOs to periods with more favorable conditions in the market, when their stock is overvalued. The market doesn't fully anticipate the negative information implicitly held in the SEO immediately at announcement, which leads to low stock returns in the longer perspective. As the market slowly reacts to the initial overvaluation, the stock price adjusts to its correct level. The large fluctuations in abnormal returns seem to be explained by the relatively higher level of risk of SEO firms compared to non-issuers. In our analysis of non-issuing firms, we find a significant difference in how SEO firms and non-issuers react to market volatility. SEO firms have a significantly higher market beta than non-issuers and move generally more than the overall market, resulting in heavier upturns and downturns. This is particularly pronounced in periods affected by financial turmoil.

Interestingly, by matching SEO firms to non-issuing firms on size and liquidity we find that no sample specific characteristics seem to drive the abnormal returns. This is in contrast to the findings of Brav and Gompers (1997), who contend that the returns observed following equity issues are consistent with that of other small growth firms and are unrelated to the issue. We find that none of the portfolios of non-issuing firms have significant alphas and that issuing firms underperform compared to non-issuers across all size and liquidity categories. This underpins our theory that the underperformance must be linked to the SEO event.

If a systematic underperformance for up to three years following the issue truly exists, market efficiency would be dead. An efficient market generates categories of events that individually can suggest that prices overreact to information. However, in an efficient market under-reactions will be as frequent as over-reactions and these anomalies happen by chance. If the underperformance is so large that it could not happen by chance, the market should anticipate this effect and adjust their expectations accordingly. The underperformance will then decrease over time and should eventually disappear. The fact that the market does not adjust for this effect implies that the market does not believe in the existence of a long-run underperformance.

Followers of an efficient market view argue that the apparent underperformance is a result of changes in the systematic risk for SEO firms which are not captured in the model, or due to other types of model misspecification. They suggest that the

changes in risk are due to SEO firm characteristics or changes imposed by the issue, such as investment level and decrease in leverage.

We do not find evidence that the abnormal performance is related to the decrease in leverage, as was proposed by the risk-based explanation of Eckbo, Masulis and Norli (2000). Further, when analyzing a SEO firm's investment activity and whether it affects the underperformance, our results show that the under-performance is more severe for SEO firms that do not use the proceeds for capital investment than those that invest the proceeds. This is inconsistent with the investment-based theory predicting that high investment firms earn lower post issue returns than low investment firms. The lower underperformance for firms using the proceeds for capital investments implies that the market sees available investment projects as a rational reason to issue new equity. On the contrary, the high underperformance for firms using the proceeds for other purposes may indicate firms taking advantage of market timing to raise cheap capital. Alternatively, they could be in financial distress and in need of external capital to reduce debt. However, financially troubled firms have to a lesser extent the opportunity to time their offerings to periods with favorable issue conditions. This fact together with the clear sign of clustering of SEOs around specific periods in our findings, lend further support to the market timing and mispricing explanation.

Our results also show that some firm specific characteristics have an effect on the cross-section of SEO returns. Surprisingly, we find no such effect on returns from deal specific characteristics. We see large variations between the different industries both when it comes to abnormal returns and issue frequency. IT companies underperform significantly, while energy firms in general show little to no underperformance. This indicates that the industries have different characteristics and risk exposures affecting their returns. We argue that this is linked to the level of information asymmetry in the industry, as the largest underperformance is found for the IT sector with high uncertainty about the true value of the firms' assets in place. In contrast to earlier research on different markets, we find no significant difference in mean abnormal return for the two flotation methods Rights Offerings and Private Placements on the OSE. Since firms choose Private Placements when the information asymmetry is extreme, they are more dependent on timing the market to periods with lower adverse selection costs. The observation of more Private Placements in economic upturns thus indicates that they are better at timing the market. This could explain the insignificant difference in abnormal returns between the two flotation methods.

Although our results are more in line with the mispricing hypothesis than a risk-based explanation, the explanations are not mutually exclusive. Providing evidence of under-reaction does not necessarily rule out other more rational explanations for the underperformance following SEO events.

The indication of mispricing and market timing supports the behavioral asset pricing model of Daniel, et al. (1998) as the best model to explain the abnormal returns following SEOs. However, as this contradicts the efficient market theory, Fama (1998) criticizes behavioral asset pricing models. He argues that the models do well on the anomalies they were designed to explain, but its prediction of long-run return reversal does not capture the range of long-run results observed in literature.

We have discussed various bad model problems which may affect our results and lead to spurious underperformance. In our analysis, we have tested for persistency but see no signs of this in our results. However, we have not tested for other biases such as using purged factors, using value-weighted data as opposed to equal-weighted, or adjusting for multiple issuing firms. This allows for the possibility that our results could have looked different if we had adjusted for such biases. A troubling aspect of the model misspecification problem is that in the absence of a clear alternative to market efficiency, supporters of this view can always claim that the abnormal performance of a given sample is due to the incorrect measurement of "normal" returns. We acknowledge that if we had used purged factors, value-weighted data and adjusted for multiple issuing firms, the underperformance would most likely have been less severe. However, considering the pronounced negative results, we find it highly unlikely that adjusting for such biases would lead to materially different results.

The key contribution and the essence from our results is that we find strong evidence of a long-run SEO underperformance that must be somewhat linked to the SEO event. We find evidence that the underperformance is most severe for the most overvalued firms, implying initial mispricing and subsequent under-reaction as the main explanation for the low stock returns.

7. CONCLUSION

We provide evidence of a long-run underperformance following SEOs. Our results show strong indications of an initial overvaluation of the SEO stock and a subsequent market under-reaction at announcement as the main explanation. Thus, we find that the mispricing explanation based on the behavioral model of Daniel, et al. (1998) best explains the anomaly of SEO underperformance.

Our evidence of mispricing does not necessarily rule out more rational explanations for the low performance following SEO events. SEO firms do have a different risk profile than non-issuers, which may affect their pattern of returns. In addition, various biases may have an impact on the magnitude of the abnormal returns. Our key conclusion is therefore that both rational and mispricing explanations are needed to fully understand the complexities affecting stock price dynamics.

Although the behavioral model of Daniel, et al. (1998) may explain the anomaly of SEO underperformance, a good asset pricing model should be judged on how it explains the big picture. As of today, no asset pricing model is able to capture all anomalies in the market. Most models are based on the assumption of an efficient market, and the alternative behavioral models are only able to explain one or some of the many anomalies. We see the need for a unified model accounting for both investor sentiment as well as pervasive risk factors. It is up to future research to find a model that better captures the exact sources of risk and better explains the stock price dynamics of SEO firms.

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APPENDIX 1: *Descriptive statistics for our sample*

Year	Mean Offer Size**	Mean MarketCap (Bn NOK)	Mean Liquidity*	Number of issues
2000	17 %	6,1	0,06	166
2001	22 %	5,5	0,05	79
2002	20 %	3,6	0,04	60
2003	18 %	1,2	0,03	61
2004	14 %	2,8	0,02	74
2005	12 %	5,3	0,02	153
2006	11 %	9,4	0,03	150
2007	14 %	9,8	0,04	152

*Liquidity is measured as the bid ask spread divided by midpoint price.
**Offer sixe is calculated as the percentage of shares issued relative to common shares before the issue.

APPENDIX 2: *Regression variables*

Regression equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + l_i LIQ_t + \varepsilon_{it}$$

Variable explanation for main regression equation:

R_{it} = Return for stock i in month t

R_{ft} = Risk free return for short term government bond in month t

α_i = Average abnormal excess return for stock i

β_i = Sensitivity of stock i to the market portfolio

R_{mt} = Return on the Norwegian market portfolio in month t

s_i = Sensitivity of stock i to the size factor

SMB_t = Return on the small minus big portfolio for the Norwegian market in month t

l_i = Sensitivity of stock i to the liquidity factor

LIQ_t = Return on the least liquid portfolio minus the most liquid portfolio on the Norwegian market in month t

ε_{it} = Residual capturing excess return not explained by the other factors for stock i in month t