Exercising Growth Options through Seasoned Equity Offerings Comparative Impact on the Stock Returns of Nordic issuers

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Authors:

Andra-Maria Vasilescu
Svitlana Malitska

Supervisor:

Ilan Cooper, Associate Professor, Ph.D.

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BI Oslo

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ABSTRACT

The apparent long-run abnormal underperformance of equity issuers has stirred great interest in finance until real (growth) options explanations have been successfully developed and tested on American SEO data in recent years. Drawing on the existing literature and on a sample of Norwegian, Swedish and Danish seasoned equity offerings from 1997 to 2009 our paper highlights a risk pattern for the issuers around the SEO date consistent with the predictions of the real options theories, namely a risk run-up prior to issuance followed by a decrease in beta after issuance. We also find significant evidence of long-run abnormal performance for equally weighted SEO portfolios in factor regressions. The magnitude and the significance of the intercepts are reduced or eliminated if the SEO portfolios returns are value-weighted instead of equally weighted. An investment factor long in low investment stocks and short in high investment stocks used to augment CAPM and Fama French regressions does not clear the underperformance but does contribute to a small reduction in the magnitude and significance of the intercepts in factor regressions. We believe that our mixed evidence generally speaks in favour of the growth options theories and calls for further research in this area.

Keywords: *Seasoned equity offerings, Risk dynamics, Real investment*

Introduction

Corporations are there to create value. Their capacity of value creation depends greatly on the investment decisions made by their managers. Such decisions involve the type and the timing of the investment undertaken, and the sources of financing. Our paper will explore the *long-run* impact of financing decisions on firm value, when choices entail equity financing, in particular through seasoned equity offerings. We are primarily interested in exploring the validity of the real options explanations for the observed patterns of systematic risk and of long-run stock performance of Norwegian, Swedish and Danish issuers.

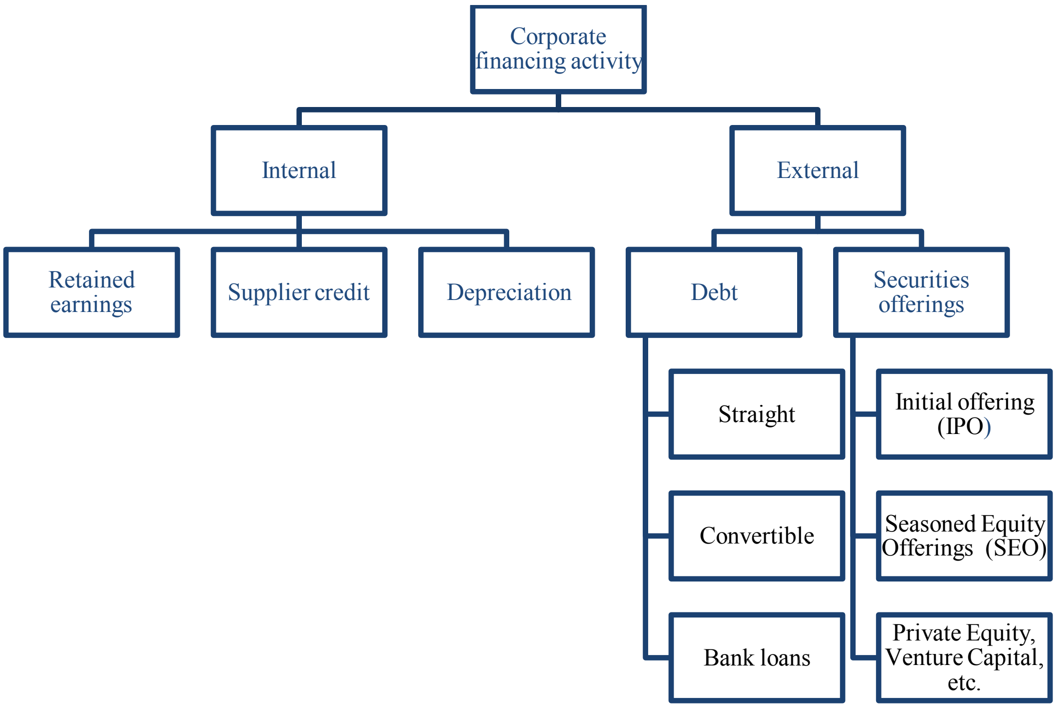
The first section of our paper will briefly link our research topic to relevant financial theory (from the choice of capital structure to behavioral and real investment based explanations for the stock return pattern of seasoned equity issuers), and to previous empirical studies on the SEO risk and return profile. Our empirical analysis will start with a focus on the long-run risk dynamics of seasoned equity issuers before and after issuance. The focus will then shift on the hypothesis of long-run abnormal post-issuance negative performance of seasoned equity issuers, as well as on the real options explanations advanced in the academic literature for the observed SEO return pattern.

1. Literature review

1.1 Capital structure and external financing

The corporate financing activity is crucial to the well-functioning of a company and to the realization of its goals. Funds are used to finance growth and can come from either internal or operating sources such as retained earnings and supplier credit, or from capital markets (Figure 1) in the form of external financing.

Figure 1 The corporate financing activity



Any external corporate financing decision – be it debt or equity- impacts the capital structure of the company directly. In order to understand the causes and the effects of financing actions (e.g. equity offerings) on company performance, it is therefore useful to look at the determinants of the capital structure. There are three main theories trying to explain the choice of the debt-equity ratio by firms. These theories go beyond the original Modigliani-Miller (1958) capital structure irrelevance theorem, which states that in perfect markets the total value of the firm is indifferent to the choice of capital structure, although this choice does impact the way the pie is split between equity holders and debt claim holders.

Trade-off theory

The first theory was developed by the same Modigliani and Miller through a correction to their original model (Modigliani and Miller 1963). The *trade-off theory* says that companies have optimal debt-equity ratios which can be estimated by weighing the benefits of debt (namely the deductibility of interest expenses for tax purposes contrasted with the non-deductibility of dividends) against its costs. The major costs of debt are caused by the probability of bankruptcy when the company incurs expenses related to the bankruptcy filing, as well as by instances of financial distress when defections by customers and suppliers are common.

The trade-off theory can thus be summarized by the following relationship:

$$\text{Firm value} = V_u + PV\text{ (tax shield)} - PV\text{ (costs of financial distress)}$$

The implication of the trade-off theory is that large, mature companies with limited investment opportunities should hold higher leverage ratios to take advantage of the tax deductibility of debt given low financial distress costs. By contrast, smaller companies with growth opportunities should avoid debt to preserve their capacity of chasing positive NPV projects (Graham and Harvey 2002).

Pecking order theory

An alternative perspective on the choice of capital structure is the *pecking order theory* which posits that actual corporate leverage ratios typically do not reflect capital structure targets. This theory is related to the widely observed corporate practice of financing new investments using internal funds with priority, and only when these are depleted through external financing in the form of debt and then of equity offerings, in this order of preference (Myers 1984). The pecking-order theory sees equity offerings as the most expensive form of external financing because of information asymmetries between investors and managers. The issue of information asymmetry will be expanded in the following sections.

The free cash flow theory

The third theory around the choice of capital structure focuses on the agency costs associated with the *free cash flow* available to managers after they undertake positive NPV projects (Jensen 1986). Namely, payouts to shareholders in the form of dividends reduce the financial resources available to managers for investments. Therefore managers have an incentive to retain earnings and to grow their firms sub-optimally. Growth means more resources under managers' control and higher management compensation. Furthermore, internal financing avoids the issue of active monitoring by capital markets of managers' activity when external financing is used. Jensen shows that debt can improve organizational efficiency. First, interest payments curb overinvestment by reducing the amount of free cash flow at managers' discretion. Second, the consequences of a failure to make debt service payments motivate the managers to run their organization more efficiently.

In line with the free cash flow theory, Jensen reiterated what Smith (1986) had empirically revealed, namely that most leverage-increasing transactions like stock repurchases and exchange of debt for stock are followed by increases in stock prices. Conversely, *most leverage-decreasing transactions like equity issues* or exchange of common stock for debt *lead to significant falls in stock price as the market penalizes instances where managers have more resources under their control*.

1.2 Seasoned equity offerings

The term SEO is employed in the academic literature to refer to equity offerings performed by firms which are already publicly listed. According to Ritter (2003), practitioners refer to such transactions with the term "follow-on offerings". Although sometimes SEOs are also referred to as secondary offerings, it is important to distinguish them from a secondary offering in the sense of a transaction where shares are sold by existing shareholders, as contrasted to a primary offering where shares are sold by the company.

Although they obey a concise definition, seasoned equity offerings are complex financial transactions, differentiable through key elements of their engineering design such as: the targeted investors (e.g. the public at large or existing shareholders), the market (domestic issues or global issues), the type of proceeds (cash or equity), the flotation method or the marketing and selling mechanism (e.g. private placements, firm commitment, best efforts, rights, standby rights, auctions), just to name a few. Eckbo, Masulis and Norli (2007) provide a comprehensive list of SEO flotation methods.

As evidenced in the literature, certain features of SEOs are more typical of certain markets and display a changing pattern. In most countries, SEOs by public firms are typically conducted as rights offerings, whereas very few SEOs are conducted as public offerings. Thus, if rights are not used, the firm can attempt to sell the issue directly to the market with no financial intermediary, place the issue with a private group of investors (a private placement), or employ an intermediary, usually an investment banker or underwriting syndicate. In addition, stock can be sold through the issuance of convertible securities, warrants and stock options and through the establishment of dividend reinvestment, employee stock ownership and management compensation plans (Eckbo and Masulis 1995). Ekbo (2008) talks about the disappearing rights offer phenomenon in the USA. Rights offers, quite popular between 1935 and 1955, usually occur because the typical company charter stipulates a preemptive right in favor of existing shareholders to any new tranches of equity intended for sale. Such rights take the form of temporary warrants to purchase the new stock on a pro-rata basis based on existing holdings and at a discount relative to the prevailing market price. Eckbo (2008) believes that the underlying cause behind this phenomenon is that the cost of such rights may be prohibitively high in large companies with fragmented ownership.

By contrast, rights offers have remained popular in Europe and Asia until recently when there as well, companies have grown bigger in size and increased market participation has led to disperse ownership. Equity rights offerings are still popular in Greece for example (Cohen, Papadaki, and Siougle 2007). The pre-emptive right of first refusal is a long tradition in the UK and among the listing requirements on London Stock Exchange. It has also been stipulated in the European Community's Second Company Law Directive (1977) and, since 1980, in the UK Companies Act (Armitage 1998). However, Japan has experienced a trend away from rights offerings after the mid-1990s (Eckbo, Masulis, and Norli 2007). A similar tendency has emerged in French SEOs and on Oslo Stock

Exchange (Bøhren, Eckbo, and Michalsen 1997). Bøhren et al. agree that after 1993, following increased share ownership by domestic and foreign investors of the stocks listed on Oslo Stock Exchange, issuers began to switch to standby offers as the overriding flotation method.

Reasons for raising capital through SEOs

The most common reason why companies raise capital is to finance growth through real investment (e.g. capital expenditures, raw materials, new positive NPV projects). Eckbo, Masulis and Norli (2007) provide a comprehensive survey of other reasons explored in the literature: to change capital structure, to exploit private information about the intrinsic value of securities, to finance mergers and acquisitions, to facilitate asset restructuring such as spin-offs, to improve the liquidity of existing shares, to shift wealth and risk bearing among classes of securities, and privatizations. In a survey of American CFOs, Graham and Harvey (2002) indicate the following motives for common stock offerings in this order of prevalence: earnings per share dilution, perceived equity undervaluation/ overvaluation, recent stock price run-ups, providing shares to employee stock option plans, maintain target debt/equity ratios, diluting holdings of certain shareholders, "stock is our least risky source of funds", holding similar amount of equity as same-industry firms, favorable investor impression versus debt issuance, no other sources of funds available, "stock is the cheapest source of funds".

The underlying factors behind the decision to issue securities come from several core areas of finance like: capital structure, managerial investment incentives, contract theory, and asset pricing. Thus it should come as no surprise that there is no consensus in the literature on the economic implications of the equity issuance decision at company level.

1.3 The announcement effect versus long run stock performance

There is extensive empirical evidence in the finance literature that stock returns are impacted by external financing events in the short and in the long run.

1.3.1 The SEO announcement effect

In the short-run, many academics talk about a negative 2-day stock price reaction associated with security offering announcements, called the announcement effect (Smith 1986). Most studies performed on the US stock markets reveal a 2-day post-announcement abnormal return in the range of -1.0 % and -3.0% e.g. Asquith and Mullins (1986), Bayless and Chaplinksy (1996).

Information asymmetry

The leading explanation of this negative reaction is information asymmetry and was introduced by Myers and Majluf (1984). This explanation is pervasive in the literature under different other but equivalent labels: adverse selection, overvaluation etc. In corporate governance terms, the management acts as principals of the shareholders and their main objective is to increase shareholders' wealth. Strong-form market inefficiency is assumed such that at any point in time, the management has superior information which tells them whether the stock is undervalued or overvalued. Given company's objective, equity will be issued when the management has information that the stock is overvalued and debt issuance is not preferable. The market, knowing this rule of action, would penalize what they believe to be a signal of overvaluation.

Information signal about the investment policy

However, the announcement is also a signal about the investment policy of the company. If the market believes that the company will use the proceeds to engage in profitable projects then the stock price may increase. Conversely, if the market suspects that the management is squandering corporate resources, a price decrease will follow the issuance. Thus the information asymmetry proposition can be complemented by the free cash flow theory introduced earlier in this section. Indeed Ritter (2003) shows that the additional equity resources raised through SEOs are relaxing the existing constraints on management's proclivity for "empire-building" or excessive growth. According to the free cash flow theory, such a constraint is the existing debt level, diluted through equity issuance. This implies that agency conflicts between shareholders and managers are intensified.

Other hypothetical explanations for the SEO negative announcement effect have been advanced in the literature. The following explanations were compiled by Smith (1986): *optimal capital structure*, *implied cash flow changes* (stock price changes reflect information about expected changes in net operating cash flows), *unanticipated announcement* (stock price changes reflect only the unanticipated component of the offering announcement and therefore their magnitude will vary inversely with the degree of announcement predictability ceteris paribus); *ownership changes* (changes in the structure of control rights in the firm affect the value of firm's equity). Armitage(1998) highlights the *price inelasticity of demand for new shares*. The announcement effect has also been interpreted as an indirect flotation cost (Eckbo, Masulis, and Norli 2007).

1.3.2. Evidence of long-run abnormal performance

Recent years have seen a surge in the number of studies on the topic of SEO long-run performance, mostly triggered by the emergence in the 1990s of the comprehensive, easy-to-use database of new corporate issues provided by the Security Data Company (SDC), a part of Thomson Reuters information service (Eckbo, Masulis, and Norli 2007).

However, the evaluation of issuers' performance around SEOs remains a controversial issue despite the abundance of studies carried out over the past two decades. Bayless and Jay (2007) provide a short review of the recent work in this field. It all seems to have started with a potential stock market anomaly coined as "the new issues puzzle" by Loughran and Ritter (1995). They show that during five years following the offering, US companies that issued equity between 1970 and 1990 either through an IPO or an SEO significantly underperformed relative to non-issuers matched by size, book-to-market and other firm characteristics. Therefore, the evidence on the long-run performance of firms conducting SEOs is that issuing firms have relatively low returns compared to non-issuers or a benchmark in the 3–5 years after the SEO.

1.3.2.1 Methodology: Buy-and-hold returns versus factor regressions

Most of the empirical studies on the long-run performance of SEOs have employed two methodologies typical for studies of long-run abnormal stock performance: buy-and-hold returns and factor regressions (Lyon, Barber, and Tsai 1999).

The buy-and-hold methodology consists of matching the issuers to non-issuers based on a single or on multiple characteristics such as size, and book-to-market and then calculating the t-statistics using annual holding-period returns of issuing firms relative to matched non-issuing firms (Loughran and Ritter 1995) or relative to portfolios of the latter (Lyandres, Sun, and Zhang 2008). The weakness of the buy-and-hold approach is that unbiased t-statistics are difficult to obtain due to three main biases: the skewness bias – the fact that long-horizon abnormal returns are positively skewed, the survivor bias- affecting the sample of non-issuing matching firms, and the rebalancing bias – differences in compounded returns between issuers and non-issuers resulting from rebalancing techniques (Lyon, Barber, and Tsai 1999). Lyandres et al. (2008) apply skewness-adjusted t-astatistics as a correction. Yet, factor regressions avoid the bias issue altogether and have been preferred by many researchers.

These models have been inspired by the seminal 3-factor model developed by Fama and French (1993) :

$$R_{pt} - R_{ft} = \alpha + \beta\left(R_{mt} - R_{ft}\right) + \gamma SMB_t + \delta HML_t + \varepsilon_t$$

where $R_{pt} - R_{ft}$ is the excess return on a portfolio in period t, $R_{mt} - R_{ft}$ is the realized market risk premium in period t, SMB_t is the return on a portfolio of small stocks minus the return on a portfolio of big stocks in period t, and HML_t is the return on a portfolio of value stocks (i.e. with high book-to-market ratios) minus the return on a portfolio of growth stocks (i.e. with low book-to-market ratios) in period t. The non-zero intercepts of this regression are interpreted as (significant or non-significant) abnormal performance.

The information contained in the following table represents a collection of empirical results from American SEO studies which have employed the two methodologies. A part of this information has been compiled by Ritter (2003).

Table 1 - Evidence on long-run abnormal performance of SEOs in the USA

This table reports the summary results of long-term seasoned offerings underperformance studies. Panel A is based on the buy-and-hold (BHR) methodology. The mean buy-and hold returns are represented for SEOs and their matches (based on size and book-to-market). Values in brackets indicate the t-statistics. The information contained in this table was compiled by Ritter (2003) except the study by Lyandres et al.

Panel A: Buy-and-hold abnormal returns (BHR)

Studies	Sample size	Period	Horizon	Mean BHR			Annualized diff.
				SEOs	Match	Diff	
(Mitchell and Stafford 2000)	4439	1961-1993	3 years	34.8%	45.0%	-10.4%	-2.7%
(Eckbo, Masulis, and Norli 2000)	3315	1964-1995	5 years	44.3%	67.5%	-23.2%	-4.8%
(Jegadeesh 2000)	2992	1970-1993	5 years	59.4%	93.6%	-34.2%	-4.9%
(Lyandres, Sun, and Zhang 2008)	10084	1970-2005	5 years	NA	NA	-50 %	NA

Panel B: Fama French 3-factor regression

Studies	Sample size	Period	Equally weighted intercepts	Value-weighted intercepts
(Eckbo, Masulis, and Norli 2000)[1]	1704	1964-1997	-0.12 (-0.65)	-0.17 (-1.12)
(Mitchell and Stafford 2000)[2]	4911	1961-1993	-0.33 (-5.19)	-0.03 (-0.44)
(Jegadeesh 2000)[3]	2992	1975-1995	-0.45 (-5.07)	-0.33 (-2.84)
(Loughran and Ritter 2000)[4]	6461	1973-1996	-0.47 (-5.42)	-0.32 (-3.00)
(Lyandres, Sun, and Zhang 2008)[5]	10084	1970-2005	-0.39 (-3.52)	-0.35 (-3.04)

[1] Amex/NASDAQ, excluding utilities

[2] Incl. utilities; an SEO firm is kept in the portfolio 5 years after issuance; use monthly returns

[3] An SEO firm is kept in the portfolio 5 years after issuance

[4] Excl. utilities; an SEO firm is kept in the portfolio 3 years after issuance

[5] Incl. utilities; an SEO firm is kept in the portfolio 3 years after issuance

The academic reactions to this empirical evidence have come in two main forms. First, Brav, Gecy and Gompers (2000) conclude that the SEO long-run underperformance is more related to the characteristics of the issuing firms than to the actual issuance decision. Thus, in a sample of SEOs from 1975 to 1992, they find that underperformance is concentrated in small issuing firms with low book-to-market ratios such that "the stock returns following equity issues reflect a more pervasive return pattern in the broader set of publicly traded companies". Second, researchers have developed and tested several plausible hypotheses in an attempt to explain this apparent anomaly.

1.3.2.2 The "bad" model problem

One hypothesis is the "bad model" problem. Market efficiency requires that, on average, there should be no abnormal returns after an event if an appropriate benchmark is used. As highlighted by Loughran and Ritter (2000), the problem is that tests of market efficiency are always joint tests of a (theoretically supported) model of market equilibrium and of the existence of abnormal returns. But in the buy-and-hold methodology, matching issuers to non-issuers on size and book-to-market is supported empirically, rather than theoretically, therefore the abnormal returns reported in Table 1 cannot be considered enough evidence for or against market efficiency. At the same time, it is doubtful that the relatively low post-issue returns of the issuers can be connected to a lower level of risk, since as Ritter (2003) shows, issuing firms are highly exposed to systematic risk according to the Fama-French coefficients.

The "bad model" hypothesis has thus encouraged researchers to explore potential non-priced risk premia or risk patterns related to external financing events, ignored by existing models. For example, Eckbo, Masulis and Norli (2000) have shown that forming zero cost portfolios short in issuing stocks and long in matched non-issuing stocks yields statistically insignificant abnormal returns when a specific six factor regression is employed. Eckbo et al. empirically chose six macroeconomic factors such as: the value-weighted CRSP market index, the return spread between long and short maturity Treasury bonds, the return spread between long and short maturity T-bills, and the unexpected inflation (inflation shocks). They have argued that the liquidity premium on SEOs is low since the increased amount of outstanding shares makes them more liquid. Overall, the equity seems to carry less risk after the SEO event, which explains the post-issuance lower returns.

1.3.2.3 Financial leverage

Following Hamada (1972), many researchers have examined whether risk changes discretely at the time of equity or debt offerings due to changes in financial leverage. Such studies have consistently unveiled a positive correlation between the sign of the financial leverage changes and the sign of the impact on stock prices (e.g. (Asquith and Mullins 1986). Eckbo, Masulis and Norli (2000) argue that the decrease in leverage induced by an equity offering reduces the level of systematic risk exposure of the issuers.

1.3.2.4 Behavioral biases

Other important hypotheses relate to behavioral biases like market timing (Cohen, Papadaki, and Siougle 2007) and investor overconfidence over the precision of private information (Daniel, Hirshleifer, and Subrahmanyam 1998). The survey compiled by Graham and Harvey (2002) present evidence that the decisions to issue equity by US corporate executives are heavily influenced by behavioral biases.

1.3.2.5 Real investment and growth options

Another interesting hypothesis was crystallized through the research carried out in the area of optimal investment and production-based asset pricing. When asset prices are used to explain investment growth, academia talks about the q-theory of investment. When investment growth is used to explain asset prices, then we deal with production-based asset pricing (Porter 2005).

First, Cochrane (1991, 1996) introduced a theoretical production-based asset pricing model similar to the consumption-based model. A consumption-based asset pricing model relates asset returns to the marginal rate of substitution through an optimization of consumer's utility function. Similarly, a production-based asset-pricing model relates asset returns to the marginal rate of transformation through a production function which gives the producers' first order conditions for the optimal inter-temporal investment demand. The key concept in production based asset pricing is *investment return* (not to be confused with ROI) which represents the marginal rate of return which firms earn by deviating from the optimal investment level through time, such that the deviations cancel each other and the production plan remains unchanged.

Cochrane (1991, 1996) has extended the q-theory of investment initiated by Tobin (1969) to reveal a negative relationship between real investment and expected stock returns. The ratio of an asset's market value over the replacement cost of the same asset has been labeled *Tobin's q*. For individual companies, Tobin's q can be approximated as the ratio of the market value of equity over the book-value of assets. If a company is fairly evaluated by the market, then its q should be equal to 1.0. A q below or above unity suggests that the company is under or overvalued respectively. Alternatively, a q greater than 1.0 suggests that the market value reflects some assets which are not recorded in the balance sheet of the company. These may be intangible assets such as growth options. Tobin's marginal q is the ratio of the market value of an additional unit of capital to its replacement cost. Cochrane shows that firms invest more when their marginal q is high, and that a high marginal q is associated with a low cost of capital.

Cooper and Priestley (2011) show that systematic risk falls during large investment periods in accordance with the q-theory of investment and the returns of a factor formed on investment-to-assets help forecast aggregate economic activity.

According to Lyandres et al. (2008), real investment is an important driving force behind the "new issues puzzle" because of the negative relationship between real investment and expected returns. The central finding of Lyndres et al. is that a new investment factor, long in low investment-to-assets stocks[1] and short in high investment-to-assets stocks, explains a substantial part of the previously reported abnormal performance in the case of new issues such as IPOs, SEOs and convertible debt offerings. This factor is used to extend the Fama and French (1993) three-factor model. Lyandres' et al. investment factor earns a significant

[1] The investment-to-assets ratio has been measured as the annual changes in gross property, plant, and equipment plus the annual changes in inventories divided by the lagged book value of assets.

average return. In addition, firms that issue equity and convertible debt appear to invest much more than matching non-issuers. Lyandres et al. conclude that adding the investment factor into standard factor regressions explains on average about 75% of the SEO underperformance.

Berk, Green and Naik (1999) are among the first academics to exploit the concept of *real options* as a possible link between real investment and the stock return dynamics of SEO firms. In their model, firms own two kinds of assets: assets that are in place and currently producing cash flows, and options to make positive NPV investments in the future. The projects carrying lower systematic risk are the most attractive to the firm and they subsequently lead to an increase in firm value. At the same time, the overall level of systematic risk of the firm will diminish as a result of such investments, and the firm will experience lower returns in the future.

Carlson, Fisher and Giammarino (2006) develop a theoretical model of risk dynamics around an SEO using real options. Their model assumes an all-equity firm and does not rely on changes in financial leverage. The intuition behind this framework is that real investment transforms risky expansion options into less risky assets in place. This is why the riskiness of a company (as measured by its market beta for example) should decrease after the event, *if* the proceeds are used to finance real investment. This intuition challenges the traditional view that increases in capital expenditures have to be accompanied by positive stock price reactions (Trueman 1986) since they signal the availability of positive NPV projects (Jensen and Meckling 1976).

De Andres et al. (2008) infer that a firm's beta is the weighted average of the betas of its assets-in-place and of its growth options:

$$\beta_i = \beta_{AIP_i} \cdot \frac{V_{AIP_i}}{V_i} + \beta_{GO_i} \cdot \frac{V_{GO_i}}{V_i}$$

where β_i and V_i represent, respectively, the beta and the total value of the firm i; β_{AIP_i} and V_{AIP_i} measure, respectively, the beta and the value of its assets-in-place; β_{GO_i} and V_{GO_i} measure, respectively, the systematic risk and the value of its growth options.

Carlson, Fisher and Giammarino (2010) serve as a key reference for the purpose of our paper, as they show that market betas of the equity issuing firms run up prior to the seasoned equity issuance and decline thereafter suggesting a similar pattern in the systematic risk of the issuers around the SEO events.

Our empirical approach will focus on the *real-options based theory* of the long-run stock returns dynamics around SEOs, given the relative novelty of this theoretical framework, as well as its capacity to arguably clear the new issues puzzle, hitherto considered an anomaly in finance.

Since most of the empirical studies testing the real options hypothesis focus on the stock market in the US, we will test the external validity of these studies in the case of the Nordic stock markets: Norway, Sweden and Denmark.

We will also investigate the long-run performance of SEOs following the investment factor methodology suggested by Lyandres et al. (2008).

2. Development of hypotheses

H_1: Systematic risk increases before the SEO date and decreases thereafter.

One of the objectives of our paper is to *explore the equity risk dynamics of issuers around seasoned equity offerings.* If the conclusions reached by Carlson, Fisher and Giammarino (2010) are viable, the *average* market betas of our seasoned equity issuers should increase prior to issuance and decrease thereafter, in line with the predictions of the real options theories.

H_2: Systematic risk dynamics around an SEO is more significantly impacted by the exercise of growth options than by the change in leverage.

While the results displayed by Carlson, Fisher and Giammarino (2010) strongly support a real-options based explanation of the risk dynamics around SEO events, we believe it would be interesting to explore to what (differing) degrees changes in betas are driven by increases in real investment and by changes in financial leverage respectively. The basic intuition is that exercising a growth option should induce a lower post-SEO beta. At the same time, increased equity financing deleverages a company and should also contribute to a decrease in beta. Figure 2 provides a summary of these influences.

Figure 2 Changes in company's risk profile induced by changes in financial leverage and by exercising growth options

Factors affecting systematic risk	Effects on systematic risk (Beta)
Decrease in financial leverage	↓
Exercise of growth options	↓
Resulting effect	↓

These unidirectional effects on beta question the findings of Carlson et al. (2010), which empirically attribute the risk dynamics of the SEOs solely to realizations of real options.

H_3: SEO firms display significant negative long-run abnormal performance.

Inspired by existing literature on SEO long-run performance, another major objective of our paper is to *test the hypothesis of long-run abnormal negative performance of SEO firms*. We will investigate whether issuers generate significantly negative abnormal returns in the long-run, using factor regressions (i.e. the CAPM and the Fama French three factor model).

H_4: An investment factor long in low investment stocks and short in high investment stocks reduces the abnormal performance of the SEO portfolio.

If we find evidence of underperformance, we will investigate the real investment-based explanation of underperformance by augmenting standard factor regressions with an investment factor following the methodology proposed by Lyandres et al. (2008).

3. Empirical implementation

3. 1 Risk dynamics around issuance events

In this section of our paper we will investigate the average beta behavior of our sample firms around the issuance dates, using the event study methodology, with an eye to the approach adopted by Carlson, Fisher and Giammarino (2006). We will estimate the average *equally-weighted* beta of our full samples of issuers, as well as the betas of sub-samples of stocks. In particular, we are interested in forming two subsamples: *country subsamples* and *R&D intensive companies*. Furthermore, we will look at the dynamics of the value-weighted average beta of our sample of issuers to check if and how size influences issuers' risk pattern.

3.1.1 Data description

This analysis is based on three samples of Norwegian, Swedish and Danish seasoned equity offerings. The data samples are described in Table 1 from the Appendix. Certain constraints were employed for our research purposes. First, the samples are drawn from similar time periods for the three markets (Norway 1997-2005; Sweden 1997-2005; Denmark 2000-2005) and we did not sample any SEOs after 2005 in order to avoid the patterns of stock behavior generated by the financial crisis (an extreme event).

Secondly, following Carlson et al. we tried to limit the impact of the issue event to the center of the time window of five years. Thus for each company in the list we checked for absence of additional stock issues two years before and three years after the issue of interest.

Finally, the SEO sample includes public and private equity placements and will exclude employee stock offerings (which are not primarily meant to raise capital for investments), as well as financial institutions.

Table 1 reports data characteristics analyzed from several perspectives. Our final sample consists of 186 issues performed by 177 companies in Norway (78 SEOs), Sweden (83) and Denmark (25). Both for issue size and the fraction of issue to the market value, we can observe a substantial dispersion between the average and median due to outliers in the upper side. By analyzing medians as a more robust measure, we note similar sizes for Norwegian and Swedish issues at around 85 million NOK with somewhat lower sizes for Danish issues. From a historical perspective it is interesting to note that the values of issue size intuitively follow the pattern of market indexes, falling in 2002-2003, and rising afterwards. It might be also interesting to look at the industry distribution of the companies included in the sample, though just as for the other characteristics, we should abstain from making more general inferences about patterns in the absolute and relative sizes of the issues, due to the small number of companies sampled from each industry/year.

For the purpose of this section, we have extracted the following information from Datastream (Thomson Reuters):

- Daily returns for the SEO firms in each country (RI);
- Daily returns for market indexes: OSLO EXCHANGE ALL SHARE – OSLOASH (RI), OMX Stockholm 30 (OMXS30) – (DSRI-Datastream calculated Total Return Index); OMX Copenhagen (OMXC20) - (DSRI-Datastream calculated Total Return Index);
- Accounting information: Research and Development-to-sales (datatype WC08341).

For consistency, throughout the paper we have used the Total Return Index datatype (DS Menmonic: RI) to compute returns. This index shows the theoretical variations in the value of a stock, assuming that dividends are reinvested and adjusting for stock splits and repurchases. For a detailed description of the RI datatype, please refer to the Note on the Total Return Index in the Appendix.

3.1.2. Methodology

In estimating the average betas of our SEO samples we followed the approach of Carlson et.al (2010) supplemented by the robustness methodology first established by Dimson (1979). We have looked at the long-term beta dynamics of issuing firms, 2 years before issuance and 3 years after issuance. The length of the time window is consistent with Lyandres' choice (2008). By contrast Carlson et al.

(2006) use a five-year long pre- and post-issuance event window, but has shown that most of the issuance effect on stock returns occurs within 2 years before and 3 years after the event.

In order to obtain the beta time-series in the first place we followed two separate steps: first estimated betas for the uniform period for whole samples, and afterwards synchronized beta series for each company in accordance to issue date.

Beta estimation for the whole period

For each eligible company we extracted the total return index (RI) as well as the corresponding market RI for the period 01/01/1993 – 27/05/2011[2]. Worth noting, for companies with several stock classes listed, we chose only the major security where the share class was not specified on the issue list.

Beta, or the slope of the regression line linking stock returns to the market return was estimated by employing matrix operations formulas of the form: $\hat{b}^{OLS} = (X'X)^{-1}X'y$. Here X corresponds to the natural logarithm of the daily market return, and y to the natural logarithm of the daily (issuer's) stock return. More specifically, for each issuing company at every daily point we estimated the beta over a certain previous period (using estimation windows of 1 month, half a year, and one year before the beta estimation point) by rolling over the estimation window day by day. This technique enabled us to obtain daily estimates of monthly, semiannual and annual betas, and therefore a dataset with more frequent beta estimates than those included in the dataset reported by Carlson et al. (2010).

Synchronizing and averaging betas

The date of the SEO event is the focus of our risk dynamics estimation. In order to obtain the average beta dynamics for all the issuers around the (general) SEO event date, we have synchronized the beta series of every firm so that the issuance date is placed at day "0". The 520 daily beta estimates preceding the SEO date

[2] Since the latest issues considered in this section happen in 2005, our analysis requires a far shorter risk estimation period – up to 2009. Thus ending date as of 27/05/2011 can be considered somewhat arbitrary.

(two years before issuance[3]) and the 780 daily estimates following the SEO date (three years after issuance) are placed accordingly before and after day "0" on the timeline (see Figure 1 in the Appendix for an illustration of this procedure). We have implemented this procedure with monthly, semiannual and annual beta estimation windows.

Finally we average the synchronized beta estimates across all companies. The resulting average beta time series provides the basis for the graphical illustration of the risk dynamics around the SEO. We have illustrated the *equally weighted* and the *value weighted* risk dynamics of our SEO sample in Figure 2 and Figure 3 from the Appendix.

3.1.3 Robustness check motivation and methodology

The risk measurement formula previously described is widely accepted and used. However, despite the apparent advantages, employing frequent but unstable daily returns data can hide certain pitfalls on the way to unbiased and consistent beta estimation. First noted by Fama (1965) and Fisher (1966) and further investigated by Scholes and Williams (1977) and Dimson (1979), biased OLS estimator of market beta is a significant feature of thinly traded securities. Not surprisingly, the returns data of Nordic issuers, as well as other small markets, does exhibit non-synchronous nature (market is dominated by securities that are not traded every day). Explaining the cause of Finnish stock market serial correlation Berglund et al. (1988; 1989) refer to thin trading as one of the major reasons. Subsequent works illustrate the importance of controlling for non-synchronous trading when measuring risk. Similar studies were performed by Bartholdy and Riding (1994) with data from New Zealand.

The principle behind the non-synchronous data problem is the following. A standard market model predicts *true* returns for security *j* in period *t* to be the function of market returns in the same period[4].

[3] We used the convention of 260-trading day in a year mainly based on the actual count of trading days from DATASTREAM. Thus our monthly, semiannual and annual estimation windows consist of 21 days, 130 days, and 260 days respectively.
[4] The following analytical illustration is largely based on (Cohen et al. 1983)

$$r_{j,t} = \alpha_j + \beta_j r_{M,t} + e_{j,t} \tag{1}$$

Observed returns, in contrast, have a stochastic nature to a large extent and are a function of true returns.

$$r_{j,t}^O = \sum_{n=0}^{N} \gamma_{j,t-n,n} r_{j,t-n} \tag{2}$$

where $\gamma_{j,t,n} \neq 0$ for $n > 0$ is a random variable that comprises a delay distribution. Thus $\gamma_{j,t,n}$ creates the delayed impact of the return generated in period t on the actually observed returns in the time window$[t; t+n]$. Since the structure of $\gamma_{j,t,n}$ differs across securities, the observed returns for each of them will adjust asynchronously to their aggregate index, namely true market returns. Cohen et al. (1983) show that with such asynchronous adjustments, cross-serial correlation is introduced into observed returns, and observed beta estimates are biased. Technically speaking, the major source of this econometric problem stems from the covariation between the regressor $r_{M,t}$ and the residual $e_{j,t}$. As for the resulting betas estimates, they tend to be biased downwards for infrequently traded stocks, and upwards for frequently traded ones.

The academic literature presents a set of alternative bias-correcting techniques, mostly derived from the basic studies of Scholes and Williams (1977) and Dimson (1979). The Scholes-Williams procedure requires estimating *single*-factor regressions in the simple market model form:

$$R_{j,t}^{SW} = \alpha_j + \beta_j R_{m,t} + \varepsilon_{j,t} \tag{3}$$

Consistent beta is subsequently calculated as

$$\beta^{SW} = (\beta_{-1} + \beta_0 + \beta_{+1})/(1 + 2r) \tag{4}$$

where β_{-1} , β_0, and β_{+1} represent lag, contemporaneous and lead market slope measures, while r is the first-order, serial correlation coefficient for the market index.

On the other hand, Dimson employed the *multiple* regressions in the form

$$R^D_{j,t} = \alpha_j + \sum_{n=-N}^{N} \beta_{j+n} R_{M,t+n} + \varepsilon_{j,t} \quad (5)$$

And the Dimson't beta is obtained by summing the slope estimates

$$\beta^D = \sum_{n=-N}^{N} \beta_{j+n} \quad (6)$$

Subsequent analytical research by Fowler and Rorke (1983) proved the inconsistency of Dimson's technique and lead to the development of a correcting procedure incorporating both Scholes and Williams' and Dimson's frameworks. Besides the theoretical generalization, the following beta estimation formula is also adapted for working with large amounts of time-series in Excel by incorporating only single regression estimates. Thus our risk dynamics analysis was performed through the following model:

$$\boldsymbol{\hat{\beta}_j = \frac{b^o_j + \sum_{n=1}^{N} b^o_{j+n} + \sum_{n=1}^{N} b^o_{j-n}}{1 + \sum_{n=1}^{N} b^o_{M+n} + \sum_{n=1}^{N} b^o_{M-n}}} \quad \textbf{(7)}$$

where b^o_j, b^o_{j+n}, b^o_{j-n}, b^o_{M+n}, b^o_{M-n} are the OLS regression estimators of β^o_j, β^o_{j+n}, -β^o_{j-n}, β^o_{M+n}, β^o_{M-n} respectively, N is the number of leads and lags,

-$\beta^o_j = cov(r^o_{j,t}, r^o_{M,t})/var(r^o_{M,t})$ is the observed security beta,

-$\beta^o_{M+n} = cov(r^o_{M,t+n}, r^o_{M,t})/var(r^o_{M,t})$ is the observed intertemporal lag[5] market beta,

-$\beta^o_{M-n} = cov(r^o_{M,t-n}, r^o_{M,t})/var(r^o_{M,t})$ is the observed intertemporal lead market beta,

- $\beta^o_{j+n} = cov(r^o_{j,t+n}, r^o_{M,t})/var(r^o_{M,t})$ is the observed intertemporal lag security beta,

-$\beta^o_{j-n} = cov(r^o_{j,t-n}, r^o_{M,t})/var(r^o_{M,t})$ is the observed intertemporal lead security beta,

-$\beta_j = cov(r^o_{j,t}, r^o_{M,t})/var(r^o_{M,t})$ is the true security beta,

-$r^o_{j,t}$ is the observed daily return of company *j* in period *t* ,

[5] Here the lead and lag definitions should be interpreted in the sense used by Scholes and Williams (1977) who view them from company's perspective, while Cohen et al.(1983) take the opposite view, referring to the leads and lags of the market return. This small ambiguity makes no difference for the calculations.

-$r^o_{M,t}$ is the observed daily return of market index in period t,

-N is the number of leads and lags considered necessary to capture the delays in company returns reactions.

Partly following the analysis of Carlson, Fisher and Giammarino (2010) our paper describes the lead and lag structure of up to 2 and 5 leads and lags, in addition to the contemporaneous beta dynamics.

As a result, for each company we obtain 11 daily time series of beta estimates – starting with regressing firm returns on the 5-day market lead (firm lag) and ending with 5-day market lag (firm lead).

For each of the three markets we perform similar calculations to obtain 11 time series of market autocorrelation estimates at each daily point in time. Using formula (7) for each issuer we obtain the series of adjusted sum betas. Since our robustness check involves comparison of the series of contemporaneous, in addition to 2 and 5 leads and lags, formula (7) and the subsequent adjusted sum betas should be adjusted by the number of terms included. For example for contemporaneous beta a simple regression of firm returns on the market returns is needed to obtain the slope coefficient. For 5 leads and lags series, we would add up slope coefficients of regressing firm returns in certain period on the 5, 4, 3, 2, and 1-day market lead, the contemporaneous returns and the 1, 2, 3, 4, 5-day market lag (firm lead). After obtaining the sum we just divide it by the sum of the similar estimates of market autocorrelation. Again, all the basis and final series start from 01/01/1993 and end on 27/05/2011 for all countries.

The syncronization of the beta series has been implemented in the same way as illustrated in Section 3.1.2 for the contemporaneous beta.

Table 2 in the Appendix shows that the upward sloping beta dynamics prior to issuance and the downward sloping beta dynamics post-issuance, plotted using contemporaneous market returns is robust to adjustments for asynchronous trading using the methodology suggested by Fowler and Rorke (1983).

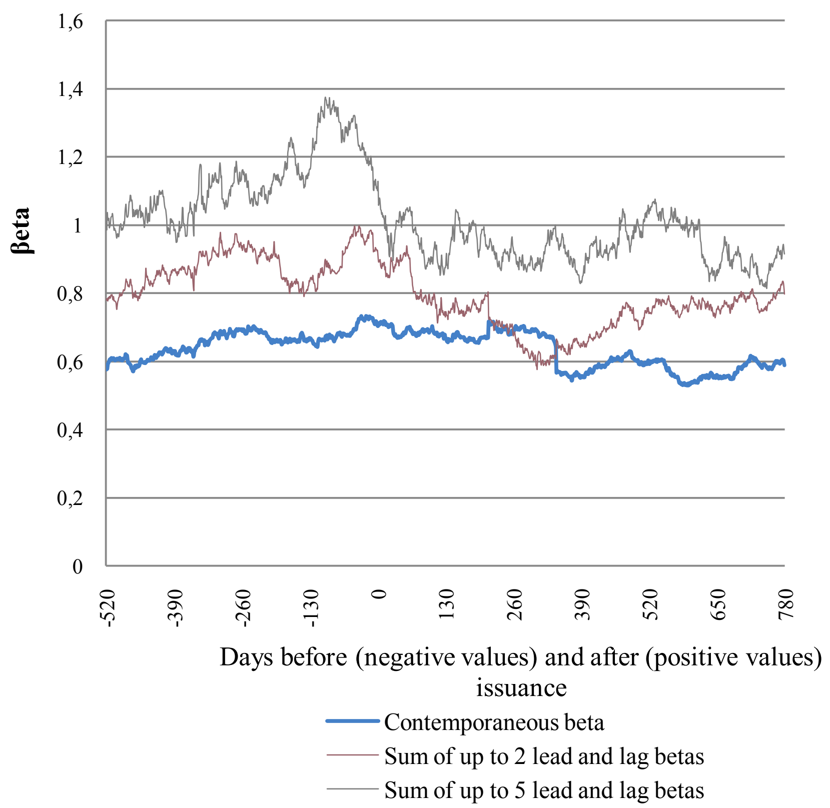
3.1.4 Results and interpretations

We will first introduce the empirical results for the aggregate sample of issuers then we will present the results of the same analysis performed on specific sub-samples in order to better understand how growth options are likely to influence the risk dynamics of the issuers.

3.1.4.1 Aggregate sample of issuers

The graph below illustrates how the average market beta evolves through time. In tune with the American SEO firms (Carlson, Fisher, and Giammarino 2010), Nordic issuers are also characterized by increasing risk several months before the SEO event and a smooth decrease in risk several months thereafter. Including up to 5 leads and lags to the adjusted sum beta (the upper middle-dark line) makes this trend even more pronounced, and the beta value more logical. It is indeed intuitively appealing to assume that the true average beta of the sample should be closer to 1.0, the beta of the market portfolio.

Figure 3: Equally-weighted Semiannual betas - Nordic issues (186)



A quantitative description of the results displayed graphically is provided in Table 2 in the Appendix. In particular, we have tried to reflect the change in beta over time by taking the difference of beta estimates between the pre-issuance and the post-issuance period. We can see that the difference between the beta estimated on the day of the issue and the beta estimated 1 and 2 years before the issue, regardless of the estimation window (monthly, semiannual (with different adjustment for leads and lags), or annual) is mostly insignificant for all subsamples, including the Nordic aggregate. However, the differences between the 1, 2 and 3-year post issuance betas and the beta estimates on the issuance date are negative and significantly different from zero. This means that there is indeed a significant decrease in the average beta 2 and 3 years after issuance relative to the issuance date for the total sample.

As we have shown in Section 1.3, behavioral theories can explain the return dynamics of seasoned equity issuers but cannot fully explain the peculiar risk pattern we observe in the graphical and tabular results. From a real options perspective however, these results make sense. Indeed the "risk loadings" should increase prior to issuance as the leverage of the growth option(s) held by the issuer rises. Risk should decrease after issuance when the option is unlevered through real investment.

An alternative explanation for the perceived risk dynamics is a mix of growth options and behavioral elements such as the "market timing" ability of astute managers. Such managers are able to optimally time the SEO and the subsequent investment when market conditions are good and/or the equity is overvalued such that existing shareholders will not see their holdings diluted. Conversely, a firm would issue debt when it is undervalued (Choe, Masulis, and Nanda 1993).

In a third scenario we may assume that all firms, as economic agents, are rational and pursue a well-defined goal when raising capital on the capital market. While for some of them it can be debt repayment or acquisition financing, a great number of firms aim to implement capital investments.

Prior to issuance, the market anticipates the uncertainty associated with the existence of the "window of investment opportunity" – the real options that a firm is being exposed to, and reacts by increased volatility and correlation with the overall market conditions (indeed, the more favorable the overall economic situation is, the more chances for the new projects to succeed).

After the issuance, unsurprisingly, investors obtain more information about the future cash-flows of the projects financed and the uncertainty is cleared. Thus the risk decreases sharply and remains much lower afterwards.

3.1.4.2 Country sub-samples

To get a perception of the relative risk dynamics occurring on distinct capital markets, we performed the average beta analysis for each Nordic SEO subsample in addition to the aggregate sample. Since the number of firms in each country subsample is now reduced accordingly, we should be fairly cautious in drawing rigid conclusions or making straightforward risk dynamics comparisons.

We can observe a pronounced risk change around the issuance event for Norway and Sweden in line with the dynamics highlighted by Carlson et al. (2010): a perceived increase in risk prior to the SEO event and a smooth decrease thereafter. However, the average risk dynamics of the Danish issuers is quite noisy, probably due to the very small sample or to the inaccuracy of the data (the electronic list of Danish issues is poorly informative about the actual types of issues reported).

The contemporaneous beta series obtained with monthly, semiannual and annual estimation windows can also be compared to each other (refer to Figure 2 in the Appendix). Definitely, the visual trends in average betas across the three countries look similar regardless of the estimation period, although the noise of the beta values decreases and the trend becomes more pronounced with the widening of the estimation window (from monthly to annual). The noise reduction induced by the annual estimation windows can account for the more significant differences in the annual pre- and post-issuance beta estimates reported in Table 2.

3.1.4.3 R&D sub-samples

The articles we are focusing on (e.g. Lyandres et al. (2008)) try to explain the dynamics of stock returns around issuance events solely based on *real* investment.

However, there seems to be a positive relationship between research and development activities in a firm and its stock returns, as documented by Chan, Lakonishok and Sougannis (2001). In particular they provide evidence that R&D intensity is positively associated with return volatility, ceteris paribus. In the real options terminology, Chan et al (2001) write that R&D actually generates risky expansion options, whereas only real investment transforms them into less risky assets in place.

Based on this intuition, we reorganized the subsamples of issuers based on research and development intensiveness[6]. The financial industries as well as unclassified firms were excluded from the classification.

Table 3 in the Appendix is based on the accounting item R&D-to-sales recorded in Datastream from 2003-2011 for listed Norwegian, Swedish, and Danish companies. We considered this relatively long time interval in order to capture a time-consistent, persistent dynamics rather than a momentary picture. To avoid outliers, we estimated the median annual expenditure on R&D for each company during this period, and after classifying each company according to its industry – we computed the median annual R&D-to-Sales for *each industry*. Finally, we assigned the industry medians to one of three categories: High, Medium or Low R&D-to-Sales based on the top 30%, middle 40% and bottom 30% deciles.

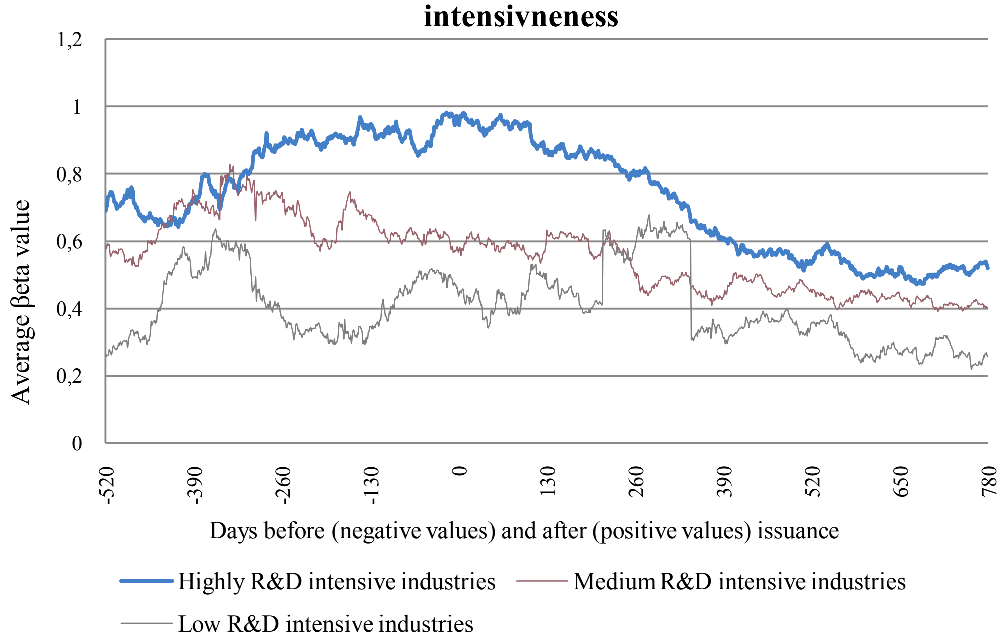
The distribution of the R&D intensiveness is generally as expected. It makes intuitive sense that industries such as Pharmaceuticals and Biotechnology, Aerospace and Defense and Software and Computer Services (tertiary economy) to be R&D intensive, and industries such as Mining and Forestry and Paper (primary economy) to be at the lower end of R&D intensiveness.

For this analysis, we used the original aggregate sample of equity issuers with the same initial constraints and in addition, with firms classified into the "H" (30% high), the "M" (40% medium), or the "L" (30% low) category along the R&D-to-sales dimension. The beta dynamics by R&D intensive industry sub-samples displays vivid tendencies. Thus, compared to less R&D intensive industries, the

[6] We have proxied the R&D intensiveness by the R&D-to-Sales ratio.

industries generating most of the real options by spending the highest amounts on R&D were subject to a sharper increase in risk before the issuance, and a sharper drop afterwards.

Figure 4: Average semiannual beta classified wrt R&D intensivneness



Numerical evidence on the beta estimates differences described in Table 10 from the Appendix also indicate the significant 2 and 3 year annual post-issue differences for the highly R&D – intensive industries. This again could suggest that real options realizations impact mostly real-option sensitive companies, namely those that by employing intensive research programs accumulated substantial uncertainty which resolved after the market financing and thus realization of these investment possibilities.

One might argue that the fall in beta could also be induced by a drop in financial leverage following the stock issue. Nonetheless, a simple leverage theory would predict a more abrupt beta decrease after the issue, and would not explain the pre-issuance beta run-up. In Section 3.1.6 we have regressed changes in betas (i.e. the difference between the post-issuance and the pre-issuance betas) on both a proxy for leverage change and a proxy for real investment to check the validity of a financial leverage-based explanation of the observed risk dynamics.

3.1.5 The case of Blom ASA

The methodology and the results obtained based on the aggregate sample of all eligible SEOs may become clearer if we take the specific case of one firm from our sample. Blom ASA is a Norwegian geographical information and offshore technology company founded in 1954. Starting from its listing on Oslo Stock exchange in 1988 (OSE: BLO) Blom has been steadily expanding its business both by organic growth and mergers and acquisitions. Prior to the equity issuance of our interest, on 13 May 1997 news highlighting a merger proposal between Blom ASA and CreditInform ASA emerged. Board considered the necessity to increase share capital by up to NOK 4,000,000 by equity issue. "The reason is partly because the company may need to strengthen the equity in connection with efforts internationally and within the information systems and information technology and partly to be able to complete acquisitions and establishments of enterprises with settlement in shares and/or cash"[7]

The amount of shares increased four times in August 1997 from 2848 to 11392[8]. Both investigation of OSE listings information and the DATASTREAM Number of shares datatype have revealed the absence of additional major seasoned equity offerings in the period 1995 – 2000 (the five year window of our study). Figure 5 in the Appendix vividly illustrates how the risk captured by the contemporaneous semiannual market beta grows steadily before the issuance event (going up for two years of growth without major downturns) and decreases abruptly during the next three years. Based on the real options explanation, we can infer that uncertainty associated with the firm expansion plans has pushed up the risk of the company. After issuance, which supposedly was followed by investment in new business units and technologies, active and potential investors could have gained more information about the intrinsic value of the company.

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[7] Own translation of the citation from the Factiva news Document reutno0020011003dt5d0075w http://global.factiva.com/aa/?ref=reutno0020011003dt5d0075w&pp=1&fcpil=en&napc=S&sa_from=

[8] Datastream data

3.1.6 Market beta, leverage and real options

Intuitively, the real options based explanation of the risk dynamics around equity offerings is tempting. Nonetheless, still intuition says that financial leverage can also account for the observed dynamics. Indeed, with an increase in equity, financial leverage is expected to decrease after issuance. This should lead to a decrease in systematic risk and to a subsequent drop in market beta. This section will empirically explore two potential determinants of systematic risk dynamics around SEO events: financial leverage and real investment.

The relationship between market beta and accounting measures of risk such as financial leverage is a traditional area of academic research. Most theoretical literature revealed a *positive* and *linear* relationship between *required return* and *leverage*, as formulated by Modigliani and Miller (1958, 1963). Modigliani and Miller show that the required rate of return on equity of a levered firm increases proportionally to the debt-to-equity ratio.

Hamada (1972), and later on Bowman (1980) independently designed two closely related linear models in order to capture the relationship between the beta of an unlevered firm and the beta of the same firm, if levered. The Bowman model, ignoring corporate income tax, is:

-Be = Bu (1 + D/E) = Bu + Bu D/E, where

-Bu = Unlevered beta (asset beta);

-Be = Levered beta which equals beta of the common stock;

-D = Market value of debt of the levered firm;

-E = Market value of equity of the levered firm.

Many other studies have investigated the determinants of systematic risk as measured by market beta, focusing on financial characteristics such as operating risk, changes in financial leverage, size and liquidity. Reviewing 13 empirical studies of the determinants of risk, (Ang, Peterson, and Peterson 1985) conclude that there is great variation among the models in their specification and empirical results. Furthermore, several of these studies fail to provide clear justification or hypotheses for the role of particular variables in the models or for the specified functional form. Beside financial leverage, several authors have supported the use of variables related to (real) assets such as net plant to total capital (Melicher and Rush 1974), or growth in assets (Logue and Merville 1972).

However, to our knowledge no academic work has specifically related changes in market beta to both changes in financial leverage and real investment around SEO events. Such events are very likely to induce shifts in the financial leverage profile of a company, with potential impact on systematic risk.

Carlson et al. (2010) do not control for leverage in their empirical approach relating SEO risk dynamics to real options. However, Carlson et al. do regress changes in beta around the issuance event on several regressors: the prior book-to-market, the prior logarithm of market capitalization, the one-year run-up, the three-day window announcement effect, the market run-up, the SEO proceeds as a percent of market capitalization, the percent of proceeds which are in the primary issuance, and a constant. They compute the post-issuance change in beta as the difference between the market beta in the six months prior to SEO announcement and the market beta in the six-month window beginning three years after the SEO.

Inspired by previous studies, we consider a linear relationship between changes in beta, financial leverage and real investment. By changes in beta around the SEO date we mean the difference between the beta estimated using daily observations over a period of one year before the issuance, and the beta estimated using daily observations over a period of one year after the issuance.

In the cross-section, we have regressed changes in average beta around the equity/offering date on a proxy for leverage and another proxy for real investment. Several model specifications, detailed below, seemed equally appropriate.

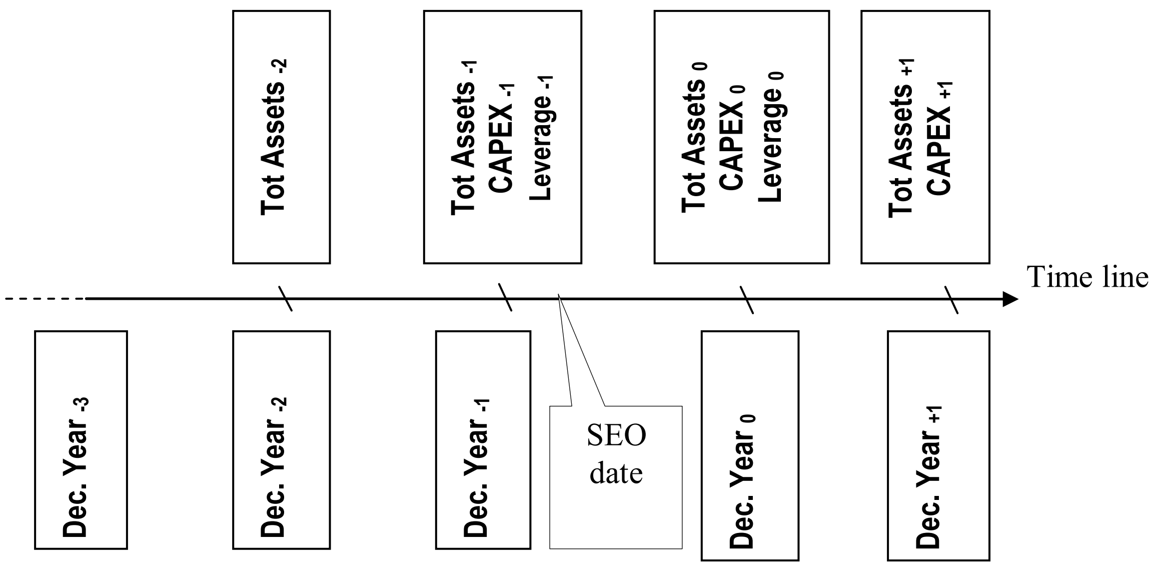
Our aggregate sample includes Norwegian, Swedish and Danish SEOs which occurred between January 1997 and June 2007. To be included, an SEO should have been performed by a non-financial firm which did not conduct any other SEO one year before and one year after the SEO in question. The original sample thus sorted included 366 events. Further, we excluded the offerings by firms which do not have valid accounting information in Datastream on capital expenditures (datatype DWCX), leverage (datatype WC08236) and Total Assets (datatype WC02999) at the end of the year preceding or following the equity/debt offering.

Different proxies for financial leverage have been applied in the literature: long-term debt/book equity (Melicher 1974), total debt/book equity (Melicher and Rush 1974) or long term debt/total assets (Rosenberg and McKibbent 1973). Following Thompson (1976), we have measured financial leverage as the ratio Total Debt-to-Total Assets. We have used the Datastream item WC08236 as a measure of financial leverage. WC08236 is defined as:

$$Leverage\ (in\ \%) = \frac{Total\ Debt}{Total\ Assets} =$$
$$= \frac{\text{Short Term Debt \& } Current\ Portion\ of\ Long\ Term\ Debt\ +\ Long\ Term\ Debt}{\text{Total Assets}} \cdot 100$$

Choosing a good proxy for real investment is not straightforward. Rosenberg and McKibben (1973) have used a ratio of gross plant to assets as one determinant of systematic risk. The closest and most convenient proxy we could find was a ratio of capital expenditures (and inventories) to total assets. However it is neither intuitively nor theoretically clear how this ratio should be modeled to best relate to changes in systematic risk. We have implemented several model specifications for that purpose, detailed below. An illustration of how we computed our variables is provided below and more clarifications follow the model specifications.

Figure 5 Leverage, capital expenditures and total assets measured around the date of the SEO event



Model specifications

Model A:

$$\%\Delta\beta_{i,t} = a + b \cdot \%\Delta\, Leverage_{i,t} + c \cdot \frac{CAPEX_0}{TotAssets_{-1}} + \varepsilon_{i,t}$$

Model B:

$$\%\Delta\beta_{i,t} = a + b \cdot \%\,\Delta\, Leverage_{i,t} + c \cdot \%\Delta CAPEX_{i,t} + \varepsilon_{i,t}$$

Model C:

$$\%\,\Delta\beta_{i,t} = a + b \cdot \%\,\Delta\, Leverage_{i,t} + c \cdot \frac{(CAPEX + \Delta Inventory)_{+1}}{TotAssets_0}{}_{i,t} + \varepsilon_{i,t}$$

Model D:

$$\%\,\Delta\beta_{i,t} = a + b \cdot \%\,\Delta\, Leverage_{i,t} + c \cdot \%\,\Delta\, Adjusted\ CAPEX_{i,t} + \varepsilon_{i,t}$$

In all specifications, the change in leverage (Δ Leverage) is calculated as the difference between the leverage ratio at the end of the year of issuance and the leverage ratio at the end of the previous year $(Leverage_0 - Leverage_{-1})$. In model A, the ratio $\frac{CAPEX_0}{TotAssets_{-1}}$ is an approximation of the relative annual growth in capital assets in the year of issuance (~ $\frac{Fixed\ Assets_0 - Fixed\ Assets_{-1}}{Total\ Assets_{-1}}$). In model B, %Δ CAPEX equals$(CAPEX_0 - CAPEX_{-1})/CAPEX_{-1}$. In model C, we added the change in inventories $\Delta\, Inventory_{+1} = Inventory_{+1} - Inventory_0$ to capital expenditures hoping to get a better estimate of real investment. The variable $\Delta\, Adjusted\ CAPEX$ is computed as the difference between CAPEX estimated over the year following the SEO event and the CAPEX estimated over the year preceding the SEO event. More precisely, we have weighted the variables $CAPEX_{+1}$ and $CAPEX_0$ according to the number of months between December of year $_0$ and the SEO event to obtain an approximation of CAPEX one year after the SEO date. Similarly, we have weighted the variables $CAPEX_{-1}$ and $CAPEX_0$ according to the number of months between December of year $_{-1}$ and the SEO date to obtain an approximation of CAPEX over one year before the SEO date. The aim of this weighting procedure was to obtain annual CAPEX values synchronized in time with the choice of the beta estimation window (one year before and one year after issuance).

Hypotheses

We expect that changes in financial leverage are positively correlated with changes in beta (i.e. if leverage decreases post-issuance, Δ Leverage <0 and beta should drop, therefore Δ Beta<0). According to the real options theory, we expect a negative relationship between real investment and changes in beta (if investment increases post issuance, Δ Investment >0 and beta should drop, therefore Δ Beta<0). Our two sets of hypotheses are:

H_0: b =0 **H_0: c=0**
H_a: b>0 **H_a: c<0**

Table 1 Results*

Coefficients	Model A	Model B	Model C	Model D
Leverage factor (b)	0,044	0,069	0,060	0,078
	(0,51)	*(0,49)*	*(0,49)*	*(0,68)*
Real investment factor (c)	-0,380	-0,027	0,354	-0,228
	(-0,35)	*(-0,38)*	*(0,25)*	*(-1,73)*
R-square	0,20%	0,23%	0,16%	1,76%

* T-statistics in brackets

Results and Interpretation

No model reveals any significant relationship between changes in beta and the chosen proxies for changes in leverage and for real investment taken individually. Moreover, in all models the F-statistic is lower than critical values at conventional confidence levels and so we cannot reject the hypothesis that the coefficients for leverage and real investment are jointly zero. Although we cannot reject the nil hypotheses, it is worth noting that the signs of the coefficients correspond to the hypothesized relationships between changes in beta and changes in leverage (c > 0) and between changes in beta and real investment (b < 0). Model D where we try to time-match real investment and the changes in betas seems to perform best. Interestingly, % Δ Adjusted CAPEX has a significant mean of 59% which implies that the issuers have increased their CAPEX expenditures on average by 59% in the 12 months following the SEO event compared to the 12-month interval preceding the SEO. We may attribute the lack of power of our statistical tests to measurement errors or to model misspecifications resulting from the mismatch between the timing of the SEO events and the accounting conventions (accounting information such as CAPEX is only disclosed once at the end of the fiscal year whereas SEOs can occur at any point in time).

Further on we believe that the hypothesis of a relationship between real investment and expected stock returns requires more rigorous investigation with the aid of factor models as suggested by Lyandres et al. (2008).

3.2 The long-run abnormal performance of SEOs. Factor regressions

We have tested the long-run stock return underperformance hypothesis based on Jensen's alphas in factor regressions. Factor regressions will involve the market model (CAPM) and the Fama-French three factor model.

3.2.1 Data description

We worked with Norwegian, Swedish and Danish issuers separately. Since we extracted information from different sources with independent databases we had to manually match the issuers reported on the web with specific securities from Datastream using unique identifiers such as the Datastream security code. These identifiers then enabled us to retrieve company fundamental information and returns from Datastream. Additional technical clarifications in this matter follow below.

Throughout our work, we looked only at firms listed on Oslo, Copenhagen and Stockholm Stock Exchange with a Datastream-defined major security. According to Datastream, for companies with more than one equity security, the major security of a company is the most significant in terms of market value and liquidity of the primary quotations of that company. Only one security per company is assigned as the major. Since many companies trade multiple types of common or ordinary stock, in Datastream, stock prices are provided for the primary share type. If there are multiple types of common or ordinary stock, Datastream Worldscope contains both a main company record as well as up to seven separate security-level records. The Worldscope database applies the following criteria to select the share that represents the company on the main company record:

1. The selected share must be available for foreign investment
2. The share is more widely traded.

A main company record contains all the general and fundamental company data (e.g. accounting data).

Our aggregate sample of issuers comprises 421 unique issuers and 1428 separate SEO events. In reporting these numbers, we did not aggregate issues conducted by the same company on the same date. The SEO data was obtained from the official websites of the Oslo Stock Exchange and of OMX Nasdaq[9]. The websites have a section dedicated to corporate actions and/or new issues. A synoptic description of our three SEO samples is provided in Table 4 and Table 5 in the Appendix. Although the presentation of the information about the equity issues was neither complete nor consistent across the two sources, we can report that the Norwegian sample contains mostly private issues (834 issues or 84.8%) and few public issues (150 issues or 15.2%). This is consistent with the existing literature highlighting the prevalence of rights issues in the European markets (Eckbo, Masulis, and Norli 2007) compared to the US markets. Private placements and rights issues make up the bulk of the Danish issues as well.

Further on, we extracted the following data from Datastream:

- Monthly Total Return Index (RI) series for all the issuers (on the first day of each month).
- Monthly total return series on the market indexes: OSLO EXCHANGE ALL SHARE – OSLOASH (181 constituent equities) -(RI), OMX Stockholm Benchmark index OMXSB (86 constituent equities) – (RI); OMX Copenhagen Cap Index (189 constituent equities) - (RI);
- A proxy for the risk-free rate: the Total Return Index series for the 3-month Norwegian, Swedish and Danish interbank interest rates (on the first day of each month).

[9] Since February 2008, both Stockholm Stock Exchange and Copenhagen Stock Exchange became part of Nasdaq OMX Group, Inc.

The source for the SMB and HML monthly returns for Norway was Prof. Ødegaard's website.

The industry distribution of the SEO samples (Table 5 in the Appendix) suggests that the most frequent Norwegian issuers belong to the real investment-intensive industries such as: Oil Equipment and Services, Oil and Gas producers Industrial Transportation. Of all industries, most Danish and Swedish SEOs appear concentrated in the Pharmaceuticals and Biotechnology sector, and Fixed Line communications. However, the Software and Computer Services, a less real-investment intensive industry also reports many seasoned equity issuers in all three Nordic markets.

Table 6 in the Appendix reports the frequency distribution of the SEO samples across size and book-to-market quintiles. The frequency distribution shows the number of observations belonging to a certain size/book-to-market quintile divided by the total number of observations. For each country, we have obtained the annual breakpoints for the size and book-to-market dimensions using all companies reported in Datastream with the major securities listed on the national stock exchange. In Table 7 we report the size and book-to-market quintile breakpoints for the period 1994-2010. The measures of size and book-to-market that we have used are detailed in Section 3.2.3.1.

Most SEOs seem to be conducted by big-growth firms in Norway (13.6%), by second smallest-medium growth firms in Sweden (8.0%) and by middle sized-growth firms in Denmark (17.65%). Thus, the SEO distribution displays a consistent pattern across country sub-samples. Indeed, growth firms (i.e. in the 20% and 40% book-to-market quintiles) conduct most of the SEOs in all countries (approximately 60% in Norway, 50% and in Sweden, and 70% in Denmark). These empirics make intuitive sense since growth firms are endowed with more investment opportunities than value firms. However, growth firms have lower internal sources of funds and need to seek external capital to finance their investments. This evidence speaks about the important role that real investment may play in the new issues puzzle. Lyandres et al. (2008) and Brav et al. (2000) report similar frequency distributions for American SEOs.

For the interested reader, more descriptive statistics of our SEO samples like the average and the median ratio of issue size relative to market capitalization and to total assets, by year and by industry are available in Tables 8, 9, 10 and 11 in the Appendix.

3.2.2 Methodology

Our dependent variable in factor regressions is the monthly return on *equally weighted* and *value-weighted* portfolios of seasoned issuers, in excess of the risk-free rate. A portfolio of issuers was built such that every month, it comprised only firms which had issued equity at least once in the 36 months prior to the month of portfolio formation. The issuers' portfolio composition changes every month, the number of firms included ranging from 41 (minimum) to 115 (maximum) for Norway, from 31 (minimum) to 62 (maximum) for Sweden, and from 19 (minimum) to 39 (maximum) for Denmark.

We have run the regressions using two time series for each of the three markets in order to balance the need of having more generous samples with the need of avoiding extreme events. The first series is shorter in an attempt to avoid the breakout of the 2008 financial turmoil (Denmark: January 2003-June 2008; Norway: January 2000-June 2007; Sweden: January 2000-June2007).The Norwegian and Swedish issuers' portfolios have a first series of 90 monthly return observations each (from January 2000 to June 2007), whereas the Danish portfolio of issuers has a first series of 66 monthly return observations (from January 2003 to June 2008) because of data limitations.

The second series includes 109 monthly observations for Norway and Sweden and 73 for Denmark (Denmark: January 2003-January 2009; Norway: January 2000-January 2009; Sweden: January 2000-January 2009). Despite our concerns, the regression output of the second time series is very similar to the output obtained using the first series. The second series adds the benefit of increased R-squares.

3.2.3 Results and interpretations

A synopsis of the results from factor regressions is provided in Table 12 and Table 13 (Appendix). A summary of the CAPM results is provided in Tables 2 and 3 below. Basically referring to the *extended* samples (i.e. January 2003-January 2009 for Denmark, January 2000-January 2009 for Norway and Sweden) all the regressions deliver negative abnormal performance for the *equally-weighted* SEO portfolios. The Danish alpha is negative and significant (α= -0.009, t-statistic= -2.29) and actually the lowest in absolute magnitude of all three markets. The Norwegian alpha is both more negative and more significant (α= -0.0175*;* t-statistic= -3.87). The Swedish result is between the values reported for Denmark and Norway (α= -0.0169*;* t-statistic= -2.74). Adjusted R-square is in the range of 54%-75%. The Norwegian equally-weighted Fama French factor regression does not help explain this apparent mispricing, with alpha of -0.0185 and t-statistic of -4.17 (see Table 13 in the Appendix).

The equally-weighted CAPM regression results for the Nordic markets are in line with the results obtained by Lyandres et al. (2008) with American SEOs: they report an equally weighted CAPM alpha for the SEO sample of -0.41% per month (t-statistic= -2.43; R-square= 78%) and a Fama French alpha of -0.39% per month (t-statistic= -3.52; R-square 92%). According to the results obtained by Lyandres et al., the bare Fama French model does not help explain the empirical negative abnormal performance of the issuers' portfolio, a conclusion we also reached. By American standards our results are rather remarkable. One possible explanation for our bigger intercepts is that our sample is considerably smaller and more recent than Lyandres et al.'s; they use a sample of 10,084 SEOs spanning the period between 1970 and 2005. None of the factors in the Fama French regressions are purged of issuing firms, and so according to Ritter (2003), the intercepts should actually underestimate the degree of abnormal performance.

Table 2 CAPM results (first sample: Jan 2000/03-Jun 2007/08)

	Equally-weighted SEO portfolio		Value weighted SEO portfolio	
	Alpha	**Adj. R^2**	**Alpha**	**Adj. R^2**
Denmark	-0,0056	59%	-0,0051	56%
	(-1,41)		(-0,99)	
Norway	-0,0178	64%	-0,0145	66%
	(-3,54)		(-3,03)	
Sweden	-0,0162	56%	0,0032	68%
	(-2,41)		(0,85)	

Table 3 CAPM results (extended sample: Jan 2000/03-Jan 2009)

	Equally-weighted SEO portfolio		Value weighted SEO portfolio	
	Alpha	**Adj. R2**	**Alpha**	**Adj. R2**
Denmark	-0,0090	74%	-0,0091	72%
	(-2,29)		(-1,68)	
Norway	-0,0175	69%	-0,0124	73%
	(-3,87)		(-2,97)	
Sweden	-0,0169	54%	0,00	69%
	(-2,74)		(-0,00030)	

However, the striking result is that compared to equally-weighted CAPM regressions, the abnormal performance disappears in the CAPM regressions of the Danish *value-weighted* SEO portfolio (α=-0.0091, t-stat=-1.68) and of the Swedish value weighted SEO portfolio (α=-0.000, t-stat=-0.0003). The negative abnormal performance of Norwegian issuers persists in the value-weighted CAPM regression, but is clearly diminished (α=-0.0124, t-stat=-2.97). This evidence makes an important step towards the "resolution" of the new issues puzzle and calls for an interpretation. First of all, our result is in line with the evidence reported in previous studies and summarized by Ritter (2003) (see Table in Section 1.3.2.1). This literature generally says that the SEO value-weighted underperformance is lower in magnitude than the equally-weighted underperformance. In one interpretation, this difference may tell us that the apparent negative abnormal performance is concentrated in small firms, given that in value weighted portfolios the returns of small firms are weighted less than the returns of big firms. To take the argument one step further, this may mean that we deal with no abnormal performance but rather with a certain risk/return pattern related to idiosyncratic elements such as company size. As mentioned in the literature review section, this is the interpretation of the new issues puzzle given by Brav, Gecy and Gompers (2000). If their argument holds, then we should see a size factor explaining the abnormal performance of the SEOs portfolio. However, the Norwegian SMB fails to account for the significant negative alphas (see Table 13 in the Appendix) although the SMB coefficient in the Fama French regression is significant while the HML coefficient is not.

The implications for an investment policy of this apparent mispricing is that significant alphas might be earned by portfolio managers who implement a policy of shorting equally weighted portfolios of seasoned equity issuers. Nonetheless, the costs associated with frequent rebalancing of equally-weighted SEO portfolios in thin markets are very likely to offset any above-average gains.

3.2.3 The investment factor

The last section of our paper will explore the hypothesis advanced by Lyandres et al. (2008) that an investment factor constructed as a zero cost portfolio long in low investment stocks and short in high investment stocks can clear the abnormal performance revealed by standard factor regressions in SEO portfolios.

3.2.3.1 Data

The following data was extracted from Datastream (Thomson Reuters):

- All Norwegian firms, which were actively listed at some point during our sample period; for firms that have A and B (or C) classes of shares we chose the major security, thus working with only one security per firm;
- Data on the market value of equity (datatype: MV), as a proxy for *size*;
- Data on the balance sheet value of the ordinary (common) equity of each firm (Worldscope datatype WC03501), as a proxy for the *book value of equity*;
- Annual accounting data: Total Assets (Worldscope datatype WC02999), Capital Expenditures (datatype DWCX) and Total Inventories (Worldscope datatype WC02101) for all Norwegian firms, for which it is available at each year-end, starting from 1994.

Using the previous two datatypes, we computed the *book-to-market* ratio for listed firms as MV/WC03501 on the 31st of December every year. As in Fama and French (1992) we excluded firms with negative book equity values as well as Financials (financial services, life and non-life insurance providers, banks, real investment trusts).

A methodological remark is necessary at this point. Market value (MV) on Datastream is the share price multiplied by the number of ordinary shares in issue. For companies with more than one class of equity capital, the market value is expressed according to the individual issue. MV is thus calculated at the security level. Market value, consolidated (MVC) is the consolidated market value of a company. MVC is the same value as MV for companies with a single listed equity security. For companies with more than one listed or unlisted equity security MVC represents: Equity "A" (MV) + Equity "B" (MV) + Equity "C" (MV) etc. However, we chose not to use MVC as a proxy for size because of the limitations associated with this datatype. In particular, companies which are fully dead (i.e. which do not have any active securities) at the time of the calculation of the MVC history (20 February 2011) do not have an MVC history calculated in Datastream. Since many of the equity issuers included in our sample were delisted ("dead") in 2011, using MVC would have considerably diminished our samples and biased them towards survivors.

3.2.3.2 Methodology

First, Lyandres et al. (2008) designed the investment-to-assets ratio as the annual change in gross property, plant, and equipment (PPE) plus the annual change in inventories, divided by the lagged book value of assets. Since Datastream does not provide the same accounting items as COMPUSTAT, we have used capital expenditures (CAPEX) as a proxy for changes in PPE.

Next, Lyandres et al. construct an investment factor as a zero-cost portfolio from buying stocks with the lowest 30% investment-to-assets ratios and selling stocks with the highest 30% investment-to-assets ratios, while controlling for size and book-to-market in order to avoid multi co-linearity in the factor regression. The investment factor is used to augment CAPM and Fama French models.

Our investment-to-assets ratio is defined as follows :

$$Investment - to - assets = \frac{\Delta Total\ inventories_t + CAPEX_t}{Total\ Assets_{t-1}}$$

where Δ Total inventories is the difference between $Total\,inventories_t$ and $Total\,inventories_{t-1}$. At the end of each year, from 1994 to 2007, we have independently sorted the firms listed on Oslo Stock Exchange (and active at some point between 1994 and 2007) on three characteristics: size, book-to-market and investment to assets. For size and investment-to-assets we established three categories: the top 30% decile ("B" for size, "H" for investment-to-assets), middle 40% ("M") and bottom 30% ("S" for size, "L" for investment-to-assets). For book-to-market, we used only two dimensions, top 50% ("H") and bottom 50% ("L") as Fama and French (1993) showed that the middle range of the book-to-market ratio does not have significant explanatory power in the cross-section of returns. The intersection of all these categories defines 18 value-weighted portfolios (3x2x3). Since we built the investment factor as a zero-cost portfolio long in low investment-to-assets stocks, and short in high investment-to-assets stocks, we worked with 12 portfolios, ignoring the middle 40% of the investment-to-assets dimension (Figure 6 below).

Figure 6 High investment and low investment portfolios (6x6)

	Size	Book-to-market	Investment-to-Assets
High Investment portfolios	S	H	H
	S	L	H
	M	H	H
	M	L	H
	B	H	H
	B	L	H
Low Investment portfolios	S	H	L
	S	L	L
	M	H	L
	M	L	L
	B	H	L
	B	L	L

Therefore, we constructed the investment factor by subtracting the average of the six value-weighted returns of the high investment-to-assets portfolios from the average of the six value-weighted returns of the low investment-to-assets portfolios. Using this sorting methodology we ensured that the correlations between the investment factor and the SMB and HML are minimized such that each factor captured unique risk characteristics (see Table 4 below).

Table 4 Correlations between factors

	INV	*SMB*	*HML*
INV	1		
SMB	0,188877	1	
HML	-0,12779	-0,32056	1

At the end of each year (call it year t-1) we constructed (rebalanced) the low-investment and high-investment portfolios to be used for computing the monthly returns of the investment factor over a 12-month period (June year t – July year t+1), starting 6 months after the end of the year. In doing so, we followed Fama and French (1992) methodology. Using a lag of 6 months, Fama and French ensured that accounting and in particular, earnings information is available to investors for the 12-month period when portfolio returns are calculated.

We have used the investment factor described earlier to extend the CAPM, as $R_{pt} - R_{ft} = \alpha + \beta(R_{Mt} - R_{ft}) + \gamma INV_t + \varepsilon$, where R_{pt} is the monthly return on the SEO portfolio at time t, $R_{ft}$is the monthly risk-free return at time t, $(R_{Mt} - R_{ft})$ is the market premium at time t, and INVt is the return on the investment factor at time t.

We have augmented the Fama and French (1993) three-factor model with the investment factor suggested by Lyandres et al. (2008), meant to capture the negative relationship between investment and stock returns. The model we have implemented is therefore:

$$R_{pt} - R_{ft} = \alpha + \beta_1(R_{Mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 INV_t + \varepsilon$$

where the dependent variable $R_{pt} - R_{ft}$ is the monthly return on the portfolio of issuers, in excess of the risk-free rate (the monthly equivalent rate of NIBOR 3-months); SMB_t is the monthly return on small firms minus the return on large firms; HML_t is the monthly return on high book-to-market stocks minus the return on low book-to-market stocks. We have applied OLS to estimate the regressions.

The independent variables, HML, SMB are constructed following Fama and French (1993) methodology and using company information relevant for the Norwegian stock market. Time series for the returns on both these factors have been obtained from Prof. Bernt Arne Ødegaard's homepage (Ødegaard).

3.2.3.3 Results and interpretations

From January 2000 to June 2007, the investment factor built with Norwegian stocks earns a non significant mean return of -0.19% per month. Table 14 and Table 15 in the Appendix display the regression results for *Norway* from CAPM and Fama-French regressions augmented with the investment factor. Again, we report the results across two samples: January 2000-June 2007 and January 2000-January 2009. It appears that the investment factor can account for a small part of the SEO underperformance in the first sample, for both value-weighted and equally weighted portfolios. However, it does not have explanatory power in the extended sample, possibly due to the disruption affecting the international financial markets and business operations after June 2007. It is plausible that investment patterns have undergone a structural break in the years following the financial breakdown, with a wave of property seizures by lenders and investments liquidated at prices not reflecting the intrinsic values of the assets. Such occurrences may have also influenced the return pattern across low and high investment companies. Consequently, taking a conservative approach we will focus on the analysis conducted with the restricted sample (January 2000-June 2007).

Table 5 below is a snapshot of the key results for the restricted sample. Contrary to the hypothesized negative relation between returns and real investment theorized by Cochrane (1996), the coefficients for the investment factor are positive but significant in both augmented Fama French and CAPM. Adding the investment factor (INV) into factor regressions does not make the abnormal performance insignificant but reduces its magnitude and significance. Thus, the augmented CAPM alpha is now minus 1.67% (t-statistic minus 3.44) compared to minus 1.78% (t-statistic minus 3.54) before, while the augmented Fama and French alpha is minus 1.66% (t-statistic minus 3.13) compared to minus 1.90% (t-statistic minus 3.54) before.

Table 5 Factor regressions with and without the investment factor (January 2000-June 2007) for the Norwegian SEO sample

Equally weighted SEO portfolio				
	CAPM	**CAPM with INV**	**Fama French**	**Fama French with INV**
Alpha	-0,0178	-0,0167	-0,0190	-0,0166
t-statistic	(-3,54)	(-3,44)	(-3,54)	(-3,13)
INV		0,2985		0,2598
t-statistic		(2,89)		(2,37)

Value weighted SEO portfolio				
	CAPM	**CAPM with INV**	**Fama French**	**Fama French with INV**
Alpha	-0,0145	-0,0140	-0,0132	-0,0118
t-statistic	(-3,03)	(-2,92)	(-2,54)	(-2,24)
INV		0,1483		0,1570
t-statistic		(1,46)		(1,45)

This evidence suggests that real investment can account only for a small portion of the reported negative abnormal performance of Norwegian SEOs, at best for up to 15% of its magnitude or significance. This means that the growth options/real investment hypothesis did not solve the new issues puzzle on the Norwegian market. We may attribute the bulk of the underperformance to behavioral biases such as information asymmetry, and investor overconfidence or we may explore alternative risk factors potentially responsible for the observed pattern of stock returns not captured by existing models. It is however likely that our methodology for the construction of the investment factor suffers from measurement errors. In addition, we did not exclude non-cash settled equity issues (capital contributions) from our SEO samples, partly because most often there was no information provided about the settlement method and partly because capital contributions account for a large part of our SEO samples. However, most of the empirical studies on SEO stock performance exclude non-cash issues from their analysis. Capital contributions can also be regarded as real investment, but the accounting item “capital expenditures” fails to capture the increases in fixed assets stemming from such contributions. Since we could not extract time series for fixed assets or property, plant and equipment from Datastream, we resorted to CAPEX as a proxy for changes in fixed assets/PPE. Last but not least we have to note that the results of the factor regression analysis are very sensitive to the choice of the sample period. Our SEO sample is surely poor in comparison to large scale studies like Lyandres et al.'s who incorporated 35 years of data and more than 10,000 SEOs. We cannot rule out the possibility that extended Nordic samples of SEOs might deliver significantly different results in standard regressions augmented with the investment factor.

4. Conclusions

Our paper draws an empirical comparison between the Nordic markets and different other stock markets around the world (primarily from the USA) regarding the characteristics and the performance of seasoned equity issuers, based on the results reported in the existing literature and on three samples of Norwegian, Swedish and Danish SEOs from 1997 to 2007. More specifically, we have investigated the long-run risk dynamics of issuing firms around the SEO event and tested the hypothesis of long-run negative abnormal performance of the issuers - documented in the academic literature - using factor regressions. The ultimate goal of our research has been to provide empirical evidence for or against the real options/real investment-based explanations for the risk/return pattern of seasoned equity issuers. Generally, our results are consistent with those reported in previous studies.

The average market beta dynamics of our samples of issuers displays an upward trend over a period of two years prior to the issuance date and a smooth drop over a period of three years after issuance. The observed beta pattern is robust to adjustments made for asynchronous trading. This evidence lends support to the real options theory which predicts that risk loadings should run up prior to issuance as growth options move into the money and the firm approaches the moment of "optimally timed" investment (Carlson, Fisher, and Giammarino 2006). According to Carlson et al., the pure real options model also predicts a rather steep drop in the post-issuance beta according to a one-time exercise of a growth option (the original model rests on the strong assumption that investment is realized instantly as a form of immediate exercise of a growth option). This prediction is not fully confirmed by the empirical evidence. One explanation for the smooth decrease in post-issuance beta has been advanced by Carlson et al.

(2010) in an extended real options model where they allow for capacity building ("time-to-build") rather than assuming instantaneous investment

Financial leverage, although it may account for a decrease in risk after issuance, fails to capture the risk run-up prior to issuance and the smooth decline in beta. Explanations for the observed risk pattern around the SEO based on a decrease in financial leverage after issuance did not find empirical support in our regressions of beta changes over proxies for changes in leverage and for real investment.

Our paper also tests the hypothesis of long-run underperformance of seasoned equity issuers. This hypothesis is not rejected on the Nordic markets if classical factor models are used (CAPM, Fama French) on equally weighted SEO portfolios. The negative abnormal performance reported for Nordic markets between 2000 and 2009 is considerably higher than the one reported by Lyandres et al. (2008) for the period 1970-2008 in the USA. One reason for this spread may be the difference in sample length and characteristics. However, the abnormal performance is diminished and even cleared when value-weighted SEO portfolios are the dependent variable in factor regressions. The reduction in abnormal performance for value-weighted issuers' portfolios compared to equally-weighted portfolios is consistent with previous academic findings. One explanation for alpha reduction with value weighted portfolios may be that the negative performance is concentrated in small firms. However, the SMB factor in Fama French regressions fails to reduce or to clear the alphas. A real investment factor augmenting the Norwegian CAPM and Fama French regressions did not provide strong evidence in favor of the real-investment explanation of the new issues puzzle. At best, the investment factor induced between a 10% and a 13 % reduction in the magnitude and significance of the intercepts. Measurement errors, including an inappropriate choice of real investment proxies may have biased our results. Still, real investment does not appear to be the leading factor behind the SEO underperfomance on the Nordic markets. Consequently we believe that more research into behavioral and economic explanations as well as into alternative risk factors on these markets is necessary. With the passage of time, SEO data and general financial information for markets outside the USA will become more easily available and increased samples are likely to generate more significant results.

APPENDIXES

Table 1: Risk Dynamics. Sample Characteristics

The following table reports the sample characteristics of 186 issues conducted between 01/01/1997 and 31/12/2005 by firms listed on the *Oslo Stock Exchange*, *Stockholm Stock Exchange* and *Copenhagen Stock Exchange*. N denotes the number of issues per corresponding characteristic. Both aaverage and median are measured in million of Norwegian kroner. For values originally reported in Swedish (SEK) kroner, Danish (DKK) kroner and British Pound (GBP) – the exchange rates as of 02/01/2006 provided by Norges Bank was used (* NOK/SEK=0,8492; NOK/DKK=1,0698; NOK/GBP=11,625). Fraction of MV denotes the ratio between the issue amount to the market value of the company in the year prior to the issue. The issue indicates the total (planned) amount. Sources: *Oslo Børs Emisjonsstatistikk, Nasdaq OMX issues statistics (Stockholm, Copenhagen), Thomson Datastream*.

Panel A: Issues by country

	N	Average issue amount, mill NOK*	Median issue amount, mill NOK*	Average fraction (%) of MV	Median fraction (%) of MV
Norway	78	478,35	85,37	331,33	15,70
Sweden	83	660,37	85,81	71,36	17,16
Denmark	25	39,68	13,22	54,93	2,24

Panel B: Issues by year

	N	Average issue amount, mill NOK*	Median issue amount, mill NOK*	Average fraction (%) of MV	Median fraction (%) of MV
1997	22	372,24	121,06	44,87	22,05
1998	13	174,33	127,03	15,92	12,72
1999	14	764,30	108,49	65,99	20,47
2000	30	742,33	66,24	77,53	21,76
2001	36	162,21	49,10	136,36	27,22
2002	22	1263,17	50,75	1014,76	9,36
2003	14	467,25	87,24	28,55	18,22
2004	12	184,96	66,76	12,00	2,81
2005	23	278,79	39,38	14,70	2,75

Table 1 - *Continued*

Panel C: Issues by industry					
	N	Average issue amount, mill NOK*	Median issue amount, mill NOK*	Average fraction (%) of MV	Median fraction (%) of MV
Aerospace and Defense	1	43,82	43,82	40,42	40,42
Automobiles and Parts	4	105,05	47,47	75,73	50,62
Beverages	1	325,55	325,55	1,27	1,27
Chemicals	1	223,34	223,34	19,77	19,77
Construction and Materials	4	605,98	265,44	16,33	14,84
Electricity	1	1271,85	1271,85	14,59	14,59
Electronic and Electrical Equipment	5	951,84	83,50	11,41	7,84
Equity Investment Instruments	1	160,00	160,00	40,80	40,80
Fixed Line Telecommunications	2	83,65	83,65	6,90	6,90
Food Producers	5	205,19	83,05	121,68	3,73
Forestry and Paper	3	1393,38	168,48	77,50	79,47
Gas, Water and Multiutilities	1	50,00	50,00	550,00	550,00
General Industrials	2	109,55	109,55	7,72	7,72
General Retailers	2	18,00	18,00	4,23	4,23
Health Care Equipment and Services	6	110,43	52,33	260,59	4,71
Household Goods and Home Construction	2	18,74	18,74	8,18	8,18
Industrial Engineering	13	604,22	250,94	102,24	19,73
Industrial Metals and Mining	2	66,75	66,75	105,23	105,23
Industrial Transportation	16	112,47	46,23	48,39	34,00
Media	4	96,26	62,59	10,51	7,27
Mining	2	626,41	626,41	3,34	3,34
Mobile Telecommunications	4	3941,79	67,00	12,32	8,27
Oil and Gas Producers	3	156,97	172,50	21,10	3,73
Oil Equipment and Services	14	298,73	71,31	27,02	8,46
Other	6	280,10	207,48	5480,85	46,83
Personal Goods	3	1347,68	128,23	4,46	4,35
Pharmaceuticals and Biotechnology	5	97,19	78,98	10,21	7,04
Real Estate Investment and Services	9	340,51	189,00	88,67	19,02
Software and Computer Services	27	76,57	48,63	54,96	21,13
Support Services	15	83,64	44,11	24,62	13,04
Technology Hardware and Equipment	12	2284,10	83,75	77,21	20,74
Travel and Leisure	10	336,43	37,27	31,03	11,55

Figure 1: An Illustration of the Average Beta estimation procedure

The three figures below provide an illustration for the risk dynamics estimation procedure. $\hat{\beta}_{X,j}$ represents the slope estimate in the regression of stock *X* return on the market return. *j* is the moment of the issuance – which equals "0" on the issue date. *k, l, m, p, q, r* – arbitrary number of days between the issue day and the beginning of the general estimation period (e.g. 01/01/1993[10]) and the end of the general estimation period (e.g. 27/05/2011). $\bar{\beta}_j$ represents the equally-weighted average of all companies' betas in the same period *relative* to the issuance date.

Step 1 Obtaining daily beta series for the overall time period 1/1/93-27/05/11

Date	Firm A	Firm B	Firm C
01/01/93	$\hat{\beta}_{A,j-k}$	$\hat{\beta}_{B,j-m}$	$\hat{\beta}_{C,j-q}$
…	…	…	…
…	$\hat{\beta}_{A,j-1}$	$\hat{\beta}_{B,j-2}$	$\hat{\beta}_{C,j-3}$
…	$\boldsymbol{\hat{\beta}_{A,j}}$	$\hat{\beta}_{B,j-1}$	$\hat{\beta}_{C,j-2}$
…	$\hat{\beta}_{A,j+1}$	$\boldsymbol{\hat{\beta}_{B,j}}$	$\hat{\beta}_{C,j-1}$
…	$\hat{\beta}_{A,j+2}$	$\hat{\beta}_{B,j+1}$	$\boldsymbol{\hat{\beta}_{C,j}}$
…	$\hat{\beta}_{A,j+3}$	$\hat{\beta}_{B,j+2}$	$\hat{\beta}_{C,j+1}$
…	…	…	…
27/05/11	$\hat{\beta}_{A,j+l}$	$\hat{\beta}_{B,j+p}$	$\hat{\beta}_{C,j+r}$

→

Step 2 Synchronization of the beta series in accordance to issue date (0)

Period No.	Adjusted sum betas		
	Firm A	Firm B	Firm C
-520	$\hat{\beta}_{A,j-520}$	$\hat{\beta}_{B,j-520}$	$\hat{\beta}_{C,j-520}$
…	…	…	…
-2	$\hat{\beta}_{A,j-2}$	$\hat{\beta}_{B,j-2}$	$\hat{\beta}_{C,j-2}$
-1	$\hat{\beta}_{A,j-1}$	$\hat{\beta}_{B,j-1}$	$\hat{\beta}_{C,j-1}$
0	$\boldsymbol{\hat{\beta}_{A,j}}$	$\boldsymbol{\hat{\beta}_{B,j}}$	$\boldsymbol{\hat{\beta}_{C,j}}$
+1	$\hat{\beta}_{A,j+1}$	$\hat{\beta}_{B,j+1}$	$\hat{\beta}_{C,j+1}$
+2	$\hat{\beta}_{A,j+2}$	$\hat{\beta}_{B,j+2}$	$\hat{\beta}_{C,j+2}$
…	…	…	…
+780	$\hat{\beta}_{A,j+780}$	$\hat{\beta}_{B,j+780}$	$\hat{\beta}_{C,j+780}$

→

Step 3 Averaging betas

Period No.	Avg a.s.beta
-520	$\bar{\beta}_{j-520}$
…	…
-2	$\bar{\beta}_{j-2}$
-1	$\bar{\beta}_{j-1}$
0	$\boldsymbol{\bar{\beta}_{j}}$
+1	$\bar{\beta}_{j+1}$
+2	$\bar{\beta}_{j+2}$
…	…
+780	$\bar{\beta}_{j+780}$

[10] The dates are chosen arbitrarily.

Figure 2: Equally weighted contemporaneous beta. Country subsamples

The following figures report average beta time series (the average slope of the market index returns) across seasonal equity issuers. Betas are estimated based on the monthly (21 days), semiannual (130 days) and annual (260 days) daily returns data.

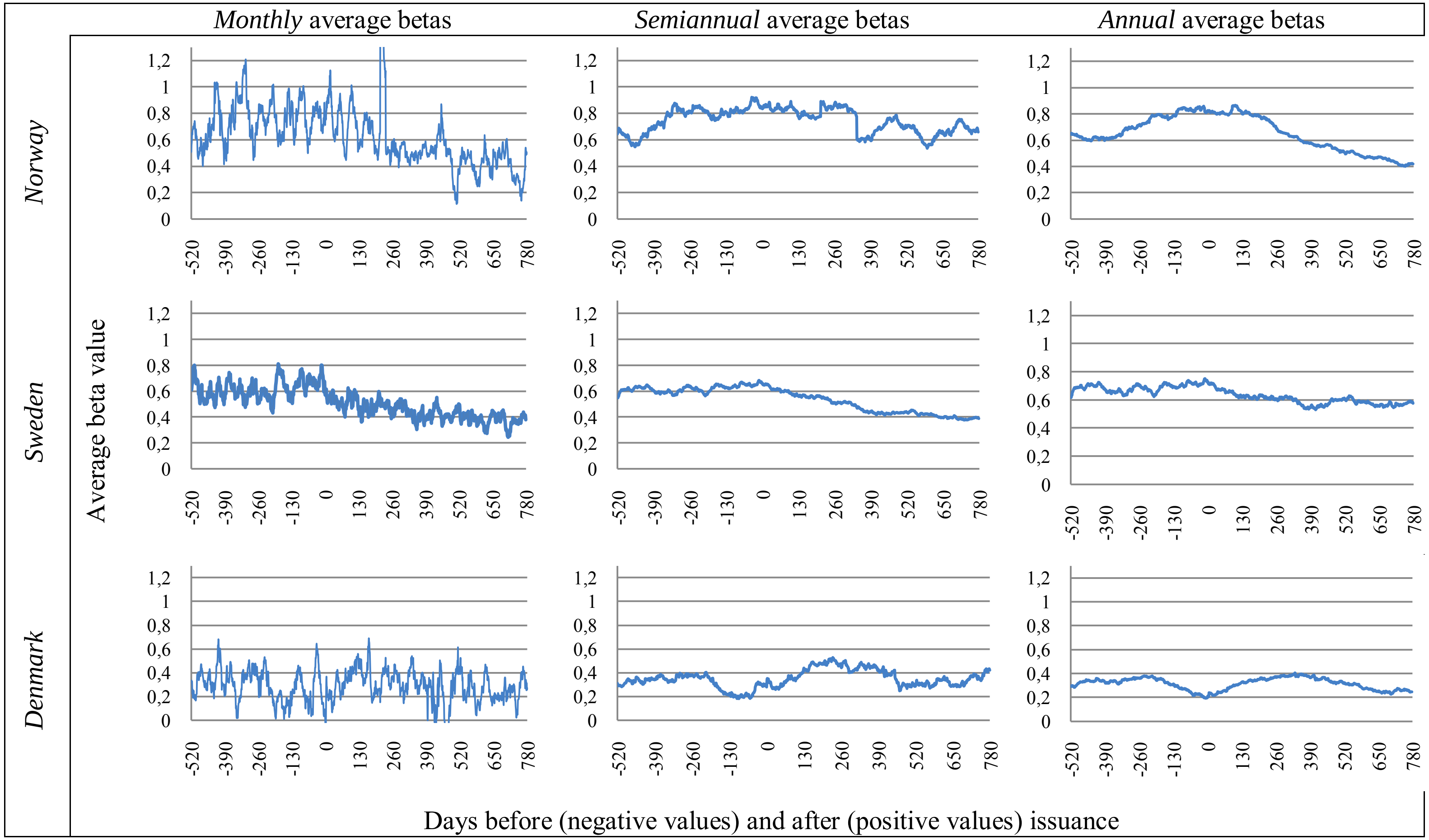


Figure 3: Value-weighted Contemporaneous (Semiannual) Beta. Country Subsamples

This figure illustrates the average value-weighted beta time series of seasonal equity issues estimated over the semiannual (130 days) time period of daily returns. The daily weight for each company in period t (period corresponding to the number of days before or after the issuance) is obtained by dividing the market value of the issuing company over the total market value of companies issuing in the same period. The daily market value for each issuer was computed as the daily number of ordinary shares publicly traded (Datastream datatype NOSH) multiplied by the corresponding daily share price (Datastream datatype PI).

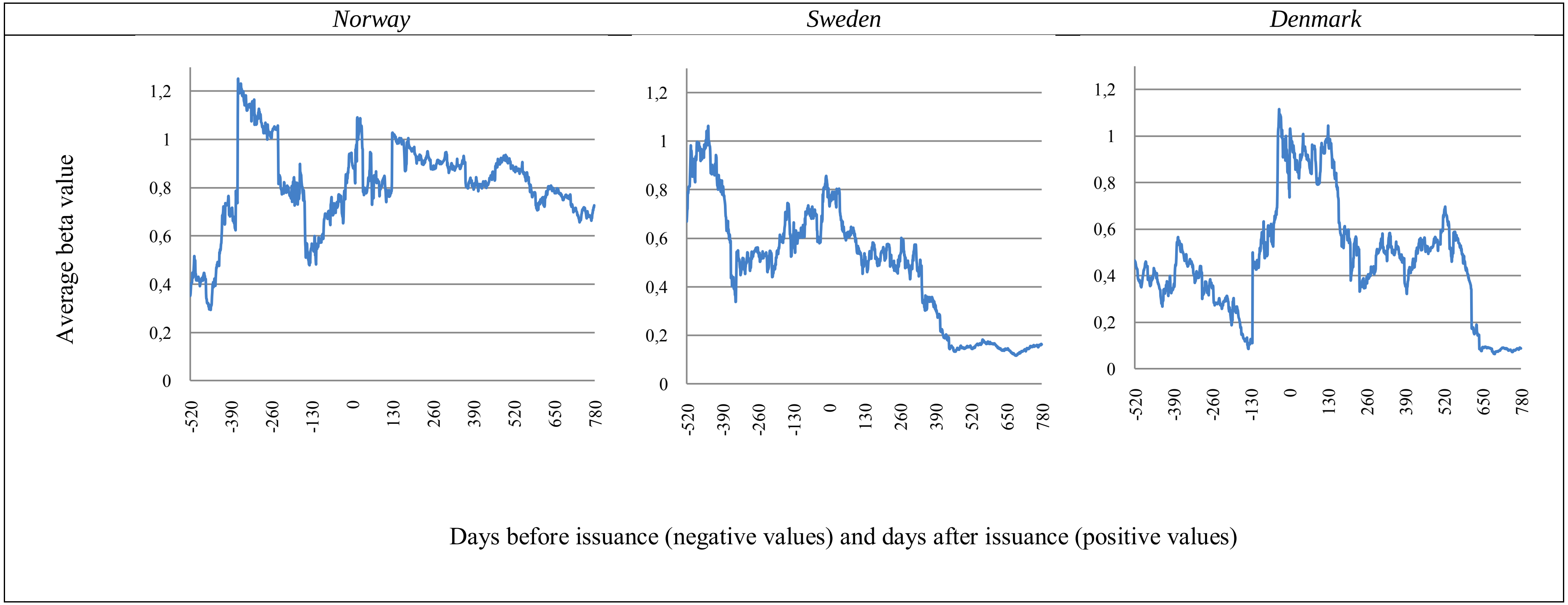


Figure 4: Robustness Check of the Semiannual Equally-Weighted Betas. Country Subsamples.

The following figures illustrate the average beta series estimated daily based on the semiannual rolling estimation window. The upper grey and lower red line represent the series calculated according to the methodology proposed by Cohen et al. (1983). The values on the horizontal axes correspond to the day before or after the date of the SEO event labeled period "zero" on the timeline.

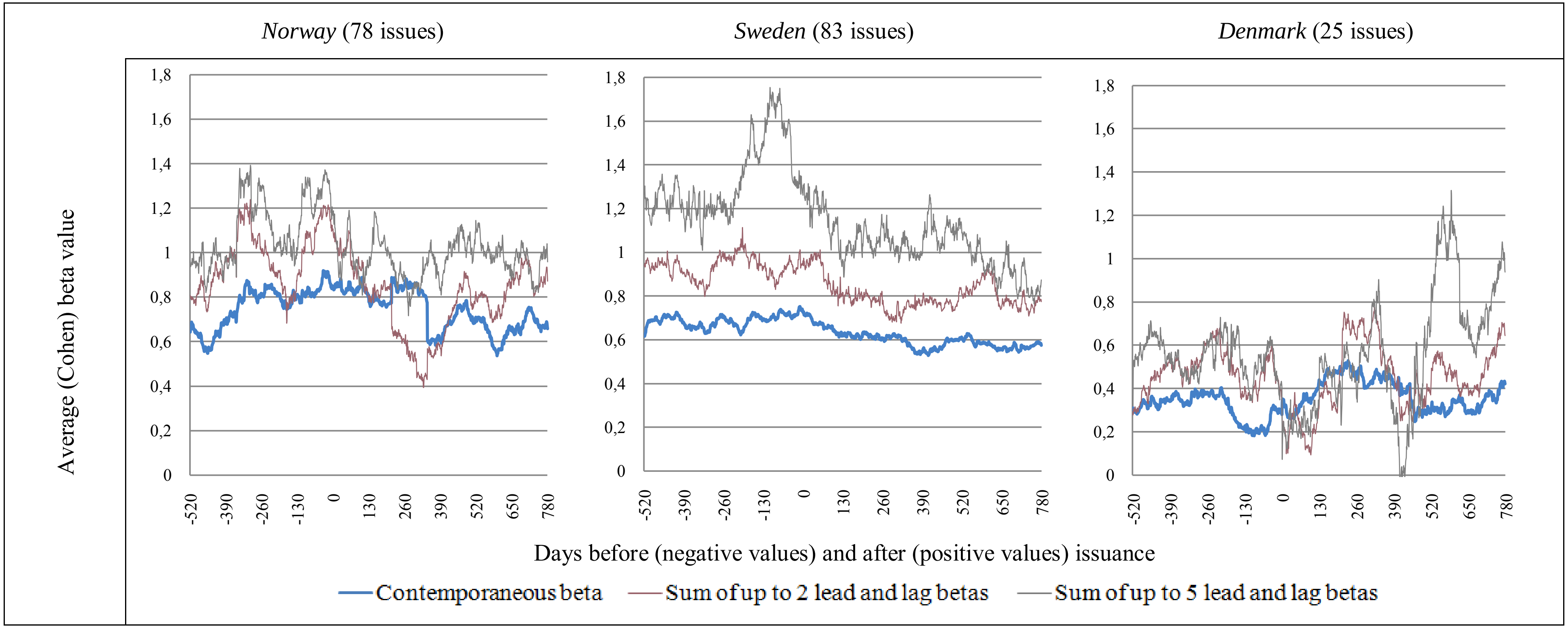


Figure 5: Blom ASA Risk Dynamics around the Seasoned Equity Issuance Event

This graph illustrates the risk dynamics of a single company – Blom ASA – around its seasoned equity issue on 27th of October 1997. The shaded area indicates the five-year time period of our research interest (increase in number of shares occurs in the time indicated by the arrow). Left-hand side vertical axis represent the beta values estimated based on the daily semiannual time period. Right-hand side vertical axis represents the number of ordinary shares (measured in thousand NOK) and represented by the red thick line on the graph.

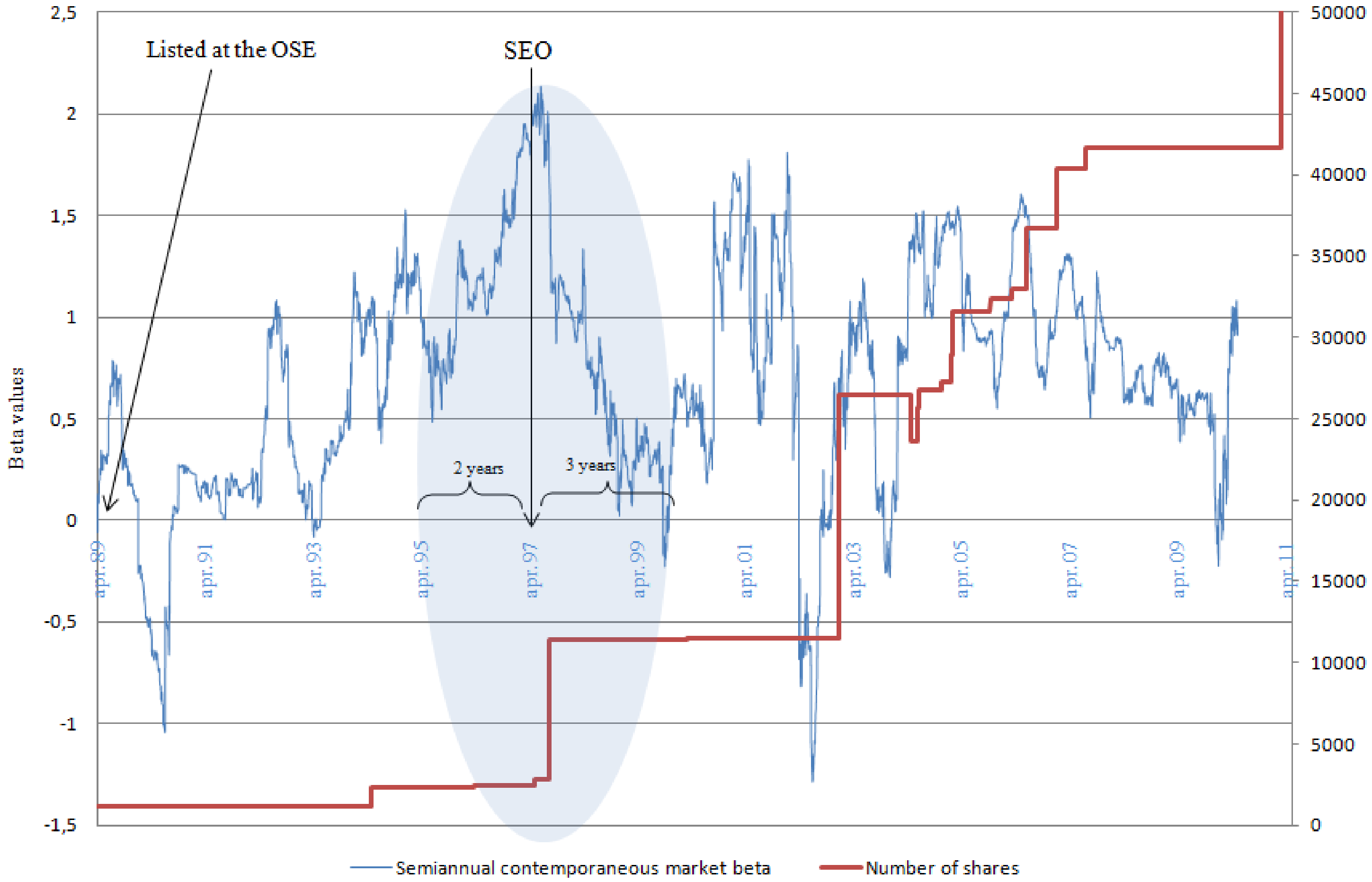


Table 2: SEO Risk Dynamics

This table presents the numerical illustration to the risk dynamics characteristics around the stock issue event. Values inside each box are the mean differences between the beta estimate in the day of issue and the corresponding estimate 1 year or 2 years before (pre-issue dynamics) or difference between the estimate 1, 2 , 3 years before the issue day and the one during the issue (post-issue dynamics).

Panel A: Pre-issue risk dynamics for country samples

	1 year					2 years				
Sample	month	sem 0	sem 2	sem 5	ann	month	sem 0	sem 2	sem 5	ann
Total	-0,06	-0,02	-0,01	-0,10	0,00	-0,02	0,05	0,07	-0,02	0,05
	(-0,53)	*(-0,42)*	*(-0,11)*	*(-0,73)*	*(0,09)*	*(-0,17)*	*(0,91)*	*(0,74)*	*(-0,12)*	*(1,27)*
Norway	-0,02	0,05	0,15	-0,11	0,13	0,25	0,17	0,34	0,25	0,13
	(-0,10)	*(0,50)*	*(0,84)*	*(-0,42)*	*(1,66)*	*(0,94)*	*(1,69)*	*(1,79)*	*(0,90)*	*(1,65)*
Sweden	0,03	-0,02	-0,02	0,01	-0,04	-0,06	-0,01	-0,13	-0,23	0,04
	(0,22)	*(-0,32)*	*(-0,10)*	*(0,03)*	*(-0,62)*	*(-0,37)*	*(-0,10)*	*(-0,98)*	*(-1,09)*	*(0,71)*
Denmark	-0,49*	-0,13	-0,20	-0,61	-0,16*	-0,48	0,16	0,36	-0,04	0,01
	(-2,16)	*(-0,84)*	*(-0,74)*	*(-1,66)*	*(-2,22)*	*(-1,64)*	*(1,07)*	*(1,39)*	*(-0,14)*	*(0,13)*

Panel B: Post-issue risk dynamics for country samples

	1 year					2 years					3 years				
Sample	month	sem 0	sem 2	sem 5	ann	month	sem 0	sem 2	sem 5	ann	month	sem 0	sem 2	sem 5	ann
Total	-0,03	-0,02	-0,18	-0,13	-0,06	0,01	-0,07	-0,12	-0,08	-0,10*	0,15	-0,09	-0,10	-0,19	-0,14*
	(-0,29)	*(-0,28)*	*(-1,57)*	*(-0,96)*	*(-1,57)*	*(0,10)*	*(-1,36)*	*(-1,21)*	*(-0,57)*	*(-2,45)*	*(1,07)*	*(-1,66)*	*(-0,89)*	*(-1,17)*	*(-2,96)*
Norway	-0,13	0,00	-0,47*	-0,23	-0,10	0,07	-0,19	-0,32	-0,21	-0,23*	0,21	-0,28*	-0,30	-0,27	-0,28*
	(-0,49)	*(-0,01)*	*(-2,03)*	*(-1,25)*	*(-1,49)*	*(0,28)*	*(-1,93)*	*(-1,73)*	*(-0,90)*	*(-3,25)*	*(0,71)*	*(-2,59)*	*(-1,34)*	*(-0,94)*	*(-3,13)*
Sweden	-0,11	-0,09	-0,08	-0,06	-0,08	-0,10	0,00	-0,07	-0,24	-0,10	-0,05	-0,04	-0,07	-0,39	-0,13
	(-1,01)	*(-1,24)*	*(-0,57)*	*(-0,28)*	*(-1,45)*	*(-0,73)*	*(-0,02)*	*(-0,54)*	*(-1,07)*	*(-1,47)*	*(-0,44)*	*(-0,61)*	*(-0,54)*	*(-1,59)*	*(-1,87)*
Denmark	-0,16	-0,10	-0,12	0,19	-0,07	-0,32	-0,25	-0,27	0,07	-0,26*	-0,34	-0,30	-0,16	0,14	-0,32
	(-0,38)	*(-0,79)*	*(-0,63)*	*(0,88)*	*(-0,82)*	*(-1,11)*	*(-1,61)*	*(-1,90)*	*(0,42)*	*(-2,07)*	*(-1,12)*	*(-1,37)*	*(-0,61)*	*(0,39)*	*(-1,94)*

Table 2 - *Continued*

Panel C: Pre-issue and post-isse risk dynamics with respect to R&D intensiveness

Sample	Pre-issue 1 year sem 0	Pre-issue 2 year sem 0	Post-issue 1 year sem 0	Post-issue 2 year sem 0	Post-issue 3 year sem 0
High R&D intensive industries	-0,02	0,11	-0,16	-0,38*	-0,43*
	(-0,15)	*(0,80)*	*(-1,49)*	*(-3,15)*	*(-3,66)*
Medium R&D intensive industries	-0,16	-0,20*	-0,06	-0,13	-0,17
	(-0,91)	*(-2,29)*	*(-0,46)*	*(-0,95)*	*(-1,25)*
Low R&D intensive industries	0,10	0,14	0,24	-0,06	-0,19
	(0,83)	*(1,22)*	*(0,67)*	*(-0,39)*	*(-1,49)*

Notes: *Significance at the 5% level. Month, sem 0, sem 2, sem 5, and ann represent the beta estimation window – one monthly estimation of the contemporaneous beta, semiannual time window for contemporaneous beta, semiannual time window for the sum of up to 2 lags and leads and contemporaneous betas, semiannual time window for the sum of up to 5 lags and leads and contemporaneous betas, and the annual window for estimation the contemporaneous beta accordingly.

Table 3: Classification of Industries Based on Research and Development – to – Sales

This table shows the result of industry classification based on the R&D/Sales ratio. The analysis is based on the accounting data of all companies traded on the Oslo Stock Exchange, and OMX Nasdaq (Stockholm and Copenhagen markets) from 2003-2011. Industry median indicates the median amount of R&D/Sales median values across the firms in a certain industry during the period. Industry average is obtained similarly using average values for R&D/Sales.

INDUSTRY	Ind.median, %	Ind.average %	Classification wrt R&D	Nb. of firms
Aerospace and Defense	4,570	5,211	High	3
Automobiles and Parts	5,550	24,438	High	5
Fixed Line Telecommunications	10,193	10,241	High	2
Gas, Water and Multiutilities	8,340	8,340	High	1
Health Care Equipment and Services	4,295	16,616	High	24
Pharmaceuticals and Biotechnology	54,615	2753,591	High	44
Real Estate Investment and Services	84,470	216,754	High	1
Software and Computer Services	12,995	25,183	High	46
Technology Hardware and Equipment	12,838	341,787	High	22
Alternative Energy	1,195	1,399	Med	3
Chemicals	2,615	184,788	Med	7
Construction and Materials	1,160	1,085	Med	15
Electricity	2,430	4,050	Med	4
Electronic and Electrical Equipment	4,015	39,619	Med	30
General Retailers	2,743	2,848	Med	2
Industrial Engineering	1,998	4,672	Med	30
Leisure Goods	2,250	3,321	Med	5
Media	1,193	13,940	Med	8
Mobile Telecommunications	1,680	1,632	Med	2
Oil and Gas Producers	4,288	4,673	Med	4
Tobacco	0,820	0,962	Med	1
Travel and Leisure	4,288	144,386	Med	6
Food Producers	0,720	4,775	Low	12
Forestry and Paper	0,583	0,582	Low	4
General Industrials	0,270	0,397	Low	2
Household Goods and Home Construction	0,810	112,863	Low	7
Industrial Metals and Mining	0,700	1,088	Low	5
Industrial Transportation	0,000	3,738	Low	6
Oil Equipment and Services	0,170	2,786	Low	18
Personal Goods	0,755	1,031	Low	3
Support Services	0,520	1,740	Low	10
Median R&D/Sales accross Norwegian, Swedish and Danish markets, %				2,250
Mean R&D/Sales accross Norwegian, Swedish and Danish markets, %				127,049
30% percentile median R&D/Sales, %				0,820
70% percentile median R&D/Sales, %				4,288
Total number of firms in classification				332

Table 4: Factor Regressions. Sample Description

This table shows our selection criteria for the three country samples of SEOs used to form the SEO portfolios in factor regressions. These samples were further filtered to obtain the samples for the risk dynamics analysis (described in Table 9) The lists of new issues available on the websites of Oslo Stock Exchange and Nasdaq OMX have different information layouts and we had to filter the lists manually for eligible issues, in each country and each year. Quite often the information was insufficient to correctly qualify a certain issue as a seasoned equity issue in the form of either public offering or private placements/right issues or equivalents. Moreover, since several issuers have changed name after issuance or were reported with slightly different names at different points in time, we have manually checked each SEO event for the right issuing firm which we then matched with a corresponding major security in Datastream. Issuers without a corresponding Datastream major security were excluded from the analysis. We scanned separate online lists of company changes for any corporate action likely to have induced a change of company name (e.g. delisting, merger, take-over etc.). Unlike many existing studies, we did not exclude non-cash issues (i.e. capital contributions) since such exclusions would have fundamentally diminished our samples to levels unfit for large-scale empirical studies.

	Denmark **(CSE Nasdaq OMX)**	**Norway** **(OSE)**	**Sweden** **(SSE Nasdaq OMX)**
Seasoned equity issuers*	76	209	136
Equity issues (SEO events)*	190	984	254
Sample period	Jan 2000-Dec 2008	Jan 1997 – Dec 2008	Feb 1997 – Dec 2008
Number of industries**	25	29	29
Types of offerings	Private (Rettet emission), Public (Offentlig emission), Rights issues (Fortegningsemission), Non-cash issues (apport indskud), listings of new classes of shares	Public (15.2%) and Private (84.8%)	Cash issues of shares
Data source	Nasdaq OMX website (OMX)	Oslo Stock Exchange website (OsloBørs)	Nasdaq OMX website (OMX)
Average SEO size	28.524 million DKK	185.91 mil NOK	201.98 mil SEK
Median SEO size	6.813 million DKK	28.98 mil NOK	94.70 mil SEK
Exclusions	Employee stock options, warrants, mergers, conversions, amalgamations of classes of shares, exercises of options, writing down of capital	Employee stock options, Private/ Public prior to issue, IPOs	Bonus issues, amalgamations of shares, buy-backs, redemptions, splits, changes in nominal values, write-down of capital, private non-cash issues***
	Financials, Life and Non-life Insurance, Banks		

** Final sample (after exclusions)*
*** Datastream sectors*
**** Private non-cash issues are not reported in the online database.*

Table 5: Factor regressions. Sample statistics.

The information compiled in this table is based on the information provided in the online databases from Oslo Stock Exchange and OMX Nasdaq websites. Since several issuers have changed name after issuance or were reported with slightly different names at different points in time, we have manually checked each SEO event for the right issuing firm which we then matched with a corresponding major security in Datastream. Issuers without a corresponding Datastream major security were excluded from the analysis. We scanned separate online lists of company changes for any corporate action likely to have induced a change of company name (e.g. delisting, merger, take-over etc.). We did not aggregate issues reported for the same company on the same date (there are counted as separate SEOs).

	Panel A: Number of (unique) issuers by year				*Panel B: Number of SEOs by year*			
ISSUE YEAR	**Denmark**	**Norway**	**Sweden**	**TOTAL**	**Denmark**	**Norway**	**Sweden**	**TOTAL**
1997		23	15			32	15	**47**
1998		18	13			23	14	**37**
1999		22	20			30	21	**51**
2000	18	32	16		23	50	16	**89**
2001	11	46	31		17	79	32	**128**
2002	16	38	27		17	66	27	**110**
2003	11	37	29		16	67	31	**114**
2004	12	43	22		16	70	23	**109**
2005	9	71	27		18	222	28	**268**
2006	19	69	17		30	129	18	**177**
2007	17	73	13		28	148	14	**190**
2008	21	44	13		25	68	15	**108**
	76	**209**	**136**	**421**	**190**	**984**	**254**	**1428**

Table 5-*continued*

	Panel C: ***Number of (unique) issuers by industry***			***Panel D: Number of SEOs by industry***			
	Denmark	**Norway**	**Sweden**	**Denmark**	**Norway**	**Sweden**	**Total**
Aerospace and Defense	1	1	1	4	3	4	**11**
Alternative Energy	1	0	1	4		1	**5**
Automobiles and Parts	1	2	4	1	10	6	**17**
Beverages	1	0	0	2			**2**
Chemicals	1	0	1	1		1	**2**
Construction and Materials	3	2	2	3	2	3	**8**
Electricity	3	0	1	12		1	**13**
Electronic and Electrical Equipment	3	8	10	5	44	20	**69**
Fixed Line Telecommunications	0	1	2		5	2	**7**
Food Producers	1	12	2	1	58	2	**61**
Forestry and Paper	0	1	2		4	4	**8**
Gas, Water and Multiutilities	0	1	0		1		**1**
General Industrials	2	1	0	3	9		**12**
General Retailers	1	2	3	1	3	5	**9**
Health Care Equipment and Services	3	2	9	4	3	18	**25**
Household Goods and Home Construction	3	3	0	3	6		**9**
Industrial Engineering	2	11	6	3	57	7	**67**
Industrial Metals and Mining	0	1	2		3	2	**5**
Industrial Transportation	7	24	2	11	100	2	**113**
Leisure Goods	0	1	2		5	2	**7**
Media	2	2	5	2	6	7	**15**
Mining	1	1	4	1	5	16	**22**
Mobile Telecommunications	0	2	1		4	2	**6**
Oil and Gas Producers	0	10	1		44	1	**45**
Oil Equipment and Services	0	45	1		276	1	**277**
Personal Goods	3	1	3	6	1	5	**12**
Pharmaceuticals and Biotechnology	9	7	11	33	27	32	**92**
Real Estate Investment and Services	3	7	9	6	13	13	**32**
Software and Computer Services	7	39	24	40	221	44	**305**
Support Services	5	3	8	16	9	16	**41**
Technology Hardware and Equipment	3	10	8	5	41	20	**66**
Travel and Leisure	9	6	5	18	15	5	**38**
Unclassified	1	3	6	5	9	12	**26**
Total	**76**	**209**	**136**	**190**	**984**	**254**	**1428**

Table 6: The Frequency Distribution of SEOs across Size and Book-to-Market quintiles

This table reports the frequency distribution (in percent) across size and book-to-market quintiles for the SEO country samples. Each box shows the ratio of SEOs conducted by firms falling in a given size and book-to-market quintile divided by the total number of SEO observations. We define size as the market capitalization of the issuing firm at the end of December in the year preceding the year of the SEO event and we use the datatype MV as a proxy for size. We calculate book-to-market ratios at the end of December in the year preceding the year of the SEO event as common equity (datatype WC03501) divided by the market value of equity (datatype MV). We computed the annual breakpoints at every year end for the size and book-to-market quintiles for each market using all *major* Danish, Norwegian and Swedish securities which were listed at some point between 1996 and 2008 on Copenhagen Stock Exchange, Oslo Stock Exchange or Stockholm Stock Exchange, respectively. By working only with major securities we ensured that we use one single share class per firm to avoid double counting. We did not confine our size and book-to-market breakpoint analysis to only active major active securities at the date of data extraction (April-August 2011), however we did exclude dead securities after the year of their delisting.

DENMARK

	Small	2	3	4	Big	Total
Low	2,0%	8,5%	17,6%	7,8%	15,7%	**51,6%**
2	2,0%	3,9%	6,5%	3,3%	3,9%	**19,6%**
3	0,7%	2,0%	7,2%	3,9%	0,0%	**13,7%**
4	2,0%	3,3%	0,7%	0,7%	2,0%	**8,5%**
High	2,0%	1,3%	1,3%	0,7%	1,3%	**6,5%**
Total	**8,5%**	**19,0%**	**33,3%**	**16,3%**	**22,9%**	**100,0%**

NORWAY

	Small	2	3	4	Big	Total
Low	5,8%	3,2%	4,2%	4,4%	13,6%	**31,2%**
2	4,9%	7,6%	7,7%	2,5%	4,0%	**26,7%**
3	3,3%	4,2%	2,8%	2,2%	2,1%	**14,6%**
4	3,2%	3,4%	2,9%	4,9%	2,0%	**16,4%**
High	2,2%	2,7%	2,2%	3,2%	0,7%	**11,0%**
Total	**19,4%**	**21,1%**	**19,9%**	**17,2%**	**22,5%**	**100,0%**

SWEDEN

	Small	2	3	4	Big	Total
Low	1,5%	4,5%	7,0%	8,0%	4,5%	**25,5%**
2	1,5%	6,0%	8,0%	6,5%	1,0%	**23,0%**
3	0,5%	5,5%	5,5%	3,5%	3,5%	**18,5%**
4	0,5%	7,0%	5,0%	4,5%	1,5%	**18,5%**
High	2,5%	4,5%	3,5%	2,5%	1,5%	**14,5%**
Total	**6,5%**	**27,5%**	**29,0%**	**25,0%**	**12,0%**	**100,0%**

Table 7: Size and Book-to-Market Breakpoints

This table reports the break-points which we estimated for size (Panel A) and book-to-market (Panel B), independently for the stocks listed on Oslo Stock Exchange, Stockholm Stock Exchange and Copenhagen Stock exchange. Based on these breakpoints we have set up the frequency distribution by size and book-to-market of our SEO country samples. This distribution is reported in Table 6. Using the Datastream defined datatypes MV and WC03501 as proxies for market capitalization (size) and common equity, we computed the *book-to-market* ratio for listed firms as MV/WC03501 on the 31st of December every year. In estimating both size and book-to-market breakpoints we included only Datastream-defined major securities (thus allowing only one share class per company) and we excluded financials (i.e. financial services, life and non-life insurance providers, banks, real investment trusts) as in Fama and French (1992). In estimating the book-to-market breakpoints, we also excluded the firms with negative book equity values.

Panel A: SIZE

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
DENMARK	**20%**	42,31	52,08	75,44	99,03	79,81	78,87	90,00	74,00	68,48	69,56	74,85	108,35	132,79	130,12	80,15	69,14	67,97
	40%	162,77	160,63	187,96	238,49	178,44	207,95	217,33	187,42	183,70	189,34	240,32	351,00	399,74	396,13	200,90	186,37	188,28
	60%	414,57	430,15	580,92	574,82	437,37	469,85	609,90	531,82	548,64	593,16	739,87	986,55	1026,67	977,36	600,56	636,39	657,97
	80%	1158,31	1168,70	1537,95	1707,96	1514,56	1781,85	1888,96	1542,04	1520,01	1811,39	2247,20	3429,00	3710,93	3531,75	2088,45	2297,81	2620,37
	# firms	*149*	*158*	*165*	*169*	*183*	*189*	*194*	*197*	*195*	*195*	*195*	*196*	*206*	*213*	*218*	*222*	*224*
NORWAY	**20%**	109,09	143,24	229,86	218,67	127,37	168,63	143,37	105,07	58,66	150,65	235,43	308,93	370,51	366,63	123,94	185,89	221,37
	40%	305,90	376,87	532,40	447,79	269,52	412,50	410,99	327,08	186,51	359,50	454,79	678,68	975,11	958,50	302,10	521,56	572,00
	60%	586,17	654,83	912,62	1095,41	570,22	963,35	988,33	797,75	479,01	842,29	1026,51	1512,56	1948,70	1955,50	810,42	1215,08	1412,79
	80%	1480,86	1558,57	1839,54	2500,26	1508,83	2236,82	2316,36	2069,92	1227,12	2083,17	3144,48	5010,19	6339,79	5427,42	2398,45	4349,27	4768,24
	# firms	*97*	*112*	*133*	*170*	*184*	*171*	*169*	*168*	*162*	*148*	*159*	*187*	*194*	*233*	*229*	*208*	*210*
SWEDEN	**20%**	147,91	167,46	210,92	154,23	80,71	89,69	49,54	39,60	31,37	54,69	51,64	75,13	73,07	51,59	21,35	28,81	28,99
	40%	301,57	319,60	455,52	390,48	249,88	313,84	196,51	152,28	111,60	193,28	204,01	260,59	263,49	161,80	72,50	99,01	107,48
	60%	780,49	892,54	1304,78	877,82	631,58	763,24	632,42	492,79	306,47	591,18	607,63	849,80	870,87	598,99	248,92	483,54	419,76
	80%	3942,57	3770,91	5662,88	3303,90	2246,81	2568,93	2593,27	1970,94	1567,84	2636,29	2607,79	3522,77	3645,28	2595,99	1039,67	1967,00	2517,85
	#firms	*136*	*147*	*171*	*230*	*273*	*320*	*342*	*330*	*321*	*303*	*322*	*356*	*393*	*442*	*451*	*442*	*454*

Table 7 – *continued*

Panel B: BOOK-TO-MARKET

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
DENMARK	**20%**	0,55	0,50	0,35	0,36	0,39	0,41	0,35	0,47	0,69	0,46	0,37	0,27	0,20	0,25	0,43	0,39	0,34
	40%	0,70	0,72	0,62	0,59	0,78	0,74	0,64	0,77	0,98	0,74	0,58	0,44	0,32	0,43	0,92	0,76	0,73
	60%	0,87	0,94	0,83	0,78	1,02	1,10	1,10	1,21	1,37	1,23	0,87	0,65	0,51	0,58	1,29	1,11	1,02
	80%	1,22	1,36	1,17	1,22	1,61	1,71	1,50	1,82	1,98	1,57	1,19	0,89	0,75	0,79	2,36	1,85	1,55
	< 0	1	1	2	0	1	1	1	3	3	3	1	0	3	1	1	3	5
	# firms	*105*	*108*	*109*	*137*	*143*	*149*	*142*	*139*	*132*	*127*	*119*	*111*	*109*	*114*	*119*	*120*	*117*
NORWAY	**20%**	0,49	0,36	0,24	0,23	0,43	0,27	0,32	0,39	0,48	0,30	0,25	0,21	0,21	0,24	0,49	0,32	0,34
	40%	0,65	0,60	0,39	0,40	0,73	0,50	0,55	0,62	0,78	0,43	0,36	0,34	0,30	0,34	0,88	0,61	0,59
	60%	0,84	0,82	0,61	0,58	1,00	0,71	0,77	0,86	1,12	0,62	0,47	0,49	0,44	0,52	1,48	0,95	0,84
	80%	1,26	1,21	0,83	0,80	1,52	1,13	1,11	1,37	1,91	0,93	0,68	0,70	0,65	0,77	2,55	1,42	1,28
	< 0	0	1	1	1	3	3	4	3	6	4	1	0	1	2	2	5	4
	# firms	*78*	*75*	*107*	*141*	*142*	*124*	*133*	*136*	*122*	*122*	*134*	*152*	*164*	*185*	*176*	*161*	*169*
SWEDEN	**20%**	0,43	0,42	0,32	0,24	0,25	0,14	0,25	0,31	0,42	0,28	0,25	0,20	0,17	0,22	0,40	0,25	0,24
	40%	0,68	0,76	0,51	0,39	0,49	0,29	0,46	0,51	0,65	0,46	0,40	0,30	0,27	0,37	0,69	0,45	0,42
	60%	0,94	1,00	0,72	0,60	0,73	0,54	0,68	0,77	0,94	0,63	0,52	0,44	0,40	0,57	1,12	0,71	0,68
	80%	1,23	1,30	1,10	0,96	1,15	0,85	0,97	1,09	1,49	0,93	0,79	0,67	0,65	0,94	1,82	1,11	1,05
	< 0	0	0	0	0	0	1	2	3	4	4	1	1	3	1	13	9	8
	#firms	*95*	*107*	*111*	*133*	*186*	*199*	*233*	*269*	*283*	*269*	*265*	*283*	*315*	*351*	*401*	*397*	*396*

Table 8: Average and Median Issue Size by Country and by Year

This table reports the average and the median issue size across issuers in each country, and every year from 1997 to 2008, based on the information on the proceeds from each issuance as reported on the websites of Oslo Stock Exchange and OMX Nasdaq. We have used daily exchange rates extracted from Datastream to convert the amounts in local currency into USD on the date of the issuance. A common, internationally used currency can facilitate the comparisons of SEO characteristics across the three Nordic markets.

Panel A: *Average issue size by year*

ISSUE YEAR	Denmark		Norway		Sweden	
(mill. units of currency)	DKK	USD	NOK	USD	SEK	USD
1997			316,70	43,95	342,45	44,64
1998			196,48	26,04	146,72	18,54
1999			350,49	45,05	652,47	79,27
2000	21,70	2,63	707,06	79,81	218,83	23,75
2001	10,23	1,19	181,50	20,03	166,43	15,97
2002	14,05	1,76	76,69	9,40	1233,88	128,46
2003	242,61	38,50	76,21	10,91	262,03	34,00
2004	34,69	5,73	93,14	14,04	144,20	19,46
2005	7,26	1,25	50,64	7,85	238,53	31,27
2006	31,24	5,28	317,06	48,83	371,77	49,48
2007	12,65	2,34	192,30	32,27	1011,47	149,21
2008	83,10	17,39	159,94	30,51	476,28	67,91

Panel B: *Median issue size by year*

ISSUE YEAR	Denmark		Norway		Sweden	
(mill. units of currency)	DKK	USD	NOK	USD	SEK	USD
1997			121,40	17,42	210,00	27,15
1998			145,21	18,16	86,75	10,99
1999			147,83	19,07	119,00	14,41
2000	11,19	1,38	197,76	22,77	108,55	11,28
2001	6,88	0,83	26,69	3,06	72,15	6,83
2002	9,59	1,29	27,02	3,19	70,60	7,47
2003	6,00	0,95	16,50	2,36	47,00	6,20
2004	7,03	1,13	26,00	3,81	79,20	10,55
2005	2,51	0,40	1,38	0,21	91,20	12,89
2006	5,40	0,88	30,09	4,69	100,50	14,07
2007	6,03	1,11	40,25	6,56	227,75	32,72
2008	6,00	1,27	31,44	6,19	157,70	26,11

Table 9: Average and Median Issue Size by Country and Industry

This table reports the average and the median issue size across issuers in each country, and by industry sector based on the information on the proceeds from each issuance as reported on the websites of Oslo Stock Exchange and OMX Nasdaq. We have used daily exchange rates extracted from Datastream to convert the amounts in local currency into USD on the date of the issuance. A common, internationally used currency can facilitate the comparisons of SEO characteristics across the three Nordic markets. The issuers were allocated to industries based on the Datastream sector classification of the major security matched with the name of the issuer reported on the relevant website.

Panel A: Average issue size by industry

INDUSTRY	Denmark		Norway		Sweden	
(mill. units of currency)	DKK	USD	NOK	USD	SEK	USD
Aerospace and Defense	10,54	1,74	77,28	12,39	33,40	4,37
Alternative Energy	20,05	3,26			393,30	59,95
Automobiles and Parts	4,19	0,75	98,19	16,30	106,80	14,03
Beverages	914,94	186,01				
Chemicals	1,36	0,26			263,00	25,43
Construction and Materials	168,91	28,67	197,76	23,28	1010,20	117,51
Electricity	29,63	5,63			1497,70	196,94
Electronic and Electrical Equipment	38,17	4,51	33,14	4,65	497,82	64,49
Fixed Line Telecommunications			476,37	56,25	98,50	10,09
Food Producers	8,11	1,73	356,00	53,05	81,05	10,36
Forestry and Paper			2216,63	287,68	128,90	14,42
Gas, Water and Multiutilities			50,00	5,46		
General Industrials	43,72	7,21	35,47	4,64		
General Retailers	1,43	0,17	78,88	12,08	225,40	30,71
Health Care Equipment and Services	27,32	3,29	31,38	4,32	410,44	54,97
Household Goods and Home Construction	5,54	0,78	188,75	30,56		
Industrial Engineering	11,51	1,73	101,81	13,53	948,07	115,45
Industrial Metals and Mining			102,14	14,67	5016,00	746,97
Industrial Transportation	259,44	41,25	127,05	18,80	50,00	6,89
Leisure Goods			69,12	11,05	192,50	25,58
Media	9,22	1,30	7,85	1,32	118,81	16,17
Mining	25,71	5,38	60,58	7,93	224,63	26,69
Mobile Telecommunications			3924,10	431,14	78,90	8,83
Oil and Gas Producers			100,88	15,48	319,00	29,93
Oil Equipment and Services			263,03	39,58	78,00	7,88
Personal Goods	12,17	1,44	64,56	8,44	1056,34	129,77
Pharmaceuticals and Biotechnology	12,16	2,12	36,93	5,90	321,55	43,00
Real Estate Investment and Services	38,20	6,63	340,48	58,83	322,16	38,05
Software and Computer Services	3,41	0,56	79,33	10,52	150,66	18,81
Support Services	19,78	2,75	37,03	4,65	110,49	13,38
Technology Hardware and Equipment	27,94	3,92	198,38	26,65	1604,16	168,70
Travel and Leisure	16,14	2,73	142,49	23,32	90,86	11,03
Unclassified			40,26	5,12	133,32	15,92

Panel B: Median issue size by industry

INDUSTRY	**Denmark**		**Norway**		**Sweden**	
(mill. units of currency)	DKK	USD	NOK	USD	SEK	USD
Aerospace and Defense	5,450	0,889	55,838	9,316	32,500	4,345
Alternative Energy	17,730	2,919			393,300	59,954
Automobiles and Parts	4,185	0,747	60,911	7,677	66,500	8,685
Beverages	914,941	186,006				
Chemicals	1,358	0,262			263,000	25,429
Construction and Materials	26,195	4,613	197,762	23,283	642,000	83,431
Electricity	13,898	2,506			1497,700	196,936
Electronic and Electrical Equipment	18,000	2,159	14,025	2,120	73,000	10,139
Fixed Line Telecommunications			400,350	50,750	98,500	10,089
Food Producers	8,109	1,731	99,999	15,721	81,050	10,355
Forestry and Paper			2359,998	256,674	94,150	9,374
Gas, Water and Multiutilities			49,995	5,461		
General Industrials	34,000	3,886	17,944	2,027		
General Retailers	1,430	0,167	73,168	10,913	195,000	23,016
Health Care Equipment and Services	12,211	1,475	28,500	4,116	96,000	13,893
Household Goods and Home Construction	2,719	0,456	87,500	12,102		
Industrial Engineering	11,067	1,840	29,999	3,835	147,000	18,137
Industrial Metals and Mining			106,334	11,638	5016,000	746,966
Industrial Transportation	6,532	1,275	39,722	5,975	50,000	6,890
Leisure Goods			22,965	3,456	168,000	23,356
Media	7,048	1,120	7,308	1,178	135,000	18,216
Mining	25,712	5,378	62,160	7,894	47,650	6,305
Mobile Telecommunications			32,969	3,596	78,900	8,833
Oil and Gas Producers			43,273	5,713	319,000	29,932
Oil Equipment and Services			34,559	5,226	78,000	7,883
Personal Goods	14,471	1,714	64,562	8,443	168,700	19,901
Pharmaceuticals and Biotechnology	6,211	1,133	28,460	4,708	122,500	14,113
Real Estate Investment and Services	13,775	2,557	90,659	13,977	299,500	34,240
Software and Computer Services	1,109	0,187	13,500	2,054	83,800	11,361
Support Services	6,750	1,200	10,413	1,176	65,800	6,961
Technology Hardware and Equipment	25,131	3,893	49,345	7,043	100,100	11,250
Travel and Leisure	12,000	1,467	119,600	18,645	53,400	6,601
Unclassified	0,000	0,000	0,337	0,037	43,600	4,371

Table 10: Average and Median Issue Size as a ratio of Market Capitalization and of Total Assets by Year

This table reports the average and the median ratios of issue size to market capitalization and to total assets across issuers in each country, and every year from 1997 to 2008. The issue size was based on the information on the proceeds from each issuance reported on the websites of Oslo Stock Exchange and OMX Nasdaq. We used the Datastream datatypes MV (market value) and WC02999 (total assets) in order to gauge the level of market capitalization and respectively, of total assets for each issuer at the end of the year preceding the date of the SEO.

	Panel A: Average % issue size of Market Capitalization			*Panel B: Average % issue size of Total Assets*		
	Denmark	**Norway**	**Sweden**	**Denmark**	**Norway**	**Sweden**
ISSUE YEAR						
1997		73,22%	43,21%		62,63%	24,18%
1998		23,15%	40,87%		28,11%	27,06%
1999		14,90%	41,09%		39,88%	56,10%
2000	21,81%	55,45%	59,58%	3,99%	36,12%	136,63%
2001	2,19%	16,19%	20,92%	1,62%	17,27%	35,72%
2002	6,02%	11,39%	20,70%	12,54%	9,39%	39,38%
2003	32,19%	14,85%	24,16%	9,06%	10,87%	48,37%
2004	98,94%	96,12%	59,49%	1,40%	20,22%	73,36%
2005	49,22%	21,80%	48,04%	7,63%	17,67%	56,28%
2006	19,36%	41,62%	72,58%	11,98%	47,84%	56,49%
2007	13,10%	19,15%	56,52%	28,11%	31,12%	49,65%
2008	53,34%	10,71%	13,00%	18,10%	12,41%	22,57%
	31,28%	**29,43%**	**39,66%**	**12,17%**	**25,36%**	**51,51%**

	Panel C: Median % issue size of Market Capitalization			*Panel D: Median % issue size of Total Assets*		
ISSUE YEAR	**Denmark**	**Norway**	**Sweden**	**Denmark**	**Norway**	**Sweden**
1997		42,34%	50,27%		25,52%	19,49%
1998		14,03%	32,07%		12,20%	19,54%
1999		12,88%	18,26%		13,13%	25,97%
2000	1,36%	37,52%	27,73%	0,93%	10,86%	47,12%
2001	0,57%	8,55%	12,50%	0,64%	4,71%	19,33%
2002	1,10%	5,06%	15,94%	2,97%	3,49%	26,86%
2003	2,63%	9,41%	15,13%	1,12%	5,83%	36,86%
2004	1,33%	20,33%	61,32%	0,42%	8,50%	50,13%
2005	0,77%	0,13%	35,59%	0,57%	0,33%	45,14%
2006	1,36%	15,45%	53,01%	0,89%	10,63%	54,04%
2007	1,49%	7,01%	26,79%	2,25%	9,41%	31,30%
2008	1,34%	4,48%	9,13%	0,98%	4,44%	17,16%
	1,35%	**7,40%**	**25,34%**	**1,03%**	**5,56%**	**29,93%**

Table 11: Average and Median Issue Size as a Ratio of Market Capitalization and of Total Assets by Industry

The following table reports the average (Panel A) and the median (Panel B) ratios of issue size to market capitalization and to total assets across issuers in each country, and in each industry from 1997 to 2008. The issue size was based on the information on the proceeds from each issuance reported on the websites of Oslo Stock Exchange and OMX Nasdaq. We used the Datastream datatypes MV (market value) and WC02999 (total assets) in order to gauge the level of market capitalization and respectively, of total assets for each issuer at the end of the year preceding the date of the SEO. The issuers were allocated to industries based on the Datastream sector classification of the major security matched with the name of the issuer reported on the relevant website.

Panel A:	*Average % issue size of Market Capitalization*			*Average % issue size of Total Assets*		
INDUSTRY	**Denmark**	**Norway**	**Sweden**	**Denmark**	**Norway**	**Sweden**
Aerospace and Defense	3,42%	61,69%	17,17%	1,30%	31,22%	90,92%
Alternative Energy	0,26%		32,01%	0,18%		65,28%
Automobiles and Parts	0,94%	9,79%	17,89%	0,54%	7,00%	29,00%
Beverages	4,90%			1,59%		
Chemicals			12,41%	1,94%		15,82%
Construction and Materials	8,10%	32,58%	17,41%	2,98%	8,00%	17,34%
Electricity	52,08%		23,69%	5,06%		8,63%
Electronic and Electrical Equip.	12,78%	23,35%	27,53%	2,37%	29,56%	44,45%
Fixed Line Telecommunications		20,03%	1,35%		23,81%	1,88%
Food Producers	1,75%	36,44%		1,03%	12,65%	83,89%
Forestry and Paper		66,70%	54,74%		5,14%	13,22%
Gas, Water and Multiutilities		23,77%			90,18%	
General Industrials	6,63%	45,84%		2,78%	51,34%	
General Retailers	2,13%	13,25%	69,80%	0,72%	11,92%	27,62%
Health Care Equip. and Serv.	2,83%	13,14%	45,04%	1,31%	53,01%	69,18%
Household Goods and Home Construction	6,56%	51,39%		6,35%	15,20%	
Industrial Engineering	5,91%	73,40%	35,48%	4,82%	28,00%	22,01%
Industrial Metals and Mining		82,81%	54,46%		9,36%	29,72%
Industrial Transportation	1,24%	22,21%	231,36%	0,83%	10,33%	8,68%
Leisure Goods		10,58%	82,54%		173,26%	18,37%
Media	11,05%	12,36%	31,80%	1,92%	9,10%	59,74%
Mining		43,63%	42,41%	28,67%	25,26%	29,84%
Mobile Telecommunications		0,00%	9,01%		11,41%	30,87%
Oil and Gas Producers		54,30%			38,88%	
Oil Equipment and Services		26,10%			27,10%	
Personal Goods	39,69%	29,23%	44,87%	10,08%	12,20%	13,18%
Pharmaceuticals and Biotechnology	72,80%	16,04%	41,28%	24,00%	57,11%	76,92%
Real Estate Invest. and Services	93,66%	36,63%	79,42%	48,75%	6,67%	41,62%
Software and Computer Services	1,20%	21,10%	27,33%	1,95%	21,77%	32,21%
Support Services	5,29%	14,86%	41,24%	5,11%	7,59%	28,10%
Technology Hardware and Equipment	34,41%	19,87%	30,73%	18,83%	39,90%	99,41%

Travel and Leisure	67,48%	24,10%	16,54%	38,81%	16,54%	34,26%
Unclassified			42,39%		7,44%	102,90%
	31,28%	**29,43%**	**39,66%**	**12,17%**	**25,36%**	**51,51%**

Panel B:	*Median % issue size of Market Capitalization*			*Median % issue size of Total Assets*		
INDUSTRY	**Denmark**	**Norway**	**Sweden**	**Denmark**	**Norway**	**Sweden**
Aerospace and Defense	1,88%	61,69%	11,31%	0,73%	22,66%	73,05%
Alternative Energy	0,21%		32,01%	0,15%		65,28%
Automobiles and Parts	0,94%	11,41%	21,35%	0,54%	9,04%	18,86%
Beverages	4,90%			1,59%		
Chemicals			12,41%	1,94%		15,82%
Construction and Materials	8,10%	32,58%	17,41%	2,59%	8,00%	15,86%
Electricity	4,78%		23,69%	3,15%		8,63%
Electronic and Electrical Equip.	4,53%	5,92%	24,89%	2,66%	8,62%	31,79%
Fixed Line Telecommunications		20,03%	1,35%		15,44%	1,88%
Food Producers	1,75%	6,71%		1,03%	4,21%	83,89%
Forestry and Paper		78,78%	47,24%		5,64%	8,01%
Gas, Water and Multiutilities		23,77%			90,18%	
General Industrials	5,49%	7,19%		1,36%	3,99%	
General Retailers	2,13%	13,37%	39,94%	0,72%	12,17%	26,14%
Health Care Equip. and Services	0,70%	13,14%	31,78%	0,69%	64,69%	50,91%
Household Goods and Home Construction	12,22%	51,39%		9,06%	10,90%	
Industrial Engineering	7,32%	16,47%	32,90%	1,82%	12,87%	11,43%
Industrial Metals and Mining		55,35%	54,46%		7,05%	29,72%
Industrial Transportation	1,78%	10,57%	231,36%	0,44%	3,21%	8,68%
Leisure Goods		1,54%	82,54%		67,38%	18,37%
Media	3,92%	12,36%	31,34%	1,92%	7,80%	22,67%
Mining		43,29%	21,32%	28,67%	25,69%	21,11%
Mobile Telecommunications		0,00%	9,01%		6,48%	30,87%
Oil and Gas Producers		13,53%			5,67%	
Oil Equipment and Services		0,49%			1,87%	
Personal Goods	14,91%	29,23%	23,52%	10,08%	12,20%	14,01%
Pharmaceuticals and Biotech.	0,44%	15,08%	30,06%	1,09%	33,07%	54,01%
Real Estate Invest. and Services	80,13%	29,64%	22,97%	1,62%	3,33%	14,65%
Software and Computer Services	0,26%	6,43%	17,89%	0,45%	9,12%	21,09%
Support Services	1,99%	12,99%	27,27%	5,36%	8,14%	31,66%
Technology Hardware and Equip.	22,06%	11,29%	29,74%	18,70%	21,65%	68,70%
Travel and Leisure	6,00%	13,64%	16,54%	6,49%	8,40%	42,30%
Unclassified			17,98%		0,21%	76,23%
	1,35%	**7,40%**	**25,34%**	**1,03%**	**5,56%**	**29,93%**

Table 12: Calendar-Time CAPM Regressions for the SEO Excess Returns

Our dependent variable in the CAPM regressions is the *monthly* return on *equally weighted* (Panel A) and *value weighted* (Panel B) portfolios of seasoned issuers, in excess of the risk-free rate. In each country, a portfolio of issuers was built such that every month, it comprised only firms which had issued equity at least once in the 36 months prior to the month of portfolio formation. The issuers' portfolio composition changes every month, the number of firms included ranging from 41 (minimum) to 115 (maximum) for Norway, from 31 (minimum) to 62 (maximum) for Sweden, and from 19 (minimum) to 39 (maximum) for Denmark. For the valueweighted portfolios, we used the Datatstream MV datatype as the expression of market capitalization necessary to adjust on the first day of each month the values of the portfolios and the weights allocated to the constituent stocks. The market return for each country has been proxied by the following market indexes: Oslo Exchange All Share – OSLOASH (181 constituents), OMX Stockholm Benchmark index OMXSB (86 constituent equities), and OMX Copenhagen Cap Index (189 constituent equities).The proxies for the risk free rates are the 3-month Norwegian, Swedish and Danish interbank interest rates (on the first day of each month). We have run the regressions using two time series for each of the three markets in order to balance the need of having more generous samples with the need of avoiding extreme events. The first series is shorter in an attempt to avoid the breakout of the 2008 financial turmoil (Denmark: January 2003-June 2008; Norway: January 2000-June 2007; Sweden: January 2000-June2007).The Norwegian and Swedish issuers' portfolios have a first series of 90 monthly return observations each (from January 2000 to June 2007), whereas the Danish portfolio of issuers has a first series of 66 monthly return observations (from January 2003 to June 2008) because of data limitations. The second series includes 109 monthly observations for Norway and Sweden and 73 for Denmark (Denmark: January 2003-January 2009; Norway: January 2000-January 2009; Sweden: January 2000-January 2009).The t-values are provided in brackets.

Panel A: Equally-weighted CAPM

DENMARK

	January 2003 to June 2008		January 2003 to January 2009
	Coefficients		*Coefficients*
Alpha	-0,0056	**Alpha**	-0,0090
	(-1,4125)		**(-2,29)**
Market premium	0,8728	**Market premium**	1,0311
	(9,6790)		**(14,46)**
R Square	**59%**	**R Square**	**75%**
Adj. R Square	**59%**	**Adj. R Square**	**74%**
Observations	66	**Observations**	73

NORWAY

	January 2000 to June 2007		January 2000 to January 2009
	Coefficients		*Coefficients*
Alpha	-0,0178	**Alpha**	-0,0175
	(-3,54)		**(-3,87)**
Market premium	1,0275	**Market premium**	0,8914
	(12,53)		**(15,38)**
R Square	**64%**	**R Square**	**69%**
Adj. R Square	**64%**	**Adj. R Square**	**69%**
Observations	90	**Observations**	109

Table 12 – *continued*

SWEDEN

January 2000 to June 2007	*Coefficients*
Alpha	-0,0162
	(-2,41)
Market premium	1,0898
	(10,70)
R Square	**57%**
Adj. R Square	**56%**
Observations	90

January 2000 to January 2009	*Coefficients*
Alpha	-0,0169
	(-2,74)
Market premium	1,0137
	(11,32)
R Square	**55%**
Adj. R Square	**54%**
Observations	109

Panel B: Value-weighted CAPM

DENMARK

January 2003 to June 2008	*Coefficients*
Alpha	-0,0051
	(-0,99)
Market premium	1,0574
	(9,12)
R Square	**57%**
Adj. R Square	**56%**
Observations	66

January 2003 to January 2009	*Coefficients*
Alpha	-0,0091
	(-1,68)
Market premium	1,3270
	(13,58)
R Square	**72%**
Adj. R Square	**72%**
Observations	73

NORWAY

January 2000 to June 2007	*Coefficients*
Alpha	-0,0145
	(-3,03)
Market premium	1,0123
	(12,98)
R Square	**66%**
Adj. R Square	**65%**
Observations	90

January 2000 to January 2009	*Coefficients*
Alpha	-0,0124
	(-2,97)
Market premium	0,9095
	(17,04)
R Square	**73%**
Adj. R Square	**73%**
Observations	109

SWEDEN

January 2000 to June 2007	*Coefficients*
Alpha	0,0032
	(0,85)
Market premium	0,7870
	(13,89)
R Square	**69%**
Adj. R Square	**68%**
Observations	90

January 2000 to January 2009	*Coefficients*
Alpha	0,0000
	(-0,0003)
Market premium	0,8390
	(15,59)
R Square	**69%**
Adj. R Square	**69%**
Observations	109

Table 13: Calendar-Time Fama French Regressions for the SEO Portfolio Excess Returns (Norway)

Our dependent variable in the Fama French regressions is the *monthly* return on *equally weighted* (Panel A) and *value weighted* (Panel B) portfolios of Norwegian seasoned issuers, in excess of the risk-free rate. In each country, a portfolio of issuers was built such that every month, it comprised only firms which had issued equity at least once in the 36 months prior to the month of portfolio formation. The issuers' portfolio composition changes every month, the number of firms included ranging from 41 (minimum) to 115 (maximum). For the value-weighted portfolios, we used the Datatstream MV datatype as the expression of market capitalization necessary to adjust on the first day of each month the values of the portfolios and the weights allocated to the constituent stocks. The market return for Norway has been proxied by the Oslo Exchange All Share index – OSLOASH (181 constituents). The proxy for the risk free rate is the 3-month Norwegian interbank interest rate (on the first day of each month). The source for the SMB and HML monthly returns for Norway was Prof. Ødegaard's website. We have run the regressions using two time series in order to balance the need of having more generous samples with the need of avoiding extreme events. The first series is shorter in an attempt to avoid the breakout of the 2008 financial turmoil (January 2000-June 2007). The Norwegian SEO portfolio has a first series of 90 monthly return observations. The second series includes 109 monthly observations (i.e. 109 monthly returns in the period January 2000-January 2009).

Panel A: Equally-weighted Fama French

January 2000 to June 2007		January 2000 to January 2009	
	Coefficients		***Coefficients***
Alpha	-0,0190	**Alpha**	-0,0185
	(-3,54)		**(-4,17)**
Market premium	1,0782	**Market premium**	0,9849
	(10,37)		**(13,83)**
SMB	0,2873	**SMB**	0,3730
	(1,65)		**(2,81)**
HML	-0,0814	**HML**	-0,0452
	(-0,63)		**(-0,45)**
R Square	**66%**	**R Square**	**72%**
Adj. R Square	**65%**	**Adj. R Square**	**71%**
Observations	90	**Observations**	109

Panel B: Value-weighted Fama French

January 2000 to June 2007		January 2000 to January 2009	
	Coefficients		***Coefficients***
Alpha	-0,0132	**Alpha**	-0,0117
	(-2,54)		**(-2,78)**
Market premium	0,9797	**Market premium**	0,8977
	(9,70)		**(13,26)**
SMB	0,0127	**SMB**	0,0422
	(0,08)		**(0,33)**
HML	-0,1419	**HML**	-0,1443
	(-1,14)		**(-1,50)**
R Square	**66%**	**R Square**	**74%**
Adj. R Square	**65%**	**Adj. R Square**	**73%**
Observations	90	**Observations**	109

Table 14: Calendar-Time CAPM Regressions augmented with the Investment Factor for the SEO Portfolio Excess Returns (Norway)

We have tested the long-run stock return underperformance hypothesis based on Jensen's alphas in factor regressions. The regression output presented in this table was delivered by the CAPM augmented with an investment factor constructed following the methodology introduced by Lyandres et al. (2008). Lyandres et al. designed an investment-to-assets ratio as the annual change in gross property, plant, and equipment (PPE) plus the annual change in inventories, divided by the lagged book value of assets. Since Datastream does not provide the same accounting items as COMPUSTAT, we have used capital expenditures (CAPEX) as a proxy for changes in PPE. We have used the Datastream datatypes DWCX, WC02999 and WC02101 as measures of CAPEX, Total assets and Total inventories respectively. Our investment-to-assets ratio at time "t" equals (Δ Total Inventories $_t$ + CAPEX $_t$)/Total Assets $_{t-1}$ where ΔTotal inventories is the difference between Total inventories $_{(t)}$ and Total inventories $_{(t-1)}$. Next, Lyandres et al. construct an investment factor as the zero-cost portfolio from buying stocks with the lowest 30% investment-to-assets ratios and selling stocks with the highest 30% investment-to-assets ratios, while controlling for size and book-to-market. At the end of each year, from 1994 to 2007, we have independently sorted the firms listed on Oslo Stock Exchange (and active at some point between 1994 and 2007) on three characteristics: size, book-to-market and investment to assets. For size and investment-to-assets we established three categories: the top 30% decile ("B" for size, "H" for investment-to-assets), middle 40% ("M") and bottom 30% ("S" for size, "L" for investment-to-assets). For book-to-market, we used only two dimensions, top 50% ("H") and bottom 50% ("L") as Fama and French (1993) showed that the middle range of the book-to-market ratio does not have significant explanatory power in the cross-section of returns. The intersection of all these categories defines 18 value-weighted portfolios (3x2x3). Since we built the investment factor as a zero-cost portfolio long in low investment-to-assets stocks, and short in high investment-to-assets stocks, we worked with 12 portfolios, ignoring the middle 40% of the investment-to-assets dimension. Finally, we constructed the investment factor by subtracting the average of the six value-weighted returns of the high investment-to-assets portfolios from the average of the six value-weighted returns of the low investment-to-assets portfolios. The resulting model is the following: $R_{pt} - R_{ft} = \alpha + \beta(R_{Mt} - R_{ft}) + \gamma INV_t + \varepsilon_i$ where R_{pt} is the monthly return on the SEO portfolio at time t, R_{ft} is the monthly risk-free return at time t, (R_{Mt} –R_{ft}) is the market premium at time t, and INV_t is the return on the investment factor at time t. We used OLS to estimate the regressions.

Panel A: Equally-weighted CAPM augmented with INV

January 2000 to June 2007	Coefficients
Alpha	-0,0160
	(-3,72)
Market premium	0,9016
	(12,55)
INV	0,2666
	(2,92)
R Square	**69%**
Adj. R Square	**68%**
Observations	90

January 2000 to January 2009	Coefficients
Alpha	-0,0184
	(-3,98)
Market premium	0,9272
	(13,46)
INV	0,0291
	(0,96)
R Square	**69%**
Adj. R Square	**69%**
Observations	109

Table 14 - *Continued*

Panel B: Value-weighted CAPM augmented with INV

January 2000 to June 2007		January 2000 to January 2009	
	Coefficients		***Coefficients***
Alpha	-0,0140	**Alpha**	-0,0128
	(-2,92)		**(-3,01)**
Market premium	0,9850	**Market premium**	0,9278
	(12,36)		**(14,58)**
INV	0,1484	**INV**	0,0148
	(1,46)		**(0,53)**
R Square	**67%**	**R Square**	**73%**
Adj. R Square	**66%**	**Adj. R Square**	**73%**
Observations	90	**Observations**	109

Table 15: Calendar-Time Fama French Regressions augmented with the Investment Factor for the SEO Portfolio Excess Returns (Norway)

We have tested the long-run stock return underperformance hypothesis based on Jensen's alphas in factor regressions. The regression output presented in this table was delivered by the Fama French model augmented with an investment factor constructed following the methodology introduced by Lyandres et al. (2008). Lyandres et al. designed an investment-to-assets ratio as the annual change in gross property, plant, and equipment (PPE) plus the annual change in inventories, divided by the lagged book value of assets. Since Datastream does not provide the same accounting items as COMPUSTAT, we have used capital expenditures (CAPEX) as a proxy for changes in PPE. We have used the Datastream datatypes DWCX, WC02999 and WC02101 as measures of CAPEX, Total assets and Total inventories respectively. Our investment-to-assets ratio at time "t" equals (Δ Total Inventories $_t$ + CAPEX $_t$)/Total Assets $_{t-1}$ where ΔTotal inventories is the difference between Total inventories $_{(t)}$ and Total inventories $_{(t-1)}$. Next, Lyandres et al. construct an investment factor as the zero-cost portfolio from buying stocks with the lowest 30% investment-to-assets ratios and selling stocks with the highest 30% investment-to-assets ratios, while controlling for size and book-to-market. At the end of each year, from 1994 to 2007, we have independently sorted the firms listed on Oslo Stock Exchange (and active at some point between 1994 and 2007) on three characteristics: size, book-to-market and investment to assets. For size and investment-to-assets we established three categories: the top 30% decile ("B" for size, "H" for investment-to-assets), middle 40% ("M") and bottom 30% ("S" for size, "L" for investment-to-assets). For book-to-market, we used only two dimensions, top 50% ("H") and bottom 50% ("L") as Fama and French (1993) showed that the middle range of the book-to-market ratio does not have significant explanatory power in the cross-section of returns. The intersection of all these categories defines 18 value-weighted portfolios (3x2x3). Since we built the investment factor as a zero-cost portfolio long in low investment-to-assets stocks, and short in high investment-to-assets stocks, we worked with 12 portfolios, ignoring the middle 40% of the investment-to-assets dimension. Finally, we constructed the investment factor by subtracting the average of the six value-weighted returns of the high investment-to-assets portfolios from the average of the six value-weighted returns of the low investment-to-assets portfolios. The resulting model is the following: $R_{pt} - R_{ft} = \alpha + \beta_1(R_{Mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 INV_t + \varepsilon$ where R_{pt} is the monthly return on the SEO portfolio at time t, R_{ft} is the monthly risk-free return at time t, (R_{Mt} –R_{ft}) is the market premium at time t, SMB_t is the monthly return on small firms minus the return on large firms; HML_t is the monthly return on high book-to-market stocks minus the return on low book-to-market stocks. and INV_t is the return on the investment factor at time t. The independent variables, HML, SMB are constructed following Fama and French (1993) methodology and using company information relevant for the Norwegian stock market. Time series for the returns on both these factors have been obtained from Prof. Bernt Arne Ødegaard's homepage (Ødegaard). We used OLS to estimate the regressions.

Panel A: Equally-weighted Fama French augmented with INV

January 2000 to June 2007	Coefficients	January 2000 to January 2009	Coefficients
Alpha	-0,0157	**Alpha**	-0,0196
	(-3,37)		**(-4,30)**
Market premium	0,9070	**Market premium**	1,0293
	(9,47)		**(12,35)**
INV	0,2277	**INV**	0,0304
	(2,37)		**(1,03)**
SMB	0,1356	**SMB**	0,3861
	(0,85)		**(2,90)**
HML	-0,1405	**HML**	-0,0245
	(-1,27)		**(-0,24)**
R Square	**71%**	**R Square**	**72%**
Adj. R Square	**69%**	**Adj. R Square**	**71%**
Observations	90	**Observations**	109

Table 15-*continued*

Panel B: Value-weighted Fama French augmented with INV

January 2000 to June 2007	
	Coefficients
Alpha	-0,0118
	(-2,24)
Market premium	0,9219
	(8,53)
INV	0,1571
	(1,45)
SMB	-0,0775
	-0,43
HML	-0,1679
	(-1,34)
R Square	**67%**
Adj. R Square	**66%**
Observations	90

January 2000 to January 2009	
	Coefficients
Alpha	-0,0120
	(-2,75)
Market premium	0,9091
	(11,42)
INV	0,0078
	(0,28)
SMB	0,0455
	(0,36)
HML	-0,1390
	(-1,41)
R Square	**74%**
Adj. R Square	**73%**
Observations	109

Note on the Total Return index – Datastream datatype RI

A total return index (RI) is available for individual equities. This shows a theoretical growth in value of a share holding over a specified period, assuming that dividends are re-invested to purchase additional units of an equity at the closing price applicable on the ex-dividend date. From 1988 onwards, the method used for its calculation is one in which the discrete quantity of dividend paid is added to the price on the ex-date of the payment. Then:

$$RI_t = RI_{t-1} * \frac{P_t}{P_{t-1}}$$

except when t = ex-date of the dividend payment D_t then:

$$RI_t = RI_{t-1} * \frac{P_t + D_t}{P_{t-1}}$$

Where:

P_t = price on ex-date

P_{t-1} = price on previous day

D_t = dividend payment associated with ex-date t

Gross dividends are used where available and the calculation ignores tax and re - investment charges. Adjusted closing prices are used throughout to determine the price index and hence the return index.

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Andra-Maria Vasilescu

Svitlana Malitska

Supervisor: Ilan Cooper, Associate Professor, Ph.D.

Exercising Growth Options through SEOs and Debt Issue Financing

Comparative Impact on Stock Returns of Norwegian issuers

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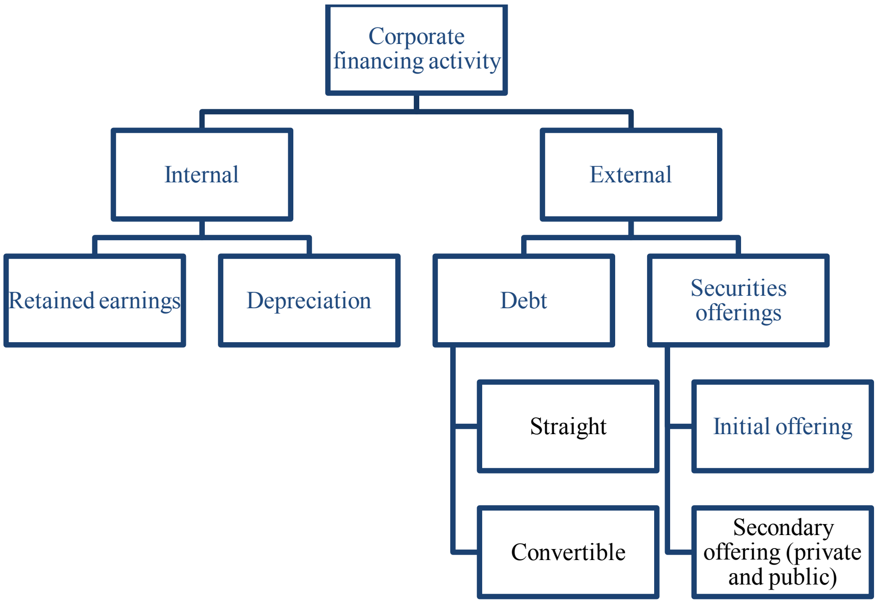
Contents

1. Introduction

Corporations are there to create value. Their capacity of value creation greatly depends on the investment decisions taken by their managers. Such decisions bear on the type and the timing of the investment undertaken, and on the sources of financing. Our paper will explore the long-run impact of financing decisions on the company value, when choices entail external financing, in particular seasoned equity offerings or debt issuance (corporate bonds) (Figure 1).

Figure 1. Corporate financing activity



There is extensive empirical evidence in the finance literature that stock returns are significantly impacted by financing events in the short and long run. As most of this literature concentrates on mature, long established markets such as in the US, Canada or Japan, we will investigate the external validity of these studies, taking the case of the Norwegian stock market.

The prevailing conclusions of most of the existing studies point to a long-run underperformance of the issuers. Several theories explaining the stock returns dynamics around issuance events have thus emerged. We summarize the main theories below.

1) *Real options and real investment* (e.g. Berk, Green and Naik 1999, Lyandres, Sun and Zhang 2007). The real options based explanation of stock returns

behavior around issuance events states that real investment transforms risky expansion options into less risky assets in place. This is why the riskiness of a company (as measured by its market beta for example) should decrease after the event, *if* the proceeds are used to finance real investment. Cooper and Priestley (2010) show that systematic risk falls during large investment periods in accordance with the q-theory of investment and the returns of a factor formed on investment-to-assets help forecast aggregate economic activity. Others concluded that increases in capital expenditures have to be accompanied by positive stock price reactions (Trueman 1986) since they signal the availability of positive NPV projects (Jensen and Meckling 1976).

2) *Capital structure and financial leverage* (e.g. Hamada 1972). Numerous studies relating common stock performance to capital structure changes have consistently unveiled a positive correlation between the sign of the financial leverage changes and the sign of the impact on stock prices (e.g. Asquith and Mullins 1983).
3) *Behavioural theories.* The adverse selection model implying that SEOs occur when the stock is initially overvalued (Myers and Majluf 1984). According to *agency theory*, SEOs decrease the management percentage shareholdings, increasing potential conflicts of interest between managers and outside shareholders, which lowers stock prices.
4) *Asymmetric information*. When investors' expectations of the firm's prospects are biased, firms can earn short-term profits by selling overvalued equity, and then the issuing decision is not strictly determined based on capital structure considerations or on the existing investment opportunity set. Asymmetric information may also account for short-term abnormal post-issuance excess returns. In the case of equity offerings (SEO), the underwriters do not recognize the value of the real options the firm has, thus the stock price is set too low, and old shareholders get only part of the project value (Brennan, 2003).

Our approach will focus on the *real-options based explanations* of stock returns dynamics, given the novelty of such theories in this field of research, as well as their capacity to (partially) resolve the new issues puzzle, hitherto considered an anomaly in finance.

1. Literature review

Contemporary research in financial literature consistently points to stock returns underperformance following external financing events in the form of either equity or debt issuance. For example, Lyandres et al. (2007) investigate the significant stock underperformance of equity and debt issuers in comparison to non-issuers with similar characteristics in the post-issue years. According to Lyandres et al. (2007), real investment is an important driving force behind the "new issues puzzle". The investment-based explanation of this puzzle argues that the post-issue underperformance arises from the negative relation between real investment and expected returns.

The central finding of Lyndres et al.(2007) is that a new investment factor, long in low investment-to-assets stocks[11] and short in high investment-to-assets stocks, explains a substantial part of the new issues puzzle. This factor will be used to extend the Fama and French (1993) three-factor model. Thus, the investment factor earns a significant average return. In addition, firms that issue equity and convertible debt invest much more than matching non-issuers. Consequently, adding the investment factor into standard factor regressions explains on average about 75% of the SEO underperformance, 80% of the IPO underperformance, 50% of the underperformance following convertible debt offerings, and 40% of Daniel and Titman's (2006) composite issuance effect.

Carlson, Fisher and Giammarino (2006) serve as a good reference for the purpose of our paper, in that the market betas of the equity issuing firms run up prior to the seasoned equity issuance and decline thereafter. They provide a real options-based explanation for the risk dynamics of a company prior to and after a SEO.

The general real options theory predicts that the riskiness of a firm will diminish as the firm exercises a growth option. The models developed in the reviewed

[11] The investment-to-assets ratio has been measured as the annual changes in gross property, plant, and equipment plus the annual changes in inventories divided by the lagged book value of assets.

literature rest on the strong assumption that expansion is achieved immediately through an instantaneous investment entirely financed by an SEO. The plain growth option theory predicts an abrupt drop in riskiness and consequently, a sharp decrease in beta.

Carlson, Fisher and Giammarino (2006) relax this assumption by including in their model: 1) a commitment by the firm to further invest or "time-to-build"; 2) additional internal financing through retained earnings along with the SEO proceeds. Their extended, real options-based model is thus able to account for smooth post-issuance falls in betas.

Spiess and Affleck-Graves (1999) provide evidence on long-run post-issue underperformance by firms making straight and convertible debt offerings between 1975 and 1989. Their results suggest that debt offerings, like equity offerings, are signals that the firm is overvalued. They also find strong evidence that the underperformance of issuers of both straight and convertible debt is limited to those issues that occur in periods with a high volume of issues.

Dann and Mikkelson (1984) conclude that stockholders earn significant negative abnormal returns at the initial announcement of a *convertible* debt offering and at the issuance date. However, offerings of *non-convertible* debt appear to have only minor negative effects on stock returns at the announcement, and no effects at issuance.

2. Development of hypotheses

One of the objectives of our paper is to ***explore the equity risk dynamics of issuers around issuing events***. If the conclusions reached by Carlson, Fisher and Giammarino (2006) are viable, the *average* betas of our seasoned equity issuers should increase prior to issuance and decrease thereafter, in tune with real options theories.

While the results displayed by Carlson, Fisher and Giammarino (2006) strongly support a real-options based explanation of the risk dynamics around SEO events, we believe it would be interesting to explore to what (differing) degrees changes in betas are driven by increases in real investment and by changes in financial leverage, respectively. The basic intuition is that following a *straight debt issuance*, the exercise of a growth option and the change in leverage have contrarian effects on the risk profile of a company. Thus, exercising a growth option should reduce firm level beta whereas increased debt financing leverages a company, leading to a higher post-issuance beta.

By contrast, the effects on the risk profile of a company of the exercise of a growth option and of leverage change are unidirectional in the case of *equity financing*. Thus, exercising a growth option should induce a lower beta. At the same time, increased equity financing deleverages a company and should also contribute to a decrease in beta. Figure 2 provides a summary of these influences.

Figure 2. Changes in company's risk profile induced by changes in financial leverage and by exercising growth options

Factors affecting company riskiness	**Effects on company riskiness (Beta)**	
	Straight debt offerings	**SEO**
Changes in financial leverage	↑	↓
Exercise of growth option	↓	↓
Resulting effect	?	↓

Pablo de Andres et.al. (2008) provide an analytical background for our hypothesis. Thus, they infer that a firm's beta is the weighted average of the betas of its assets-in-place and of its growth options:

$$\beta_i = \beta_{AIP_i} \cdot \frac{V_{AIP_i}}{V_i} + \beta_{GO_i} \cdot \frac{V_{GO_i}}{V_i} \qquad (1)$$

- β_i and V_i represent, respectively, the beta and the total value of the firm *i*;

- β_{AIP_i} and V_{AIP_i} measure, respectively, the beta and the value of its assets-in-place; and β_{GO_i} and V_{GO_i} measure, respectively, the systematic risk and the value of its growth options.

At the same time, we can decompose a firm's systematic risk in the beta of firm's equity and the beta of firm's debt:

$$\beta_i = \beta_{E_i} \cdot \frac{E_i}{V_i} + \beta_{D_i} \cdot \frac{D_i \cdot (1-t)}{V_i} \qquad (2)$$

where β_{E_i} and E_i represent, respectively, the market risk of equity and the market value of the firm's shares *I*, β_{D_i} and D_i reflect, respectively, the market risk of debt and the debt value; and *t* is the tax rate.

Based on equation (1), and assuming that issuers use the proceeds of the issue to finance real investment, we can infer that the beta of the average issuer should decrease following the event. Thus, the second term in equation (1) will decrease after the issuance if the firm is committed to use the proceeds to finance new projects. Moreover, the bigger the amount of growth opportunities before the issue event, the more pronounced the issuance impact on the firm's overall beta will be. In the particular case of SEOs, this impact is further enhanced by the second term in equation (2).

These unidirectional beta influences question the empirical findings of Carlson et al.(2006), which attribute the risk dynamics of the SEOs solely to real options realizations. We argue that the observed post-issue beta decreases might be affected by both leverage changes and real investment, such that a control for financial leverage is needed.

This control can be provided by studying the risk dynamics of debt issuing firms. Assuming these issuers have some real options to realize, the second term in equation (1) will decrease and the second term of equation (2) will increase accordingly. The final beta change will be determined by the relative prevalence of the two effects.

Another objective of our paper is to ***test the hypothesis that equity and debt issuers underperform non issuers*** with similar characteristics in the years following the issuance (Loughran and Ritter 1995; Spiess and Affleck-Graves 1995). Within this framework, we will test whether issuers generate significantly negative (risk-adjusted) abnormal returns in the long-run, based on classical asset-pricing models (i.e. CAPM, Fama and French three factor model).

If we find evidence of underperformance, we will investigate the real investment-based resolution of underperformance following the methodology proposed by Lyandres et al. (2007). The hypothesis in this setup is that an increase in real investment following the issuance should trigger lower stock returns for the issuers, as predicted by the real options theory and Tobin's q theory of investment. This intuition is unaccounted for by the general asset pricing models, which we will augment with an investment factor à la Lyandres et al. (2007).

4. Research Methodology

4.1. Data description

Our study will be based on samples of Norwegian seasoned equity offerings, straight debt and convertible offerings, respectively.

In most countries, SEOs by public firms are typically conducted as rights offerings, whereas very few SEOs are conducted as public offerings. Thus, if rights are not used, the firm can attempt to sell the issue directly to the market with no financial intermediary, place the issue with a private group of investors (a private placement), or employ an intermediary, usually an investment banker or underwriting syndicate. In addition, stock can be sold through the issuance of convertible securities, warrants and stock options and through the establishment of dividend reinvestment, employee stock ownership and management compensation plans (Eckbo and Masulis 1995)

Our SEO sample will include public and private equity placements by Norwegian companies and will exclude employee stock offerings (which are not primarily meant to raise capital), as well as financial institutions. Recurrent issuers, in a window of less than 5 years, will also be excluded from our sample. Similar exclusions will apply to our samples of straight and convertible debt issuers.

Our source of identifying debt issuers is DATASTREAM. Datastream provides the issuance date for each series of corporate bonds, in addition to other relevant data like amount raised, maturity and coupon rate.

We will use the Newsweb service of Oslo Børs to obtain the corresponding prospectuses for each issue. This information will help us to identify the use of proceeds. The announcement dates of the offerings may be identified using the Atekst database made available by BI Norwegian School of Management.

DATASTREAM will provide us with the time series of stock prices for the companies included in the sample (spanning 2 years before and 3 years after the offering), the returns on the Norwegian stock market index and a risk-free equivalent rate (3 months NIBOR).

Starting with the methodology suggested by Carlson, Fisher and Giammarino (2006), we run a time-series analysis on a sample of companies listed on the Norwegian Stock Exchange (Oslo Børs) which have issued debt or equity in the period 1997-2005. We expect a structural break to occur in our sample of issuers after 2007 when the worldwide financial crisis has generated peculiar patterns of stock behaviour, mostly influenced by investor sentiment rather than fundamentals. As a result, we will confine our analysis to the period before 2008. We also expect to observe a peculiar behavior of stock returns around 2000-2001 due to IT bubble, though less significant comparing with the financial crisis.

Our analysis will involve two steps. First, we will look at the long-term beta dynamics of issuing firms (2 years before issuance and 3 years after issuance). The length of the time window is consistent with Lyanders' choice (2007). By contrast Carlson et al. (2006) uses a five-year long pre- and post-issuance event window, but has shown that most of the issuance effect on stock returns occurs within 2 years before and 3 years after the event. In the second step, we will investigate the underperformance hypothesis and the investment-based resolution of the new issues puzzle with respect to the Norwegian market.

4. 2. Risk dynamics around issuance events

In this section of our paper we will investigate the average beta behavior of our sample firms around the issuance dates, using the event study methodology, with an eye to the approach adopted by Carlson, Fisher and Giammarino (2006).

The aim is to study the conditional CAPM beta dynamics in the period spanning 5 years around each type of issuance event (equity, straight and convertible debt). The sample period would thus be divided into twenty-one trading day periods (“months”) prior to the announcement day and after issuance, totaling 60 periods (24 months before announcement, 36 months after). The interval between announcement and issuance will be regarded as one period. In each period the log returns will be regressed on a constant and on the log return of the OBX Total Return Index.

Our conclusions could be enhanced if we consider a benchmark for the risk evolution across the sample period. Thus, we can match each firm in the sample with a non-issuer with similar characteristics such as industry, size and book-to-market ratio.

We will then estimate the average beta of our full samples of issuers, equally-weighted and value-weighted, as well as the betas of sub-samples of stocks. In particular, we are interested in forming two subsamples: ***R&D intensive companies*** (such as chemicals and pharmaceuticals, IT services, biotechnology) and ***real investment intensive industries*** (i.e. public utilities, real estate development). We expect to see different patterns of volatility behavior in the two subsamples, given the riskier profile of the R&D investments compared to real investments. One reason behind the riskier profile of the R&D investment is the absence of a secondary market where a failed investment can be recuperated (as is the case of land purchases or real estate development).

We are also interested in the average betas for subsamples of issuers, based on the ***stated-use-of funds*** (e.g. capital investment, acquisition financing, working capital, debt refinancing). This approach, used by Carlson et al.(2006) can provide us with more insight into how real investment is related to the risk profile of the firm.

4.2.A Robustness checks

Financial data has luckily been known as an exceptional tool for research based on its preciseness and exuberance. Our estimation of the periodic (monthly) betas will be based on the daily stock prices. Despite the apparent advantages of frequent data availability, a study can be seriously flawed by the presence of illiqudity. Scholes and Williams (1997) draw our attention to the potential bias and inconsistency in OLS estimators of asynchronous variables.

We try to avoid this problem by employing robustness technique used by Denis and Kadlec (1994). The sample firms stock returns will be regressed on 0, 2,5,10 and 15 leads and lags of market stock returns. The sum of the regression factor loadings will provide the aggregate beta, dynamics of which we will analyze and compare to the one-factor beta.

4.2.B A hybrid model for investigating the relative impact of real option and leverage effects on betas

A way of controlling for financial leverage when assessing the effect of real options realizations on the market beta we can think of is to regress changes in betas on changes in capital expenditures (a proxy for increased real investment) and on changes in financial leverage, as illustrated by changes in the debt-to-assets ratio.

An empirical model we might use looks like this:

$$\Delta\bar{\beta}_t = a_t + b_t \Delta\overline{capex}_t + c_t \Delta\overline{\frac{Debt_t}{Assets_t}} + \varepsilon_t$$

where $\Delta\bar{\beta}_t$ re represents the average percentage changes of market betas estimated for the firms in our sample, and $\Delta\overline{capex}_t$ represents the average percentage change in capital expenditures for the firms in the sample portfolio. The motivation behind its use is that firms realize their growth opportunities (real options) by investing, thus by increasing their capital expenditures in their cash flow statement. $\Delta\overline{\frac{Debt_t}{Assets_t}}$ represents the average percentage change in the debt-to-assets ratio for the firms in the sample portfolio.

The expected result from the estimated regression are that $b_t < 0$, and $c_t > 0_t$. The intuition behind our expectations has been exposed in the previous section: realizations of growth options cause a decrease in the risk of the company, while leverage increase has the opposite effect.

4.3. The investment-based resolution of the new issues puzzle

We will test the long-run stock return underperformance hypothesis based on Jensen's alphas in factor regressions. Factor regressions will involve the market model (CAPM) and the Fama-French three factor model.

According to existing literature, we expect to obtain significant negative alphas in time series regressions for new issues portfolios. This result would account for what has been coined by Loughran and Ritter (1995) the new issues puzzle.

The drawback of this methodology is that it actually implies a joint hypothesis test, part of which refers to the tenability of the asset pricing model used. If significant alphas ensue, it does not necessarily mean that we are faced with stock underperformance. It may well be the case that the asset pricing model is poor at explaining the cross section of returns.

If our null hypothesis of no significant abnormal post-issuance returns is rejected, we can reasonably infer that there may be other sources of risk, not captured by market beta or common factors in factor regressions, affecting stock returns. That is why we will explore the investment-based explanation advanced by Lyandres, Sun and Zhang (2006) in their attempt to elucidate the new issues puzzle based on real options/real investment theories. Following the methodology proposed by Lyandres et al. (2007), we will do so using an investment factor in factor regressions.

We will start constructing the investment factor ourselves doing a triple, independent sort on size, book-to-market, and investment-to-assets of Norwegian listed stocks. Then we will form a zero-cost portfolio by buying stocks with the lowest 30% investment-to assets ratio and selling stocks with highest 30% investment-to-assets ratios. The investment-to-assets ratio will be measured as the annual changes in gross property, plant, and equipment plus the annual changes in inventories divided by the lagged book value of assets.

Each characteristic will divide companies in three groups: high 30%, medium 40% and low 30%. From all possible intersections of these independent groups along the three characteristics, we will form 27 portfolios. The investment factor, INV, will then represent the return on the zero-cost portfolio built above which will be computed as the difference between the simple average return of the nine high-investment portfolios and the simple average return of the nine low-investment portfolios.

Next, following the methodology suggested by Lyandres et al. (2007), for each type of security (equity, straight and convertible bonds), we will build an independent portfolio of issuers with issuing dates in the 36 months before the month of the portfolio formation. The independent portfolios will be rebalanced every month, as new issuers will be added and oldest dropped. The excess returns on these portfolios will form the dependent variables in factor regressions.

We will use the investment factor described earlier to extend the CAPM, as follows:

$$R_{pt} - R_{ft} = \beta_{0i} + \beta_{1i}(R_{Mt} - R_{ft}) + \varepsilon_i \qquad (4)$$

We will then augment the Fama and French (1993) three-factor model with the investment factor suggested by Lyandres et al. (2007), meant to capture the effect of exercising growth options. The model we will use is therefore:

$$R_{pt} - R_{ft} = \beta_{0i} + \beta_{1i}(R_{Mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}INV_t + \varepsilon_i \qquad (5)$$

where the dependent variable R_{pt} is the monthly return on a sample portfolio of issuers, in excess of the risk-free rate (NIBOR 3 months); SMB_t is the monthly return on small firms minus the return on large firms; HML_t is the monthly return on high book-to-market stocks minus the return on low book-to-market stocks.

We can use both OLS and WLS (Weighted Least squares) to estimate the regressions.

The independent variables, HML, SMB are constructed following Fama and French (1993) methodology and using company information relevant for the Norwegian stock market. Time series for the returns on both these factors have been obtained from Prof. Bernt Arne Ødegaard's homepage.

4.3. A Real investment versus intangibles (Research and Development)

Lyandres et al. (2007) as well as Carlson, Fisher and Giammarino (2006) try to explain the dynamics of stock returns around issuance events based on real investment. Changes in real investment appear to be a reasonable proxy for the exercise of growth options. Based on the q theory of investment the relationship between real investment and stock returns is negative (Cochrane 1996). However, there seems to be a positive relationship between research and development activities in a firm and its stock returns, as documented by Chan, Lakonishok and Sougannis (2001). In particular they provide evidence that R&D intensity is positively associated with return volatility, ceteris paribus. In the real options terminology, Chu (2005) writes that R&D actually generates risky expansion options, whereas only real investment transforms them into less risky assets in place.

We believe it is therefore worthwhile to consider the case of R&D intensive industries (such as Chemicals and Pharmaceuticals, Technology providers, Automobile manufacturers). We should expect R&D intensive companies to show increased volatility of stock returns after an SEO or a debt issuance event.

We will attempt to build an additional investment factor to account for R&D expenditures which, intuitively, embed riskier growth options than classical investment in property, plant and equipment. An R&D-to-assets factor embedded in the Fama and French model (augmented with the Lyandres et al. investment factor) should help us further reduce the magnitude of the alphas in factor regressions. With higher perceived risk, the performance of R&D intensive industries should be superior to the performance of capital-intensive ones.

5. Expected results

In line with the results of Carlson, Fisher and Giammarino (2005) we expect beta to start increasing 24 months before the date of the issuance event, and to decrease slowly (not abruptly) over at least 24 months after the event date. We expect to obtain similar patterns of beta behavior across sub-samples, but we cannot make confident predictions with regards to the average beta behaviour of debt issuers. Due to the opposite signs of the leverage effect and of the growth options realizations effect, the resulting impact on beta can lead to a decrease, an increase or a neutral evolution after issuance.

We expect our average beta dynamics to be robust after we have controlled for asynchronous trading.

The second part of our paper should confirm the negative relationship between real investment and expected returns. Then, it should fulfill the real options theory prediction that issuers earn lower expected returns than non issuers, if they use the proceeds from the issuance to finance real investment.

If we detect a substantial long-run post-issue underperformance by firms making straight debt offerings, then our results are consistent with those documented by Spiess and Afleck-Graves (1999) and others.

If we obtain negative alphas in regular factor regressions, they would be indicative of long-run abnormal returns for Norwegian issuers. However, we hope that the investment factor developed by Lyandres et al. (2007) will make these alphas insignificant and/or reduce their magnitude.

An R&D factor included in factor regressions might also lead to insignificant alphas, as R&D activities are thought to contribute to the risk profile of a company by creating rather than extinguishing risky expansion options. Therefore the loading on the R&D factor would have a different sign than the loading on the investment factor in factor regressions.

6. Implications

This paper will achieve several objectives. First, it can be used to draw an empirical comparison between the Norwegian and different other stock markets when it comes to the performance of seasoned equity and debt issuers.

As an element of novelty, our work will incorporate the case of Norwegian debt issuers, and will use it to test the real options hypothesis against the classical capital structure theory, both used to explain the risk dynamics of stock returns around issuance events.

Our paper will also investigate the hypothesis of long-run underperformance of stock and debt issuers. This hypothesis is not rejected if classical asset pricing models are used (e.g. CAPM, multifactor models). However, a factor model augmented with a (real) investment factor may absorb the residual "negative" performance of issuers and this is what we want to check. Such a factor may incorporate a type or risk different from the systematic, and it is supposed to reduce the underperformance of the issuers as it is highlighted by the mainstream asset pricing models.

As an extension to the real options theories based on real investment, one of the models we will be using tests the hypothesis advanced by the recent financial literature that there is a positive relationship between R&D investment and stock returns. Such model would also constitute an element of novelty compared to the existing literature in the field

The conclusions of this investigation have direct implications for investment strategies – should SEO and debt issuers record negative abnormal returns in the post – offering years, investors can also make abnormal returns shorting such stocks.

Our study should also have implications for financial decision making. It can serve as a guideline for managers on what might be the most appropriate type of financing, depending on the circumstances of the investment proposal under assessment.

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