LUND UNIVERSITY
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The announcement effect on mean and variance for underwritten and non-underwritten SEOs

Bachelor Essay in Financial Economics

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Abstract

This thesis investigates the stock return and its variance around seasoned equity offering announcements for Swedish companies listed on the OMX Large cap, Mid cap and Small cap exchanges. The analysis is made on a full sample containing 52 SEOs, as well as two sub-samples containing underwritten and non-underwritten SEOs. The framework for the event study is OLS regressions based on the CAPM-model.

During the studied sample period, January 2006 to December 2010, companies making SEO announcements are found to exhibit a significant negative average cumulative abnormal return of around 2.5 percent on the announcement day as well as for a three-day horizon. For longer horizons, the average cumulative abnormal return is around negative 1.6 percent. Non-underwritten SEOs are found to exhibit less negative returns than underwritten ones, which is in line with previous studies investigating this matter.

The return variance for an issuing company is found to increase during the month following the SEO announcement for 40 out of 52 companies, whereof 30 variance ratios are found to be significant. Further, there is no evidence that there is a significant difference in return variance between underwritten and non-underwritten SEOs.

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Word list

Seasoned Equity Offering (SEO) = Nyemission

Underwritten SEO = Garanterad nyemission

Non-underwritten SEO = Ej garanterad nyemission

Underwriter = Garant

Directed share issue = Riktad nyemission

Rights issue = Nyemission med företrädesrätt

Subscription right = Teckningsrätt

Subscription price = Teckningskurs

Primary preferential right = Primär företrädesrätt

Subsidiary preferential right = Subsidiär företrädesrätt

Dilution = Utspädning

Prospectus = Emissionsprospekt

Record date - Avstämningsdag

Flotation cost = Total emissionskostnad

Take-up level = Teckningsgrad

Cumulative abnormal return (CAR) = Kumulativ överavkastning

1.1 Introduction

Seasoned equity offerings have been frequently occurring on the Swedish stock market, especially during the financial crisis of 2008-2010. Underwritten SEOs has gone from being less frequent to representing a majority of the performed SEOs. The high provision paid to underwriters for guaranteeing full subscription of the SEOs has been widely debated in financial media and questioned by many.[1]

The flotation cost associated with SEOs can be weighed against the interest expense a company would pay if it chose bank loan financing, or the interest rate it would pay on a corporate bond if it would chose a bond issue. Just as the interest expense, the flotation cost impacts the corporate value negatively. According to Eckbo and Masulis (1992), underwriter compensation accounts for approximately 90 percent of total flotation costs, making them by far the most significant cost in the issuing process. Minimizing flotation costs should therefore be of interest to all existing shareholders, and it logically follows that minimizing underwriter compensation should be the main target.

1.2 Purpose

The purpose of this thesis is to investigate whether underwritten SEOs have significantly better return properties than non-underwritten SEOs. In this thesis, “better” is defined as higher abnormal returns coupled with lower variance, measured over the event window. According to the purpose, the following hypotheses are constructed:

> **Hypothesis 1:** Is there significant abnormal return around SEO announcements?
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> **Hypothesis 2:** Is there a significant difference in cumulative abnormal returns between underwritten SEOs and non-underwritten SEOs?
>
> **Hypothesis 3:** Is there, in general, an increase in return variance for the issuing company during the month following the SEO announcement?
>
> **Hypothesis 4:** Do underwritten SEOs exhibit lower event window variance than non-underwritten SEOs?

[1] For example, by former president of Aktiespararna, Günther Mårder, 2010.

1.3 Problem discussion

Without the use of underwriters, a company issuing new shares as a tool to raise capital faces the risk of not receiving the requested funds. This shortfall in capital occurs if existing shareholders do not use all their subscription rights to buy the newly issued shares. If a company experiences a shortfall of capital, the board of the company usually has a strategy for going forward. The main solutions usually undertaken by managers are to extend the rights issue period, seek alternative means of financing, or proceed with current operations at a slower pace. To address the problem of possible capital shortfall, companies use underwriters in order to ensure that their SEO get fully subscribed. The provision paid to underwriters is typically calculated as a percentage of the underwriter's guaranteed amount. The percentage rate usually falls within the range of 0-10 percent, with higher percentages for companies with smaller market capitalization and smaller percentages for companies with larger market capitalization and financial institutions, e.g. banks.[2]

According to the above, the underwriting process can be regarded as an insurance policy. However, it is not perfectly clear whether the underwriters' obligation to actually complete the subscription is legally binding.[3] There have been cases when the underwriters have not fulfilled their obligations due to personal bankruptcy or bankruptcy of the underwriting company. It is thus ultimately the responsibility of the issuing company to ensure that the credit worthiness of underwriters is sufficient to fulfill the stated obligations. For the issuing company, paying the underwriter can be regarded as buying a put option on its own stock, since the issuing company buys the right to sell stock at a pre-determined price.[4] A long put option in combination with existing stock is called a protective put and have the benefit of reducing risk for its holder since its payoff structure reduces the variance of cash flows, especially when the strike price is below the exercise price.[5] It is therefore of interest

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[2] Gustavsson, M and P. Lindström, 2010, Garanter vid nyemissioner – förutsättningar och kostnader.

[3] Hoffman Bermejo and Raudsepp (2009) states that underwriting agreements are not legally binding. Professor in Swedish and international business law, Erik Nerep, is of the opinion that underwriting agreements are legally binding. Prawitz (2009) discusses juridical arguments both for and against the legally binding issue and calls for legislative authorities to provide a clear statement that settles this question once and for all.

[4] Many studies valuing the underwriter agreement using options theory has been made. See for example research made by Marsh, 1994, *Underwriting of Rights Issues*, a study of the returns earned by sub-underwriters from UK rights issues and Marsh, 1998, *Sub-underwriting of rights issues, a failure of competition?*

[5] Bodie, Z., A. Kane and A.J. Marcus, 2005, *Investments, Sixth Edition*, McGraw-Hill, Singapore, p. 711.

to study whether or not underwritten SEOs have the benefit of lowering the event window variance, compared to non-underwritten SEOs.

1.4 Delimitations

Subscription commitments made by large shareholders has not been regarded as underwriting. Only the percentage of the SEO that has been guaranteed by underwriters earning provision has been counted as a guarantee.

The study is limited to rights issues with primary preferential rights.

No analysis regarding the underwriters' juridical responsibilities is undertaken. It is noted that uncertainty regarding underwriter agreements juridical implications is prevailing, but no attempt of resolving this problem has been made.

The event study is based on the CAPM-model only. Only Swedish market data has been used for regression estimations.

No modeling of what affects the size of the underwriter fee is included.

1.5 Outline

The paper is organized as follows. Section 2 presents the results from previous research, gives an introduction to the SEO issuing process and describes the benefits of underwriting. Section 3 outlines the theoretical framework. Section 4 describes the data and the variables used in the regressions. Section 5 describes the event study methodology and the test procedures as well as diagnostic checking of the estimations. Section 6 contains the results of the study and section 7 concludes.

2. Previous research, SEO issuing process & benefits of underwriting.

2.1 Previous research

Many studies regarding announcement effects around SEOs have been conducted for the Swedish stock market. Malmström and Nilsson (2002) study the sample period 1993-2001, and find positive cumulative abnormal returns.[6] They also examine which firm specific variables are significant determinants of the abnormal returns. Von Arronet, Källstrand and Tarnawski-Berlin (2003) compare announcement effects between sectors in Nordic countries.[7] Fritzell and Hansveden (2006) study the sample period 1986-2005, and find a negative CAR of around 2 percent on the event day.[8] Egerot, Hagman and Svensson (2009) use the sample period 1997-2008 and find a negative CAR for all their examined event window horizons.[9] Gustavsson and Lindström (2010) investigate which factors cause the decision of using underwriters.[10] Månsson and Rostedt (2010) analyse the effect of SEO announcements on returns depending on the purpose of the SEO, debt payback, acquisition, or increase of working capital, and find negative CARs for all purposes.[11]

To our knowledge, only one study with focus on comparing return properties for underwritten SEOs and non-underwritten SEOs has been made. Andersson and Söderberg (2007) studies the sample period 1986-2005, with focus on abnormal returns and the offering discount. The authors find that SEOs in general exhibits a negative average CAR of around 2 percent on the announcement day and a negative 1 percent for other horizons.[12] They also find that non-underwritten SEOs exhibit less negative average and median CAR than underwritten SEOs for all event window horizons. The authors also perform a cross-sectional analysis of the abnormal returns in order to determine which firm specific variables are significant factors for explaining CARs. The Andersson and Söderberg

[6] Malmström, K. and A. Nilsson, 2002, Annonseringseffekt av *nyemissioner* - En fallstudie på Stockholmsbörsen.
[7] Von Arronet, C., J. Källstrand, and M. Tarnawski-Berlin, 2003, Kursreaktioner på tillkännagivande av nyemission.
[8] Fritzell, M. and J. Hansveden, 2006, Stock Market Reactions and Offering Discounts of Swedish Equity Issues.
[9] Egerot, R., E Hagman, and M. Svensson, 2009, Deltagande I nyemission - en buy and hold-strategi.
[10] Gustavsson, M and P. Lindström, 2010, Garanter vid nyemissioner – förutsättningar och kostnader.
[11] Månsson, M. and C. Rostedt, 2010, Varning för ras – En studie av aktiemarknadens reaktion på nyemissionsbeskedet.
[12] Andersson, M.E. and S. Söderberg, 2007, Rights Issues in the Swedish Market, A Comparison between Insured and Uninsured Rights Issues.

research is very interesting since it is a predecessor to our analysis. However, the authors do not focus on a comparison regarding the variance. Our analysis, using the sample period 2006-2010, can be seen as a complementary study, with the additional feature of variance comparison.

2.2 The SEO issuing process

Since the issuing of new stock is a rather complicated and time consuming task for a company to undertake, a short introduction of the issuing process is initially presented.

First, there are different ways a company can formulate the share issue. It can choose to perform a directed share issue, or an issue with primary preferential rights. Directed share issues are typically targeted to a specific group of investors, often employees or institutions. Directed share issues are not analyzed in this study. In our study, only rights issues with primary preferential rights are analyzed, since it is the most commonly used flotation method in Sweden. Rights issues with primary preferential rights are directed to all existing shareholders, who are given rights in proportion to their existing amount of stock. In case not all subscription rights are used for subscription in the SEO, the access to the remaining subscription rights is decided by the subsidiary preferential right. If there is unsubscribed stock after both primary and subsidiary rights have been used, the rest is subscribed by underwriters if such has been contracted. The new shares are almost always offered at a discount to the current market price. The discount is set to encourage subscription in the SEO. One of the most extreme examples of subscription price discounts in Sweden is the Scandinavian Airlines, SAS, SEO in 2009, where new shares were offered to the market at a 90 percent discount.[13] In addition to the discount, SAS used underwriters to make sure the SEO would get fully subscribed. A large discount puts more value in the subscription right and causes a larger dilution of the stock price. Underwriters are subscribing directly to the issuing price stated in the SEO prospectus. This is beneficial to underwriters, since they receive a discount in addition to their underwriter compensation.

2.3 The Benefits of underwriting

The benefits of underwriting have generally been said to be:

[13] http://www.va.se/nyheter/nyemissioner-onodigt-dyrt-53775

1. To give managers a certain and stable environment to operate in.
2. To show existing shareholders, as well as the rest of the market, that the company's operations are of economic value, worth investing in.
3. To support the stock price and decrease the return variance during the period the SEO is performed.

Reason 1 is self-explanatory. If the company is guaranteed to obtain the capital it sought for, it does not have to devote any resources for analysis and formulation of back-up plans in the event of crisis, seek alternative means of financing, etc. Reason 2 argue that the presence of underwriters should confirm that the company's future business plans are of economic value. The reason for this is that before an underwriter agrees to provide a guarantee, a thorough due diligence is usually performed. If the underwriter finds the company's plans to be unprofitable, he will most likely not take the risk of providing a guarantee. The presence of underwriters can therefore strengthen confidence and encourage existing shareholders to participate in the SEO. Thus, incentives for excessive selling should be dampened. Reason 3 puts emphasis on stock price support. One of the biggest concerns for a company issuing new shares is the problem that arises if the stock price falls below the subscription price stated in the prospectus. The most famous case illustrating this problem is the Swedbank SEO in 2009, where the stock price fell below the subscription price during the period shortly after the SEO announcement. When this occurs, existing shareholders notice that they can buy the stock cheaper in the stock exchange rather than buying it through subscription in the SEO. Since it is now unprofitable to subscribe, shareholders therefore refrain from doing so. The consequence is that underwriters become forced to subscribe to their full share of stock at an unfavorable price. Since SEOs are rarely covered to 100 percent solely by underwriter agreements, a big fall in the stock price vastly increases the probability that the SEO will not be fully subscribed.

Although reason 1 is probably the main reason to why companies use underwriters, reason 3 is according to us the most interesting to investigate. The argument for that is that reason 1 and 2 are expected to ultimately show up as an effect in 3. The presence of underwriters should accordingly decrease uncertainty about the issuing company's future, which ceteris paribus, should lead to a decrease in return variance.

3. Theory

To be able to perform our analysis, a theoretical framework is established. The pecking order theory for raising capital and its extensions to rights issues is first examined. Then, a discussion about asset pricing models and their implications for event studies is provided.

3.1 The pecking order theory for raising capital

The pecking order theory was first proposed by Myers and Majluf (1984).[14] Their theory states that companies rank their means of financing in the following way:

1. Retained earnings
2. Bank loan financing
3. Issue of corporate bonds
4. Issue of new shares

Financing a project with retained earnings is the cheapest, simplest and thus most preferred method. Whether or not bank loan financing is preferred to the issuing of corporate bonds depends on a large number of parameters which are specific to each company. It is thus not possible to conclude than bank loans are always cheaper. Issuing of new shares is the least favorable option, since it is associated with the highest flotation costs. Flotation costs include all fees associated with the SEO, such as registration fees, advisory fees paid to investment banks, underwriter compensation, etc. The pecking order theory thus states that share issues should be avoided if the other means of financing are accessible. One can therefore argue that, in general, firms without access to better options, i.e. cheaper sources of capital, will choose to issue new equity.

In their 1984 paper, Myers and Majluf assume that a company faces a short-lived, but profitable, project opportunity which requires financing through a share issue. They further assume that managers have superior information about the company's intrinsic value, compared to other investors, and that they act in the best interest of existing shareholders. Managers will therefore decide not to issue new shares when the company is undervalued, since this will only dilute the share price further, making existing shareholders worse off

[14] Myers, S.C and N.S. Majluf, 1984, Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have

than before the offer. Myers and Majluf argue that a company will only issue new shares when managers perceive the company as overvalued. Eckbo and Masulis (1992) expand the pecking order theory by including an analysis of share issues under various flotation methods. The authors provide a theoretical framework for underwritten rights issues, non-underwritten rights issues and firm commitments. According to Eckbo and Masulis, all firms optimize their decision regarding a share issue based on the following decision rule: $b-(c+f)>0$. "Where b is the net present value of the project, c is the difference between the intrinsic value of the shares sold to outsiders and the shares market value conditional on the issue decision, and f is total flotation costs".[15]

According to Eckbo and Masulis, only firms with expected take-up level very close to 1 can perform a SEO without using underwriters. A high take-up level should signal high company quality and thereby less severe overvaluation, since existing shareholders find it attractive to subscribe in the SEO. In Eckbo and Masulis, non-underwritten SEOs are also found to be associated with significantly lower flotation costs. Therefore, non-underwritten SEOs should be expected to have less negative abnormal returns than underwritten SEOs.

Andersson and Söderberg (2007) provide a reversed argument. They argue that the use of an underwriter should signal that the company is less overvalued. The reason is that before an underwriter decides to provide a guarantee, a thorough due diligence is usually performed. If the underwriter finds the company to be overvalued, he will probably not be willing to provide a guarantee. Thus the presence of an underwriter are expected to serve as a certification of value and signal high company quality, meaning that abnormal returns for underwritten SEOs should be expected to be less negative than for non-underwritten SEOs.

[15] Eckbo, B.E. and R.W. Masulis, 1992, Adverse selection and the rights offer paradox.

3.2 Theoretical discussion about asset pricing models

To conduct an event study, one has to use an asset pricing model as framework for the empirical analysis. Most asset pricing models are built on the foundation that investors should only be compensated for exposure to non-diversifiable, systematic risk. We discuss the Capital Asset Pricing Model, CAPM, the Fama-French three-factor model, and the Arbitrage Pricing Theory, APT, before choosing the CAPM-model.

The CAPM model states that the expected return of an asset should be linearly related to its covariance with the market portfolio, according to equation 1:

$$[R_{it}] = \alpha_i + \beta_i [R_{mt}] + \varepsilon_{it} \qquad \text{(Eq.1)}$$

Where R_{it} is the excess return of a certain asset, i at time t, α_i is the regression intercept coefficient and β_i is the estimated relationship between the return on the individual asset, R_{it}, and the excess return on the market portfolio, R_{mt}.

The market portfolio is theoretically defined as the market value-weighted portfolio of all traded assets in the economy. Naturally, it is very difficult to observe and measure the return of the true market portfolio in practice. Researchers therefore often use the returns of a broad stock market index as a proxy for the market portfolio even if this is theoretically incorrect.

Eugene F. Fama and Kenneth R. French (1992)[16], found that beta was cross-sectionally statistically insignificant and proposed a three factor model with the following specification:

$$[R_{it}] = \alpha_i + \beta_i [R_{mt}] + \beta_{iSMB}[SMB] + \beta_{iHML}[HML] + \varepsilon_{it} \qquad \text{(Eq.2)}$$

Where R_{it} is the excess return of asset, i at time t, α_i is a regression coefficient, β_i is as before the estimated relationship between R_{it} and the excess return on the market portfolio, R_{mt}. SMB is the return on a factor mimicking portfolio constructed from small company returns minus big company returns. HML is the return on a factor mimicking portfolio

[16] Fama, E and K.R French, 1992, The cross section of expected stock returns.

constructed from companies with high book-to market ratios minus companies with low book-to-market ratios, and β_{iSMB} and β_{iHML} are the factor loadings for asset, i, on the SMB and HML portfolios, respectively.

One can also consider the Arbitrage Pricing Theory. The APT normally includes several systematic risk factors. For example Chen, Roll and Ross (1986) estimate the model:

$$R_{it} = \alpha_i + \beta_{iIP} IP_t + \beta_{iEI} EI_t + \beta_{iUI} UI_t + \beta_{iCG} CG_t + \beta_{iGB} GB_t + \varepsilon_{it} \quad \text{(Eq.3)}$$

Where *IP* is the percent change in industrial production, *EI* is the percent change in expected inflation, *UI* is the percent change in unexpected inflation, *CG* is the excess returns of long-term corporate bonds over long-term government bonds, and *GB* is the excess returns of long-term government bonds over T-bills.[17]

The unexplained part of the return is denoted as the residual and is defined as:

$$\varepsilon_{it} = [R_{it}] - \alpha_i + \beta_i [R_{mt}] \quad \text{(Eq.4)}$$

Clearly, the higher the explanatory power, measured as R^2 of the asset pricing model, the smaller the unexplained part of returns, and the higher the possibility of detecting the event's effect on return. To illustrate this, consider the case where the researcher use a poor performing asset pricing model with a low R^2. If a large residual is obtained, it will be difficult to tell whether this is due to the event or due to the poor performance of the asset pricing model. Thus, the goal should be to find an as good model as possible. However MacKinlay (1997) argues that the marginal explanatory power of additional factors to the market beta usually is quite low, implying that the gains of using multifactor models are limited.[18] The aim of this thesis is not to find the perfect asset pricing model. Therefore, the CAPM is used for the event study analysis.

[17] Bodie, Z., A. Kane and A.J. Marcus, 2005, *Investments, Sixth Edition*, McGraw-Hill, Singapore, p. 427
[18] MacKinlay, A. Craig, 1997, Event Studies in Economics and Finance.

3.3 Expected answers to stated hypotheses based on economic theory

As mentioned above, the pecking order theory implies that SEO announcements in general are related to company overvaluation. The answer to hypothesis 1 is therefore expected to be "yes", and that SEO announcements in general should be associated with negative abnormal returns, at least over short event window horizons. From economic theory, the answer to hypothesis 2 is not perfectly clear. However, empirical findings in both Eckbo and Masulis and Andersson and Söderberg suggest that the answer to hypothesis 2 also should be "yes", that non-underwritten SEOs have significantly less negative returns than underwritten ones. Regarding hypothesis 3, we have not been able to find an existing theory or empirical work describing the issue in the literature. However, one could argue that a SEO announcement in general is a complex process with many elements that can increase uncertainty about the company's future, and that this uncertainty would lead to an increase in return variance around the event date. The answer to hypothesis 3 is therefore expected to be "yes".

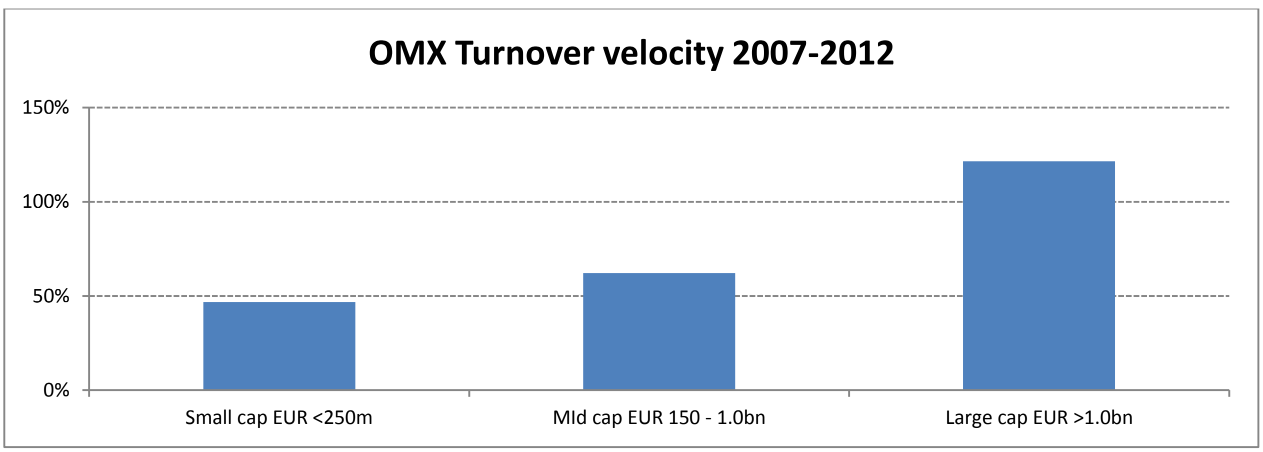
Regarding hypothesis 4, we have not been able to find an existing theory or empirical work. However, as described in the chapter "Benefits of underwriting", together with the option theory analogy, explained in the problem discussion, one could argue that underwriting should contribute to lowering the event window variance compared to non-underwritten SEOs, and that the answer to hypothesis 4 therefore also should be expected to be "yes".

4. Data and Variables

4.1 Data sample

In this event study, daily stock price data for 52 companies performing SEOs, listed on the OMX Stockholm Large-cap, Mid-cap and Small-cap exchanges, is used. The stock price data is gathered from Thomson Reuters Datastream. The sample period is January 2006 to December 2010. Stocks listed on smaller Swedish exchanges are not included, since small companies often are subject to various kinds of firm specific risks, such as liquidity risk and effects of non-synchronous trading.[19] By only including companies on larger lists, companies with high turnover velocity, spurious effects in return properties caused by infrequent trading are minimized. Turnover velocity is defined as the ratio between the Electronic Order Book (EOB) turnover of domestic shares and their market capitalization.[20] Below, a chart of the turnover velocity for the Swedish OMX exchange is presented.

Chart 1. Turnover velocity for the Swedish OMX Exchange.



Data: Nasdaq OMX

The sample size of underwritten SEOs is 45 and the sample size of non-underwritten SEOs is 7.

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[19] The effects of non-synchronous trading are well described in Asgharian, 2010.
[20] http://www.world-exchanges.org/statistics/statistics-definitions/turnover-velocity

4.2 Delimitations in the data sample

No SEOs with units has been included in the study. A unit is as a stock coupled with a subscription option. Units are not studied since this method differs from the traditional rights issue with primary preferential rights, and also due to the fact that units are a rather uncommon flotation method. No SEOs coupled with Greenshoe options are included, since these agreements unnecessarily complicate the analysis. No IPOs are included, due to the lack of available historical stock price data. No directed share issues are included, due to the fact that directed shares are not publicly traded in the stock exchange.

4.3 Variables

4.3.1 The risk free interest rate

The risk free interest rate used in this event study is the Swedish 90-day SSVX rate. On a daily basis, this rate is reported as a simple yearly interest rate. That is, the interest rate obtained by buying a 90-day SSVX four times without compounding it. To use this risk free rate in our CAPM-model it is necessary to transform the yearly 90-day SSVX rate into a daily risk free interest rate. The daily interest rate, R_f is calculated as:

$$R_f = 1 + r_{yearly}^{\ 1/360} - 1 \qquad (1)$$

4.3.2 Return variables

This event study is carried out using daily excess returns for individual assets and the market portfolio, respectively. The excess returns for the individual assets, R_i are calculated as:

$$R_i = R - R_f \qquad (2)$$

Where R is the observed daily return on asset, i and R_f is the risk free interest rate.

The excess return on the market portfolio, R_m is calculated as:

$$R_m = R - R_f \qquad (3)$$

Where R is the daily market return and R_f is the risk free interest rate. As proxy for the market portfolio we use the Stockholm OMXSPI Index.

4.4 Testing the variables for stationarity

Before estimating the regression model, it is important to first test both the dependent and explanatory variable for stationarity. Stationarity is important, because if one of the series in an equation is found to be non-stationary, we risk estimating a spurious regression relationship. [21] A random variable is said to be covariance-stationary, or weakly stationary, if it has the following properties:

$$1.\ E[Y_t] = \mu \quad \forall t$$

$$2.\ Var[Y_t] = \gamma_0 \leq \infty \quad \forall t$$

$$3.\ Cov[Y_t, Y_{t-h}] = \gamma_h \quad \forall t$$

This implies that:

1. The mean function should be constant and independent of time. No time-trend should be present in the data.

2. The variance should be finite and constant throughout the sample.

3. The autocovariance function should be independent of time. The covariance should depend only on the time lag, h and not the time period itself.

For all series in our data sample, the stationarity tests are carried out in EViews by running the Augmented Dickey-Fuller, ADF-test, with the specification:

$$\Delta Y_t = a_0 + a_1 t + \gamma Y_{t-1} + \sum \beta_i \Delta Y_{t-i} + \varepsilon_i \qquad \text{(Eq.5)}$$

Where EViews is set to automatically select the number of lagged values of ΔY_{t-i} based on the Schwarz information criterion. The null hypothesis for the ADF-test is:

[21] Information about spurious regressions can be found in Granger and Newbold, 1974, Spurious regressions in econometrics, *Journal of Econometrics 2*, p 117

$$H_0 = \text{Unit root}$$

$$H_1 = \text{No unit root}$$

The t-statistics and the corresponding p-values are presented in table 1 in the appendix. It is observed that the null hypothesis is rejected for all series in the sample. Thus, it is concluded that all dependent and independent variable series are stationary and that we can proceed with estimation of the regression model.

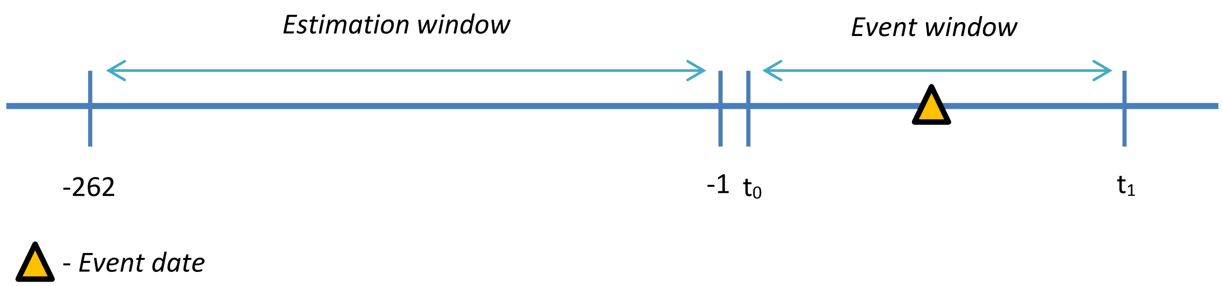
5. Method

The empirical research is carried out using OLS-regressions based on the CAPM-model. First, the variables used in the regression model are tested for stationarity using the ADF-test procedure described above. After confirmation of stationarity, estimation of the regression model is performed. The Gauss Markov assumptions of a linear regression model are tested using appropriate econometric tests. For each event window horizon, cumulative abnormal returns, CARs, are calculated and aggregated over securities. The aggregated average CAR for each horizon, $\overline{CAR}$ is then tested for significance using a J-test. For the variance tests, it is first tested whether there is a significant increase in the return variance during the month following the SEO announcement compared to the variance prevailing during two months before the announcement. This is done with a variance ratio F-test. It is then investigated whether there is a significant difference in event window variance between underwritten SEOs and non-underwritten SEOs. In order to perform this analysis, the full sample of companies is sorted into two portfolios, one with underwritten and one with non-underwritten SEOs. The variance ratio between these two portfolios is tested for significance using an F-test.

5.1. Event study methodology

An event study consists of an estimation window, where model parameters are estimated, and an event window where the effect of the event is analyzed. As noted above, we follow the conventional event study methodology outlined in MacKinlay (1997). To illustrate our event study methodology we present figure 1.

Figure 1: Event study methodology



5.2 Estimation Window

Our estimation window consists of 262 trading days and is selected as one year before the first date in the event window. For the 262 trading days, the daily return for each individual asset, i and the corresponding daily market return are calculated according to the formulas:

$$R_{it} = \left[\frac{p_{it}}{p_{it-1}} - 1 \right] \text{and, } R_{mt} = \left[\frac{p_{mt}}{p_{mt-1}} - 1 \right] \qquad (4)$$

To obtain beta estimates for each company, the following regression is estimated:

$$[R_{it}] = \alpha_i + \beta_i [R_{mt}] + \varepsilon_{it} \qquad \text{(Eq.6)}$$

The result is 52 beta coefficients, which are all found to be positive and significant on the 5 percent significance level. The beta coefficients are inserted in the model for normal returns, (Eq. 7).

5.3 Event Window

Our event window is one month long and stretches from two weeks before to two weeks after the announcement date. For this period we calculate the individual stock returns using the formula 4 above, as well as the so called normal returns and abnormal returns. The event window horizons are one day, three, seven, 15 and 29 days long, respectively. The three day event window is measured as the announcement date $\pm$ 1 trading day. The seven day event window is measured as the event day $\pm$ 3 trading days, and so forth.

5.4 Measuring normal returns

The normal return is the return of a certain asset, i that would have been expected if the event did not take place, i.e. the return under "normal conditions", when the asset moves with the market. To calculate the normal return, R_{nit} for asset i at time t, the market model is used:

$$R_{nit} = \beta_i [R_{mt}] \qquad \text{(Eq.7)}$$

where β_i is the estimated beta coefficient for a certain asset, i, obtained from regressions in the estimation window and R_{mt} is the daily market return.

5.5 Measuring abnormal returns

The abnormal return, AR_{it} is defined as the return in excess of what is predicted by the CAPM model. AR_{it} is calculated as:

$$AR_{it} = R_{it} - R_{nit} \qquad (5)$$

Where R_{it} is the observed daily return on asset i, and R_{nit} is the normal return.

5.6 Diagnostic checking of the regression model

After estimation of the regression model, it is obligatory to perform diagnostic checking of the residuals. It is needed to test if the Gauss Markov assumptions of a linear regression model hold. If the Gauss Markov assumptions are violated, the OLS estimator will no longer be the best linear unbiased estimator (BLUE estimator) of β_i. The OLS estimator will still be unbiased, but not efficient. If OLS is not BLUE, the variables will have to be transformed before applying OLS again. The Gauss Markov assumptions are:

$$E[\varepsilon_t] = 0$$

Heteroskedasticity: $Var[\varepsilon_t] = \sigma^2$

Autocorrelation: $Cov[\varepsilon_i, \varepsilon_j] = 0 \ \forall i \neq j$

The residuals are also tested for normality using the Jarque-Bera test. If the residuals are not normally distributed, inference based on the standard F-tests and t-tests will not be valid.

5.7 Testing for Heteroskedasticity

From each of our original regression equations the residuals are obtained and stored. For each residual series, ε_i, tests for heteroskedasticity are performed using White's test in EViews. White's test is chosen since it has higher power against a general structure of heteroskedasticity, while the Breusch-Pagan test has higher power when the structure of the heteroskedasticity is known.[22]

The White's test procedure is carried out by estimating the following auxiliary regression:

$$\varepsilon_i^2 = \alpha_0 + \alpha_1 R_i + \alpha_2 R_i^2 + \nu_t \qquad \text{(Eq.8)}$$

The test statistic, $N * R^2$ is asymptotically χ_p^2 distributed with p degrees of freedom, where N is the sample size, R^2 is the coefficient of determination from the auxiliary regression and p is the number of regressors in the auxiliary regression, excluding the constant. The null hypothesis for White's test is:

$$H_0 = \text{Homoskedasticity}$$

$$H_1 = \text{Heteroskedasticity}$$

The results from the heteroskedasticity tests are presented in table 1 in the appendix. The null hypothesis of homoskedasticity is rejected for 10 out of 52 companies. This is a problem, since it indicates that the regression model is not satisfactorily specified for these companies.

5.8 Testing for Autocorrelation

All residual series are tested for autocorrelation using the Breusch-Godfrey LM-test in Eviews. The auxiliary regression is estimated according to:

$$\varepsilon_i = \alpha_0 + \gamma_1 R_i + \alpha_1 \varepsilon_{i-1} + \alpha_2 \varepsilon_{i-2} + \alpha_3 \varepsilon_{i-3} + \alpha_4 \varepsilon_{i-4} + \alpha_5 \varepsilon_{i-5} + \alpha_6 \varepsilon_{i-6} + \nu_t \qquad \text{(Eq.9)}$$

[22] Murray, M.P, 2006, *Econometrics, A modern introduction*, Pearson Education Inc.

[23] MacKinlay, Craig. A, 1997, Event Studies in Economics and Finance.

The residuals are regressed against a constant, the regressor and six lagged values of the residuals. The test statistic, $N * R^2$ is asymptotically χ_p^2 distributed with p degrees of freedom, where N is the sample size, R^2 is the coefficient of determination from the auxiliary regression and p is the number of lagged residuals in the auxiliary regression. The null hypothesis for the LM-test is:

$$H_0 = \text{No autocorrelation in the residuals}$$

$$H_1 = \text{Autocorrelation in the residuals}$$

The observed test statistics and their corresponding p-values are presented in table 1 in the appendix. The null hypothesis of no autocorrelation is rejected for 16 out of 52 companies. This indicates that either the dependent variable, the independent variable or both exhibit problems with autocorrelation.

5.9 Jarque-Bera normality test

The residuals are tested for normality using the Jarque-Bera test. The Jarque-Bera test is constructed to detect deviations from the normal distribution and the test statistic is calculated as:

$$JB = N * \left[\frac{S^2}{6} + \frac{(K-3)^2}{24} \right] \tag{6}$$

Where N is the sample size, S is the sample skewness and K is the sample kurtosis. The JB-test statistic is χ^2 distributed with 2 degrees of freedom. The null hypothesis for the JB-test is:

$$H_0 = \text{Data is normally distributed}$$

$$H_1 = \text{Data is not normally distributed}$$

The test statistics and their corresponding p-values are presented in table 1 in the appendix. According to the Jarque-Bera test, the null hypothesis of normally distributed residuals is rejected for 50 out of 52 companies.

5.10 Correcting for heteroskedasticity and autocorrelation

For companies exhibiting either heteroskedasticity or autocorrelation, the regressions are re-estimated using the option of Newey-West heteroskedasticity and serial correlation-consistent standard errors in EViews. This procedure changes the standard errors, and therefore the t-statistics, quite significantly, however not enough to change the significance of the variables. The Newey-West standard errors support valid inference with OLS.

5.11 Testing the significance of average CAR

For each horizon, cumulative abnormal returns are aggregated through securities and an average CAR, $\overline{CAR}$, is calculated as:

$$\overline{CAR} = \frac{1}{N}\sum_{i=1}^{N} CAR_i \tag{7}$$

In order to make an inference about whether or not $\overline{CAR}$ is significantly different from zero, it is necessary to calculate the variance of $\overline{CAR}$. In practice, because the true variance of the individual CARs, $\sigma^2_{CAR\,i}$ is unknown, an estimator must be used to calculate the variance of the abnormal returns. The sample variance of $\sigma^2_{CAR\,i}$ from the market model regression in the estimation window is an appropriate choice.[23] The individual residual variances from the estimated market model regressions are aggregated and the variance of $\overline{CAR}$ is calculated as:

$$Var\left[\overline{CAR}\right] = \frac{1}{N^2}\sum_{i=1}^{N} \sigma^2_{CAR_i} \tag{8}$$

For each horizon, it is tested if $\overline{CAR}$ is significantly different from zero using the test statistic:

$$J = \frac{\overline{CAR}}{\sqrt{Var\left[\overline{CAR}\right]}} \overset{a}{\sim} N(0,1) \tag{9}$$

The J-test statistic is asymptotically standard normal distributed.

[23] MacKinlay, Craig. A, 1997, Event Studies in Economics and Finance.

5.12 Testing for equality of sample means

To test our hypothesis 2, whether or not the returns in the portfolio of underwritten SEOs are significantly different from the portfolio of non-underwritten SEOs, a t-test for equality of sample means is performed. The test statistic is calculated as follows:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \tag{10}$$

Where $\bar{x}_1$ and $\bar{x}_2$ are the two sample means, s_1^2 and s_2^2 are the two sample variances, and n_1 and n_2 are the two sample sizes. Since our sample sizes are not large enough to be approximated by the normal distribution, the t-distribution is used. Also, since the population variances are unknown and not assumed to be equal, a common number of degrees of freedom for the test, v has to be calculated as:[24]

$$v = \frac{\left[\left(\frac{s_1^2}{n_1}\right) + \left(\frac{s_2^2}{n_2}\right)\right]^2}{\left(\frac{s_1^2}{n_1}\right)^2 /(n_1 - 1) + \left(\frac{s_2^2}{n_2}\right)^2 /(n_2 - 1)} \tag{11}$$

The null hypothesis for this test is:

$$H_0 : \bar{x}_1 - \bar{x}_2 = 0$$

Versus the alternative hypothesis:

$$H_1 : \bar{x}_1 - \bar{x}_2 \neq 0$$

The decision rule is to reject H_0 if: $t < -t_{v,\alpha/2}$, or if $t > t_{v,\alpha/2}$

[24] Newbold, P., W.L. Carlsson and B. Thorne, 2006, *Statistics for business & Economics, 6th Edition*, p.378.

5.13 Variance tests

To answer our hypothesis 3, i.e. to determine whether a SEO announcement in general has an effect on the return variance of the issuing company, a variance ratio test is conducted. The ratio between the return variance two months before the event window versus the variance for the month following the announcement day is studied. For all assets, i, the variance ratio, VR_i, is calculated as:

$$VR_i = \frac{S_x^2}{S_y^2} \sim F_{n_x-1, n_y-1, \alpha} \tag{12}$$

where S_x^2 is the largest of the two sample variances. For this F-test to be correctly executed, it is required to organize the variance ratio with the larger variance in the numerator and the smaller variance in the denominator. [25]

The null hypothesis of the F-test is:

$$H_0 : S_x^2 = S_y^2$$

Versus the alternative hypothesis:

$$H_1 : S_x^2 > S_y^2$$

It is thus a one-sided test. The decision rule is to reject H_0 if: $\frac{S_x^2}{S_y^2} > F_{n_x-1, n_y-1, \alpha}$.

To test hypothesis 4, a variance ratio test is again performed. The test procedure is the same as described for hypothesis 3 but using the samples underwritten and non-underwritten SEOs. Due to the absence of event window clustering, the portfolio variance can be calculated using simple aggregation as described in Eq. 8.[26]

[25] Ibid, p. 391.

[26] The calculation of CAR variance when event windows are clustered are described in MacKinlay, 1997, Event Studies in Economics and Finance.

5.14 Reliability

The SEO prospectuses were requested from the Swedish Financial supervisory authority, Finansinspektionen. Since the prospectuses are approved by the same authority, errors due to incorrect prospectus information are unlikely. Relevant information has been carefully extracted from the prospectuses. After information extraction, our study is strictly quantitative, which would facilitate a replication made by other researchers. Our event study methodology follows the conventional standard in the literature, which is outlined in MacKinlay (1997).

Since our delimitation process result in a sample solely containing rights issues with primary preferential rights, the risk of making analysis based on other flotation methods is minimized. The fact that our sample period covers a severe financial crisis may lead to more negative, and more volatile returns than what would be found by other researchers for a different sample period.

5.15 Validity

As with any regression coefficient, the beta coefficients estimated in the regression model are measured with error. Since all beta coefficients are still found to be significant on the 5 percent significance level, this should be considered to be of minor significance. Due to the relatively strict delimitations, total sample size is fairly small, 52 companies. The sample size of underwritten SEOs is 45, and the sample size of non-underwritten SEOs is only 7. The small sample size of non-underwritten SEOs decreases the validity of inference for that sample. However, both our samples can be seen as extension to the sample studied in Andersson and Söderberg, and in that context, this problem becomes less severe.

The event study estimations are based on the CAPM-model only. The CAPM is a linear model specification and is thus restricted to measuring a linear relationship between the asset and the source of systematic risk. It is possible that a more complex model can provide a better fit to the data. For example, using the Fama-French three factor model or an APT model could lead to different results.

The CAPM-model implicitly assumes that stock returns are normally distributed. Our individual company returns are, as results show, found not to be normally distributed, while the market returns are found to be normally distributed. The assumption of normally distributed asset returns is primarily important for the correctness of aggregated portfolio risk measures. For regression model estimation purposes, used in this thesis, the assumptions of normality is not necessary for the original CAPM-equation to be valid as a regression model. The CAPM is still the estimated relationship between the individual asset and the market return. The validity of the conducted F-tests is somewhat diminished due to the fact that F-tests in general are quite sensitive to the assumption of normality[27], which is a problem since our data shows indications of non-normality.

[27] Newbold, P., W.L. Carlsson and B. Thorne, 2006, *Statistics for business & Economics, 6th Edition*, p. 390.

6. Results of the event study

6.1 Results regarding returns, full sample

When studying the full sample including all SEOs, a significant negative average CAR of -2.5 percent and a negative median CAR of -3.5 percent are observed for horizons one and three. This is in line with several previous studies examining announcement effects of SEOs. In general, our average CARs are found to be slightly more negative than what is presented in Andersson and Söderberg (2007). This result might arise due to the fact that our sample period includes a severe financial crisis. It can also arise due to a smaller total sample size. Our results are summarized in table 2 below.

Table 2. Average and median CAR, full sample.

	All SEO's		Non underwritten SEO's		Underwritten SEO's	
Horizon	**Average CAR**	**Median CAR**	**Average CAR**	**Median CAR**	**Average CAR**	**Median CAR**
1	-0,02597	-0,03513	0,01133	-0,03299	-0,03177	-0,03727
3	-0,02479	-0,03426	0,05147	0,01294	-0,03666	-0,05354
7	-0,01781	-0,02499	0,04728	0,02924	-0,02793	-0,03125
15	-0,01641	-0,02551	0,00658	-0,03221	-0,01998	-0,01881
29	-0,01687	-0,00841	-0,04278	0,09770	-0,01246	-0,00841

The focus is preferred to be on median CAR, since the data sample contains large positive and negative outliers in the CARs. However, to test for the significance of abnormal returns using the J-test procedure described above, one has to use average CAR, $\overline{CAR}$.

The results from the significance tests are presented in table 3 below.

Table 3. Significance tests of average CAR.

Test if average CAR is significant				
Horizon	**Average CAR**	**Standard deviation**	**J-test statistic**	**p-value**
1	-0,02597	0,00490	-5,30111	0,00000
3	-0,02479	0,00849	-2,92177	0,00559
7	-0,01781	0,01296	-1,37391	0,15525
15	-0,01641	0,01897	-0,86462	0,27452
29	-0,01687	0,02638	-0,63941	0,32519

For horizon one and three, $\overline{CAR}$ is found to be significant on all commonly used significance levels. For horizons seven, 15 and 29, $\overline{CAR}$ is found to be not significantly different from zero on all commonly used significance levels. This is due to the larger standard deviation in returns for the longer horizons. It is thus noticed, that for longer horizons, it becomes more difficult to distinguish the impact of the event. This is in line with the efficient market hypothesis, which states that new information rapidly should be incorporated in the stock price.

6.2 Results regarding returns, sub sample

When studying the returns in the groups of underwritten and non-underwritten SEOs separately, it is observed that the average CAR for non-underwritten SEOs is higher than for underwritten SEOs for all horizons except for CAR29. The median CAR for non-underwritten SEOs is higher for all horizons except for CAR15. The difference in returns between the two groups is tested for statistical significance using the test procedure outlined in (10). The results are presented in table 4 below.

Table 4. Test for the difference of sample means.

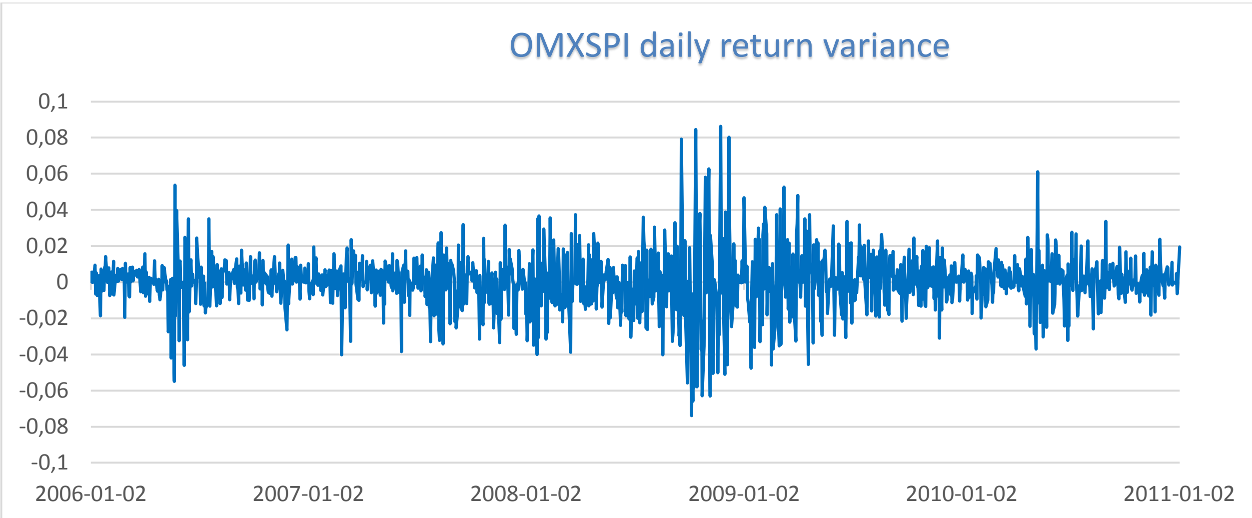
Horizon	x1-x2	denominator	t-statistic	p-value
1	-0,04310	0,01625	-2,65182	0,02917
3	-0,08812	0,02139	-4,12005	0,00334
7	-0,07521	0,02644	-2,84515	0,02164
15	-0,02656	0,03198	-0,83049	0,43035
29	0,03031	0,03771	0,80375	0,44477

It is observed that there is a significant difference in returns for horizons one, three and seven, while the difference for horizons 15 and 29 is found to be insignificant.

6.3 Results regarding variance, full sample

For 40 out of 52 companies, the event window variance is found to be higher than the estimation window variance. 30 of these 40 variance ratios are found to be significant. For four companies the estimation window variance is larger than event window variance. For 18 companies, the variance ratio is not large enough to be significant on the five percent level.

Both the estimation and event window variances for individual companies are likely to be affected by the overall market variance prevailing in each time period, respectively. Below, a chart of the market returns for the OMXSPI index is presented. An increase in return variance is observed in years 2008 and 2009, a period when the global financial crisis increased uncertainty in the financial markets.



The majority of the observations with higher event window variance are located in the period from February 2008 to June 2009, a period with increasing market return variance.

For the four companies with lower estimation window variance, a very clear trend can be observed. These observations are located between July 2009 and September 2009, a period characterized by decreasing market return variance.

6.4 Results regarding variance, sub samples

The comparison between the 29 day event window variance for the sample of underwritten SEOs and the 29 day event window variance for non-underwritten SEOs is considered below.

Table 5. Test for significant difference in return variance.

Event window variance			
	Variance	**F-ratio**	**P-value**
Underwritten SEO's	0,003390968	1,499381438	0,301393281
Non-underwritten SEO's	0,002261578		

It is observed that the event window variance ratio is not statistically significant on all commonly used significance levels. The variance for the portfolio of non-underwritten SEOs is lower than the variance for underwritten SEOs.

7. Analysis and discussion

7.1 Answers to hypotheses 1-4.

H1: The answer to hypothesis 1 is "yes" for short horizons up to three days, and "no" for horizons of seven days and longer. There is a significant negative announcement effect on the event date.

H2: The answer to Hypothesis 2 is "yes". The difference is significant for horizons one, three and seven, while insignificant for horizon 15 and 29.

H3: The answer to hypothesis 3 is "yes". There is in general an increase in return variance for the issuing companies during the month following the SEO announcement.

H4: The answer to hypothesis 4 is "no". In the studied sample, there is no indication that underwritten SEOs have lower event window return variance than non-underwritten SEOs.

7.2 Results in line with theory?

The result in hypothesis 1 is in line with the pecking order theory developed by Myers and Majluf (1984). The result in hypothesis 2 is in line with empirical findings in both Eckbo and Masulis (1992) and Andersson and Söderberg (2007). Eckbo and Masulis's theory, that a non-underwritten SEO is a signal of relative company quality, seems to better explain the results than the theory of underwriters being certifiers of value. The results in hypothesis 3 provide support for the argument that a SEO is an event that increases uncertainty and thereby return variance. The results in hypothesis 4 contradict our theoretical expectation that underwritten SEOs should have lower event window variance than non-underwritten ones.

7.3 Concluding discussion

Our results do not indicate that underwritten SEOs have better return properties than non-underwritten SEOs. On the contrary, non-underwritten SEOs seems to perform better than underwritten SEOs, since they are associated with less negative returns coupled with a lower variance. On a purely return based perspective, one can therefore not see any clear benefits of underwriting.

It is problematic, however, to make the causal statement that the inferior return properties of underwritten SEOs are due to the underwriting itself, and not some other underlying firm specific variable or property not included in the analysis. Since no deep analysis trying to determine or find support of causality is performed, this thesis cannot conclude that the inferior return properties are directly *caused* by the underwriting. It is merely an observation, that in the studied sample, the group of underwritten SEOs exhibit worse performance. Underwriting still has a purpose and function for issuing companies despite that underwritten SEOs, in our sample, the sample in Eckbo and Masulis as well as in the sample studied by Andersson and Söderberg, fail to show any advantages from a return based perspective.

Our findings are in line with the ones in Andersson and Söderberg (2007), that Swedish investors seem to devote little importance to whether a SEO is underwritten or not. This might be because of various reasons of which some are hypothesized below.

- During the last 10 years, underwritten SEOs have become more or less standard. The market might therefore no longer distinguish whether a SEO is underwritten or not.
- The underwriter obligations are typically not secured by any collateral, which is impairing the quality of the underwriting.
- The insecurity about whether the underwriter agreement is legally binding or not is also impairing the quality of underwriting.

Based on the findings of our event study analysis, we could suggest a decreased dependence on underwriters, a downward pressure on underwriter compensation, or making the underwriter compensation conditional on the ex post actual subscription. However, without consideration of other research, the results from our thesis should not alone be used as guidance for decisions. It is important to note that all matters regarding underwriting are ultimately up to legislators and the market to decide.

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9. Appendix

Table 1. Results of stationarity tests and residual diagnostic tests.

	Stationarity tests				**Residual diagnostics tests**					
	Y-variables		X-variables							
	ADF test		**ADF test**		**White's test**		**LM test**		**Jarque-Bera test**	
Company	test, Stat	p-value	test, Stat	p-value	test, Stat	p-value	test, Stat	p-value	test, Stat	p-value
1	-17,17249	0,00000	-7,54907	0,00000	8,89388	0,01170	5,46270	0,48600	98,54457	0,00000
2	-15,20404	0,00000	-7,53886	0,00000	0,18962	0,90950	8,44601	0,20720	24542,02000	0,00000
3	-17,43522	0,00000	-7,71002	0,00000	2,96026	0,22760	13,60355	0,03440	51,68928	0,00000
4	-15,52800	0,00000	-7,87257	0,00000	3,58365	0,16670	6,07752	0,41460	103,07250	0,00000
5	-17,37565	0,00000	-16,32519	0,00000	2,71169	0,25770	7,52543	0,27500	144,26740	0,00000
6	-13,31898	0,00000	-13,46220	0,00000	0,41936	0,81080	10,03079	0,12340	99539,99000	0,00000
7	-19,23140	0,00000	-16,49177	0,00000	0,46856	0,79110	16,02031	0,01360	4,72213	0,09432
8	-17,80821	0,00000	-18,13113	0,00000	7,89242	0,01930	7,30073	0,29390	9,10929	0,01052
9	-14,33289	0,00000	-17,90355	0,00000	0,95934	0,61900	15,49655	0,01670	19477,11000	0,00000
10	-17,93728	0,00000	-18,33084	0,00000	0,56363	0,75440	2,53536	0,86450	4187,52000	0,00000
11	-18,97921	0,00000	-18,13971	0,00000	0,88222	0,64330	11,48128	0,07460	36,72981	0,00000
12	-16,58035	0,00000	-17,82156	0,00000	0,83267	0,65950	5,32295	0,50310	807,70210	0,00000
13	-17,69596	0,00000	-18,37830	0,00000	1,20977	0,54610	5,40219	0,49340	15325,68000	0,00000
14	-7,05281	0,00000	-17,33349	0,00000	4,02436	0,13370	32,99988	0,00000	4058,38900	0,00000
15	-16,19099	0,00000	-16,07569	0,00000	16,69936	0,00020	12,76404	0,04690	369,26370	0,00000
16	-15,34906	0,00000	-16,03335	0,00000	1,36470	0,50540	7,30552	0,29350	38,33084	0,00000
17	-13,35954	0,00000	-15,88696	0,00000	25,17455	0,00000	7,62981	0,26650	10,48072	0,00530
18	-15,46424	0,00000	-15,88696	0,00000	6,65621	0,03590	3,56038	0,73590	195,21160	0,00000
19	-19,46074	0,00000	-15,50922	0,00000	3,16851	0,20510	15,12396	0,01930	226,77460	0,00000
20	-14,28410	0,00000	-15,56178	0,00000	0,80618	0,66830	7,68127	0,26240	1914,30500	0,00000
21	-16,10920	0,00000	-15,52362	0,00000	4,20144	0,12240	6,10593	0,41140	2041,88300	0,00000
22	-14,10081	0,00000	-15,63904	0,00000	10,49431	0,00530	9,32934	0,15590	6,21957	0,04461
23	-15,57538	0,00000	-15,63904	0,00000	0,57249	0,75110	8,77108	0,18690	590,20440	0,00000
24	-12,86633	0,00000	-15,56020	0,00000	0,83032	0,66020	12,25342	0,05650	7021,90000	0,00000
25	-13,00267	0,00000	-15,60112	0,00000	0,01431	0,99290	17,06554	0,00900	50,12715	0,00000
26	-16,70288	0,00000	-15,63084	0,00000	3,99800	0,13550	6,38849	0,38110	6,67533	0,03552
27	-16,48134	0,00000	-15,55936	0,00000	4,03773	0,13280	5,49682	0,48180	5,92539	0,05168
28	-13,45523	0,00000	-15,57228	0,00000	0,65302	0,72140	12,00451	0,06190	428,08680	0,00000
29	-15,35867	0,00000	-15,57087	0,00000	10,12140	0,00630	7,69030	0,26170	688,27230	0,00000
30	-16,04335	0,00000	-12,83800	0,00000	1,96905	0,37360	3,81892	0,70120	343,88690	0,00000
31	-19,99514	0,00000	-12,50734	0,00000	11,95478	0,00250	28,90608	0,00010	1514,80800	0,00000
32	-19,48523	0,00000	-15,43956	0,00000	1,58548	0,45260	17,48070	0,00770	121,84570	0,00000
33	-14,83720	0,00000	-12,50734	0,00000	0,43474	0,80460	3,09008	0,79750	6284,65000	0,00000
34	-13,92326	0,00000	-12,50734	0,00000	21,72374	0,00000	9,84333	0,13140	14,68962	0,00065
35	-13,02645	0,00000	-15,41343	0,00000	8,69064	0,01300	6,50530	0,36900	204,65700	0,00000
36	-16,67347	0,00000	-15,41343	0,00000	1,60538	0,44810	10,65013	0,09980	404,85750	0,00000
37	-18,71350	0,00000	-16,41590	0,00000	0,13258	0,93590	16,34034	0,01200	220,64260	0,00000
38	-15,37469	0,00000	-16,81921	0,00000	0,99532	0,60800	7,31399	0,29280	1555,34800	0,00000
39	-19,47260	0,00000	-16,47436	0,00000	1,34439	0,51060	25,83152	0,00020	571,22720	0,00000
40	-13,90650	0,00000	-16,62056	0,00000	1,86788	0,39300	17,12561	0,00880	5256,56600	0,00000
41	-18,48700	0,00000	-16,62056	0,00000	2,38696	0,30320	5,87909	0,43690	303,72430	0,00000
42	-14,07287	0,00000	-17,01464	0,00000	0,81828	0,66420	13,28656	0,03870	294,43690	0,00000
43	-17,78515	0,00000	-17,01904	0,00000	0,21454	0,89830	6,41041	0,37880	369,87880	0,00000
44	-16,63069	0,00000	-16,39427	0,00000	3,09714	0,21260	2,10809	0,90950	249,79950	0,00000
45	-20,56727	0,00000	-16,67079	0,00000	0,02562	0,98730	15,41770	0,01720	412,60950	0,00000
46	-16,89607	0,00000	-16,38190	0,00000	0,31649	0,85360	5,47041	0,48500	2018,84000	0,00000
47	-17,40089	0,00000	-16,38190	0,00000	1,80802	0,40490	15,84262	0,01460	613,67020	0,00000
48	-18,51176	0,00000	-16,31446	0,00000	0,16874	0,91910	15,64998	0,01580	56,21456	0,00000
49	-14,96081	0,00000	-16,58514	0,00000	1,65086	0,43800	9,33005	0,15580	208,99330	0,00000
50	-17,36673	0,00000	-16,63086	0,00000	0,26921	0,87410	4,35965	0,62810	13388,26000	0,00000
51	-15,17500	0,00000	-16,63086	0,00000	3,12228	0,20990	6,18525	0,40280	117,30810	0,00000
52	-14,35466	0,00000	-16,80446	0,00000	0,60265	0,73980	6,57050	0,36240	7773,06100	0,00000