LUND UNIVERSITY
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Post-SEO Performance in the Recovery Phase of the Financial Crisis

- Announcement Effects and Long-Run Performance of Swedish Firms

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Abstract

This thesis focuses on seasoned equity offerings and aims to examine announcement effects and long-run performance of SEO firms on the Swedish stock exchanges, during the recovery phase of the global financial crisis. Also, an OLS regression is run in order to explain post-SEO performance using the independent variables book-to-market ratio, market capitalization and the firms' number of SEOs during the time period.

The study takes on a deductive approach measuring and analyzing SEO firms' performance, meaning that hypotheses are deduced based on earlier research and theory. Earlier studies and theory generally suggest negative announcement effects, along with long-run underperformance of firms that issue seasoned equity.

The sample consists of Swedish firms listed on NASDAQ OMX Stockholm and First North. More specifically, the sample includes a total of 123 observations measuring announcement effects and 81 observations measuring long-run performance. The results generated by the study show clear signs of negative announcement effects and long-run underperformance for Swedish SEO firms during the time period. However, long-run underperformance cannot be concluded for SEO firms listed on First North during the time period. Moreover, the independent variable for number of SEOs is negatively significant for firms listed on NASDAQ OMX Stockholm. The results suggest that signaling theories, which say that an SEO has a negative impact on firm value, are applicable on the Swedish stock markets. Furthermore, interpreting the results hint that the markets have not been efficient in terms of initial re-evaluation of stock prices after information of SEO announcements.

Keywords: Seasoned Equity Offering, SEO, Announcement Effects, Long-Run Performance, Event Study, Cumulative Abnormal Return, Market Efficiency, Swedish Stock Markets.

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1 Introduction

This chapter aims to give the reader an introduction to the subject that the thesis covers. The chapter begins with a background and thereafter continues with a problem discussion. Furthermore, the chapter describes the research purpose, which is summed up by stating the research questions of the study. Lastly, research limitations, definitions of important terms, and the outline for the rest of the thesis is provided.

1.1 Background

In September 2008, the fourth-largest investment bank in USA, Lehman Brothers, filed for bankruptcy. The financial crisis escalated and the panic in the financial markets multiplied. That being said, corporations' access to the debt markets became more complicated and firms were to a lower extent able to trust borrowing as an external financing source (Economist.com, 2013). This reality for corporations spread worldwide with the global financial crisis. Furthermore, the crisis had a substantial negative impact on GDP, which in turn hints that firms in general would realize increased difficulties to generate internal funds. Thus, the arising complexity in the debt market, along with generally decreased cash inflows, oftentimes left companies to rely on the equity markets to raise capital. Moreover, in 2009 the European Commission flagged for short-run losses and medium- to long-run uncertainties regarding the recovery of the crisis. They forecasted investments to decline by around ten percent in 2009 in the Eurozone (European Commission, 2009). The expanding uncertainties and declining investment forecasts were going to affect investor confidence in the stock market during the coming years (Vigna, 2014). In other words, firms experienced an increased need of equity, which coincided with uncertainties among investors. This, in turn, would potentially lead to spectacular years in the equity markets following the global crisis.

Sweden, as a member of OECD and EU-27, is generally considered a healthy economy in terms of GDP per capita, productivity and inflation (moodys.com, 2014). Also, Sweden has showed historically that it is able to recover from crises, and quickly retain higher growth

rates than pre-crisis levels (European Commission, 2009). Thus, Sweden can be viewed as an indicator of strong performance for a developed economy. An additional indicator of recent strong performance is that the number of Swedish seasoned equity offerings reached a record high level in 2013, which proves that investors' risk appetite for Swedish firms has recovered after the latest financial crisis (di.se, 2014). Therefore, performance of the Swedish equity markets is of important interest for several parties within the Eurozone and other developed markets.

In summary, the global financial crisis complicated the equity markets, potentially changing the assumptions and theories of future stock return. Therefore, this thesis evaluates stock return for a firm post SEO, which is one measure of equity market performance in total. The study focuses on firms listed on the Swedish equity markets, which represent strong performance in the recovery phase of a crisis.

1.2 Problem Discussion

Earlier research has shown that firms performing Seasoned Equity Offerings (SEOs) significantly underperform. Different studies have separately showed that underperformance occur both short-term after announcement relative the firm's own historical "normal" return, and long-run relative the market. In an investor perspective, it is important that a study includes not only firm performance relative its own historical performance, but also performance relative the market, which in this study is represented by a stock index. Although an economic raw return is positive for investors, it is more relevant to measure performance compared to an index. This is due to rational investors' desire to always invest in assets generating the highest return, given their risk appetite. If an individual stock's return does not beat the generally less risky market return, it is considered an underperformance.

Historically, several methods have been used to analyze firm performance, but it is generally explained by the same theories. Performance is usually measured with changes in the market value of the stock. Mikkelson and Partch (1986) and Masulis and Korwar (1986) are examples of early studies showing that the market responds negatively to a firm's announcement of an SEO. These results are partly explained by the *signaling model* and the *adverse selection model*[1], suggesting that the firm's real reason of issuing equity is poor confidence in future

[1] Both models defined in section *2.5.2 Signaling with SEOs*.

cash flows and that the stock is overvalued, respectively. This signaling goes in line with Myers and Majluf's (1984) pecking order theory, saying that firms only turn to the equity markets when internal funds and debt are unavailable. If a negative announcement effect is followed up by long-run underperformance, the market did not fully adjust the stock price at the time of the equity offering announcement. Thus, the market is not fully efficient responding to the information of an equity issue, which leads to that the firm underperforms in a longer perspective as well (Loughran & Ritter, 1995; Spiess & Affleck-Graves, 1995). However, Carlson, Fisher, and Giammarino (2004) and Billet, Flannery, and Garfinkel (2011) are examples of studies that for different reasons have critiqued the assumptions of underperformance related to an equity issue. The negative announcement effect may be due to the firm's historical conditions leading to the SEO-decision (Carlson et al., 2004), while long-run underperformance may be due to later financial and operational decisions (Billet et al., 2011). Hence, the underperformance may not be due to the SEO itself.

The studies mentioned above cover SEOs in time periods including both economic booms and recessions, leading to an overall neutral economic situation. Moreover, they include only firms listed on the exchanges in USA. With the financial crisis in mind, it is first now possible to measure announcement effects and long-run performance of Swedish listed firms in the recovery phase of the crisis. Also, earlier studies have naturally focused on historical time periods that today may be viewed as old. Therefore, the continuously developing stock market, along with potential changes in the markets due to the financial crisis, may lead to results that possibly challenge the results and applied theories of earlier studies.

1.3 Research Purpose

With inspiration from earlier research, this study aims to evaluate announcement effects and long-run performance of firms' stock return after SEO in the recovery phase of the financial crisis, including all Swedish firms listed on NASDAQ OMX Stockholm and NASDAQ OMX First North. Announcement effect is defined as the market reaction within the event window of the official announcement of equity issue. The actual return in the event window is compared to expected return of the stock, which in turn generates daily abnormal return. Long-run performance is referred to as the three-year monthly stock return, compared to index for the same time period. The purpose of evaluating two different time dimensions is to

broaden the analysis of earlier studies in the area, and hence, generate results covering a larger picture of firms' performance after decision to perform an SEO. After concluding the results of performance, the secondary purpose of this study is attempting to explain the under- or over-performance by running a regression. The dependent variable is Cumulative Abnormal Return (CAR), which represents long-run performance for the observations post equity offering. The independent variables used to explain the dependent variable are book-to-market ratio, size (market capitalization), and a dummy variable for the number of SEOs during the study's time period.

To sum up, the purpose of this study is to measure, analyze, and answer the following research questions for the mentioned sample and time period:

1. "Did the official announcement of an SEO lead to a negative market reaction?"
2. "Did SEO firms underperform in a three-year perspective following the last issuing date?"
3. "Did the mentioned independent variables have a significant effect on performance? If so, how did these independent variables impact performance?"

1.4 Research Limitations

As for SEOs, there have been several studies on firms' performance following Initial Public Offering (IPO). Ritter (1991) showed that IPOs on the American stock exchanges in 1975-1984 underperformed in a long-run perspective relative the market, and several studies thereafter have showed similar results. Despite that IPOs is a form of an equity issue as well, this study focuses strictly on SEOs. For the same reason, other equity-like financing such as convertible debt, called "backdoor" equity financing by Stein (1992), is also excluded from this study.

Moreover, there are several research areas related to SEOs that may affect the post-announcement performance. Firstly, the benefits and costs to bring in an underwriter[2] to be responsible for the issue were analyzed by Eckbo and Masulis (1992). Although the

[2] A financial institution acting as a financial intermediary between firms and investors, verifying the quality of information (Ogden, Jen, and O'Connor, 2003).

underwriting fees may be considered expensive, the benefits of a successful SEO exceed the costs when certain circumstances are fulfilled (Eckbo & Masulis, 1992). Also, the actual role of the underwriter is an important research area within SEOs (Ogden, Jen, and O'Connor, 2003).

Furthermore, there is evidence that firms oftentimes manage or even manipulate their earnings before the offering. For example, Teoh, Welch, and Wong (1998) provide evidence of this managing/manipulation and explain a substantial negative relationship between pre-issue earnings management and post-issue stock performance. However, due to limitations in time and resources, the above mentioned research areas are not touched upon in this study.

1.5 Definitions

In order to give the reader an initial and basic understanding of the subject, the most central term, Seasoned Equity Offering, is defined below. Also, Initial Public Offering is defined in order to avoid confusion between these two main types of equity offerings.

- **Initial Public Offering (IPO):** An external financing source. The process when a firm sells stock to the public for the first time (Berk & DeMarzo, 2011).
- **Seasoned Equity Offering (SEO):** Also an external financing source. More specifically, when firms return to the equity markets and issue additional shares for sale. There are two main types of SEOs; cash offer, which means that the firm offers new shares to all potential investors, and rights offer, which means that the firm turns to existing shareholders for additional equity (Berk & DeMarzo, 2011). In this thesis, seasoned equity offering, equity offering, and equity issue are used as synonym terms for an SEO (plural: SEOs), including both cash- and rights offer. Also, the term *SEO firms* is used throughout the thesis and it is defined as all firms that issue equity during the time period.

1.6 Thesis Outline

The outline for the rest of this thesis is as follows: chapter 2 presents a literature and theoretical review, covering corporate finance theories associated with seasoned equity offerings, along with earlier research within the topic. Chapter 3 covers the methodology used

to answer the research questions. Also, chapter 3 presents a methodological discussion. Thereafter, chapter 4 presents and describes the results and findings of the study. Furthermore, chapter 5 analyzes the results in terms of earlier research and theories, along with presenting a discussion based on the analysis. The ending chapter 6 aims to conclude the research questions and describes further research that the authors recommend.

2 Literature and Theoretical Review

This chapter covers corporate finance theories associated with seasoned equity offerings. Moreover, results of earlier studies examining announcement effects and long-run performance are presented. Also, independent variables used in earlier research to explain performance are explained. Lastly, the hypothesis testing in this study is presented.

2.1 Why Firms Need Capital

Firms are continuously in need of capital to fund operations, investment opportunities, amortization of debt, etc. The fundamental choice is whether to raise capital from internal or external sources. Historical profits are the source of internal capital, and using that increases the firm's financial leverage by decreasing equity (ceteris paribus). External capital is raised by pure debt, pure equity or mixtures of the two, and comes from sources outside the firm. The decision of financing source naturally has an impact on the firm's capital structure. (Hillier, Grinblatt, and Titman, 2011)

2.2 Capital Structure

Historically, several theories have been developed trying to determine the most preferable capital structure for a firm. Modigliani and Miller (1958 & 1963), Miller (1977), Kraus and Litzenberger (1973), and Myers and Majluf (1984) are key examples that have presented well-known capital structure theories.

Modigliani and Miller (1958) present that the market value of a firm is constant regardless of its capital structure. The authors prove their theory explaining that increased financial leverage comes with higher financial risk, offsetting the impact on cost of capital. Therefore, a constant cost of capital independent of financial leverage is concluded. If this does not hold,

the authors explain that profitable arbitrage opportunities arise in the markets[3]. However, this theory assumes perfect capital markets, which do not hold in reality (Ogden et al., 2003). In Modigliani and Miller (1963), the authors correct their own theory from 1958 in terms of tax advantages for debt financing. When the tax deductibility of interest costs is taken into account, there is an advantage of debt financing over equity financing. Although the occurrence of corporate taxation suggests that debt financing is cheaper than equity financing for firms, the authors mention that corporations should not seek to only issue debt in their capital structure. They also briefly introduce that retained earnings (i.e. internal financing) may be cheaper in some circumstances, even when corporate taxation is taken into account (Miller & Modigliani, 1963). Moreover, Miller (1977) introduces another violation of perfect capital markets, explaining the relationship between personal taxation and capital structure. Adding the role of personal taxation, the tax benefits of corporate taxation potentially disappear (Miller, 1977).

Using the theories created by Modigliani and Miller, Kraus and Litzenberger (1973) developed the *traditional tradeoff theory* of capital structure. The tradeoff between tax advantages of debt financing and a positive relationship between leverage and financial distress costs, leads to an optimal debt-to-equity ratio for every corporation, which maximizes firm value. The traditional tradeoff theory has later been revised, including variables such as costs associated with management overinvestment, business erosion, and investor conflicts (Ogden et al., 2003). However, the view that corporations should aim for a unique and optimal capital structure, by weighting costs and benefits of the financing alternatives, retains. Summing up the tradeoff theories, debt financing is preferable over equity up to a certain degree of financial leverage. Also, it should be highlighted that the specific optimal capital structure differs between corporations.

Donaldson (1961) and Myers and Majluf (1984) present the *pecking order theory*, which challenges the tradeoff theories of capital structure. The pecking order theory explains a financing hierarchy of financing sources, where internal financing is the most preferable one, followed by debt and equity, respectively. According to Myers and Majluf (1984), the pecking order theory can be summed up with the following hierarchy of financing sources:

[3] More specifically, through buying and selling stocks and bonds, investors will be able to earn risk-free income streams, which eventually restore the stated equality.

1. Internal funds or risk-free debt
2. Risky debt
3. Hybrids of debt and equity
4. Pure equity

The underlying reason for this order is that the lower transaction costs, information asymmetry and adverse selection costs related to the financing source, the better it is for firm value. Thus, according to the pecking-order theory, debt is always preferable over equity due to its lower transaction costs, information asymmetry and adverse selection costs.

2.3 Efficient Market Hypothesis (EMH)

Although EMH is closely linked to theories from the 1800s, it is generally considered formulated by Fama (1970). A market is considered efficient when the market price of the security fully reflect the rational value of the security (Ogden et al., 2003). Fama (1970) argues for three types of market efficiencies:

- **"Weak form" efficiency:** The security's price reflects information related to its historical prices or return sequences.
- **"Semi strong form" efficiency:** The security's price reflects all available information that is obvious to the public.
- **"Strong form" efficiency:** The security's price reflects all public and private information.

Moreover, EMH assumes that the market reacts immediately to information, adjusting the market price continuously when new information is available (Fama, 1970). Intuitively, this means that illiquid markets are less efficient than liquid markets. For instance, on a stock exchange where the shares are not traded frequently, the market price of a stock may not be reevaluated and adjusted immediately after new information is available.

2.4 When do Firms Issue Equity?

According to the pecking order theory, corporations would only issue equity when other financing sources are unavailable. One situation when a firm typically issues equity is when they are facing poor historical and current performance. Issuing stock then gives the business hope for the future (Masulis & Korwar, 1986).

However, Fama and French (2005) violate the pecking order predictions, presenting that 67 percent of their sample firms during the time period 1973-1982 made some type of equity issue[4] every year. This number increases to 74 percent for 1982-1992, and to 86 percent for 1993-2002. Furthermore, Fama and French (2005) argue that the typical firm issuing equity is not facing significant financial distress. However, the authors mean that pure SEOs are infrequent, but are large in size when they actually occur. The large size of the SEOs means that they are substantial portions of total equity issues, particularly for smaller firms.

2.5 Market Reactions to Seasoned Equity Offerings

As mentioned, when firms issue equity, their capital structure changes. Also, assuming that EMH holds, the market will react to the information and reevaluate the stock immediately. Part of the information the market reacts to is the information asymmetry and signaling related to an SEO. Information asymmetry is the basis of signaling effects.

2.5.1 Information Asymmetry

The pecking-order theory partly blames information asymmetry to be the reason why equity issues are viewed as a last resort financing source. The concept of information asymmetry origins from Akerlof (1970), which provided the first theoretical analysis of the problems arising when the quality of units in a market differ. This gives rise to moral hazard problems[5], which cause adverse selection costs and an inefficient market price. Information asymmetry associated with SEOs suggests that investors require compensation for their lack of

[4] Different types of equity issues, including pure SEOs, private placements, rights issues, convertible debt, mergers, warrants, direct purchase plans, employee options, grants, and benefit plans.

[5] Market participants trying to cheat the market, acting as they hold good quality products when they actually do not (Ogden et al., 2003).

information, leading to an undervaluation of the stock and hence makes an equity issue expensive for the corporation (Ogden et al., 2003).

2.5.2 Signaling with SEOs

Leland and Pyle's (1977) *signaling model* anticipates that changes in management stockholdings in the firm cause changes in the market value of the stock. In line with the information asymmetry problems, investors assume that management is better informed about expected future cash flows, and that managers only hold large portions of firm equity if they believe the future cash flows will exceed historical and current cash flows. Therefore, rational investors view equity offerings to outside parties as credible negative signals of firm value (Leland & Pyle, 1977). This theory has also been empirically tested and supported by Downes and Heinkel (1982).

Jensen and Meckling's (1976) *agency theory model* touches upon the same subject as Leland and Pyle (1977). The agency theory model suggests that larger percentage shareholdings by managers decrease potential conflicts of interest between management and shareholders. More specifically, assuming that managers want to maximize their own wealth, their interests go in line with shareholders' interests as well if managers own a large stake of corporate stock.
Dobbin and Jung (1996) demonstrate another theory associated with agency problems. When managers' interests are not aligned with shareholders' interests (firm value maximization), managers may seek to execute value destroying growth activities, investing in negative net present value (NPV) projects. The reason for this behavior is that it would benefit management control, building large and complex "empires". Investors' awareness of this behavior causes a negative reaction of the announcement of an equity issue.

Moreover, Miller and Rock (1985) propose that changes in external financing signals decreased current earnings. This theory is based on the presumption that investment decisions on average are consistent, and therefore this model concludes a stock price decrease proportional to the size of the announced equity offer.

Furthermore, Myers and Majluf (1984) present the *adverse selection model*, which says that rational investors assume that managers accept equity issues only when they believe the stock

is overvalued. This is based on that management act upon the interest of shareholders, who benefit if additional equity is issued to outside investors when the stock is overvalued. That being said, this theory concludes that rational investors view equity offering announcements as a negative signal of firm value.

To sum up, Leland and Pyle (1977), Jensen and Meckling (1976), Dobbin and Jung (1996), Miller and Rock (1985) and Myers and Majluf (1984) all conclude that raising additional equity to outside investors has a negative impact on rational investors' view on firm value. Hence, the market value of the firm's stock decreases. However, a number of studies containing contradictions to the above-mentioned theories have been conducted. McConell and Muscarella (1985) suggest that a negative market reaction may be partially offset if the firm simultaneously announces capital expenditure increases. Thus, the negative impact on market price by an equity issue announcement may be compensated for if the equity aims to be used for investment opportunities, including projects with positive NPV. Moreover, Cooney and Kalay (1993) say that an equity offer announcement may lead to both positive and negative market price reactions, depending on certain circumstances. Finally, Viswanath (1993) argues that the announcement of an equity issue does not always lead to a negative market reaction. Instead, Viswanath (1993) means that the price reaction to an SEO announcement is positively related to the most recent run-up in the market price of the stock[6].

2.6 Earlier Studies on SEO Announcement Effects

Several event studies have been conducted to determine the announcement effects of seasonal equity offerings. Previous studies reveal that the market reacts negatively to a firm´s announcement of an equity offering, which is in line with the signaling theories in section *2.5.2 Signaling with SEOs*. More specifically, the average abnormal returns in the event window has ranged from -0.75 percent to -3.0 percent, depending on the study and sample (Ogden et al., 2003).

Masulis and Korwar (1986) conducted an event study consisting of 1406 SEOs, announced over the period 1963-1980. The authors examined the announcement impact of SEOs on

[6] Viswanath (1993) defines that a run-up in the stock is if future NPV>0 projects exist.

publicly traded firms, and documented a statistically significant underperformance. The negative market reactions in this study are briefly explained by different signaling theories, e.g. the Myers and Majluf's (1984) adverse selection model, Jensen and Meckling's (1976) agency theory model and Leland and Pyle's (1977) signaling model.

Asquith and Mullins (1986) is another study that measures the effect on stock prices after the announcement of 531 SEOs over the period 1963-1981. In this study, the stock market reaction to equity issue announcements is measured using daily excess stock returns. The authors found that the stock price decreases by approximately 3 percent following the announcement. Also, there is a significant negative relationship between size of the equity offering and abnormal returns (Asquith & Mullins, 1986).

Mikkelson and Partch (1986) observe the impact equity offerings have on stock price of 360 firms during the time period 1972-1982. The changes in stock prices are measured using an event study. The authors document on average a negative statistically significant impact on stock price following the announcement of common stock and convertible debt offerings. Furthermore, the authors find results suggesting that the market reacts more negatively to offerings of common stock and convertible debt compared to offerings of straight debt. These findings are consistent and in line with Myers and Majluf's (1984) pecking order theory.

Bayless and Chaplinksy (1996) use cumulative announcement date prediction errors for equity issuance to compare and measure the price reaction to SEO announcements, depending on if the issue is in high or low issuing volume periods. This method is used to be able to find out and explain if there is a window of opportunity for seasoned equity offerings. The results in this study indicate that the price reaction in periods of high equity issues volume are about 200 basis points lower on average compared to low ditto. This result supports the existence of windows of opportunity because high equity volume issues periods are associated with lower levels of information asymmetry, due to the pecking order theory. Also, this suggests that firms may be able to decrease their equity issuance costs by doing equity offerings when there are periods of lower information asymmetry levels (Myers & Majluf, 1984).

Other studies that find negative effects on the stock price caused by equity offering announcements are Smith (1977), Logue and Jarrow (1978), and Marsh (1979). Also, Ritter (2003) describes an average announcement effect of -2 percent to an SEO. Moreover, there

are studies suggesting that the negative market effects to SEOs are not unique to the American market, e.g. Loderer and Zimmerman (1988) for rights offerings in Switzerland and Bøhren, Eckbo and Michalsen (1997) for rights offerings and standbys in Norway. Thus, these studies show that the negative announcement effects of SEOs are also supported by studies conducted with samples of firms in other countries than USA.

Carlson et al. (2004) challenge previous studies that explain the negative average announcement effects with arguments based on constant mispricing. Instead, Carlson et al. (2004) use option theory to explain the negative average announcement effects of SEOs. Furthermore, this study is similar to Lucas and McDonald (1990), which argued for a theory based on pre price run-ups of SEO announcement effects. The main difference between these studies is that Lucas and McDonald (1990) focus on a risk neutral setting, while Carlson et al. (2004) use a risk aversion setting. Moreover, Carlson et al. (2004) argue that the firm's historical financial conditions and corporate decisions leading to the equity offerings are the main reasons to a negative market reaction. Thus, the SEO itself is not the underlying factor of the negative market reaction.

2.7 Earlier Studies on Long-Run Performance of SEOs

Two of the first studies to analyze long-run performance of firms post equity offering were Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995). The latter study uses a sample of NYSE/Amex- and NASDAQ-listed firms that did an SEO during the time period 1975-1989. The authors define long-run performance as Cumulative Abnormal Return (CAR), which is the average cumulative monthly return for the SEO firms that exceed the market return. Spiess and Affleck-Graves (1995) present a CAR between -30.99 percent and -39.36 percent five years after issuance, depending on the matching method used to measure market return[7]. Furthermore, the CAR-measures were positive the first month after the issue, but showed a continuous negative trend from the first month until year five. Also, the average cumulative raw return of the sample firms was positive during the five years following the issue, reaching a level of 45.9 percent in month 60. The positive average cumulative raw

[7] Spiess and Affleck-Graves (1995) use three different portfolios to represent normal return of non-issuing firms in the market. The portfolios used to match SEO performance with are size-matched firms, industry- and size-matched firms, and book-to-market- and size-matched firms.

return means that the matching firms in total had an even higher positive average raw return. The results for average cumulative raw return and average CAR of Spiess and Affleck-Graves' (1995) 1247 observations can be seen below in *Figure 1.*

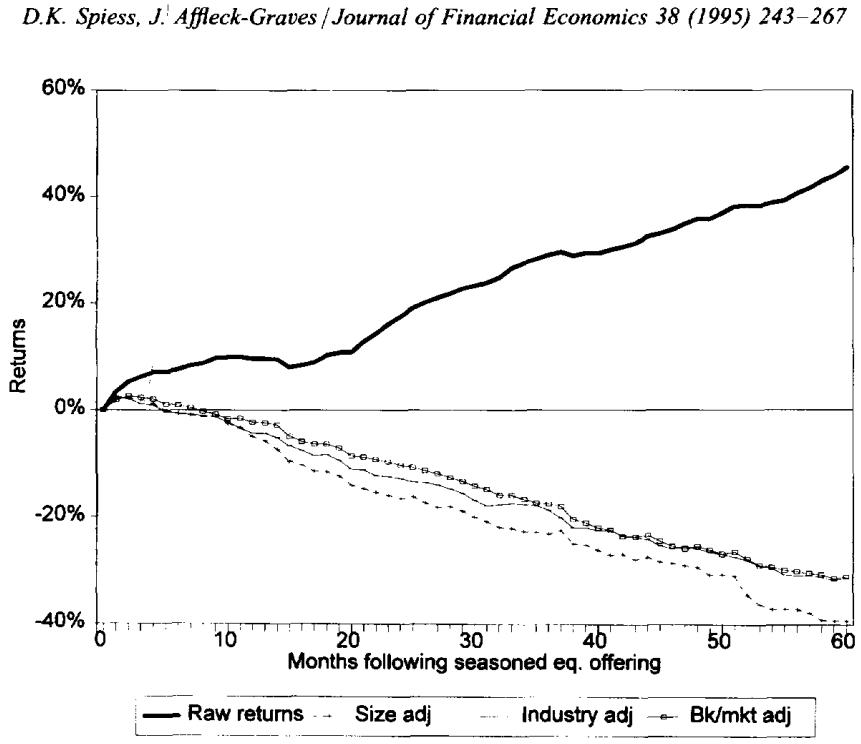

Figure 2.1: Spiess & Affleck-Graves (1995) average cumulative raw return and average CAR using three different matching methods

Furthermore, Spiess and Affleck-Graves (1995) describe a possible interpretation to the SEO underperformance. That is, managers realize when the market is willing to overpay for the stock, and take advantage of this opportunity by timing their equity issues. Moreover, long-run underperformance also suggests that the market does not correctly respond to the information initially after announcement. Thus, the initial reaction by the market causes a biased re-evaluation of the stock. Instead, investors wait for additional evidence or signals before they amend their view of firm value. Spiess and Affleck-Graves' (1995) interpretation goes in line with the signaling theories in section *2.5.2 Signaling with SEOs,* saying that an equity issue is a negative signal for firm value. However, the authors' interpretation violates the efficient market hypothesis, since the market does not fully adjust for the information enclosed in the equity offer announcement.

Loughran and Ritter (1995) examine that both IPOs and SEOs underperform relative non-issuing firms on the American stock exchanges during the time period 1970-1990. Firms doing SEOs have an average cumulative raw return of 7 percent[8], while the matching non-issuing firms have a 15 percent ditto, which suggests an 8 percent underperformance for the SEOs. Loughran and Ritter's (1995) interpretation of their results goes in line with Spiess and Affleck-Graves (1995), suggesting that firms issue equity when the stock is overvalued. This interpretation is based on Myers and Majluf's (1984) adverse selection model.

Loughran and Ritter (1997) provide evidence that a post-issue decline in operating performance occur for SEO firms. Thus, operating measures such as profit margin and return on assets decrease during the period following the issue, which Loughran and Ritter (1997) link to the issuer's poor stock performance. Moreover, Autore, Bray, and Peterson (2009) link stock performance to the intended use of funds generated by the issue. Debt repayment or general corporate purposes as intended use of proceeds on average lead to a substantial underperformance relative the market. On the other hand, issuers that communicate a specific investment purpose underperform to a smaller degree (Autore et al., 2009).

However, Billet et al. (2011) critique the assumptions of long-run underperformance. The authors argue that long-run performance may be affected by other financial and operating decisions occurring after the event, which the majority of earlier studies do not take into account. Hence, the authors argue that underperformance may not be due to the SEO event itself. Furthermore, Billet et al. (2011) mean that firms returning to the external financing markets numerous times tend to underperform to a higher extent.

2.8 Independent Variables Explaining Long-Run Performance of SEOs

2.8.1 Book-to-Market Ratio

Book-to-market ratio measures the market's valuation of the corporation (Berk & DeMarzo, 2011). Daniel and Titman (2006) measure the book-to-market ratio's impact on long-run

[8] Equal to the average return of US T-bills during the same time period (Loughran & Ritter, 1995).

performance, and conclude that there is a positive relationship. This means that firms with higher book value of equity relative market value of equity tend to outperform firms with lower book value relative market value. However, Daniel and Titman (2006) suggest that there is no significance between past performance measures and future stock performance. Instead, the book-to-market effect on stock return is due to historical realization of intangible information. Thus, Daniel and Titman (2006) interpret the book-to-market ratio as a proxy for the market's overvaluation of a firm's intangible information. Similarly, Brav, Geczy, and Gompers (2000), Spiess and Affleck-Graves (1995), and Loughran and Ritter (1995) present significant positive coefficients for book-to-market variables on long-run performance.

2.8.2 Size (Market Capitalization)

Intuitively, firm size impacts the return of stock. Therefore, Spiess and Affleck-Graves (1995) and Brav et al. (2000) use market capitalization as an independent variable for the firm's size, trying to explain long-run performance. Both studies' regressions result in a positive relationship between size and performance, implying that smaller firms tend to underperform more than larger firms. However, the same size variable in Loughran and Ritter (1995) is insignificant, suggesting there is no relationship between firm size and performance after SEO.

2.8.3 Number of SEOs during Time Period

Billet et al. (2011) find strong negative significance on their variable for number of financing events of the same firm. More specifically, the higher number of external financing events, the more the firm underperforms. This means that a firm's long-run performance is dependent on the frequency of the firm's issuance activities. Also, Loughran and Ritter (1995) measure the number of equity issues with a dummy variable (1 if the firm issues equity more than once during the past five years), and provide the same results, suggesting that firms issuing several times during a period of time perform worse.

2.9 Hypothesis Testing

Based on covered theory and literature, the following null hypotheses for announcement effects, long-run performance, and the independent variables impact on long-run performance, have been formulated:

Hypothesis for research question 1:

H_0: The official announcement of an SEO lead to a market reaction = 0

H_1: The official announcement of an SEO lead to a market reaction ≠ 0

Hypothesis for research question 2:

H_0: Market adjusted long-run performance for SEOs = 0

H_1: Market adjusted long-run performance for SEOs ≠ 0

Hypothesis for research question 3:

H_0: The coefficient for variable X^9 = 0

H_1: The coefficient for variable X ≠ 0

The results for each of the hypothesis testing are presented in section *4.2.2 Statistical Significance of Announcement Effects*, *4.3.1 Statistical Significance of Long-Run Performance*, and *4.4 OLS Regression,* respectively.

[9] Book-to-market ratio, market capitalization, and the firm's number of SEOs during time period.

3 Methodology

This chapter aims to explain the methodology used to answer the research questions. The chapter starts off describing the study's research approach, strategy, data collection method, and sample selection. Thereafter, the measurements for announcement effects, long-run performance and independent variables are explained. Lastly, a critical methodological discussion is presented.

3.1 Research Approach and Strategy

The approach of this study is inspired by earlier studies within the area of firms' performance after the announcement of SEO. That being said, the study takes on a deductive theory approach. According to Bryman and Bell (2011), a study follows deductive theory when the researcher deduces hypotheses on the basis on what is already known within the domain and on theoretical considerations related to that particular field of research. Furthermore, the hypotheses must include concepts translatable into the existing research entities. Finally, the hypotheses must be analyzed with empirics (Bryman & Bell, 2011). According to Bryman and Bell (2011), *Figure 3.1* presents the step-by-step process using a deductive research approach.

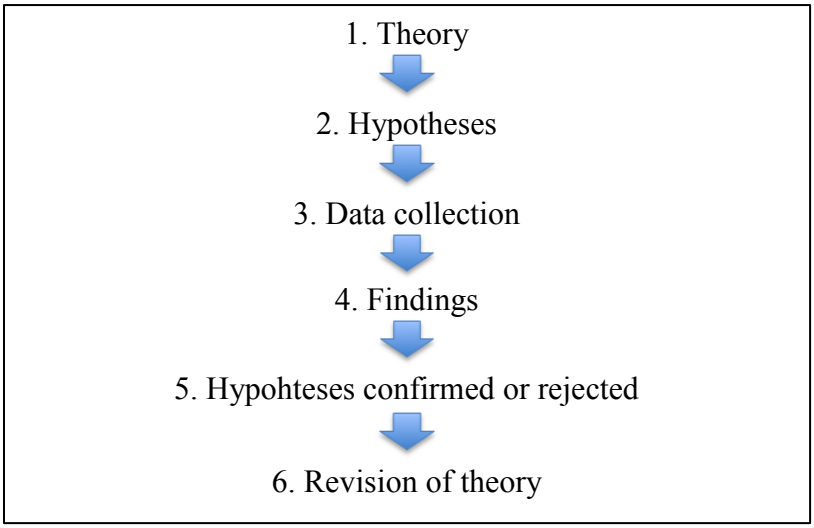

Figure 3.1: "The process of deduction" (*Bryman & Bell, 2011).*

Moreover, this study uses a quantitative research strategy, which is natural since it takes on a deductive approach. A quantitative research strategy means that the study emphasizes quantification when gathering and analyzing data, along with employing measurements. Also, a quantitative strategy incorporates a natural scientific model and views the social reality as external and objective. (Bryman & Bell, 2011)

Bryman and Bell (2011) compare the quantitative strategy to the alternative of using a qualitative strategy. The authors acknowledge four preoccupations that can be determined for a quantitative strategy, i.e. measurement, causality, generalization, and replication.

- **Measurement:** Despite that measurements are an advantage of a quantitative strategy, it entails concerns regarding the validity and reliability of the study.
- **Causality:** Quantitative researchers usually try to explain the causes and effects of results, using dependent and independent variables. When trying to explain results using a cross-sectional design, concerns about the variables' simultaneous effects are raised.
- **Generalization:** The concern regarding generalization of findings in quantitative studies is strong. In order to strengthen the ability and credibility of generalizing the results in this study, the authors conduct a comprehensive sample selection (Section *3.3*), along with testing the statistical significance of the measures (section *3.4.1.4*, section *3.4.2.2*, and section *3.4.3*).
- **Replication:** For the study to be credible, biases and lack of objectiveness must be excluded from the results. More specifically, the researchers must make sure that the study can be replicated retaining the same results.

The authors of this study are aware of the risks and possible weaknesses of conducting a quantitative study. More about these risks is presented in the methodological discussion in section *3.5*.

3.2 Data Collection Method

All data included in the study is manually collected from secondary sources, which is the most common data collection method for this type of study. The authors consider that data is of high quality, collected from reliable sources, which makes it a natural choice to use secondary data.

The actual observations and official issuing dates are gathered from the website Nyemissioner.se, which is a leading source of information within SEOs on the Swedish stock exchanges. Furthermore, the exact date for all firms' equity offering announcements are defined using the Retriever Research database, where SEO announcements communicated by reliable Swedish press[10] are found.

Quantitative data is mainly gathered from Thomson Reuters Datastream, which is an integrated application including global financial data. Data that is gathered from Thomson Reuters Datastream is adjusted stock prices (P[11]), index prices for OMXSPI (PI[12]), book-to-market ratios (1/MTBV[13]), and market value (i.e. market capitalization) (MV[14]). Moreover, index prices for First North All-Share are gathered from NASDAQ OMX Nordic's official website.

Processing of data is exclusively completed in Excel, where part of the measurements and analysis of performance is done as well. Also, analytics software SPSS is used to analyze the firms' performance further. Results for the regression, measuring the independent variables' impact on long-run performance, along with diagnostic tests, are generated by econometrics software Eviews.

[10] Dagens Industri, Veckans Affärer, Affärsvärlden, GP, and Sydsvenskan are considered reliable sources.
[11] Official closing price for stock.
[12] Official closing price for index.
[13] Market value of common equity divided by the balance sheet value of common equity. 1/MTBV equals book-to-market ratio.
[14] Share price multiplied by the number of ordinary shares in the company.

3.3 Sample Selection

In this section, the sample selection, which is done prior to the collection of data, is presented. The sample selection has been categorized into time period, exchanges, corporations, and indices.

3.3.1 Time Period

As mentioned earlier, the purpose of this study is to measure firms' post-SEO performance in the recovery phase of the global financial crisis. *Figure 3.2* below shows the index price of OMXSPI[15] from January 2007 until March 2012, and it is generated in order to define the time period for recovery of the crisis in Sweden. The index price shows a negative trend from approximately July 2007 until January 2009. However, in January 2009 the negative trend is replaced by a positive trend the coming years. This hints that the recovery phase of the financial crisis in Sweden started in January 2009. Furthermore, the index price had not fully reached its pre-crisis levels at the end date March 31st 2012, hinting further that the recovery of the crisis was not finalized at the time. Naturally, the ending date of this study is set to March 31st 2012, to be able to measure long-run performance defined as the three-year stock return. Thus, the time period of this study is set to January 1st 2009 – March 31st 2012. This means that Swedish firms issuing equity within that interval are included in this study.

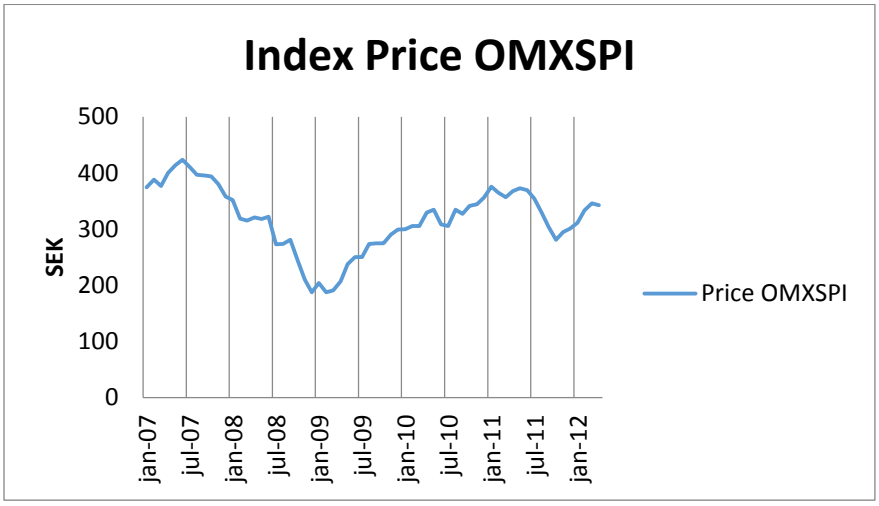

Figure 3.2: Historical index prices for OMXSPI.

[15] This study uses index price of OMXSPI as a proxy for the health of the Swedish economy.

3.3.2 Exchanges

The two exchanges included in the study are NASDAQ OMX Stockholm and NASDAQ OMX First North. These two exchanges are selected because they cover firms on the Swedish stock markets, both operated by NASDAQ OMX Stockholm AB and owned by NASDAQ OMX Group (nasdaqomxnordic.com). Furthermore, the fact that the smaller firms listed on First North are less regulated than firms listed on OMX Stockholm, makes it interesting to compare the two in terms of markets reaction after SEO announcement.

3.3.3 Corporations

Out of all equity issuing corporations on the selected exchanges and during the selected time period, no specific sampling has been done. However, certain sample limitations have been defined, affecting the number of firms included in the measures for announcement effects and long-run performance, respectively.

3.3.4 Sample Limitations for Announcement Effects

In order to estimate a firm's "normal" return in the estimation window, the study uses its stock's historical daily return. If the firm has not been listed long enough prior to announcement, "normal" return cannot be estimated, and hence, these firms are excluded from the study. If data for a firm is not available for the whole estimation period, an individual estimation is performed in order to evaluate if there are enough observations of historical prices to generate robust results. However, the absolute minimum of observations of historical daily prices is 126 trading days (Benninga, 2008). That being said, Forestlight Studio (Entertainment) AB (167 trading days) and Lightlab Sweden AB (222 trading days) are included in the study despite the lack of data for the whole estimation window. Also, firms announcing equity offerings, but cancel before the issue takes place, are excluded from the study.

3.3.5 Sample Limitations for Long-Run Performance

Firstly, corporations being delisted during the three-year period following the equity issue are excluded from the study. Also, only the firm's first equity offering during the time period is included in the study for long-run performance. Thus, if a firm returns to the equity market several times to issue additional equity, only the first SEO is included. Instead, this is measured in the regression. These sample limitations are in line with Spiess and Affleck-Graves (1995), which included only non-overlapping independent issues of firms during the time period.

3.3.6 Index

According to Benninga (2008), market indices as benchmarks should be broad-based and value-weighted, and origin from the same exchange as the sample firms. In order to fulfill these criteria, OMX SEK PI (OMXSPI) and First North All-Share SEK are chosen as benchmarks to represent market return for OMX Stockholm and First North, respectively.

3.4 Data Analysis

This section aims to explain the approach and measures used to analyze the research questions of the study. Firstly, the event study used to analyze announcement effect is explained. Thereafter, measures for long-run performance are presented, and lastly the cross-sectional regression, including diagnostic tests, is described.

3.4.1 Event Study Measuring SEO Announcement Effects

According to Benninga (2008), an event study may be used to determine if a particular event in the life of the company impacts its stock return. Briefly explained, an event study measures if the event causes abnormal return during the event window, and is calculated as the difference between actual return and expected return of the stock. Furthermore, the potential abnormal return is summed up during the event days, using the measure Cumulative Abnormal Return (CAR), which measures the total effect of the event.

3.4.1.1 Estimation Window

The estimation window is used to estimate a firm's expected return. The estimation window usually consists of 252 trading days, in order to exclude seasonal effects on the corporation's stock from its normal return (Benninga, 2008). Furthermore, the estimation model in this study goes in line with MacKinlay's (1997) *market model*, which assumes a stable linear relationship between stock return and market return. In this study, index OMXSPI represents market return on OMX Stockholm, whereas index First North All-Share SEK represents market return on First North. Moreover, the time period of the estimation window is defined in line with MacKinlay (1997), using trading day -282 to -30 in relation to the event, generating 252 trading days in total. This time period is chosen mainly to avoid volatility in the stock return due to rumors and speculations about the event of equity offering. Such rumors and speculations may arise after invitation to an extraordinary general meeting (EGM), and are preferably excluded from the estimation window.

3.4.1.2 Event Window

The event window includes the event day, which according to Benninga (2008) is the date when the event becomes official to the public. However, the event window is normally an extended period around the event day to account for pre-event leakage and market reactions after the stock market closes on the event day (Benninga, 2008) and (MacKinlay, 1997). This study includes closing price for four trading days in the event window, where the announcement date is the second day. This, in turn, generates three event days including measures of stock returns. The two days post-announcement are included to adjust if the SEO is announced after the Swedish stock market has closed for the day, and to give the market time to reevaluate the stock (Masulis & Korwar, 1986) and (Bayless & Chaplinsky, 1996).

3.4.1.3 Abnormal Return (AR) and Cumulative Abnormal Return (CAR)

The event study is created with inspiration from MacKinlay (1997). Firstly, a simple OLS-regression is used to calculate the *market model* parameters[16], and hence, to estimate expected return for the event days. The expected return for firm i event day t is calculated as follows:

[16] Expected return for stock as dependent variable, and market index return as independent variable.

$$E(r_{it}) = Intercept(market\ model) + [\ Slope(market\ model) * r_{mt}\ ]$$

Where:

r_{mt} = Actual return for index event day t.

Furthermore, Abnormal Return (AR) for firm i event day t is calculated as follows:

$$AR_{it} = r_{it} - E(r_{it})$$

Where:

r_{it} = Actual return for firm i event day t.

As the next step, Cumulative Abnormal Return (CAR) for firm i event day t is calculated as follows:

$$CAR_{it} = \sum_{t=t_1}^{t_3} AR_{it}$$

Moreover, both the arithmetic mean and median for AR and CAR for all firms and event days are calculated. Also, standard deviation and variance both for the firms individually and combined are computed.

3.4.1.4 Statistical Significance Tests

In order to test and confirm/reject the hypothesis for announcement effect, the results need to be tested if statistically significant. Test statistics for average CAR event day three is calculated inspired by MacKinlay (1997) and is summarized below.

$$Average\ AR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{it}$$

$$Var(Average\ AR_t) = \frac{1}{N^2} \sum_{i=1}^{N} \sigma_{\varepsilon_i}^2$$

$$Average\ CAR(t_1, t_2, t_3) = \sum_{t=t_1}^{t_3} Average\ AR_t$$

$$Var(Average\ CAR(t_1, t_2, t_3)) = \sum_{t=t_1}^{t_3} Var(Average\ AR_t)$$

Where:

N = Number of firms.

$\sigma^2_{\varepsilon i}$ = Standard deviation to the power of 2 (variance) for firm i.

Moreover, using the variables above, test statistics (θ) is calculated as follows:

$$\theta = \frac{Average\ CAR(t_1, t_2, t_3)}{Var(Average\ CAR(t_1, t_2, t_3))^{1/2}} \sim N(0,1)$$

Test statistics is compared to critical values from the normal distribution table. Critical values are collected for the one, five, and ten percent significance levels.

3.4.2 Long-Run Performance of SEOs

The time period for long-run performance is generally defined as 3-5 years. This study measures three-year performance after equity issue and uses monthly historical prices from month 0 to month 36. Thus, this study uses event time $T_0 - T_{36}$, giving 36 observations for monthly return during the three-year period. Each monthly return in the study is generated by historical prices with 21 trading-days interval, which is in line with Loughran and Ritter (1995).

3.4.2.1 Abnormal Return (AR) and Cumulative Abnormal Return (CAR)

The approach used to measure long-run performance is inspired by Spiess and Affleck-Graves (1995). Firstly, abnormal return is determined by taking the difference between monthly return for each firm and the return for related index the same time period. Thereafter, the arithmetic mean for abnormal return is calculated generating an average abnormal return including all firms. Lastly, the average abnormal returns for each month are added up in order to determine average Cumulative Abnormal Return (CAR). The approach can be summed up using the following formulas, inspired by Spiess and Affleck-Graves (1995):

$$AR_t = \left(\frac{1}{n_t}\right) \sum_{i=1}^{n_t} (R_{SEO,it} - R_{Index,it})$$

Where:

AR_t = Average abnormal return including all firms.

n_t = Number of firms.

$R_{SEO,it}$ = Return for SEO firm i event month t.

$R_{Index,it}$ = Return for index the same time period.

$$CAR_T = \sum_{t=0}^{T} AR_t$$

Where:

CAR_T = Average cumulative abnormal return month T.

3.4.2.2 T-Test

In order to confirm/reject the hypothesis for long-run performance, the results for average CAR month 36 need to be tested if statistically significant. According to Barber and Lyon (1997), a two-tailed t-test should be performed in order to statistically conclude long-run performance. Therefore, test statistics for the measure is calculated according to the following formula:

$$t_{CAR} = \frac{Average\ CAR_{36}}{\sigma_{CAR}/\sqrt{n}}$$

Where:

σ_{CAR} = Standard deviation.

n = Number of observations.

Test statistics is compared to critical values collected from the t-distribution table, using n-1 degrees of freedom for the significance levels of one, five, and ten percent.

3.4.3 Regression Analysis

The third research question, "Did the mentioned variables have a significant effect on performance? If so, how did these independent variables impact performance?", is answered

based on a multiple regression model. Similarly to Loughran and Ritter (1995), this study runs a cross-sectional regression in order to describe and evaluate the explanatory variables' impact on the firms' long-run performance. According to Brooks (2008), a cross-sectional regression is a type of regression in which the dependent and independent variables are associated with a single point in time. Furthermore, a multiple cross-sectional regression model allows having several independent variables in which each helps to explain, understand or predict the explained variable. The independent variables are tested at the one, five and ten percent significance levels since that is conventional (Brooks, 2008).

The Ordinary Least Squares (OLS) method is used in order to determine the coefficient estimates. The dependent variable is explained by intercept (α), coefficients (β) for the independent variables and the error term (*u*).

$$\text{CAR}_{36} = \alpha + \beta_1 * (\text{Book to Market Ratio}) + \beta_2 * \text{LN}(\text{Market Cap}) + \beta_3 * (\text{Dummy for Several Offerings}) + u$$

3.4.3.1 Dependent and Independent Variables

Dependent Variable:

CAR_{36}: In the regression, the dependent variable is CAR for month 36, which is collected from the results of research question two.

$$CAR_{36} = \sum_{t=0}^{36} AR_t$$

Independent variables:

The chosen independent variables are inspired by Loughran and Ritter (1995), Spiess and Affleck-Graves (1995), Brav et al. (2000), Daniel and Titman (2006), and Billet et al. (2011), which variables were explained for in section *2.8 Independent Variables Explaining Long-Run Performance of SEOs*. The collection and measurement of each independent variable is explained below.

Book-to-Market Ratio: This variable is calculated by dividing the book value of equity with the market value of equity. This study measures it by dividing 1 with the market-to-book-value (MTBV) collected from Thomson Reuters Datastream. The book-to-market ratio is used

to find the value of a company by comparing the book value of a firm to its market value. It is used as a proxy for how investors value the company's stock relative its book value. As Loughran and Ritter (1995), this study uses data from the 31st of December the year before the equity issue.

Market Capitalization: Company size is a factor that could conceivably affect and correlate with abnormal return. Firm size may be defined as the market capitalization of a firm, which is the stock price multiplied with the number of shares outstanding. Furthermore, the market capitalization of each firm is collected by taking data at the 31st of December the year before the equity offering, which is in line with Spiess and Affleck-Graves (1995). The natural logarithm of the variable is used in order to take into account for the risk of heteroskedasticity (Brooks, 2008). Also, this approach reduces the values of significant size, and thus, handles the potential problems caused by outliers.

That being said, the independent variable for firm size included in the regression is:

$$LN(Market\ Capitalization)$$

Dummy Variable for Several Issues: A dummy variable is included in the regression since some firms are issuing equity more than once during the observed time period. The dummy variable takes on a value of 1 if the firm issued equity more than once throughout the time period, otherwise 0. The dummy variable is included in the same way as an independent variable in a cross-sectional regression (Brooks, 2008).

3.4.3.2 OLS Regression

OLS is according to Brooks (2008) the most common method used to estimate parameters' impact on a dependent variable. OLS selects the slope coefficient and the intercept in order to minimize the vertical distances from the actual data observations to the fitted line. If the data fulfills the assumptions underlying the OLS model, it is viewed as the best linear unbiased estimator providing correct inferences (Brooks, 2008; Dougherty, 2011). Diagnostic tests are used to test whether these assumptions are fulfilled.

According to Brooks (2008), the five assumptions are as follows:

1. The errors' average value equals zero => $E(u_t) = 0$. No need to test for this, since it is never violated when an intercept is included.
2. The errors have a constant variance of overall values of independent variables => $Var(u_t) = \sigma^2$. This means that the residuals must be homoscedastic. Can be tested for using Breush-Pagan-Godfrey (BPG) and/or White's test for heteroskedasticity.
3. The errors are statistically independent cross-sectionally => $Cov(u_i, u_j) = 0$. If not, there is an autocorrelation issue present. No need to test for autocorrelation for cross-sectional data, since it is not likely to occur and testing for it is complicated.
4. No relationship between the error term and independent variable => $Cov(u_t, X_t) = 0$. If not fulfilled, there is risk of endogeneity. More about this in section *3.5.6 Endogeneity Problem for Regression*.
5. The residuals are normally distributed => $u_t \sim N(0,\sigma^2)$. A Jarque-Bera test can be run to check for normality of the residuals.

Finally, two additional tests need to be performed for cross-sectional data to ensure that an OLS model is the most appropriate model. These tests are a correlation matrix to check for multicollinearity and a Ramsey RESET test to check for non-linearity (Brooks, 2008).

3.4.3.3 Heteroskedasticity

BPG and White's test are two standard tests available to check for heteroskedasticity. White's test is more general and the test is valuable because it makes few assumptions about the possible form of heteroskedasticity. BPG tests for a linear relationship between the residual variance and the independent variables. In other words, the tests use different approaches to conclude if the squared residuals from the OLS regression are related to the independent variables. The squared residuals are a proxy for the variance of the error terms, which under the null hypothesis of homoskedasticity should be constant, and hence, have no relationship to the independent variables. In order to test this relationship, BPG and White's test generate an F-test, a Chi-square test and a "scaled explained SS" test. If the null hypothesis is confirmed using the three statistical tests, data is homoscedastic. (Brooks, 2008)

$$H_0: Data\ is\ homoskedastic$$

3.4.3.4 Normal Distribution

A Jarque-Bera test shows if the residuals are normally distributed with an expected value of zero and a variance of σ^2 (Brooks, 2008). The null hypothesis, that the residuals are normally distributed, is rejected if the p-value for the test is less than the chosen significance level.
The following null hypothesis is formulated for the Jarque-Bera test:

$$H_0: Residuals\ are\ normally\ distributed$$

Brooks (2008) argues that if the residuals are not normally distributed, it may still be appropriate to practice OLS. This is because it is difficult to implement a model that does not make the assumption of normally distributed error terms. Also, if non-normal distribution exists in the regression, it will not lead to significant problems if the number of observations is sufficient in the regression (Brooks, 2008).

3.4.3.5 Multicollinearity

A correlation matrix tests how the independent variables are correlated with each other. According to Brooks (2008), it can be difficult to detect multicollinearity if the regression contains more than two explanatory variables. That being said, an accepted rule of thumb is that the correlation between two variables should not be outside the range of -0.7 - 0.7 (Gujarati & Porter, 2009).

3.4.3.6 Non-Linearity

Since OLS estimates a linear relationship between the dependent variable and independent variable(s), data need to be tested for non-linearity. According to Brooks (2008), Ramsey's RESET test is a good indication if such signs exist. It should, however, be noted that the test is only designed to find quadratic and interactive non-linearity, and thus not detect other categories of non-linearity.
The following null hypothesis is formulated for Ramsey's RESET test:

$$H_0: Data\ is\ linear$$

3.4.3.7 Coefficient of Determination - R^2

The regression's explanatory statement is read out by the coefficient "R-squared" or "R^2", and takes on a value between 0 and 1. The coefficient of determination explains how much of the total variation in data that is explained by the regression model (Brooks 2008).

The formula for R^2 is:

$$\frac{ESS}{TSS}$$

Where:
ESS = Explained sum of squares.
TSS = Total sum of squares.

Brooks (2008) criticizes R^2 because explanatory power always increases when another independent variable is added to the regression. Furthermore, Brooks' (2008) solution to the problem is instead to use the adjusted R^2, of which takes into account the reduction in the number of degrees of freedom when a variable is added. Thus, the adjusted R^2 can be considered a more appropriate measure for the coefficient of determination.

3.4.3.8 F-Test

According to Brooks (2008), an F-test can be used to test the null hypothesis that all coefficients, except the intercept, are equal to zero (i.e. $\beta_1 = 0$, $\beta_2 = 0$, ..., $\beta_k = 0$, for k independent variables). If the p-value for the F-test is lower than the chosen significance level, the null hypothesis is rejected.

3.5 Methodological Discussion

3.5.1 Reliability and Replication

The term reliability refers to the issue whether the measures of the study are consistent. Also, it is closely related to the term replication, meaning that the study must be replicable by others in order to fulfill the criteria of reliability (Bryman & Bell, 2011). Furthermore, Bryman and Bell (2011) designate three factors that need to be considered when determining if the study is reliable, i.e. stability[17], internal reliability[18], and inter-observer reliability[19].

To achieve high reliability, the authors of this study have gathered data from reliable secondary sources. Nyemissioner.se, reliable Swedish business newspaper (e.g. Dagens Industri), the official website of NASDAQ OMX Nordic, and Thomson Reuters Datastream are all considered to contain correct information and data. Despite the reliability of chosen secondary sources, samples of data have been confirmed using a second source. Samples of official announcement dates have been confirmed by NASDAQ OMX Nordic's official website. Also, samples of stock- and index prices have been confirmed by the same official website. In order for the study to be practically repeatable, all observations included in the study for announcement effects and long-run performance are listed in *Appendix A* and *Appendix B,* respectively. To sum up, the authors consider this study to be reliable and replicable, which is a presumption for the criteria of validity to be fulfilled.

3.5.2 Validity

Bryman and Bell (2011) describe validity as the concerns with integrity of the conclusions generated by the measures in the study. Furthermore, the concept of validity can be divided into measurement validity, internal validity and external validity. Measurement validity is fulfilled if the measures actually reflect the concepts that the study is supposed to examine. Moreover, internal validity concerns the causality mentioned in section *3.1 Research*

[17] Results related to measures do not fluctuate over time.
[18] All indicators associated to a result must be consistent.
[19] Only an issue when subjective judgment is included in the results.

Approach and Strategy, while external validity refers to the generalization of the results, also mentioned in section *3.1 Research Approach and Strategy* (Bryman & Bell, 2011).

The measures used in this study are the same as the measures used in earlier studies within SEO performance. Furthermore, conducting event studies and long-run performance studies using cumulative abnormal return are well known and generally accepted methodologies within the area of corporate finance. Also, concluding results testing its statistical significance contribute to increased validity of the study. That being said, the authors consider the study fulfilling the criteria of validity. Using other performance measures in addition to CAR would have increased validity of the study further. However, this has not been performed due to limitations in time.

3.5.3 Secondary Data and Quantitative Method

Bryman and Bell (2011) briefly describe criticism that quantitative research methods have been exposed to, mainly coming from researchers preferring a qualitative method. One key argument of criticism is that the natural scientific model of a quantitative method causes artificial precision and inaccuracy in the results, which cannot be related to society and "everyday life". However, the basis of this study is data of stock prices and individuals' market reactions to a real life event (SEO announcement). Therefore, the authors consider this study to contribute with a clear connection between research and reality.

3.5.4 Announcement Effects

As mentioned, this study uses the market model to estimate expected return of a stock. The market model is simple in design and the most commonly used method in event studies (Benninga, 2008). Also, it tends to generate robust results despite potential distribution problems in data (MacKinlay, 1997). However, there are several alternatives to the market model. MacKinlay (1997) mentions the *constant mean return model*[20] as a main competitor to the market model. The constant mean model, however, does not take cyclicality of stock return into account. Considering potential cyclicality caused by the financial crisis, the authors of this study chose the market model, assuming it would generate a more precise

[20] The constant mean return model assumes a constant average stock return over time.

estimation. Furthermore, the authors are aware of that both models could have been tested, and compared by the coefficient of determination (R^2) in order to conclude the most efficient model. Moreover, there are more advanced methods, where an economic method including certain statistical assumptions may be the most efficient way to estimate normal return (MacKinlay, 1997). However, this has not been performed in this study due to limitations in time.

Another present issue conducting an event study is inferences caused by uncertainty of the exact event date. MacKinlay (1997) argues that one cannot be certain if the market was informed of the event prior to closing time of the exchange at the event date. In this study, that potential problem has been handled by extending the event window.

3.5.5 Long-Run Performance

This study uses cumulative abnormal return to measure long-run performance. Another commonly used measure is *market adjusted buy-and-hold return*. Barber and Lyon (1997) define buy-and-hold return as an investment strategy where the investor buys the stock and then holds it over a certain period of time. Fama (1998) compares the benefits of the two measures, suggesting that buy-and-hold return reflects a more relevant investment strategy, while CAR takes continuous movements in stock prices into account. Furthermore, the two measures generate different results of long-run performance, particularly if the volatility is higher for the SEO firms than for indices (Barber & Lyon, 1997). Similarly to Spiess and Affleck-Graves (1995) and Brav et al. (2000), this study could preferable have measured both CAR and buy-and-hold return, which would have generated a broader analysis of long-run performance.

Moreover, Brav et al. (2000) compare equally weighted abnormal return to value-weighted abnormal return. This study uses the equally weighted alternative, which assumes a strategy with equal investment in all SEO-firms' stock. Value-weighted abnormal return, on the other hand, reflects investments proportional to the SEO firms' market value at the time. The reason why this study measures equally weighted abnormal return, is that it gives a better picture in terms of mispricing in the markets (Brav et al., 2000). Also, this study takes the size perspective into account in the regression analysis.

3.5.5.1 Matching Method

Loughran and Ritter (1995) and Brav et al. (2000) explain that the result of long-run performance is sensitive to what matching method the study uses. This study uses broad-based market indices as its matching method to represent market return. An alternative matching method would be the use of reference portfolios, including firms of the same size as the SEO firms (Barber & Lyon, 1997). Furthermore, Barber & Lyon (1997) argue that the use of control firms as matching method is preferable over reference portfolios. This is based on that test statistics is biased when measuring CAR using reference portfolios as matching method. Thus, preferably this study could have used non-issuing control firms matching the SEO firms in terms of market capitalization, which goes in line with Loughran and Ritter (1995). However, one can argue that this method is more sensitive since the volatility in single control firms is usually higher than for broad-based market indices. Also, the SEO firms and control firms potentially differ significantly in terms of other variables than market capitalization, leading to biased results. All together, the authors of this study consider the matching method used being the most appropriate for this study, mainly due to mentioned arguments but also due to the time aspect of collecting data.

3.5.6 Endogeneity Problem for Regression

When running a regression, the possible risk of endogenous variables is always present. Endogeneity in data means that there is correlation between the independent variable(s) and the error term, which in turn results in biased and inconsistent parameters (Brooks, 2008). One main cause of endogeneity is omitted variables (Brooks, 2008). This means that endogeneity occurs because certain independent variables that should be included in the regression are left out. Instead, these particular independent variable(s) appear in the error term, and if they are correlated with any of the included independent variables, an endogeneity problem is a fact. Other main causes of endogeneity are simultaneity[21], measurement error[22], and selection bias[23] (Angrist & Pischke, 2009; Brooks, 2008). The authors of this study are aware of the risk of endogeneity, particularly due to omitted variables. To deal with the problem, chosen independent variables are inspired by and measured as in earlier studies. Furthermore, collecting historical values of independent

[21] The risk of simultaneous effects between dependent and independent variables.
[22] Potentially arising when using proxies as dependent and/or independent variables.
[23] Nonrandom assignment to treatment and control groups.

variables minimize the risk of simultaneity. Risks of measurement error and selection bias are not relevant for this study, due to the lack of proxy variables and treatment group, respectively. In summary, the potential risk of endogeneity is minimized in this study but cannot be completely eliminated.

4 Results

In this chapter, the results and findings of the study are presented. Firstly, the number of observations are showed. Thereafter, results for announcement effects and long-run performance are presented and described. Lastly, the results for the regressions, including diagnostic tests, are presented.

4.1 Number of Observations

The number of observations is generated according to the sample selection and sample limitations in section *3.3 Sample Selection. Table 4.1* shows the number of observations for both time perspectives and both exchanges. Looking at the sample for announcement effect, the number of observations on each of the exchanges is almost equal (60 versus 63 observations). The observations add up to a total of 123 observations for announcement effect. For long-run performance, on the other hand, there is a larger difference between observations for OMX Stockholm and for First North (45 versus 36, respectively). The change of proportions of observations between the two time perspectives is due to higher extent of delisted and excluded observations on First North (See section *3.3.5 Sample Limitations for Long-run Performance)*. In total there are 81 observations for long-Run performance.

Table 4.1: Number of observations for both time perspectives and both exchanges

Observations:	**Announcement Effect**	**Long-Run Performance**
OMX Stockholm	60	45
First North	63	36
Total	123	81

4.2 SEO Announcement Effects

This section presents results related to the announcement effects of SEOs on OMX Stockholm, First North, and for the two exchanges combined.

4.2.1 SEO Announcement Effects during Event Window

Figure 4.1 below shows the average cumulative abnormal return (CAR) for event day 1 to 3, generated by the event study. This is shown for both exchanges separately. As can be seen in the figure, both average and median CAR for OMX Stockholm are negative during the whole event window, ending up with an average CAR of -3.82 percent and a median CAR of -3.90 percent event day 3. This suggests that firms listed on OMX Stockholm underperformed during the announcement of equity offering, compared to their normal historical stock return. Moreover, the median CAR for First North is also negative during the whole event window, with a CAR event day 3 of -1.31 percent. However, the average CAR for First North is positive (5.41 percent) event day 3, which is due to a positive average abnormal return (AR) of 11.24 percent event day 2. The difference between average and median CAR makes the performance of SEOs on First North more complex to analyze than for OMX Stockholm.

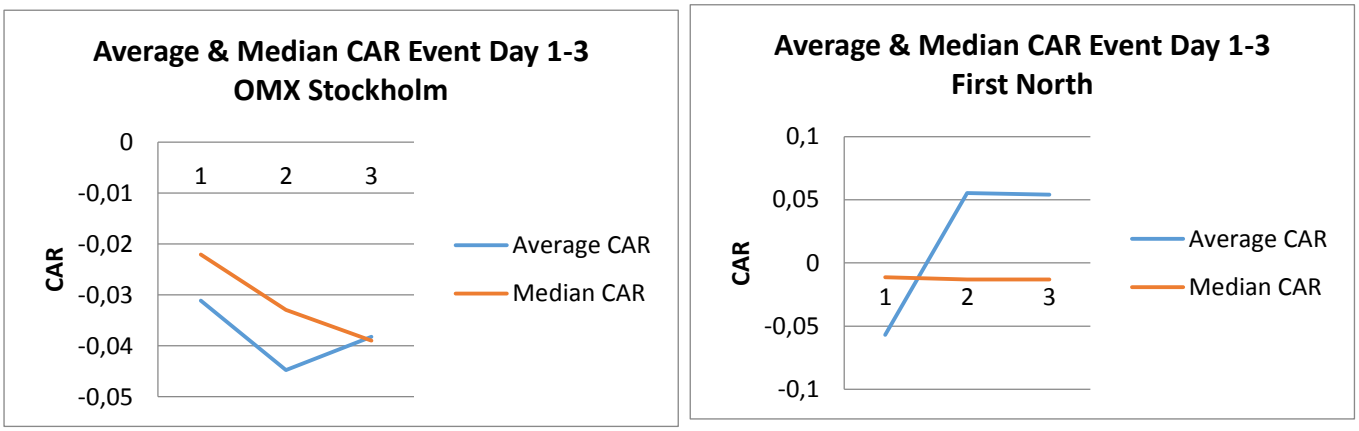

Figure 4.1: Average and Median CAR for OMX Stockholm and First North separately.

Using the observations for both exchanges, *Figure 4.2* presents the average CAR for both exchanges combined. The average CAR is 0.91 percent event day 3, while median CAR is -2.94 percent the same event day. Again, the positive average CAR is mainly due to the positive average AR event day 2 for First North.

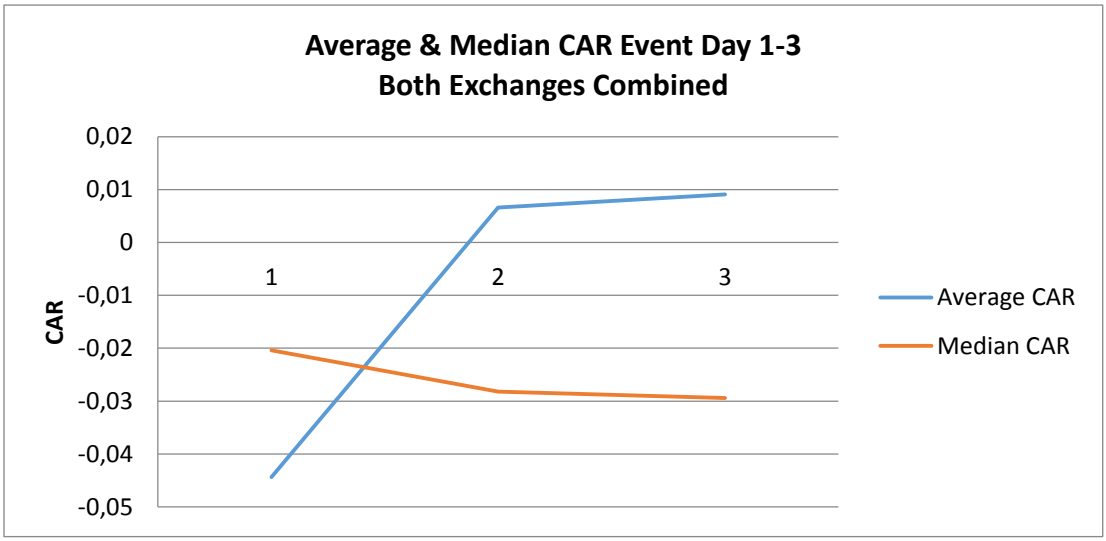

Figure 4.2: Average and Median CAR for both exchanges combined.

Intuitively, the positive average AR event day 2 for First North is, according to earlier studies, a bit surprising. In order to analyze it further, a boxplot for AR event day 2 is created and presented below in *Figure 4.3*. The boxplot shows that there is a significant outlier (observation ”123” Arctic Gold AB in the boxplot), with an AR of 805 percent. This can be compared to the median AR of -0.78 percent, which is showed in the boxplot as well. Thus, Arctic Gold AB is a key explanation to the positive average AR event day 2. Also, the boxplot shows that the positive outliers, particularly Arctic Gold AB, exceed the negative outliers, which is a reason why average CAR is higher than median CAR. Boxplots for event day 1 and 3 are attached in *Appendix C*.

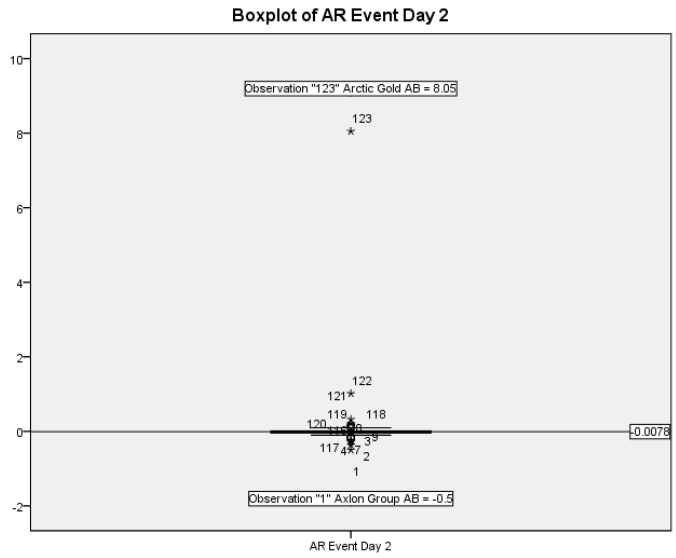

Figure 4.3: Boxplot for both exchanges combined, AR event day 2.

Table 4.2 sums up the results for average CAR by breaking it down to descriptive statistics for all three event days. What stands out in the table is, except from the maximum of 8.05 (Arctic Gold AB) for event day 2, the standard deviations. For event day 1 and 3, the standard deviation is 0.18 and 0.12, respectively. For event day 2, the standard deviation is 0.74, which is significantly higher than for the other two days. The relatively higher standard deviation for event day 2 is a natural consequence of the significant maximum value.

Table 4.2: Descriptive statistics for average AR, all event days separately.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
AR Event Day 1	123	-0.93	0.88	-0.044	0.18
AR Event Day 2	123	-0.50	8.05	0.05	0.74
AR Event Day 3	123	-0.57	0.94	0.0025	0.12
Valid N (listwise)	123				

Figure 4.4 below shows the average and median CAR year-by-year depending on what year the firm announced its equity offering. Firstly, it can be seen that Arctic Gold AB announced its SEO in 2010, leading to the relatively high average CAR that year. Except from average CAR 2010, all other years show a negative average and median CAR. Lowest median CAR was for 2010 (-3.59 percent), while the lowest average CAR was for 2011 (-5.85 percent). What should be added is that according to section *3.3.1 Time Period,* the year of 2012 only includes observations that announced an equity issue before April 1st. The year-by-year average and median CAR for both exchanges separately are presented in *Appendix D.*

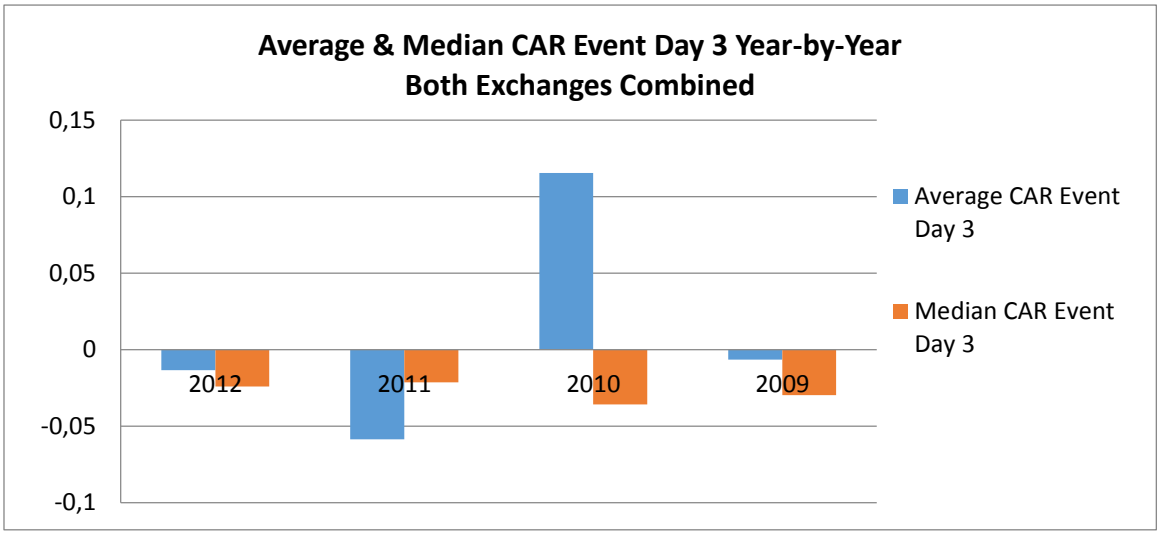

Figure 4.4: Average and median CAR presented year-by-year when the SEO was done

4.2.2 Statistical Significance of Announcement Effects

This far, only economic under- or over performance during the event window has been measured. The following section includes measures to conclude if SEO performance is statistically significant. *Table 4.3* presents the statistical significance of all individual abnormal returns for every firm. Therefore, there are a total 369 observations, including AR for each of the three event days for all 123 corporations. In total, there are 61 negatively significant AR and 36 positively significant AR, and hence, 272 insignificant observations. Out of the 61 negatively significant observations, 32 are from OMX Stockholm and 29 from First North.

Table 4.3: Statistic significance of Abnormal Return.

Significant AR	OMX Stockholm	First North	Total
Total AR Observations	180	189	369
Positively Significant	16	20	36
Negatively Significant	32	29	61
Not Significant	132	140	272

Finally, *Table 4.4* presents the statistical significance for CAR event day 3. Test statistics are calculated using the mean, median, and mean excluding Arctic Gold AB, respectively.

Furthermore, test statistics is compared to critical values for the one, five and ten percent significance levels, assuming normal distribution. If the sample is insignificant, the results cannot be statistically differed from zero. As showed in the table, test statistics for the sample's "mean" is insignificant, while "median" is negatively significant on ten percent level, and "mean excluding Arctic Gold AB" is negatively significant on five percent level. The variables used to calculate all three test statistics are presented in *Appendix E.*

Table 4.4: Statistic significance for CAR event day 3.

Test Statistics (Mean)	0.55	Not Significant
Test Stats (Median)	-1.79	Significant *
Test Stats (Mean) w/o Arctic Gold AB	-2.36	Significant **
Critical Values:		
1%	+/- 2.575	⇨ ***
5%	+/- 1.98	⇨ **
10%	+/- 1.645	⇨ *

4.3 Long-Run Performance of SEOs

This section presents results related to long-run performance of SEOs on OMX Stockholm, First North, and for the two exchanges combined.

Figure 4.5 below shows the average cumulative raw return and average CAR for both exchanges separately through the three-year period (36 months). Average cumulative raw return for SEOs listed on OMX Stockholm is positive until month 18, then it turns negative month 19 and ends up at –12.1 percent month 36. The average cumulative raw return for SEOs listed on First North is more volatile. It is positive during month 1, 3-9, and 30, while it is negative the rest of the time during the 36-months period. Noticeable is the occurrence of a substantial increase in average raw return month 29, which impacts the average cumulative raw return significantly. Average cumulative raw return for SEOs on First North ends up at -11.1 percent after 36 months. To sum up, both exchanges end up at a negative cumulative raw return after 36 months, where the returns of the First North observations are more volatile during the time period than those for OMX Stockholm.

Moreover, *Figure 4.5* shows average CAR for both exchanges separately. OMX Stockholm's average CAR increases from month 2 to 5, followed by a negative trend during the rest of the time period. Average CAR for SEOs on OMX Stockholm ends up at –38.20 percent. Average CAR for First North is, just as its average cumulative raw return, more volatile than OMX Stockholm's ditto. It shows a negative trend from month 7 to month 27. However, the substantial increase in average raw return month 29 impacts the average CAR curve as well. Average CAR for First North ends up at –10.50 percent month 36.

Summarizing all four curves, it can be concluded that average cumulative raw return for the two exchanges end up at approximately the same level after 36 months. Observe that SEOs on both exchanges show a three-year negative average cumulative raw return. Average CAR, on the other hand, is lower for OMX Stockholm than for First North month 36, suggesting that SEOs on OMX Stockholm underperform to a higher degree relative the market than SEOs on First North do. Taking the similar level of raw returns into account, it can be concluded that the higher underperformance on OMX Stockholm is due to higher returns for the OMXSPI index than for the First North All-share index.

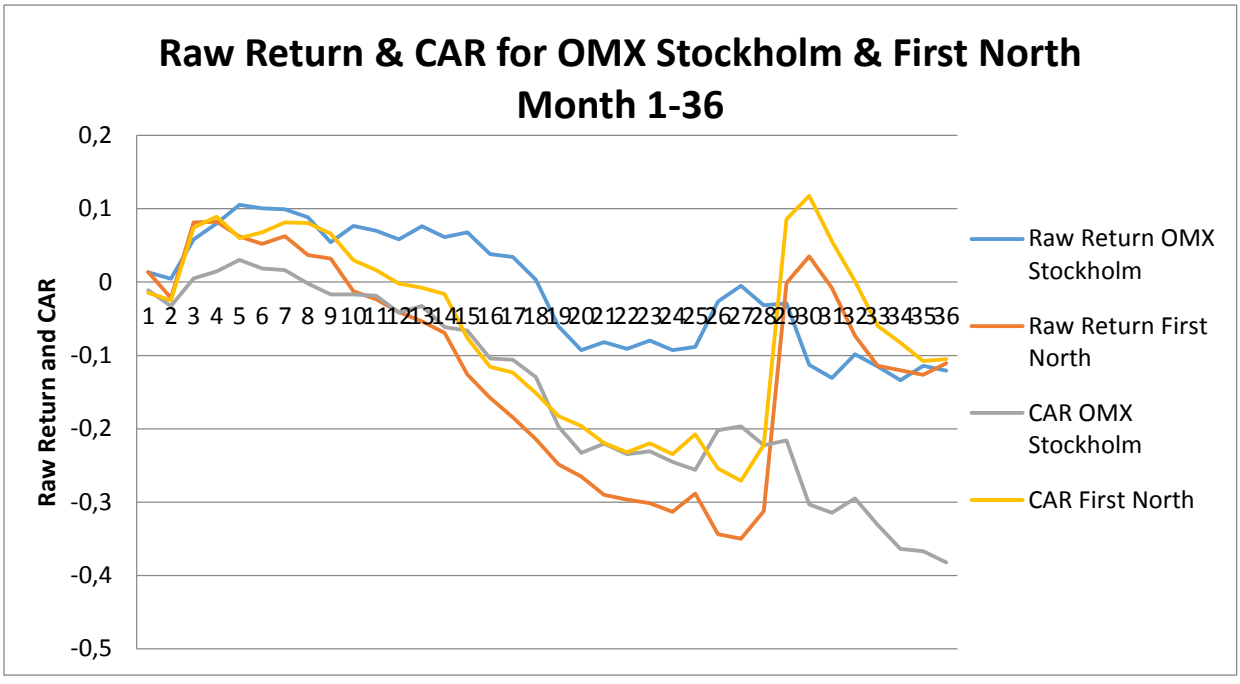

Figure 4.5: Raw return and CAR for OMX Stockholm and First North separately.

Figure 4.6 below presents average cumulative raw return and average CAR for both exchanges combined. Noticeable is that both curves follow each other, showing the same

trends, during the whole time period. The average CAR curve shows a negative trend approximately from month 7 to 24, and again from month 30 to 36. The fact that the curves follow each other means that indices perform an approximately constant higher return than SEO firms during the time period. Average cumulative raw return ends up at –11.63 percent month 36, while average CAR ends up at –25.90 percent month 36. Values for average raw return and average CAR month 1 through month 36 are presented in *Appendix F*.

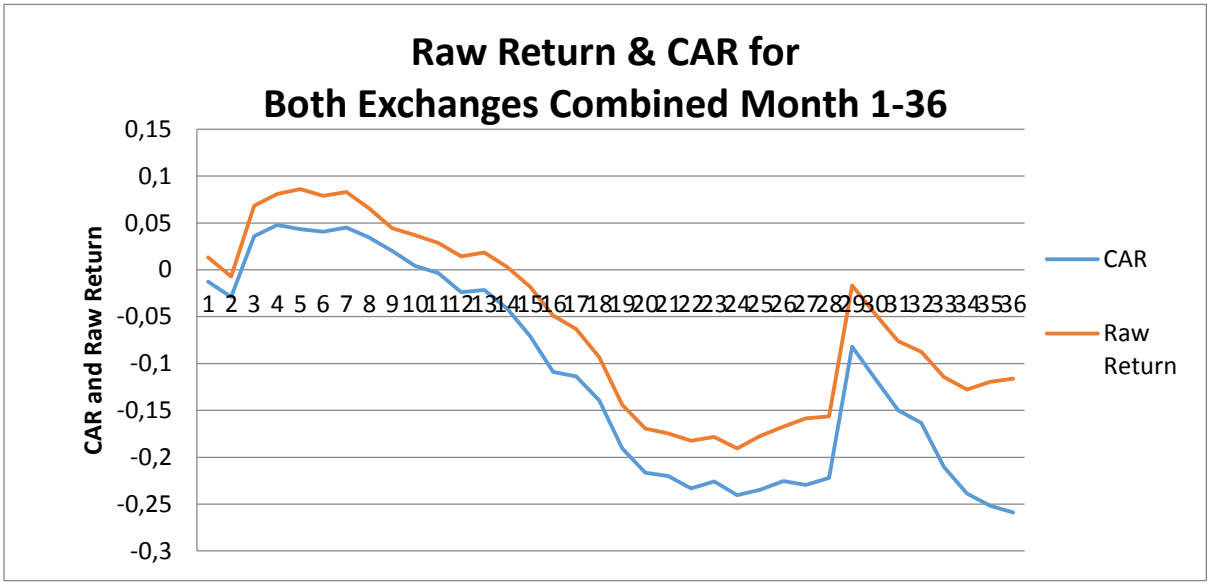

Figure 4.6: Raw return and CAR for both exchanges combined

Table 4.5 below shows descriptive statistics of average CAR for the 81 observations at month 36. The minimum value of -3.76 belongs to RusForest AB. The maximum value of 11.36 belongs to Cassandra Oil AB, which according to the boxplot presented in *Appendix G,* is the only outlier in the sample. This suggests that Cassandra Oil AB is a key reason why the standard deviation of average CAR month 36 is relatively high. Both RusForest AB and Cassandra Oil AB are listed on First North.

Table 4.5: Descriptive statistics for CAR month 36, both exchanges combined.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
CAR Month 36	81	-3.76	11.36	-0.2588	1.84472
Valid N (listwise)	81				

4.3.1 Statistical Significance of Long-Run Performance

Lastly, *Table 4.6* presents the statistical (in)significance for average CAR month 36. Test statistics is calculated using a t-test with 80 (81 observations minus 1) degrees of freedom. The results for First North and both exchanges combined cannot be statistically differed from zero. However, average CAR for SEO firms listed on OMX Stockholm is statistically significant on 5 percent level. The variables used to calculate test statistics are presented in *Appendix G.*

Table 4.6: Statistic significance for CAR month 36.

Test Statistics:		
OMX Stockholm	-2.04	**
First North	-0.27	Not Significant
Both Exchanges Combined	-1.27	Not Significant
Critical Values:		
1%	+/- 2.64	⇨ ***
5%	+/- 1.99	⇨ **
10%	+/- 1.66	⇨ *

4.4 OLS Regression

Firstly, a regression with CAR month 36 for all observations from both exchanges as dependent variable was run. The diagnostic tests conclude that an OLS regression fits the data[24]. However, all three independent variables are statistically insignificant, which means that the coefficients cannot be differed from zero. The results for the OLS regression including all observation and related diagnostic tests are presented in *Appendix H.*

As mentioned, *Table 4.6* shows that average CAR month 36 for the observations listed on OMX Stockholm is negative and statistically significant, which is in line with earlier research. That being said, a regression with CAR month 36 for OMX Stockholm as dependent variable may be considered more interesting to analyze and compare to results of earlier studies.

[24] However, it can be argued for that non-normality is an issue.

Therefore, the following regression results, including diagnostic tests, are for SEO-firms listed on OMX Stockholm.

Table 4.7 below shows the results from the OLS regression with CAR month 36 for SEO firms listed on OMX Stockholm as dependent variable. The coefficients show how the independent variables impact the dependent variable economically. Thereafter, the coefficients, along with standard errors and t-statistics are used to generate the p-values. The p-value for a variable is what determines if the coefficient is statistically significant, and hence can be statistically differed from zero.

As can be seen in *Table 4.7* the book-to-market ratio has a coefficient of 0.015. This means that a one-unit increase in book-to-market ratio would increase CAR month 36 by 0.015.
One may argue that a 0.1-unit increase in book-to-market ratio is more relevant to analyze, which would increase CAR month 36 by 0.0015. However, looking at the p-value suggests that this variable is statistically insignificant. Thus, the impact of a firm's book-to-market ratio on its CAR month 36 cannot be differed from zero.

Moreover, the natural logarithm of market capitalization (LN (Market Cap)) has a coefficient of 0.105. This means that a one-unit (1 million SEK) increase in market capitalization increases CAR month 36 by 0.001. The actual impact of this variable is calculated by the following formula:

$$0.105292 * \ln(1.01) = 0.001047\ldots$$

However, the variable for market capitalization is also statistically insignificant, meaning its coefficient cannot be differed from zero.

The last independent variable, the dummy variable for several offerings shows a coefficient of -0.964. Also, its p-value suggests that the coefficient is statistically significant on five percent level. Thus, if firms return to the equity markets to issue equity more than once during the time period, this affects its CAR month 36 by -0.964.

Furthermore, Adjusted R-squared suggests that 8.1 percent of the total variation in data is explained by this regression, when degrees of freedom are taken into account. Lastly, the F-

statistic and its p-value conclude if the null hypothesis (that is, all coefficients in the regression, except the intercept, are equal to zero) should be confirmed or rejected. This null hypothesis is rejected on ten percent significance level. Values for dependent and independent variables are presented in *Appendix B.*

Table 4.7: Regression Results with CAR Month 36 for OMX Stockholm as dependent variable.

Variable	**Coefficient**	**Standard Error**	**t-Statistics**	**P-Value**
Intercept (C)	-0.878	0.719	-1.22	0.23
Book-to-Market Ratio	0.015	0.182	0.084	0.93
LN(Market Cap)	0.105	0.093	1.13	0.27
Dummy Several Offerings	-0.964	0.425	-2.27	0.029**
R-Squared	0.144	F-Statistic	2.30	
Adjusted R-Squared	0.081	Prob(F-Stats)	0.092*	

*Comment: ** = p<0.05 ; * = p<0.1*

4.4.1 Diagnostic Tests

The diagnostic tests conclude that the OLS assumptions are not violated and that the model is appropriate to use. Results for each test for heteroskedasticity, multicollinearity, normal distribution, and non-linearity are summarized below. The specific test results are showed in *Appendix I.*

4.4.1.1 Heteroskedasticity

The results from both Breusch-Pagan-Godfrey's test and White's test show insignificant p-values. The Breusch-Pagan-Godfrey test presents p-values of 0.64, 0.62, and 0.58 for the F-test, chi-squared test, and "scaled explained SS" test, respectively. The same p-values for White's test are 0.92, 0.89, and 0.86. In summary, this means that both tests confirm the null hypothesis, suggesting that data is homoscedastic. Thus, there is no present heteroskedasticity problem.

4.4.1.2 Normal Distribution

The Jarque-Bera test for each of the variables show that CAR month 36 and LN (Market Cap) are normally distributed. However, book-to-market ratio and the dummy variable are not normally distributed. Furthermore, the histogram shows that the combined Jarque-Bera test has a p-value of 0.037, which suggests that the null hypothesis of normal distribution is rejected on 5 percent level but confirmed on 1 percent level. The ambiguous results for the Jarque-Bera tests, along with the lack of alternative models not assuming normal distribution, leads to that the potential problem of non-normality is ignored.

4.4.1.3 Multicollinearity

The correlation matrix presents results for correlation between all independent variables. The highest correlated independent variables are book-to-market ratio and the dummy variable for several offerings (-0.08), with a p-value of 0.61. This means that there is no signs of multicollinearity between any of the independent variables.

4.4.1.4 Non-Linearity

Ramsey's RESET test shows that F-statistics and "FITTED^2" have a p-value of 0.84, and that the chi square test has a p-value of 0.83. Thus, the null hypothesis of linearity is confirmed. These results suggest that a linear model such as OLS, should be used to estimate the parameters.

5 Analysis and Discussion

This chapter aims to analyze the results generated in chapter 4, and compare these results to earlier research and theories. Also, a discussion is presented based on the analysis. The discussion explains certain premises and other factors that potentially impact the results.

5.1 SEO Announcement Effects

"Did the official announcement of an SEO lead to a negative market reaction?"

When including all observations on both exchanges, and using the arithmetic mean calculating test statistics, one *cannot* conclude a negative market reaction to SEO announcements. However, analyzing the data further, *Figure 4.3* and *Table 4.2* show that one particular outlier, Arctic Gold AB[25], has a significant impact on the results. This is due to its positive abnormal return event day 2, which also affects the variance of the sample substantially. Excluding Arctic Gold AB from the sample, a statistical negative market reaction can be concluded on five percent significance level. Furthermore, *Figure 4.4* shows that no particular trend in underperformance can be seen throughout the years 2009-2012. To sum up the results of the first research question, excluding Arctic Gold AB from the sample, the official announcement of an SEO did lead to a negative market reaction. One can argue that this negative market reaction cannot be associated to a certain year or stock exchange, but rather to both exchanges during the time period 2009-2012 as a whole.

5.1.1 Results Compared to Earlier Studies and Theory

As can be seen in *Appendix E,* the average cumulative abnormal return is -5.67 percent event day 3 (excluding Arctic Gold AB). This can be compared to earlier studies, where average abnormal returns in the event window varies from -0.75 percent to -3.0 percent (Ogden et al., 2003). Thus, the results of this study show a more negative average market reaction than what

[25] Arctic Gold AB is listed on First North.

Ogden et al. (2003) describe that earlier studies have showed. Thus, it can be argued for that an SEO announcement in Sweden during the recovery phase of the financial crisis leads to a more negative announcement effect than for SEO firms on the American stock markets during other time periods.

Overall, this study shows no signs of more negative market reaction during a specific year in the time period. This hints that during the recovery phase of the financial crisis, there were no specific windows of opportunity in the equity markets that firms have taken advantage of. Thus, the results of this study go against Bayless and Chaplinsky (1996), which say that there are high volumes issuing periods causing windows of opportunities for firms to impose on.

Naturally, the results of this study confirm theories suggesting that issuing additional equity to outside investors has a negative impact on the market's view on firm value. Several theories base this assumption on information asymmetry, including signaling of equity offerings suggesting that managers have poor confidence in the company's future operating performance and/or them believing that the stock is overvalued. Also, an equity offering may be associated with agency problems, where managers' interests are not aligned with shareholders' interests. This study cannot specifically conclude which of these theories are relatable to Swedish SEO firms, but concludes that they may be appropriate to look further into if the results were to be analyzed further. Moreover, the overall negative announcement effect on the firms' market value supports the pecking order theory, saying that pure equity financing is a last resort financing source.

It is also important to analyze the results in terms of theories going against the traditional signaling theories saying that equity issues lead to negative market reactions. McConell and Muscarella (1985), Cooney and Kalay (1993), and Viswanath (1993) all suggest that equity offerings may lead to positive market reactions. As can be seen in *Table 4.3,* 36 of the observations for abnormal return (AR) are positively significant, which hints that the results partly go in line with mentioned contradicting theories. Positively significant abnormal return, such as Arctic Gold AB event day 2, may be caused by simultaneous positive information to potential investors. Similarly to what McConell and Muscarella (1985) suggest, positive information possibly includes announcements of capital expenditure, increasing the investors' confidence in the firm. Moreover, the fact that *Table 4.3* shows both negatively and positively significant observations for AR supports the tradeoff theory, suggesting that firms aim for an

optimal capital structure. Assuming rational investors, a positive market reaction to an equity announcement would be when the firm's financial distress costs exceed the tax advantages of debt. Thus, different results of this study possibly support the pecking order theory and the tradeoff theory, respectively. That being said, this study does not aim to challenge either of these capital structure theories, but rather to raise the question for further research.

5.2 Long-Run Performance of SEOs

"Did SEO firms underperform in a three-year perspective following the last issuing date?"

As seen in *Table 4.6,* when including observations on both exchanges, CAR month 36 is economically negative, but a statistical long-run underperformance *cannot* be concluded. However, outliers particularly coming from First North cause a relatively high variance, which is the reason to the insignificant results. This argument is further confirmed looking at *Figure 4.5* and *Figure 4.6.* These diagrams show a negative average cumulative raw return month 36 for samples on both exchanges. This concludes that investors would have been better off investing in risk-free assets during the period, which along with a positive raw return for the two indices speak for an underperformance of SEO firms on both exchanges. Also, looking at only OMX Stockholm, there is a statistical long-run underperformance for SEO firms, relative index OMXSPI. To sum up, the negative CAR month 36 for OMX Stockholm is statistically significant, and the samples on both exchanges have a negative average raw return. This speaks for that SEO firms did underperform during a three-year perspective following the last issuing date.

5.2.1 Results Compared to Earlier Studies and Theory

Similarly to Spiess and Affleck-Graves (1995) and Loughran and Ritter (1995), the results of this study[26] conclude long-run underperformance for SEO firms in on OMX Stockholm in the recovery phase of the financial crisis. One main difference, however, is that the SEO firms in the mentioned earlier studies generate a positive average raw return, while the SEO firms in this study generate a negative ditto. Furthermore, a comparison between *Figure 1* and *Figure*

[26] Note: As mentioned, only long-run underperformance on OMX Stockholm is statistically significant.

4.6 shows that the results of this study are in line with Spiess and Affleck-Graves' (1995) in terms of an initial increase in CAR, followed by a negative trend leading to an overall long-run underperformance.

The results of this study are aligned with the interpretations of Spiess and Affleck-Graves (1995 and Loughran and Ritter (1995). The results suggest that, despite the negative announcement effect described in research question 1, the market does not fully adjust to the information contained in the equity offering announcement. Instead, the initial re-evaluation of the stock by the market is biased, which is a potential reason to the long-run underperformance. This interpretation challenges the efficient market hypothesis, and hence, suggests that the Swedish stock markets are inefficient in terms of market reaction to SEO announcements. One possible explanation to inefficiency is illiquidity in the market, which causes a delay in market reactions. However, this argument is challenged by the fact that test statistics for OMX Stockholm is statistically significant, while test statistics for First North is insignificant. More specifically, the illiquidity argument does not hold completely since the generally less traded stocks on First North statistically perform better during the time period, relative the market.

Moreover, it should be mentioned that the matching method differs between Spiess and Affleck-Graves (1995)[27], Loughran and Ritter (1995)[28] and this study. As mentioned in section *3.5.5.1 Matching Method,* the results of long-run performance is sensitive to what specific matching method that is used, and this may have a significant impact on the differences in results.

[27] Use of portfolios only including non-issuing firms, matching SEO firms by different variables.
[28] Use of control firms matching SEO firms by firm size.

5.3 Independent Variables Impacting Long-Run Performance of SEOs

"Did the mentioned independent variables have a significant effect on performance? If so, how did these independent variables impact performance?"

This section aims to explain the potential impact the independent variables have on SEO firms' long-run performance. The analysis uses the results from *Table 4.7* and compares to earlier studies and theory.

5.3.1 Book-to-Market Ratio

The variable book-to-market ratio has a positive coefficient of 0.015 for OMX Stockholm, but it is statistically insignificant. The positive coefficient goes in line with Spiess and Affleck-Graves (1995), Loughran and Ritter (1995), Brav et al. (2000), and Daniel and Titman (2006), but these studies' coefficients for book-to-market are statistically significant.

Similarly to Titman and Daniel (2006), one may say that the lower book-to-market ratio, the more overvalued the firm's stock is. That being said, the positive coefficient goes in line with Myers and Majluf's (1984) adverse selection model. More specifically, managers have a tendency to issue additional equity when the firm's stock is overvalued, which leads to a negative market reaction when rational investors are aware of this potential behavior. If the book-to-market ratio is relatively high, rational investors assume that the underlying reason for SEO is not that managers want to take advantage of an overvalued stock, and hence, the long-run market reaction is not as negative as if the book-to-market ratio was lower. However, since the coefficient is not significant, the argument of overvaluation cannot be confirmed. Instead, one can argue for that the insignificant book-to-market value goes in line with EHM, assuming that the market value of a stock always reflects its true value. Therefore, current overvaluation by the market does not occur, and book-to-market ratio has no impact on future stock return.

5.3.2 Size (Market Capitalization)

LN (Market Cap) shows a positive coefficient of 0.105 for OMX Stockholm, but the p-value shows that the coefficient is statistically insignificant. This result goes completely in line with Loughran and Ritter (1995), which also concluded statistical insignificance for their variable of market capitalization.

Intuitively, a positive significant coefficient would make sense. That is, larger firms are generally more well-known and traded more frequently. This would lead to an unbiased initial adjustment of the stock price at announcement, and thus, better long-run performance. However, this theory cannot be confirmed due to the insignificant coefficient.

5.3.3 Number of SEOs during Time Period

The coefficient for the dummy variable is -0.964, and statistically significant for OMX Stockholm. This result goes in line with Billet et al. (2011) and Loughran and Ritter (1995). Several equity issues during the time period may signal that the firm is desperate for external equity, possibly due to unavailability of internal funds and debt, and goes in line with the pecking order theory. Naturally, the signaling caused by several equity lead to continuous negative market reactions during the time period. Possibly, several offerings also show management incompetence, not being able to invest issued equity in positive NPV project(s) generating internal funds. Instead, the firm needs to return to the equity markets to issue more external funds.

5.4 Discussion

This study shows results for the Swedish stock markets during the recovery phase of the financial crisis, including observations according to sample selections in section *3.3*. However, it is important to discuss how the results of the study may have differed with other premises.

Firstly, the study includes firms that use different approaches to issue seasoned equity. More specifically, both firms providing priority to current shareholders, and firms that do not provide that type of priority, are included. Focusing on one or the other, or adjusting for differences between the two in the results possibly would have changed the findings. Similarly to Masulis and Korwar (1986), this study could have excluded all observations showing signs of being rights offers. Also, focusing on observations within a range of offering size, similarly to Asquith and Mullins (1986), may have targeted the results further. However, one must keep in mind that the Swedish market for SEOs is significantly smaller than in USA, which possibly would have made the data collection for these alternative approaches difficult to accomplish.

Furthermore, measuring long-run performance, this study excludes delisted corporations completely. One key reason to delisting is poor stock performance, and the possibility that the firm filed for bankruptcy. That being said, one may argue for that the results of the sample's average abnormal returns are positively biased due to exclusion of delisted companies. More advanced databases, along with adjusting the methodology, arguable could have solved the problem of delisting. However, due to time and cost restrictions, this study could not go through with that solution.

On the other hand, there are possible adjustments that potentially would have increased the abnormal returns of the SEO firms. As in Brav et al. (2000), abnormal returns may have been higher if value-weighted abnormal return was measured. As mentioned, this study gives all firms the same percentage impact on average return, while using a value-weighted portfolio would have given larger firms a higher percentage impact on AR, and hence, improved the results of SEO firms' returns. However, the insignificant coefficient for market capitalization in the regression speaks against this argument.

Carlson's et al. (2004) arguments that financial conditions prior to the offering is the underlying reason for the negative announcement effect, are to some extent not applicable on this study. By measuring a firm's expected return in the estimation window prior to the announcement, historical financial conditions are taken into account. Thus, if firms perform worse in the event window relative their own historical performance, a negative abnormal return caused by the actual SEO event can be concluded. However, this study does not examine if long-run underperformance possibly is due to historical financial performance or financial decisions after the equity offering, which Billet et al. (2011) suggest should be taken into account.

Moreover, the consequences of relatively low interest rates during the time period are one potential explanation to the poor long-run performance of SEO firms after the financial crisis. During the recovery phase of the crisis, interest rates have been set relatively low in order to boost investments and decrease savings in risk-free assets. However, as Vigna (2014) flagged for, the recovery phase of the crisis was characterized by decreased investor confidence, causing the demand for risky investments to go down. Therefore, one may argue for that low interest rates, along with lower demand for risky investments instead boosted demand for lower-risk stock. Thus, investors' risk appetite suited stock with low betas but with higher risk and expected return than risk-free assets. That being said, the demand and price of risky SEO firms may have decreased, while the demand and price for less risky firms included in indices OMXSPI and First North All-share increased. Hence, this explanation possibly caused the average negative raw return and negative average abnormal return of SEO firms.

Lastly, the occurrence of the global financial crisis may have taught investors that over optimism in the markets normally is the underlying reason of crises. The over optimism, which generally causes an increase of prices in the stock markets eventually backfires and causes a loss for investors. Therefore, investors may avoid over optimism in risky securities, such as SEO firms, which decreases the demand and price of these firms' stock.

6 Conclusion

This ending chapter aims to conclude the research questions. Also, this chapter covers potential future research that the authors recommend.

This study has examined announcement effects and long-run performance of SEO firms in the Swedish stock markets, during the recovery phase of the global financial crisis. The consequences of the crisis would potentially change the assumptions of performance in the stock markets. Therefore, this study has examined post-SEO performance and compared to theory and results in earlier studies.

6.1 Research Purpose and Contributions

When excluding one particular outlier, a negative statistically significant announcement effect can be concluded on the Swedish stock markets in the recovery phase of the financial crisis. This particular outlier is excluded because its abnormal return differs substantially from the rest of the observations, hinting that other factors than the actual announcement of equity offering impacted its result. That being said, one can argue for the following answer to the first research question:

The official announcement of an SEO did lead to a negative market reaction on the Swedish stock markets during the recovery phase of the financial crisis.

Furthermore, for SEO firms listed on NASDAQ OMX Stockholm, a statistically significant long-run underperformance relative the market can be concluded. However, long-run underperformance relative the market cannot be concluded for SEO firms listed on First North. Moreover, SEO firms on both stock exchanges generated an economic underperformance in terms of negative average cumulative raw returns. A key reason why SEO firms on First North did not statistically underperform is the volatility among the firms' individual cumulative abnormal returns. To sum up, the following answer to the second research question can be concluded:

SEO firms listed on NASDAQ OMX Stockholm generated a long-run underperformance relative the market in the recovery phase of the financial crisis.

Lastly, for the three independent variables included in the regression, trying to explain long-run performance, the following answer can be concluded for NASDAQ OMX Stockholm:

Book-to-market ratio has no significant impact on SEO firms' long-run performance.

Market capitalization has no significant impact on SEO firms' long-run performance.

Issuing additional equity several times during the time period has a negative impact on SEO firms' long-run performance.

In summary, an overall negative announcement effect was followed up by long-run underperformance for SEO firms listed on NASDAQ OMX Stockholm. Although there are signs of long-run underperformance for SEO firms on First North as well, this cannot be concluded in this study. An SEO firm issuing additional equity more than once during the time period partly explains its long-run underperformance.

This study supports and adds to previous findings that a negative announcement effect and long-run underperformance of SEO firms is not unique to the American stock markets. That being said, the consequences of the financial crisis did not significantly change the assumptions of post-SEO performance in the Swedish stock markets. Moreover, the study interprets that during its recovery of a crisis, the stock market OMX Stockholm is not efficient in terms of re-evaluating firms' market value to information of seasoned equity offering announcements. Thus, the OMX Stockholm stock market has potentially been biased in its initial adjustments to this type of information. Also, this study adds a methodological discussion to previous literature regarding the sensitivity of performance results depending on what measures and method are used.

6.2 Future Research

According to the methodological discussion and analysis, several methodological adjustments can be done in order to broaden the analysis of firms' post-SEO performance. Firstly, using market adjusted buy-and-hold return as measurement for long-run performance may generate different results for this study's sample and time period. Future studies within the area, aiming to provide more of an investor perspective should preferably use market adjusted buy-and-hold return as measurement.

Moreover, the authors recommend that future research run regressions for both announcement effects and long-run performance, including different independent variables. Such variables may analyze the impact of intended use of proceeds, industry or sector belongings, reported earnings or profit margin prior to announcement, and certain macroeconomic factors at the time of announcement. Lastly, the authors of this study recommend further analysis of how firms' capital structures impact the short- and long-run market reaction of SEO announcements. Including an independent variable measuring the percentage change in debt-to-equity ratio caused by the equity issue would potentially provide further indications of capital structure theories' applicability on Swedish listed firms.

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Databases and Software:

Excel

EViews

NASDAQ OMX Nordic. Accessible: www.nasdaqomxnordic.com

Nyemissioner.se. Accessible: www.nyemissioner.se

Retriever Business. Accessible: web.retriever-info.com

SPSS

Thomson Reuters Datastream

Appendix A – Announcement Dates

Announcement Dates and CAR Event Day 3

Firms	Exchange	Announcement Date	CAR Event Day 3
BioInvent International AB	OMX Stockholm	12-02-14	-0,1708
Nordic Mines AB	OMX Stockholm	12-03-08	-0,0062
Artimplant AB	OMX Stockholm	12-02-02	0,1452
Image Systems AB	OMX Stockholm	12-01-20	-0,0180
Transcom WorldWide S.A.	OMX Stockholm	11-10-20	-0,0884
KappAhl AB	OMX Stockholm	11-09-30	-0,8564
Rederi AB Transatlantic	OMX Stockholm	11-10-07	0,0079
Diös Fastigheter AB	OMX Stockholm	11-09-22	0,0199
Oasmia Pharmaceutical AB	OMX Stockholm	11-09-30	0,0163
Opcon AB	OMX Stockholm	11-08-24	-0,3512
Allenex AB	OMX Stockholm	11-09-20	-0,2937
Orexo AB	OMX Stockholm	11-05-27	0,0090
BioInvent International AB	OMX Stockholm	11-06-01	-0,0479
Fastighets AB Balder	OMX Stockholm	11-05-09	0,0048
Swedish Orphan Biovitrum AB	OMX Stockholm	11-03-29	-0,0790
Precise Biometrics AB	OMX Stockholm	11-03-28	-0,2990
Fingerprint Cards AB	OMX Stockholm	11-04-11	0,0042
Hemtex AB	OMX Stockholm	11-02-15	-0,0687
Digital Vision AB	OMX Stockholm	11-03-09	0,1350
Hexpol AB	OMX Stockholm	11-01-12	0,0719
Fastighets AB Balder	OMX Stockholm	11-01-24	-0,0479
MSC Konsult AB	OMX Stockholm	10-11-01	-0,0853
Eniro AB	OMX Stockholm	10-10-29	-0,0735
Hexagon AB	OMX Stockholm	10-10-25	-0,0272
Karo Bio AB	OMX Stockholm	10-10-26	-0,2143
Sensys Traffic AB	OMX Stockholm	10-10-12	-0,1655
Diös Fastigheter AB	OMX Stockholm	10-11-01	0,0112
Nordic Mines AB	OMX Stockholm	10-11-15	-0,0110
Corem Property Group AB	OMX Stockholm	10-10-15	-0,0016
Oasmia Pharmaceutical AB	OMX Stockholm	10-10-19	-0,1993
Artimplant AB	OMX Stockholm	10-09-07	-0,0783
Stockwik Förvaltnings AB	OMX Stockholm	10-08-31	-0,2426
Elanders AB	OMX Stockholm	10-08-26	-0,0302
HQ AB	OMX Stockholm	10-05-26	-0,2447
PA Resources AB	OMX Stockholm	10-05-07	-0,2132
Note AB	OMX Stockholm	10-04-07	0,1384
SAS AB	OMX Stockholm	10-04-07	0,1828
Hemtex AB	OMX Stockholm	10-04-05	-0,0687
Rörvik Timber AB	OMX Stockholm	10-02-08	0,5520
Cision AB	OMX Stockholm	10-02-02	0,0455

Sagax AB	OMX Stockholm	10-02-15	0,0343
BioInvent International AB	OMX Stockholm	10-01-14	-0,0095
TradeDoubler AB	OMX Stockholm	09-11-17	-0,0119
Gunnebo AB	OMX Stockholm	09-10-23	-0,1322
Haldex AB	OMX Stockholm	09-10-23	-0,0467
Ticket Travel Group AB	OMX Stockholm	09-11-03	0,0514
Rottneros AB	OMX Stockholm	09-10-12	0,0951
Mertiva AB	OMX Stockholm	09-09-15	-0,1028
Fingerprint Cards AB	OMX Stockholm	09-09-15	0,0203
Swedbank AB	OMX Stockholm	09-02-05	0,0505
Eniro AB	OMX Stockholm	09-04-27	0,7795
Cybercom Group AB	OMX Stockholm	09-05-20	-0,0076
Allenex AB	OMX Stockholm	09-05-07	-0,0766
Trelleborg AB	OMX Stockholm	09-03-23	0,0185
Hemtex AB	OMX Stockholm	09-03-31	-0,0553
SAS AB	OMX Stockholm	09-02-03	-0,2323
Nordea Bank AB	OMX Stockholm	09-02-10	-0,0129
Husqvarna AB	OMX Stockholm	09-02-20	-0,1191
Skandinaviska Enskilda Banken AB	OMX Stockholm	09-02-05	0,1638
Digital Vision AB	OMX Stockholm	09-02-12	-0,0603
TrustBuddy International AB	First North	12-03-28	-0,0170
Hansa Medical AB	First North	11-12-08	-0,1746
CybAero AB	First North	11-01-24	0,0358
Hansa Medical AB	First North	11-12-08	-0,1746
Seamless Distribution AB	First North	11-12-28	0,2649
Agrokultura AB	First North	11-12-20	0,2252
World Class Seagull International AB	First North	11-11-07	0,0826
ChronTech Pharma AB	First North	11-10-27	-0,0797
Lightlab Sweden AB	First North	11-11-25	-0,5815
Human Care HC AB	First North	11-10-12	-0,0415
Oniva Online Group Europe AB	First North	11-11-10	-0,0448
Cryptzone AB	First North	11-11-11	-0,1832
Invisio Communications AB	First North	11-10-21	0,0071
C-RAD AB	First North	11-09-16	-0,2530
Tilgin AB	First North	11-08-12	-0,1490
ChronTech Pharma AB	First North	11-07-27	0,1076
Selena Oil & Gas Holding AB	First North	11-06-09	-0,0422
Mediaprovider Scandinavia AB	First North	11-05-19	0,1323
ADDvise Lab Solutions AB	First North	11-06-08	-0,0071
CybAero AB	First North	11-05-04	-0,0835
Lappland Goldminers AB	First North	11-04-29	0,0078
Cryptzone AB	First North	11-06-01	0,0139
Pilum AB	First North	11-05-12	0,0076
Hansa Medical AB	First North	11-05-13	0,0585
Oniva Online Group Europe AB	First North	11-03-16	-0,0938
Genovis AB	First North	11-03-28	0,1366

Capilon AB	First North	11-04-04	-0,0313
Agrokultura AB	First North	11-02-16	-0,2263
OraSolv AB	First North	11-03-09	-0,1005
SRAB Shipping AB	First North	11-01-20	0,4944
Lightlab Sweden AB	First North	11-01-27	-0,2348
Seanet Maritime Communications AB	First North	11-01-14	0,0174
Vinovo AB	First North	11-11-24	-0,0959
Arctic Gold AB	First North	11-11-16	8,0408
Invisio Communications AB	First North	11-11-19	0,0055
World Class Seagull International AB	First North	10-11-22	-0,0129
Axlon Group AB	First North	11-09-02	0,4300
RusForest AB	First North	10-09-22	-0,0748
ChronTech Pharma AB	First North	10-09-27	-0,1701
CybAero AB	First North	10-10-11	-0,0039
Cassandra Oil AB	First North	10-08-24	-0,6951
Redbet Holding AB	First North	10-08-02	-0,2742
VKG Energy Services AB	First North	10-07-02	-0,0737
Forestlight Studio AB	First North	10-05-10	-1,7893
Labs2 Group AB	First North	10-05-17	-0,0144
Mediaprovider Scandinavia AB	First North	10-05-03	-0,2169
Impact Coatings AB	First North	10-02-03	-0,1115
Lightlab Sweden AB	First North	10-02-02	-0,0450
Ellen AB	First North	09-12-22	-0,0274
ChronTech Pharma AB	First North	09-11-27	-0,1649
Agellis Group AB	First North	09-11-20	-0,1123
OraSolv AB	First North	09-10-15	-0,1211
Cassandra Oil AB	First North	09-10-14	0,1274
Bredband2 i Skandinavien AB	First North	09-09-29	-0,1003
Catech AB	First North	09-09-23	-0,1053
Labs2 Group AB	First North	09-04-30	0,0128
Cryptzone AB	First North	09-05-06	0,9640
Lappland Goldminers AB	First North	09-03-18	0,0107
Ellen AB	First North	09-03-27	-0,0537
Petrogrand AB	First North	09-02-13	-0,9744
Mediaprovider Scandinavia AB	First North	09-02-27	0,0009
Agellis Group AB	First North	09-03-11	0,1305
Oniva Online Group Europe AB	First North	09-02-02	-0,1476

Appendix B – Variables in Regression

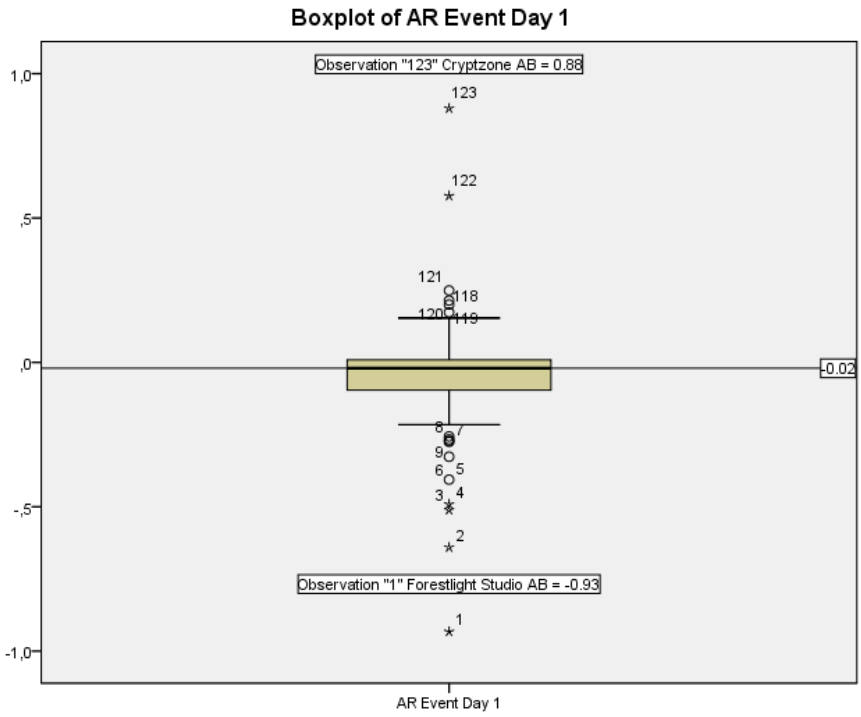
Dependent and Independent Variables in Regression

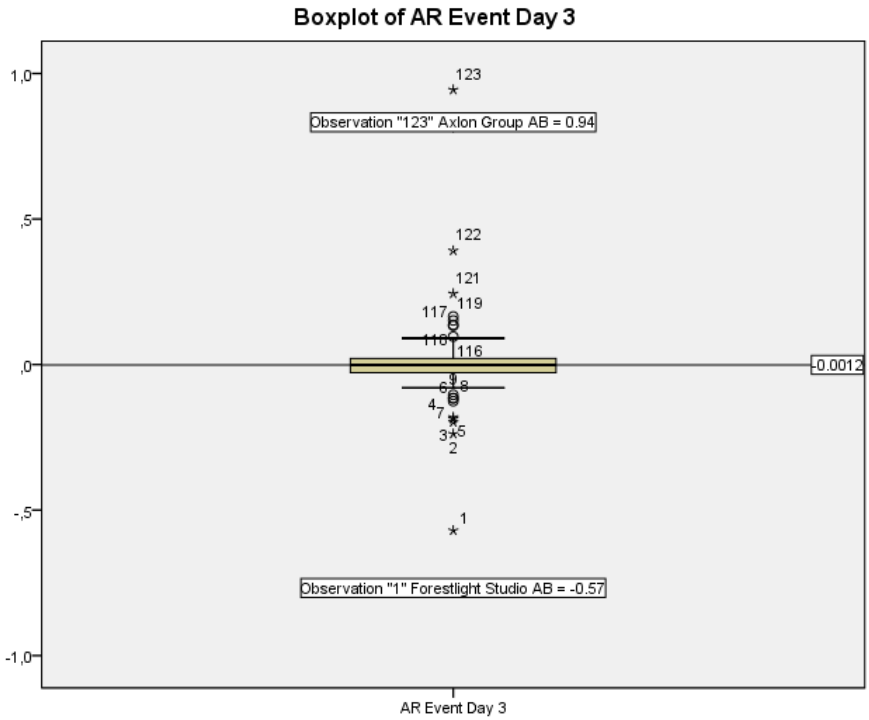
Companies	CAR Month 36	Book-to-Market Ratio	LN Market Cap (Million SEK)	Dummy Several Offerings
Transcom WorldWide S.A.	0,546	1,83	4,404	0
KappAhl AB	0,288	3,47	8,136	0
Rederi AB Transatlantic	-0,124	-8,08	7,362	0
Opcon AB	-0,425	-2,35	6,201	0
Orexo AB	1,157	0,86	6,862	0
Swedish Orphan Biovitrum AB	1,132	0,88	9,059	0
Precise Biometrics AB	1,041	0,96	5,780	0
Hexpol AB	1,330	0,75	8,267	0
Fastighets AB Balder	0,731	1,37	8,331	1
MSC Konsult AB	-0,031	-32,69	2,954	0
Hexagon AB	0,362	2,77	10,197	0
Karo Bio AB	0,530	1,89	6,995	0
Sensys Traffic AB	1,101	0,91	6,181	0
Diös Fastigheter AB	-0,002	-515,94	6,858	1
Nordic Mines AB	-3,184	-0,31	6,515	1
Corem Property Group AB	-0,186	-5,36	7,257	0
Oasmia Pharmaceutical AB	0,501	1,99	6,763	1
Artimplant AB	-1,562	-0,64	4,708	1
Stockwik Förvaltnings AB	-0,274	-3,66	3,964	0
Elanders AB	-0,094	-10,59	5,758	0
HQ AB	-2,059	-0,49	8,104	0
PA Resources AB	-3,494	-0,29	8,325	0
Note AB	-0,122	-8,19	5,323	0
Rörvik Timber AB	-1,938	-0,52	4,717	0
Cision AB	0,082	12,26	6,206	0
Sagax AB	0,551	1,82	6,969	0
BioInvent International AB	-1,236	-0,81	7,254	1
TradeDoubler AB	-1,238	-0,81	6,964	0
Gunnebo AB	0,300	3,33	6,559	0
Haldex AB	1,081	0,93	6,389	0
Ticket Travel Group AB	0,064	15,60	3,965	0
Rottneros AB	-1,367	-0,73	5,288	0
Diamyd Medical AB	-0,647	-1,55	6,218	0
Fingerprint Cards AB	0,294	3,41	4,113	1
Swedbank AB	0,530	1,89	10,038	0
Eniro AB	-2,500	-0,40	7,460	1
Cybercom Group AB	-0,430	-2,33	5,752	0
Allenex AB	-2,223	-0,45	5,004	1
Trelleborg AB	0,875	1,14	8,268	0

Hemtex AB	-1,203	-0,83	6,056	1
SAS AB	-2,145	-0,47	8,738	1
Nordea Bank AB	-0,144	-6,93	11,865	0
Husqvarna AB	-0,146	-6,85	9,379	0
Skandinaviska Enskilda Banken AB	0,344	2,91	10,604	0
Image Systems AB	-3,254	0,00	3,054	0

Appendix C – Boxplots Announcement Effect

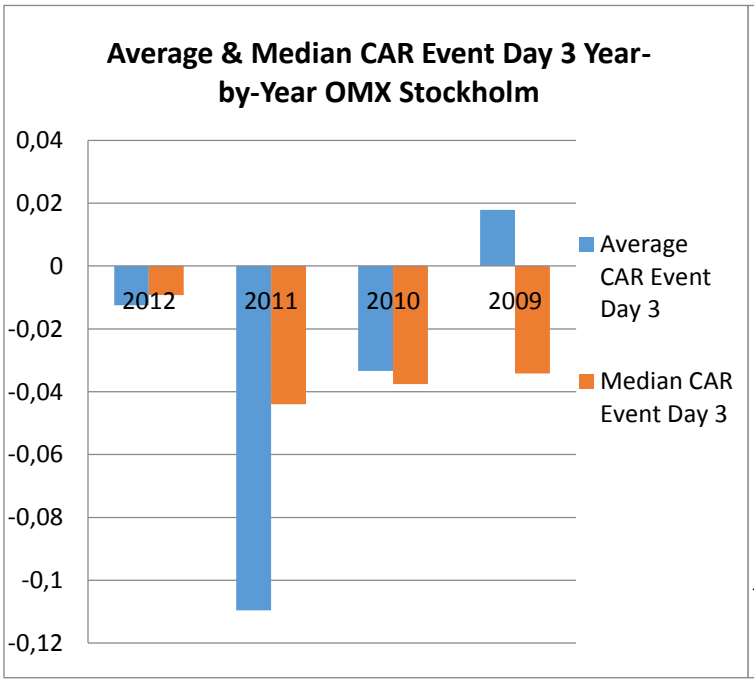
Boxplots for Event Day 1 and 3

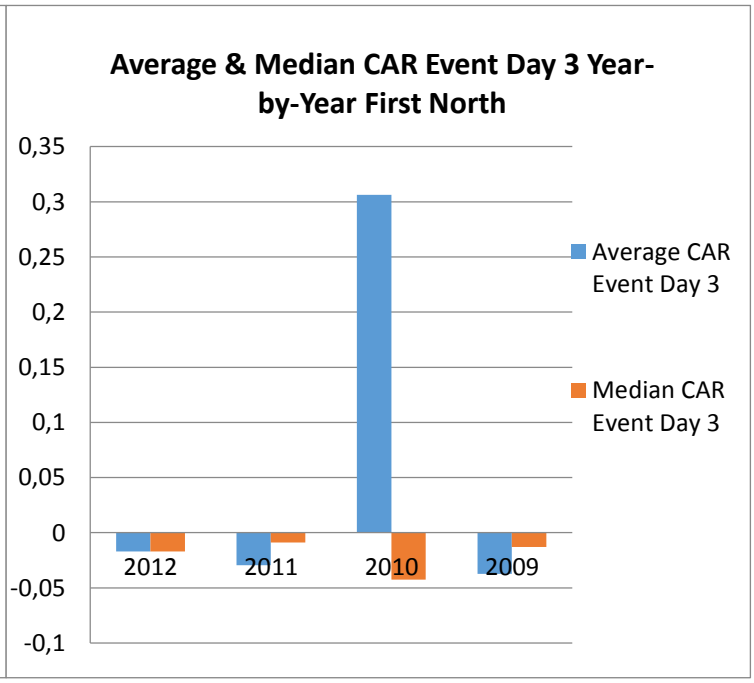




Appendix D – Year-by-Year Results

Average and Median CAR Event Day 3 Year-by-Year for both Exchanges Separately





Appendix E – Test Stats Announcement Effect

Variables used for Test Statistics for Average and Median CAR Event Day 3

Event Day	Average AR	Average CAR	Median AR	Median CAR	Var(avg AR)	VAR(avg CAR)
1	-0,04435	-0,04435	-0,02041	-0,02041	0,00027	0,00027
2	0,05093	0,00658	-0,00780	-0,02822	0,00441	0,00468
3	0,00252	0,00910	-0,00121	-0,02942	0,00012	0,00480

Variables used for Test Statistics for Average and Median CAR Event Day 3 Excluding Arctic Gold AB

Event Day	Average AR	Average CAR	Var(avg AR)	VAR(avg CAR)
1	-0,04435	-0,04435	0,000275	0,000275
2	-0,0146	-0,0590	0,000179	0,000454
3	0,00225	-0,0567	0,000125	0,000580

Appendix F – CAR Long-Run Performance

Raw Return and CAR Month 1 through 36

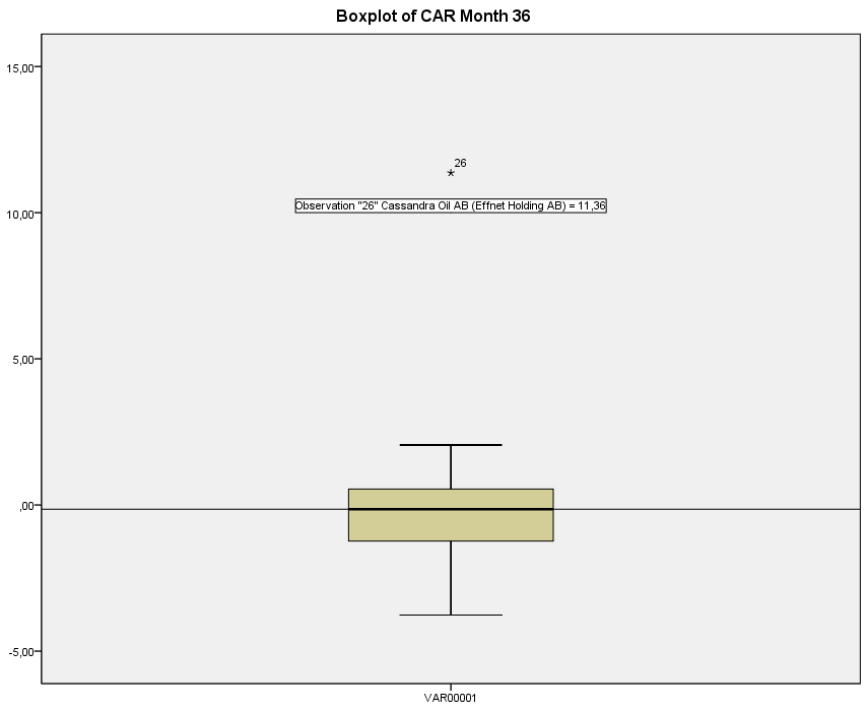
Month	Raw Return OMX Stockholm	Raw Return First North	Raw Return Combined	CAR OMX Stockholm	CAR First North	CAR Combined
1	0,0134	0,0135	0,0134	-0,0114	-0,0145	-0,0128
2	0,0045	-0,0216	-0,0071	-0,0324	-0,0245	-0,0289
3	0,0581	0,0814	0,0684	0,0048	0,0745	0,0358
4	0,0801	0,0822	0,0810	0,0146	0,0891	0,0477
5	0,1053	0,0623	0,0862	0,0301	0,0598	0,0433
6	0,1005	0,0520	0,0789	0,0186	0,0679	0,0405
7	0,0994	0,0625	0,0830	0,0163	0,0811	0,0451
8	0,0885	0,0369	0,0656	-0,0022	0,0802	0,0344
9	0,0544	0,0318	0,0444	-0,0166	0,0662	0,0202
10	0,0766	-0,0124	0,0370	-0,0168	0,0300	0,0040
11	0,0701	-0,0233	0,0286	-0,0187	0,0161	-0,0032
12	0,0582	-0,0408	0,0142	-0,0418	-0,0019	-0,0240
13	0,0761	-0,0537	0,0184	-0,0328	-0,0078	-0,0217
14	0,0610	-0,0691	0,0032	-0,0613	-0,0164	-0,0413
15	0,0680	-0,1258	-0,0182	-0,0661	-0,0762	-0,0706
16	0,0382	-0,1577	-0,0489	-0,1039	-0,1154	-0,1090
17	0,0340	-0,1844	-0,0631	-0,1059	-0,1232	-0,1136
18	0,0031	-0,2139	-0,0934	-0,1295	-0,1513	-0,1392
19	-0,0606	-0,2487	-0,1442	-0,1970	-0,1825	-0,1906
20	-0,0928	-0,2652	-0,1694	-0,2326	-0,1962	-0,2164
21	-0,0819	-0,2899	-0,1743	-0,2203	-0,2192	-0,2198
22	-0,0910	-0,2967	-0,1824	-0,2345	-0,2319	-0,2333
23	-0,0798	-0,3014	-0,1783	-0,2306	-0,2199	-0,2258
24	-0,0927	-0,3132	-0,1907	-0,2451	-0,2345	-0,2404
25	-0,0885	-0,2882	-0,1772	-0,2561	-0,2075	-0,2345
26	-0,0263	-0,3436	-0,1673	-0,2020	-0,2544	-0,2253
27	-0,0052	-0,3499	-0,1584	-0,1965	-0,2707	-0,2295
28	-0,0317	-0,3124	-0,1564	-0,2223	-0,2218	-0,2221
29	-0,0292	-0,0013	-0,0168	-0,2160	0,0857	-0,0819
30	-0,1129	0,0349	-0,0472	-0,3032	0,1176	-0,1162
31	-0,1308	-0,0080	-0,0762	-0,3145	0,0554	-0,1501
32	-0,0984	-0,0733	-0,0872	-0,2946	0,0010	-0,1632
33	-0,1150	-0,1140	-0,1146	-0,3308	-0,0594	-0,2102
34	-0,1339	-0,1204	-0,1279	-0,3636	-0,0828	-0,2388
35	-0,1140	-0,1266	-0,1196	-0,3667	-0,1078	-0,2516
36	-0,1206	-0,1108	-0,1163	-0,3820	-0,1049	-0,2588

Appendix G – Long-Run Performance

Test Statistics for CAR Month 36

Test Statistics	CAR	Number of Obs.	Standard Deviation	Test Statistics
OMX Stockholm	-0.382	45	1.256	-2.04
First North	-0.105	36	2.355	-0.27
Both Exchanges Combined	-0.259	81	1.833	-1.27

Boxplot for CAR Month 36



Appendix H – Regression for both Exchanges Combined

OLS Regression

Dependent Variable: CAR_MONTH_36
Method: Least Squares
Date: 05/15/15 Time: 11:34
Sample: 1 81
Included observations: 81

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOOK_TO_MARKET_RATIO	-0.042139	0.144627	-0.291365	0.7716
LN_MARKET_CAP	0.019230	0.097476	0.197276	0.8441
DUMMY_SEVERAL_OFFERING S	0.004390	0.455150	0.009645	0.9923
C	-0.319227	0.662828	-0.481614	0.6314

R-squared	0.001810	Mean dependent var	-0.258846
Adjusted R-squared	-0.037080	S.D. dependent var	1.844718
S.E. of regression	1.878608	Akaike info criterion	4.147061
Sum squared resid	271.7460	Schwarz criterion	4.265305
Log likelihood	-163.9560	Hannan-Quinn criter.	4.194502
F-statistic	0.046542	Durbin-Watson stat	1.846452
Prob(F-statistic)	0.986583		

Heteroskedasticity: Breusch-Pagan-Godfrey & White's Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.050007	Prob. F(3,77)	0.3754
Obs*R-squared	3.183427	Prob. Chi-Square(3)	0.3642
Scaled explained SS	28.50310	Prob. Chi-Square(3)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/15/15 Time: 11:38
Sample: 1 81
Included observations: 81

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.239586	5.297138	1.177916	0.2425
BOOK_TO_MARKET_RATIO	-0.773936	1.155817	-0.669601	0.5051
LN_MARKET_CAP	-0.626725	0.779001	-0.804524	0.4236
DUMMY_SEVERAL_OFFERINGS	4.618254	3.637437	1.269645	0.2080

R-squared	0.039302	Mean dependent var	3.354888
Adjusted R-squared	0.001872	S.D. dependent var	15.02739
S.E. of regression	15.01332	Akaike info criterion	8.303874
Sum squared resid	17355.77	Schwarz criterion	8.422118
Log likelihood	-332.3069	Hannan-Quinn criter.	8.351315
F-statistic	1.050007	Durbin-Watson stat	2.066132
Prob(F-statistic)	0.375395		

Heteroskedasticity Test: White

F-statistic	0.771575	Prob. F(8,72)	0.6288
Obs*R-squared	6.395854	Prob. Chi-Square(8)	0.6030
Scaled explained SS	57.26584	Prob. Chi-Square(8)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/15/15 Time: 11:38
Sample: 1 81
Included observations: 81
Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.837706	12.31031	0.555445	0.5803
BOOK_TO_MARKET_RATIO^2	0.432121	0.580234	0.744737	0.4589
BOOK_TO_MARKET_RATIO*LN_MARKET_CAP	0.916243	1.065759	0.859710	0.3928
BOOK_TO_MARKET_RATIO*DUMMY_SEVERAL_OFFERINGS	-2.593343	4.640579	-0.558840	0.5780
BOOK_TO_MARKET_RATIO	-7.223810	8.517242	-0.848139	0.3992
LN_MARKET_CAP^2	-0.046292	0.312604	-0.148086	0.8827
LN_MARKET_CAP*DUMMY_SEVERAL_OFFERINGS	-2.450759	2.064984	-1.186817	0.2392
LN_MARKET_CAP	-0.443100	3.938044	-0.112518	0.9107
DUMMY_SEVERAL_OFFERINGS^2	20.83339	12.11179	1.720092	0.0897

R-squared	0.078961	Mean dependent var	3.354888
Adjusted R-squared	-0.023376	S.D. dependent var	15.02739
S.E. of regression	15.20201	Akaike info criterion	8.385172
Sum squared resid	16639.29	Schwarz criterion	8.651222
Log likelihood	-330.5995	Hannan-Quinn criter.	8.491915
F-statistic	0.771575	Durbin-Watson stat	2.121039
Prob(F-statistic)	0.628806		

Multicollinearity: Correlation Matrix

Covariance Analysis: Ordinary
Date: 05/15/15 Time: 11:34
Sample: 1 81
Included observations: 81

Correlation
Probability

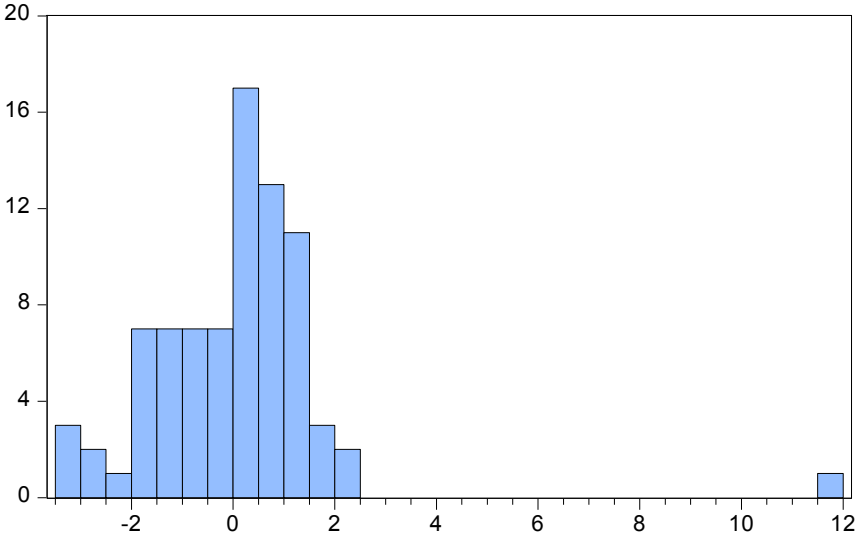
	CAR_MONTH_36	BOOK_TO_MARKET_RATIO	LN_MARKET_CAP	DUMMY_SEVERAL_OFFERINGS
CAR_MONTH_36	1.000000			

BOOK_TO_MARKET_RATIO	-0.036013	1.000000		
	0.7496	-----		

LN_MARKET_CAP	0.026367 0.8153	-0.107547 0.3392	1.000000 -----	
DUMMY_SEVERAL_OFFERINGS	-0.000741 0.9948	-0.060707 0.5903	-0.169504 0.1303	1.000000 -----

Normality: Jarque-Bera Tests

	CAR_MONTH_36	BOOK_TO_MARKET_RATIO	LN_MARKET_CAP	DUMMY_SEVERAL_OFFERINGS
Mean	-0.258846	1.138679	5.561987	0.320988
Median	-0.145925	0.833333	5.415167	0.000000
Maximum	11.36127	11.11111	11.86517	1.000000
Minimum	-3.763568	0.000000	1.232560	0.000000
Std. Dev.	1.844718	1.465490	2.202229	0.469765
Skewness	2.814709	4.205390	0.435218	0.766885
Kurtosis	20.72153	27.75092	2.943496	1.588112
Jarque-Bera	1166.882	2306.304	2.567880	14.66733
Probability	0.000000	0.000000	0.276944	0.000653
Sum	-20.96654	92.23301	450.5209	26.00000
Sum Sq. Dev.	272.2387	171.8129	387.9850	17.65432
Observations	81	81	81	81



Series: Residuals
Sample 1 81
Observations 81

Mean	3.29e-17
Median	0.105895
Maximum	11.62234
Minimum	-3.487608
Std. Dev.	1.843048
Skewness	2.819424
Kurtosis	20.81599
Jarque-Bera	1178.570
Probability	0.000000

Non-Linearity: Ramsey RESET Test

Ramsey RESET Test
Equation: UNTITLED
Specification: CAR_MONTH_36 BOOK_TO_MARKET_RATIO
LN_MARKET_CAP DUMMY_SEVERAL_OFFERINGS C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.413313	76	0.6805
F-statistic	0.170828	(1, 76)	0.6805
Likelihood ratio	0.181862	1	0.6698

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.609442	1	0.609442
Restricted SSR	271.7460	77	3.529168
Unrestricted SSR	271.1365	76	3.567586

LR test summary:

	Value	df
Restricted LogL	-163.9560	77
Unrestricted LogL	-163.8650	76

Unrestricted Test Equation:
Dependent Variable: CAR_MONTH_36
Method: Least Squares
Date: 05/15/15 Time: 11:39
Sample: 1 81
Included observations: 81

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOOK_TO_MARKET_RATIO	-0.246151	0.514575	-0.478358	0.6338
LN_MARKET_CAP	0.079877	0.176454	0.452679	0.6521
DUMMY_SEVERAL_OFFERINGS	0.026267	0.460672	0.057018	0.9547
C	-0.842290	1.430282	-0.588898	0.5577
FITTED^2	5.623932	13.60696	0.413313	0.6805

R-squared	0.004049	Mean dependent var	-0.258846
Adjusted R-squared	-0.048370	S.D. dependent var	1.844718
S.E. of regression	1.888805	Akaike info criterion	4.169507
Sum squared resid	271.1365	Schwarz criterion	4.317313
Log likelihood	-163.8650	Hannan-Quinn criter.	4.228809
F-statistic	0.077238	Durbin-Watson stat	1.862727
Prob(F-statistic)	0.989003		

Appendix I – Regression for OMX Stockholm

OLS Regression

Dependent Variable: CAR_MONTH_36
Method: Least Squares
Date: 05/15/15 Time: 11:11
Sample: 1 45
Included observations: 45

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOOK_TO_MARKET_RATIO	0.015347	0.181903	0.084369	0.9332
LN_MARKET_CAP	0.105292	0.093475	1.126421	0.2665
DUMMY_SEVERAL_OFFERINGS	-0.963830	0.425003	-2.267817	0.0287
C	-0.877877	0.718508	-1.221806	0.2288

R-squared	0.143978	Mean dependent var	-0.381987
Adjusted R-squared	0.081342	S.D. dependent var	1.270609
S.E. of regression	1.217836	Akaike info criterion	3.316716
Sum squared resid	60.80813	Schwarz criterion	3.477308
Log likelihood	-70.62611	Hannan-Quinn criter.	3.376583
F-statistic	2.298647	Durbin-Watson stat	1.420375
Prob(F-statistic)	0.091665		

Heteroskedasticity: Breusch-Pagan-Godfrey & White's Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.568894	Prob. F(3,41)	0.6387
Obs*R-squared	1.798329	Prob. Chi-Square(3)	0.6153
Scaled explained SS	1.961171	Prob. Chi-Square(3)	0.5805

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/15/15 Time: 11:20
Sample: 1 45
Included observations: 45

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.120376	1.326529	1.598439	0.1176
BOOK_TO_MARKET_RATIO	-0.387916	0.335834	-1.155083	0.2547
LN_MARKET_CAP	-0.060184	0.172576	-0.348742	0.7291
DUMMY_SEVERAL_OFFERINGS	0.329660	0.784653	0.420135	0.6766

R-squared	0.039963	Mean dependent var	1.351292
Adjusted R-squared	-0.030284	S.D. dependent var	2.215113
S.E. of regression	2.248404	Akaike info criterion	4.543005
Sum squared resid	207.2681	Schwarz criterion	4.703598
Log likelihood	-98.21762	Hannan-Quinn criter.	4.602873

F-statistic	0.568894	Durbin-Watson stat	1.795949
Prob(F-statistic)	0.638662		

Heteroskedasticity Test: White

F-statistic	0.395340	Prob. F(8,36)	0.9158
Obs*R-squared	3.634133	Prob. Chi-Square(8)	0.8885
Scaled explained SS	3.963210	Prob. Chi-Square(8)	0.8604

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/15/15 Time: 11:21
Sample: 1 45
Included observations: 45
Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.445370	3.816201	1.164868	0.2517
BOOK_TO_MARKET_RATIO^2	0.252476	0.313912	0.804287	0.4265
BOOK_TO_MARKET_RATIO*LN_MARKET_CAP	0.221654	0.232592	0.952972	0.3470
BOOK_TO_MARKET_RATIO*DUMMY_SEVERAL_OFFERINGS	0.530100	0.906435	0.584819	0.5623
BOOK_TO_MARKET_RATIO	-2.715379	2.044091	-1.328404	0.1924
LN_MARKET_CAP^2	0.001455	0.074499	0.019532	0.9845
LN_MARKET_CAP*DUMMY_SEVERAL_OFFERINGS	0.304950	0.562983	0.541667	0.5914
LN_MARKET_CAP	-0.358637	1.030905	-0.347885	0.7300
DUMMY_SEVERAL_OFFERINGS^2	-2.173476	3.970978	-0.547340	0.5875

R-squared	0.080759	Mean dependent var	1.351292
Adjusted R-squared	-0.123517	S.D. dependent var	2.215113
S.E. of regression	2.347933	Akaike info criterion	4.721805
Sum squared resid	198.4605	Schwarz criterion	5.083137
Log likelihood	-97.24060	Hannan-Quinn criter.	4.856506
F-statistic	0.395340	Durbin-Watson stat	1.849905
Prob(F-statistic)	0.915801		

Multicollinearity: Correlation Matrix

Covariance Analysis: Ordinary
Date: 05/15/15 Time: 11:15
Sample: 1 45
Included observations: 45

Correlation
Probability

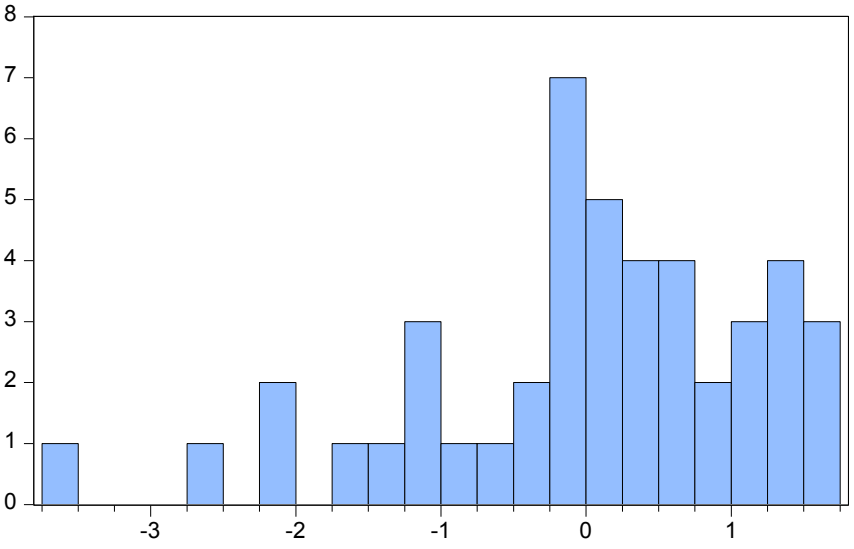
	CAR_MONTH_36	BOOK_TO_MARKET_RATIO	LN_MARKET_CAP	DUMMY_SEVERAL_OFFERINGS
CAR_MONTH_36	1.000000			

BOOK_TO_MARKET_RATIO	0.029994	1.000000		

	0.8449	-----		
LN_MARKET_CAP	0.187308 0.2179	-0.047433 0.7570	1.000000 -----	
DUMMY_SEVERAL_OFFERINGS	-0.342745 0.0212	-0.077352 0.6135	-0.074145 0.6284	1.000000 -----

Normality: Jarque-Bera Test

	CAR_MONTH_36	BOOK_TO_MARKET_RATIO	LN_MARKET_CAP	DUMMY_SEVERAL_OFFERINGS
Mean	-0.381987	1.138224	6.781382	0.244444
Median	-0.094400	1.041667	6.762845	0.000000
Maximum	1.329908	4.166667	11.86517	1.000000
Minimum	-3.494125	0.000000	2.954389	0.000000
Std. Dev.	1.270609	1.013791	1.972365	0.434613
Skewness	-0.888160	1.114385	0.295988	1.189302
Kurtosis	2.896355	3.659230	2.951085	2.414439
Jarque-Bera	5.936358	10.12875	0.661553	11.25119
Probability	0.051397	0.006318	0.718366	0.003604
Sum	-17.18942	51.22006	305.1622	11.00000
Sum Sq. Dev.	71.03567	45.22199	171.1699	8.311111
Observations	45	45	45	45



Series: Residuals
Sample 1 45
Observations 45

Mean	9.87e-18
Median	0.155037
Maximum	1.687627
Minimum	-3.510073
Std. Dev.	1.175586
Skewness	-0.885495
Kurtosis	3.627445
Jarque-Bera	6.618918
Probability	0.036536

Non-Linearity: Ramey RESET Test

Ramsey RESET Test
Equation: UNTITLED
Specification: CAR_MONTH_36 BOOK_TO_MARKET_RATIO
LN_MARKET_CAP DUMMY_SEVERAL_OFFERINGS C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.202207	40	0.8408
F-statistic	0.040888	(1, 40)	0.8408
Likelihood ratio	0.045975	1	0.8302

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.062094	1	0.062094
Restricted SSR	60.80813	41	1.483125
Unrestricted SSR	60.74604	40	1.518651

LR test summary:

	Value	df
Restricted LogL	-70.62611	41
Unrestricted LogL	-70.60312	40

Unrestricted Test Equation:
Dependent Variable: CAR_MONTH_36
Method: Least Squares
Date: 05/15/15 Time: 11:26
Sample: 1 45
Included observations: 45

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOOK_TO_MARKET_RATIO	0.015814	0.184083	0.085905	0.9320
LN_MARKET_CAP	0.117420	0.112002	1.048377	0.3008
DUMMY_SEVERAL_OFFERING S	-1.265669	1.553442	-0.814751	0.4200
C	-0.978128	0.880013	-1.111493	0.2730
FITTED^2	0.244527	1.209289	0.202207	0.8408

R-squared	0.144852	Mean dependent var	-0.381987
Adjusted R-squared	0.059337	S.D. dependent var	1.270609
S.E. of regression	1.232336	Akaike info criterion	3.360139
Sum squared resid	60.74604	Schwarz criterion	3.560879
Log likelihood	-70.60312	Hannan-Quinn criter.	3.434973
F-statistic	1.693878	Durbin-Watson stat	1.417161
Prob(F-statistic)	0.170437		