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Long Term Returns Of Companies Conducting Rights Issues On The Swedish Market

Masters's Thesis

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I declare that I have independently prepared the final thesis and that I have cited all used sources of information and literature. This thesis or its substantial part has not been submitted for the attainment of another or the same academic degree.

Aalborg, 02.06.2025 Magnus Laurits Elefsen

Abstract

Companies conducting rights issues in Sweden are associated with lower long-term returns. Motivated by an observed tendency for the share price of issuing firms to decline over time, this thesis examines the Swedish stock market from 2006–2020. Based on a sample of 865 rights issues carried out by 340 unique firms, analyzed using three fixed effects OLS models, this thesis concludes an underperformance of 24.1% in the three years following the rights issue and 43.9% in the subsequent five years after the issue announcement date, compared to matching non-issuing firms. These findings provide strong evidence of long-term underperformance associated with rights issues, contributing to the literature on equity issuance and long-term stock performance with a specific focus on rights issues.

Keywords

Rights Issues, Long-Term Returns, Buy-and-Hold Return (BHR), Seasoned Equity Offerings (SEO), Stock Performance, Swedish Stock Market, OLS Regression, Market Timing, Firm Characteristics, Equity Issuance

List of Abbreviations

AIC	Akaike Information Criterion
BHR	Buy-and-Hold Return
B/M	Book-to-Market Ratio
CAR	Cumulative Abnormal Return
CLT	Central Limit Theorem
D/E	Debt-to-Equity Ratio
EBITDA_M	EBITDA Margin
FE	Fixed Effects
IPO	Initial Public Offering
MOM	Share Price Momentum
MVE	Market Value of Equity
NPM	Net Profit Margin
OLS	Ordinary Least Squares
OMX	OMXS30 Index Return
ROI	Return On Investment
SEO	Seasoned Equity Offering
VIF	Variance Inflation Factor

Contents

Introduction

Companies going from private to public through initial public offerings *IPOs* are motivated by the access to capital that is available to companies traded on the public exchanges. Ritter and Welch (2002) discusses the motives for companies to go public and finds that factors such as raising capital for growth and operations, as well as enabling the founding investors to exit the company, are motivators. Other articles, including Brau and Fawcett (2006), which surveyed several CFOs, concluded that future acquisitions are the primary motivation for IPOs. Regardless of the motives behind the IPOs, companies do this to raise additional capital.

After going public, firms may sell additional stock through seasoned equity offerings, *SEOs*. Similarly to IPOs, this allows companies to issue new stock offered to new or existing investors. Looking into research on the motivation behind the additional equity offerings, the literature concludes several factors and motives. DeAngelo et al. (2010) argue that firms with high leverage are more likely to conduct SEOs as they may face difficulties meeting their financial obligations, and a way to meet them is to raise capital through SEOs. They also suggested that firms with high growth opportunities are more likely to issue additional stock as they require substantial investments to finance the expansion. Firms characterized by high growth often prefer to be financed through equity rather than debt, as they may have trouble meeting their obligations, as their earnings will be realized in the future.

This thesis focuses on one specific type of SEO; *Rights Issues*. Rights issues are a specific type of SEO where existing shareholders are offered the opportunity to buy additional stock in a company at a discounted price. The rights are distributed

and allotted to the investors in proportion to their ownership, based on the number of shares held by the owners at the time the issue is conducted (Lambrechts and Mostert, 1980). With the allocated subscription rights, which essentially are a call option, the investors may decide to sell, exercise, or let the subscription rights expire. Shareholders who choose not to exercise their rights are subject to dilution. Rights issues are a popular method of raising equity as it offers existing shareholders the opportunity to maintain their proportional ownership, i.e., a non-dilutive event for the current owners, while at the same time increasing the equity of the company to fund the business.

Despite the preferential rights for existing shareholders to subscribe in the rights issue, an important question to ask is whether the rights issues create long-term value for the investors or if it is value-destroying. Sampling all rights issues conducted on the Swedish market from 2006 to 2020, this thesis sheds light on the long-term share return of companies conducting rights issues. By calculating the buy-and-hold returns for the 1-, 3-, and 5-year periods following the rights issue and comparing these results to a group of matching firms, while controlling for several recognized factors driving asset returns, this thesis aims to draw conclusions and contribute to the discussion of whether rights issues create or destroy value. While a few other articles has conducted similar studies with explicit focus on rights issues, including (Otieno and Ochieng, 2015), who sampled 12 rights issues on the Nairobi Security Exchange, this paper aims to draw more sufficient and definitive conclusions as it samples 865 issues distributed across 14 years making it the largest study conducted within this field in the Nordics.

1.1 The Swedish market

The financial markets in Sweden are recognized for their sophistication and maturity, which provide a great and opportunistic environment for small and growing companies. Over the past decades, the financial markets in Sweden have evolved significantly, as they have successfully adapted to global trends and technology developments. This combination of a mature financial market and a thriving community of small and growing companies positions Sweden as a dynamic hub for business

development and investment opportunities.

This strong and developed financial market is reflected in Sweden's dominant role when it comes to IPO activity in the Nordics. First North Stockholm, Nordic Growth Market, Spotlight Stock Market, and Nasdaq Stockholm are Sweden's primary and growth-oriented exchanges, which offer attractive listing opportunities for companies characterized by well-established investor interest, streamlined regulatory processes, and great liquidity. Looking at the Nordic IPO activity in 2024, there were a total of 36 IPOs and direct listings in the Nordic countries. Of these, Sweden accounted for 23 according to the annual report published on IPO activity in the Nordics by PricewaterhouseCoopers (2025). While IPO activity naturally fluctuates with the overall market conditions, Sweden remains the most active market in the Nordics, which underscores Sweden's role as a key financial hub, not only for domestic companies but also for foreign firms seeking exposure to Nordic capital markets.

Many small and mid-cap companies often require additional funding after going public. The favorable and opportunistic market conditions in Sweden make these SEOs more attractive. With a well-established culture for rights issues, Sweden has a strong tradition of rights issues with high investor participation. Looking at the market for rights issues in Sweden since 2006, it is evident that the popularity of conducting such issues has increased over the past years. In figure 1.0 below, the total yearly volume, represented by the bars, shows a spike around the time when the financial crisis broke out. This sudden increase in the volume could indicate that the companies needed to raise capital to strengthen their balance sheets as a result of the financial crisis. In the years following the financial crisis until 2016, the amount raised in rights issues dramatically slowed down until it picked up in 2016, and then a clear pattern of increased volume in recent years emerged. The sharp increase in the number of rights issues in 2020 and 2021, as shown in the figure, could be attributed to the economic uncertainty caused by the COVID-19 pandemic. Following such market uncertainties and challenges, this forces companies to strengthen their capital base. This pattern highlights the cyclical nature of rights issues, often spiking during times of economic turbulence.

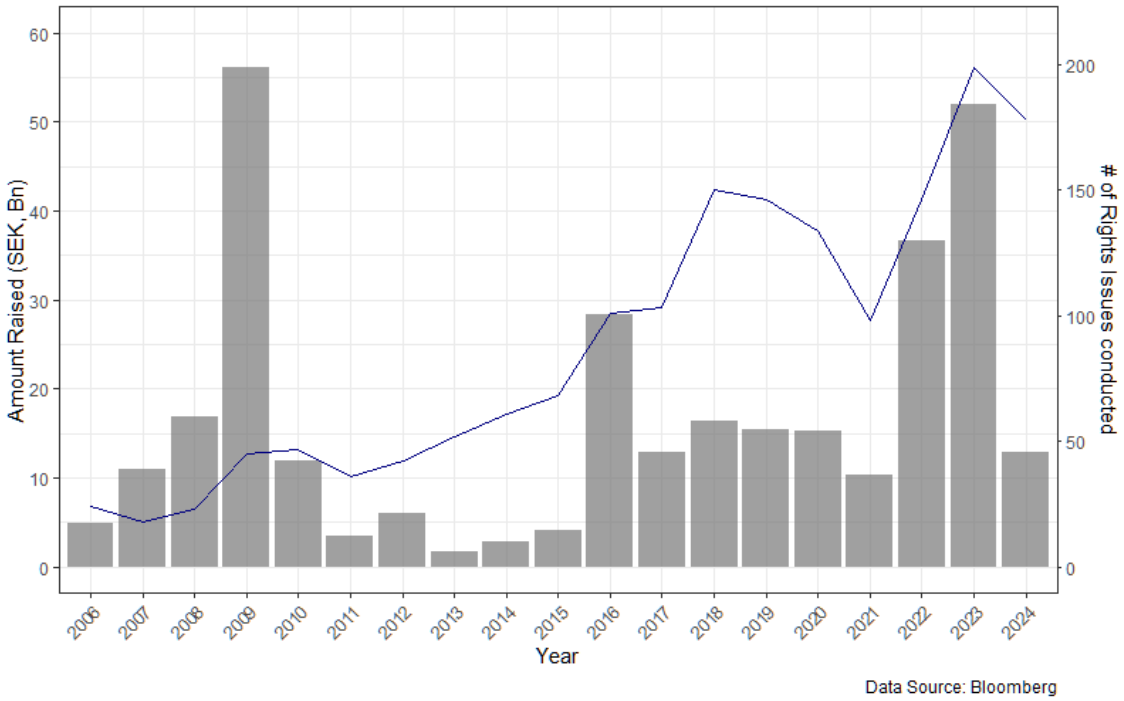


Figure 1.0. *Note*: This figure presents the yearly volume of rights issues conducted by Swedish listed firms from 2006 to 2024. The vertical bars represent the total amount raised in SEK billion, while the blue line indicates the number of rights issues conducted each year. The dual-axis chart highlights both the monetary and frequency trends in equity capital raising. Data source: Bloomberg.

Based on conclusions from existing literature on SEOs and stock performance, the underperformance of SEOs is attributed to the fact that they are conducted at times when market valuations are high, and companies take advantage of this to raise additional capital. To get an initial indication of whether this seems to be the case for rights issues as well, figure 1.2 below plots the number of rights issues conducted in each year together with the market development in Sweden. As represented by the blue line, the OMXS30 index has traded higher since 2006, and the number of rights issues conducted in Sweden has increased. Some of this correlation is attributed to the growing popularity of rights issues as a financing solution. Looking at the years following the market drop during the breakout of Covid-19, the activity of rights issues slowed down as the number of issues conducted in 2021 dropped to the same levels as in 2016 and 2017. Even though it is hard to tell if a pattern of great market performance and the number of rights issues conducted exists, this chart provides some insights and supports the argument that issuing companies might time their issues to take advantage of favorable market valuations.

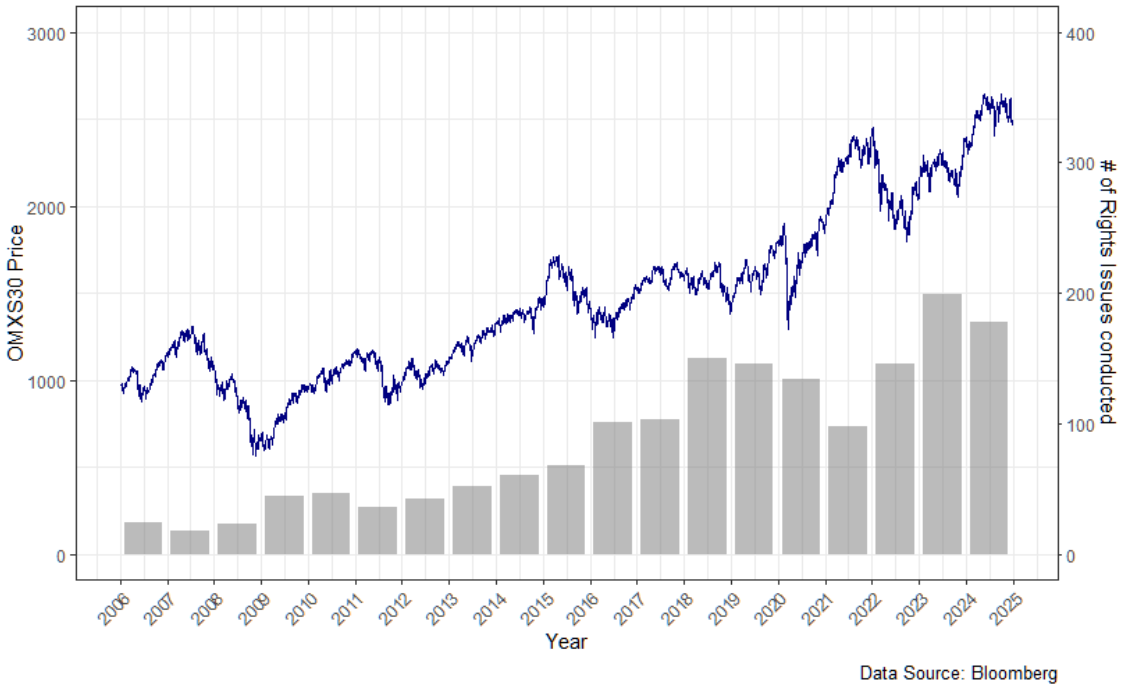


Figure 1.1. *Note*: This figure illustrates the relationship between the number of rights issues and market development in Sweden from 2006 to 2024. The vertical bars show the annual count of rights issues, while the blue line represents the OMX Stockholm 30 index (OMXS30) level over the same period. The figure provides visual context on how equity issuance activity coincides with overall market performance. Data source: Bloomberg.

1.2 Literature review

The underperformance of companies going public through initial offerings and issuing seasoned equity is well documented in existing literature and is a well-known phenomenon documented across various geographies and periods. Jay R. Ritter's 1991 paper, *The Long-Run Performance of Initial Public Offerings* (Ritter, 1991), is one of the most recognized and most frequently cited articles on post-issue share returns of companies going public. Sampling 1,526 IPOs from the U.S in the years from 1975 to 1984, Ritter's article concludes a significant underperformance when compared to similar firms. For the three years following the IPO, these companies had 23% lower returns than those of matching firms. According to his article, the underperformance is a result of the tendency of investors to overvalue the new public firms, which leads to price corrections in the long term. Additionally, his article finds that IPOs issued in *hot markets* underperform those issued in *cold markets*, a distinction made by the author between periods of high (hot) and low (cold) IPO activity and market valuations. This finding suggests that firms strategically time

their offerings when valuations are high, eventually leading to an underperformance as markets converge.

Even though a significant amount of research has been conducted on IPO underperformance, several studies have also investigated whether this phenomenon exists among companies conducting seasoned equity offerings. One of the largest studies conducted is based on U.S equity offerings and is by Loughran and Ritter (1995). In their research, they sampled a total of 3702 SEOs conducted by companies listed on the Amex, the NYSE, and Nasdaq, covering a total of 20 years, as they sampled companies issuing new stock from 1970 to 1990. Their conclusions report that the average annual return for issuing firms was 7% compared to 15% per year for non-issuing matching firms. The matching firms in their research were chosen based on size similarities measured as the company with the market capitalization closest to the issuing firm. The reasoning behind the underperformance is according to the researchers that companies tend to issue equity when the share price of the company is overvalued.

Spiess and Affleck-Graves (1995) published an analysis of 1,247 American companies conducting SEOs in 1975-1989. Their research also concluded substantial negative long-run abnormal returns of the companies issuing new stock. With a median five-year return for companies conducting SEOs of 10.0% and 42.3% for similar-sized firms that did not issue stock. The methodology for choosing similar firms is based on the companies operating within the same industry. The conclusion in their study is similar to the one mentioned above from Loughran and Ritter (1995), that the underperformance is due to managers taking advantage of the equity offerings when the firm's stock price is overvalued. Another interesting finding in their research relates to the short-term performance of the shares of companies issuing new stock. They found that the adjusted returns following the issue were positive and statistically significant in the first month. This finding is consistent with several other articles, including Loderer et al. (1991), Tripathy and Rao (1992), and Barclay and Litzenberger (1988), who also found a short-term positive impact on the returns.

Looking at studies conducted outside of the U.S, research has concluded similar

findings to the ones described above in the American markets. According to Levis (1995), companies in the United Kingdom that execute SEOs subsequently perform poorly in the period following the issue. Some of the oldest literature in the field was conducted by Marsh (1979), who sampled companies that conducted SEOs in the UK between 1962 and 1972 and found that they outperformed the market the year after the offering but underperformed the market in the second year. Similar to the U.S and UK, SEOs conducted in Japan also underperform according to Kang et al. (1999).

SEOs cover a broad range of equity issuance methods, including directed issues, accelerated bookbuilding, private placements, and rights issues. Most existing literature examines all types of SEOs when researching the long-term performance of the share price post issues, but a handful of articles focus only on rights issues, which indicate deviations from the consensus that underperformance follows the SEOs. Tsangarakis (1996) found a positive relationship between announcements of rights issues and increased returns in Greece. Kithinji et al. (2014) found that companies conducting rights issues experience abnormal returns in the days leading up to and following the rights issue. The article was, however, not able to comfortably determine the direction or magnitude of the abnormal returns, as they were more dependent on factors such as firm-specific fundamentals, investor sentiment, and market conditions.

Essentially, literature is somewhat ambiguous, as some research on post-issue returns of companies conducting SEOs concludes a clear underperformance, while articles focusing on rights issues are inconclusive or even indicate positive abnormal returns.

1.3 Research question

As mentioned throughout this introduction section, a clear underperformance is concluded among firms that go IPO and issue additional stock through SEOs. However, these studies are mainly focused on large geographies, and most of the prominent articles combine all types of SEOs in their studies. This dissertation aims to unfold and

explore the potential long-term underperformance of companies conducting rights issues, specifically, and with a very specific focus on the Swedish market. Hence, the research question of this thesis is:

Do companies conducting rights issues on the Swedish stock market experience long-term underperformance in share price returns?

1.4 Thesis structure

The thesis is structured as follows. Chapter 2 outlines the methodology used to investigate the long-term returns of companies conducting rights issues. This includes a description of the dataset, the matching process for control firms, the return calculation methodology, and the construction of the regression models. Chapter 3 presents the empirical results, including exploratory analysis and regression outputs for both pooled and fixed effects models. Chapter 4 discusses the implications of the findings in the context of existing literature, focusing on the potential reasons behind the observed underperformance. Finally, Chapter 5 concludes the thesis with a summary of the key findings, contributions to the literature, and suggestions for future research.

Methodology

As the research question for this thesis revolves around studying post-issue share returns, this methodology section outlines the empirical strategy employed to examine the potential relationship between rights issues and subsequent stock price performance. Essentially, the purpose is to provide a transparent and replicable framework for conducting the analysis. In general terms, the methodical approach used in this thesis is aligned with other research articles in the field. When reading the existing literature, there is a clear methodological path that most of the articles follow. This is highly beneficial as it allows for comparison across different periods and geographies. As most research is based on SEOs in general and not focused on a specific issuing form, applying the established methodology is advantageous as it makes the analysis comparable to others, while isolating the effects on just rights issues.

The empirical analysis is designed to test whether there are systematic patterns in the share price performance following rights issues, controlling for firm-specific and market variables that are known to drive equity returns. To draw statistical conclusions on the research question, a cross-sectional panel regression framework is used as it enables an assessment of the statistical significance and economic magnitude of these relationships, potentially providing valuable insight into the firms that are subject to these issues. From an investor's point of view, this would enhance the ability to make informed investment decisions and allow for more effective portfolio construction by identifying characteristics associated with post-issue performance.

2.1 Data

This thesis uses a sample of 865 rights issues conducted from 2006 to 2020 in Sweden by 340 unique firms. The reasoning behind the cut-off year being 2020 is due to the thesis research period is on 1, 3, and 5-year performance post issue. In other words, to be able to evaluate the 5-year post-issue return, we must have available pricing data for at least five years. The rights issues are sourced from a screening conducted on the Bloomberg terminal using the *IPO* module, which allowed for a range of specific screening criteria, such as geography, which was particularly useful, as this thesis focuses on the Swedish market. The issues included companies offering shares on the following four exchanges: Nordic Growth Market, Spotlight Stock Market, Nasdaq Stockholm & First North Stockholm. As the sample of this dissertation includes 865 issues, it is by far the largest study conducted in the Nordics. The number of issues conducted on each exchange is distributed as follows:

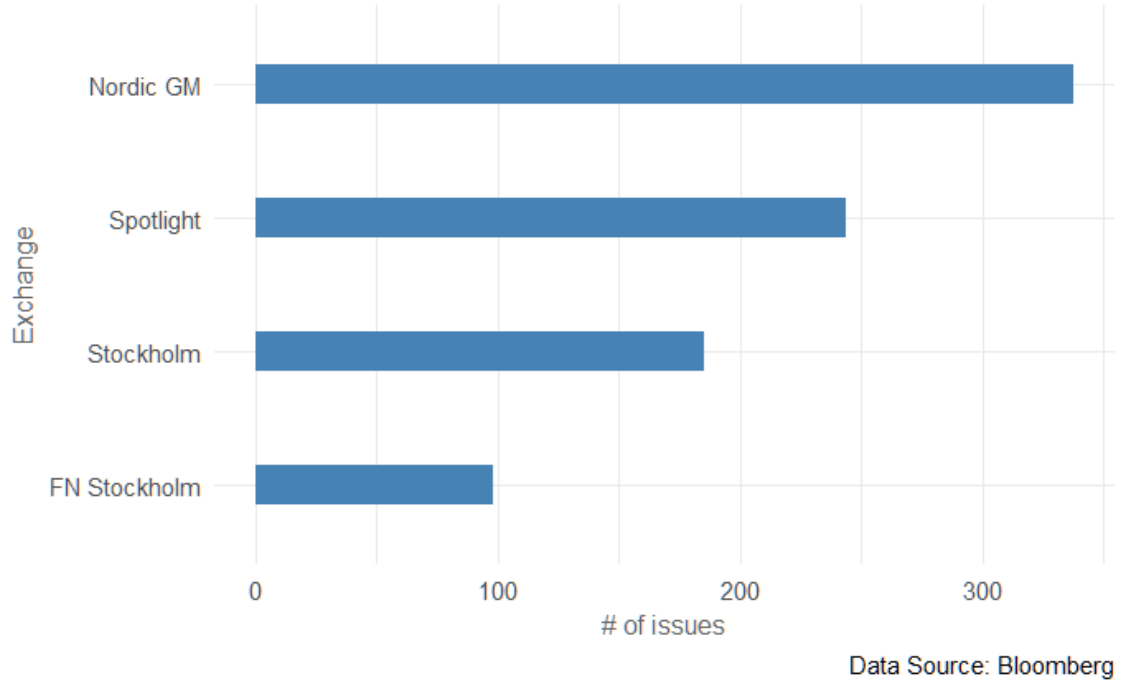


Figure 2.2. *Note*: This figure displays the number of rights issues conducted across different Swedish stock exchanges during the sample period. Most rights issues occurred on the Nordic Growth Market (Nordic GM) and Spotlight Stock Market, followed by Nasdaq Stockholm and First North Stockholm. The chart provides an overview of the distribution of capital-raising activity across exchanges, highlighting the dominance of alternative markets in facilitating equity issuance for smaller firms. Data source: Bloomberg.

As shown in the table, there is a clear overweight towards the smaller exchanges. This supports the indication that, by nature, the companies seeking financing through rights issues are generally smaller.

2.1.1 Matching firms

To evaluate whether issuing firms underperform, each issuing firm is compared to a nonissuing firm, a *matching firm*. The idea behind this approach is to have a treatment group (the issuing firms) and a control group (the matching firms). As this thesis examines stock returns, it is crucial to compare the returns of the issuing firms to another group. A certain return over a certain period does not tell a lot alone, but tells an important story when compared to another return result.

To choose the matching firms, an equity screening is conducted each year on December 31 for all listed equities traded on the four exchanges from where the issuing firms are listed, i.e., Spotlight Stock Market, First North Stockholm, Nordic Growth Market & Nasdaq Stockholm. From these annual screenings, companies that have conducted rights issues in the last 5 years are excluded from the sample, leaving a clean dataset with non-issuing companies. Each year, these companies are then ranked by market capitalization. From this list, each issuing firm is matched with the nonissuing firm that has the closest, but higher, market capitalization to the issuing firm at the time of the announcement. This means that all companies that conducted a rights issue in 2010 are matched with the nonissuing company that had the closest, but higher, market capitalization as of December 31, 2009, and this match is used throughout the period.

Some research in this field applies a slightly different methodology when gathering the control group. Another approach is to match firms on industry groups. This is not done in this study for one specific reason: this study is limited to the Swedish market. Even though this is a developed and mature market, it is relatively small when compared to the U.S, for example. This means that the universe of listed equities and hence the pool of potential matching firms is already not that large, at an average number of firms in each year of 492. If an initial filtering on industry matching was applied before the market cap matching took place, it would decrease

the pool substantially, leading to the same matching firms being matched and included in the study numerous times. Furthermore, the difference in the market capitalization between the issuing and matching firm would be substantially larger, leading to potentially biased results from the size factor.

As the matching procedure is solely based on market capitalization, this may also bias the results. While market capitalization is a critical determinant of firm characteristics and commonly used in academia (e.g., Loughran and Ritter (1995)), it does not capture other important firm characteristics that may also be important in a matching procedure to gather a representative and reliable control group. To assess the quality of the matching procedure and sample, the industry classification of each issuing and non-issuing firm is gathered and compared. As certain industries may systematically exhibit higher or lower returns due to cyclical or growth trends, this may influence the sample and potentially bias the results. If rights-issuing firms are concentrated in a few sectors while matched non-issuing firms are drawn from a more diverse or different industry base, the results could be biased by underlying industry-specific dynamics rather than the capital-raising event itself.

Table 2.1 below compares the number of firms from each industry between the issuers and non-issuers. The industry split between the issuing and non-issuing firms is relatively well balanced across most groups. The largest industries, such as Financial Services, Software & Services, Technology Hardware & Equipment, and Health Care Equipment, are represented with very similar proportions in both groups. A few industries do, however, show modest deviations, including sectors like Pharmaceuticals, Consumer Discretionary Distribution, and Utilities. In general, the overall distribution suggests that the matching procedure of exclusively matching on market capitalization does not severe major industry imbalances. This indicates that, despite not explicitly controlling for industry, the control group should be comparable to the treatment group in terms of sector affiliation. Thus, the potential bias from industry effects is likely limited. That said, ideally, the issuers were initially matched to a non-issuer based on industries and potentially other characteristics such as profitability measurements and size measured as total assets or total sales to further limit the potential bias of collecting an unbalanced sample.

Table 2.1: Industry Breakdown of Issuers and Non-Issuers

Industry	# of issuers	# of non-issuers	% of issuers	% of non-issuers
Consumer Services	5	2	0.6%	0.2%
Semiconductors & Semiconductor	7	0	0.8%	0.0%
Transportation	5	4	0.6%	0.5%
Household & Personal Products	6	4	0.7%	0.5%
Automobiles & Components	8	3	0.9%	0.3%
Consumer Durables & Apparel	14	7	1.6%	0.8%
Food	15	17	1.7%	2.0%
Utilities	10	24	1.2%	2.8%
Media & Entertainment	18	20	2.1%	2.3%
Consumer Discretionary Distrib	41	40	4.7%	4.6%
Telecommunication Services	24	37	2.8%	4.3%
Energy	44	32	5.1%	3.7%
Commercial & Professional Serv	50	50	5.8%	5.8%
Real Estate Management & Devel	56	30	6.5%	3.5%
Materials	62	38	7.2%	4.4%
Capital Goods	59	101	6.8%	11.7%
Financial Services	106	67	12.3%	7.7%
Health Care Equipment & Servic	83	103	9.6%	11.9%
Software & Services	96	94	11.1%	10.9%
Technology Hardware & Equipmen	112	98	12.9%	11.3%
Pharmaceuticals	44	161	5.1%	18.6%
Total	**865**	**865**	**100%**	**100%**

Note: This table summarizes the number and relative proportion of companies across broad industry groups in the full sample. *Source*: Bloomberg Terminal, field `DX204` – GICS Industry Group Name.

2.1.2 Stock Returns

After having conducted the screening for rights issues in Sweden and matched each issue with a matching firm, each issuing and matching firm is followed with a daily adjusted closing price from the issue announcement date (or corresponding date for the matching firm) until the earliest of; the day of desisting or the day for the fifth anniversary year for the rights issue announcement. As most years have 253 trading days, this totals 1,265 observations for each issuing firm and matching firm. Choosing the intervals to measure the long-run performance of the issues is partly decided based on the methodology used in existing literature and a trade-off. One wants to have the longest possible period following the issue to measure, while at the same time having as many rights issues included in the sample as possible. In other words, it would have been interesting to study if the long-term performance was measured as 10 years following the issue, but this would limit the sample size dramatically, as the cut-off year would have to be in 2014. For this reason, and following the methodology of Loughran and Ritter (1995), the study

is limited to the 5-year post-issue performance. As the dataset includes the daily adjusted close price for 1265 days, it also allows for examination of the 1 and 3 year (253 and 759 days, respectively) post-issue performance. With these three intervals, it allow for comparison with other studies with the same intervals. Furthermore, it makes sense to cap the interval at 5 years as this period captures the full period of nonperformance of IPOs according to Loughran (1993).

The long-term returns are calculated using the Buy-and-hold return *BHR* as it is the most effective measure and accurate reflection for long-term returns that an investor would have realized without any effects and influences caused by frequent trading. The buy-and-hold return (BHR) for stock i over the period from time t_1 to t_2 is calculated as:

$$\text{BHR}_{i,t_1,t_2} = \prod_{t=t_1}^{t_2}(1 + R_{i,t}) - 1 \tag{2.1}$$

where BHR_{i,t_1,t_2} is the total buy-and-hold return for stock i, and $R_{i,t}$ denotes the return of stock i at time t. The formula reflects the compounded return of holding the stock continuously from time t_1 to t_2, capturing the cumulative effect of individual period returns. The BHR provides a clear picture of the total return from holding the equity over a specific period, unlike alternative short-term measures, which may be influenced by temporary price fluctuations. Furthermore, this methodology is relevant when evaluating post-issue share performance, where price movements can exhibit present trends. As the purpose is to evaluate the performance of the shares in a passive investment strategy, BHR is optimal as it eliminates biases associated with cumulative return measures like Cumulative Abnormal Return *CAR*, which can be skewed due to compounding effects. Additionally, BHR is the most used returns methodology in empirical research on post-event stock performance, ensuring that the results are comparable to other studies on share returns post issues.

The BHR is calculated for 1-year, 3-year, and 5-year periods for each of the 865 issuing firms, with t_1 being the issue announcement date and t_2 being the trading date on the 1-year, 3-year, or 5-year anniversary, respectively. Simultaneously, these calculations are conducted for each of the matched firms, using the same t_1 and t_2 dates as their corresponding issuing firm. To illustrate how the BHR is calculated for

each of the issuing and matching firms, table 2.2 illustrates the process of calculating the BHR.

Table 2.2: Illustration of BHR Measurement Periods Using a Dummy Issue Announcement Date

Firm	t_1 (Start Date)	t_2 (1-Year)	t_2 (3-Year)	t_2 (5-Year)
Issuing Firm 1	Announcement date (e.g., March 15, 2012)	March 15, 2013	March 15, 2015	March 15, 2017
Matched Firm 1	March 15, 2012	March 15, 2013	March 15, 2015	March 15, 2017
⋮	⋮	⋮	⋮	⋮
Issuing Firm 865	Announcement date (e.g., July 8, 2019)	July 8, 2020	July 8, 2022	July 8, 2024
Matched Firm 865	July 8, 2019	July 8, 2020	July 8, 2022	July 8, 2024

Note: This table illustrates the measurement periods for buy-and-hold returns (BHRs) based on a hypothetical issue announcement date. Each issuing firm is matched with a non-issuing firm that shares the same start and end dates. The dataset consists of 865 such matched firm pairs and yields the 1-yer 3-year and 5-year BHR for all 1730 firms.

2.2 OLS regression

As the motivation for the study is now established and the data collection is described, this section will introduce the main model used to conduct the analysis. Since the research focuses on testing the relationship between a dependent variable (the long-term stock return) and a key independent variable (whether the company has conducted a rights issue), an Ordinary Least Squares model is an appropriate method to assess this potential linear relationship. Ordinary Least Squares *OLS* is a popular and commonly used statistical methodology used to examine a potential relationship between one dependent y-variable and one or more independent x-variables.

OLS works by minimizing the sum of squared residuals (the differences between the observed values of the x-variables and the predicted values by the model). The purpose of this process is to ensure that the total or *sum of errors* is as small as possible; this is ensured by giving greater weight to larger errors. In practice, by this process, the OLS model identifies the coefficient estimates that produce the regression line which fits the dataset in the best possible way, i.e., the lowest sum of squared residuals. Essentially, it minimizes the total squared difference between the observed values from the dataset and the regression line (Wooldridge, 2019).

The general form and expression for an OLS model is expressed as

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n + \epsilon \tag{2.2}$$

where y is the dependent variable, $x_1, x_2, \ldots, x_n$ represent the independent variables, β_0 is the intercept, $\beta_1, \ldots, \beta_n$ are the coefficients associated with each independent variable, and ϵ is the error term. The model is commonly used in econometrics and finance as it is an effective method to test and capture a linear relationship (Greene, 2012).

2.2.1 Assumptions

OLS models come with a set of underlying assumptions to ensure that the estimates of the model are valid and inference is reliable. These assumptions are important and fundamental in order to obtain reliable statistical properties of the model, as they are required for the OLS estimators to be consistent, efficient, and unbiased (Wooldridge, 2013). In case these conditions are not met, it would lead to biased estimates of the OLS model, and hypothesis testing and confidence intervals would be biased and unreliable, dramatically lowering the credibility of the study. However, in empirical research, the OLS assumptions are often violated and fail to hold, especially when working with financial and economic data, because real-world data are rarely ideal. These violations occur due to the inherent characteristics of such data, including trends, volatility, and interdependence (Wooldridge, 2013). Because of this, the research should always be critically assessed, diagnosed, and potentially adjusted for violations of the assumptions. Understanding and running diagnostic tests for each assumption allows for a quick assessment of whether the OLS can be used as is or whether further model adjustments must be made in order to obtain robust and reliable results. This next section will dive into the different assumptions of the OLS model used in this study, and an introduction to the different diagnostic tests will be made.

Normality

The assessment of normality of the residuals is an important validation of one of the underlying assumptions in linear regression models. In particular, the assumption of normality is important to ensure the validity of statistical inference, including confidence intervals and hypothesis testing. Essentially, this first assumption states that the residuals of the model should be symmetrically distributed around zero and follow a Gaussian distribution. This assumption becomes important when using the t-test or F-tests to assess the statistical significance of variables, and especially for smaller samples. In larger samples, the assumption is justified by the Central Limit Theorem *CLT* (Greene, 2012). In larger samples, the distribution of the OLS estimators approaches normality regardless of the distribution of the residuals due to CLT, which implies that regardless of any non-normal distribution of the residuals, the estimated coefficients will approximate normality as the sample size increases. The only requirement is that the errors are independent and identically distributed with finite variance, i.e., $\varepsilon_i \overset{\text{i.i.d.}}{\sim}$ some distribution with $E[\varepsilon_i] = 0$ and $\text{Var}(\varepsilon_i) = \sigma^2$. When working in an empirical setting and especially when working with financial and economic data, it is common to observe that the residuals often deviate from normality (Cont, 2001). As mentioned, it is not always necessary to augment the model or transform the data to reach normality of the residuals. In practice, the research is continued relying on the CLT.

To test for normality in residuals, the Jarque–Bera test is performed with the following stated hypothesis:

$$H_0 : \varepsilon_i \sim \mathcal{N}(0, \sigma^2)$$
$$H_1 : \varepsilon_i \text{ does not follow } \mathcal{N}(0, \sigma^2)$$

Heteroskedasticity

This next assumption of linear regression models revolves around the variance of the residuals or error terms in the estimated model. OLS assumes that residuals are homoscedastic, meaning that the error terms remain constant across all levels of the x-variables. In case the variation is not constant, the model suffers from

heteroscedasticity, and a key assumption is violated as the residuals change systematically when the value of the independent variables changes. In other words, the residuals are a function of the x-variable (Wooldridge, 2019). In case the residuals suffer from heteroskedasticity, the coefficient estimates from the OLS are not biased, but it affects the reliability and efficiency of the coefficients. Specifically, the standard errors of the estimated parameters are unreliable, which in turn affects the inferences, as confidence intervals and hypothesis testing are unreliable. Furthermore, it can lead to inaccurate conclusions drawn based on statistical significance of variables, as the p-values are misleading (Greene, 2018). Therefore, it is important to test, and potentially adjust the model for heteroscedastic error terms to ensure robustness.

Heteroscedasticity is one of the assumptions that are easily testable. An initial plot of the model residuals often gives a good indication of whether the assumption is violated, but to formally test for heteroscedasticity, a number of statistical procedures and tests are available. The most commonly used is the White test or Breusch-Pagan test. In this thesis, the Breusch-Pagan is applied, which involves regressing the squared residuals on the original independent variables before evaluating whether the x-variable explains the variation in the squared residuals. The Breusch-Pagan test follows a chi-squared distribution and is employed to detect heteroskedasticity in a regression model. Under the null, it assumes homoscedasticity.

$$H_0 : \text{var}\left[u \mid x_1, x_2, \ldots\right] = \sigma^2$$
$$H_1 : \text{var}\left[u \mid x_1, x_2, \ldots\right] = f(x)$$

Multicolinearity

Another important assumption in OLS regression is that there is no multicollinearity among the independent x-variables. In essence, multicollinearity is when two or more explanatory variables in the regression model are highly correlated in a linear way. If multicollinearity is present, it becomes a challenge to isolate and understand the individual effect and explanatory power of each independent variable on the de-

pendent variable. This may lead to increased variance in the coefficient estimates, which in turn leads to larger standard errors and potentially statistically insignificant coefficients. In turn, these factors inflate the uncertainty of the coefficient estimations and will lead to unstable and unreliable results (Wooldridge, 2019)

It is important to note that even though the presence of multicollinearity does not violate the unbiasedness of the estimators, it does compromise their precision and interpretability, which in turn affects the statistical inference when conducting hypothesis tests and constructing confidence intervals. It can also lead to incorrect conclusions about the significance of the relationships in the model (Greene, 2012)

Just like the other assumptions, multicollinearity is detectable relatively easily through diagnostic tools. The most common is to compute a correlation matrix of the independent variables. This allows for an easily accessible indication of whether there might be an element of multicollinearity among two or more independent variables. There are, however, slightly more advanced diagnostic tools to determine if there may exist intercorrelation among the x-variables. One approach is to calculate the Variance Inflation Factor VIF which quantifies how much of the coefficient variance is inflated because of multicollinearity. As a rule of thumb and benchmark in the literature, if the VIF exceeds 10, it is often a good indication that multicollinearity exists (Kutner et al., 2004). If multicollinearity is detected, a few options are available; the simplest is to just remove one of the correlated variables, while alternative accommodations include merging the correlated variables or finding alternative measurements for the variable that is interesting to include in the model. In this thesis, a correlation matrix of the x-variables is computed, as well as a VIF test.

2.2.2 Variables

This next section will introduce the different dependent and independent variables included in the OLS model. As the time horizon for the assessment period of the post-issue return is 1–5 years, the model is estimated three times, i.e., with 1-year, 3-year, and 5-year BHR as dependent variables. The approach of the model specification is to go from a general-to-specific model and include several independent variables that existing literature suggests explaining long-term returns. In case any

of the explanatory variables turn out to be insignificant, these are removed, and the model is re-estimated with only the significant variables.

Buy-hold-return

As motivated and initially introduced in the data section, the dependent Y-variable is the BHR for each equity in this sample. The BHR is calculated based on the daily adjusted closing stock price for the 1, 3, and 5-year periods. If an issuing or matching firm is delisted before its 5th anniversary date, the total return is truncated on that date of delisting. In these cases, the truncated return reflects the actual performance an investor would experience before the stock ceased trading. Hence, the percentage buy-and-hold return for firm i is:

$$R_{iT} = \left[\prod_{t=\text{start}}^{\min[T,\text{delist}]} (1 + r_{it}) - 1 \right] \times 100\%, \tag{2.3}$$

Where *start* is the date of the first trading day after the issue announcement (or the corresponding matching-firm start date), $\min[T, \text{delist}]$ is the earlier of the last trading day following the delisting or the end of the one, three or five-year window and r_{it} is the return for company i on date t. This calculation is applied on each equity with a 1, 3, and 5-year period to reach the 1-year, 3-year, and 5-year BHR for each company.

Issuing dummy

As the purpose of this study is to capture a potential difference in the return of companies that issued and did not issue, the main variable is the issuing dummy. If the company conducted a rights issue, it takes the value of 1 or 0 if it is a matching firm. The coefficient estimate of this issuing dummy variable will represent the difference in returns of firms that conducted rights issues and those that did not. If the coefficient turns out to be positive, it means that companies that issued new equity had higher returns and vice versa.

Days since IPO

The first control variable in the model is the number of days since the company went public for the first time. This variable serves two purposes; as discussed in the literature review, there is a clear consensus and conclusion that companies that go public subsequently have lower returns in the following years. Therefore, this is an important variable for this model as it might bring insights and explain part of the 1, 3, or 5-year return of the companies. Other than this, the variable also serves as a proxy for firm age. DeAngelo et al. (2006), Fama and French (2004), and Pástor and Pietro (2003) all find a relationship between the firm age and the long-term stock returns. Essentially, the findings are that young firms tend to underperform mature firms due to more stable fundamentals, lower uncertainty, and lower volatility in cash flows and profitability. The IPO date for all firms in the sample is manually collected from the FactSet database. The number of days is calculated as the difference between the recorded IPO date and the issue announcement date for issuers, or the matching start date for non-issuers.

Market value of equity

The market value of equity is included in the model as an additional control variable to capture any potential size effects that may determine long-term stock returns. The motivation for including this variable stems from the fact that firm size is a recognized factor that influences stock performance. Fama and French (1995) discovered that smaller firms tend to deliver higher average returns than large firms, also when controlling for market risk, i.e., the size premium.

To address potential skewness in the firm size distribution in the sample, the market value of equity is included on a log scale. This ensures that the regression captures the proportional differences that may exist across the included firms. To eliminate any potential announcement effects of the rights issue, the market value of equity is calculated for each firm 10 days before the announcement date. Hence, the size variable is included for each firm as:

$$\text{MVE}_{i,t-10} = \log\left(\text{Share Price}_{i,t-10} \times \text{Shares Outstanding}_{i,t-10}\right) \tag{2.4}$$

Book-to-market ratio

As a proxy for firm valuation, the book-to-market ratio is included in the model. The ratio is a simple calculation of the book value of equity over the market value of equity and serves as an indication of whether the firm is undervalued or overvalued relative to its accounting fundamentals. The higher the ratio, the cheaper the stock, as this indicates that their market valuation is low relative to its book value, whereas lower ratios reflect higher valuations, which potentially is justified by high expectations on growth outlooks. Fama and French (1992, 1993) identify the book-to-market ratio as a key variable when explaining cross-sectional variation in returns. In essence, their results conclude that firms with a higher book-to-market ratio on average earn higher returns over time. Furthermore, this variable is commonly practiced to be included in studies on issuing underperformance, as extensive empirical evidence concludes that valuation is a strong predictor for long-term returns.

In the context of rights issues, this variable may shed important light on the theory that firms are incentivized to issue equity when their stock prices are high, which allows for capital raises at stronger terms.

The data for the book value of equity is derived from the latest quarterly report available 10 days before the rights issue announcement date (or the corresponding start date for the matched firm). The market value of equity is calculated as the share price times total shares outstanding 10 days before the start date. This ensures that the valuation measure reflects only the information available to investors before the issuance. Following the methodology of Ritter (1991), the firms with missing or negative values for the book value of equity are assigned a dummy value, in this case, SEK 1 million. The variable is calculated as:

$$\text{BMVE}_{i,t-10} = \frac{\text{Book Value of Equity}_{i,t-10}}{\text{Share Price}_{i,t-10} \times \text{Shares Outstanding}_{i,t-10}} \tag{2.5}$$

Profitability variables

When examining long-term returns, profitability measures are important factors to consider as they are fundamental to understanding the underlying financial health

of companies and the firm's ability to generate earnings. In this model, two measurements for profitability are used: Net income to total sales *profit margin* and the EBITDA to total sales *EBITDA margin*. These two measurements of profitability are included as they offer valuable insights into the firm's operational performance, which in turn might be explanatory for long-term returns.

Net profit margin measures how much of the total firm revenue is retained as a profit after deducting all expenses, taxes, and interest. Essentially, this measure reflects a firm's overall profitability on the very last line of the income statement. When understanding this variable in the context of companies issuing new stock, there might be some interesting dynamics between the issuing firms that are net profitable and those that are not. Firms with strong profit margins may be motivated by other factors for raising capital than firms with lower profit margins. A fair assumption would be that proceeds raised by firms that are net profitable go towards expansion and strategic investments, while unprofitable firms may raise capital to finance operations or repay debt. Ultimately, this could influence investor appetite for the firms and could lead to lower long-term returns. Looking at existing literature, the net profit margin has previously been linked to long-term stock returns by Fama and French (2015), who identify profitability as a strong explanatory factor in asset pricing through their five-factor model. Essentially, they conclude that more profitable firms tend to earn higher returns. Furthermore, Novy-Marx (2013) concludes that profitability metrics are as good at predicting stock returns as traditional value metrics.

The EBITDA margin reflects the operational performance of the firm as it excludes non-operating items such as interest, tax, depreciation, and amortization. The EBITDA margin is particularly useful when examining companies across industries with different capital structures and D&A policies, as it reflects the raw operational profit. High EBITDA margins reflect strong operational efficiency, and empirical studies support the relevance of EBITDA margins in the context of long-term returns. In a paper from 2013, Beneish et al. (2013) found that operating profitability measures like the EBITDA margin serve as useful and important variables in forecasting earnings growth and future returns. Similar to these findings,

Peters and Taylor (2017) emphasized the importance of operating profit metrics when explaining firm valuations and investor behavior.

For each of the firms in the sample, the Net Profit Margin and EBITDA Margin are calculated as

$$\text{Net Profit Margin}_{i,t-10} = \frac{\text{Net Income}_{t-10}}{\text{Total Sales}_{t-10}} \tag{2.6}$$

$$\text{EBITDA Margin}_{i,t-10} = \frac{\text{EBITDA}_{t-10}}{\text{Total Sales}_{t-10}} \tag{2.7}$$

Where Net Income_{t-10}, $\text{Total Sales}_{t-10}$, and EBITDA_{t-10} refer to the values from the most recent quarterly report available at 10 days before the rights issue announcement date for issuing firms, or 10 days before the matching start date for matched firms.

Leverage

The debt-to-equity ratio is included as another independent variable to measure the firm's leverage. The ratio reflects the firm's financing structure as it indicates the proportion of assets that is financed through debt compared to equity. The purpose of this variable is to capture any effects on long-term returns associated with financial risk and capital structures. The hypothesis is that firms with high leverage may face higher risks in meeting their obligations and, in turn, higher bankruptcy risk. This added risk may then, in turn, be reflected in the long-term returns, as lower leveraged firms are better positioned for volatile market conditions.

Research has found the existence of an inverse relationship between stock performance and firm leverage. In their asset pricing model, Fama and French (1992) includes the financial leverage as a control variable, which shows that higher leveraged firms tend to underperform, hence the motivation to include this variable.

As the balance sheet metrics are released every quarter, the data used in this variable is also based on the latest available quarterly report at 10 days before the

start date. Hence, the calculation for the D/E is:

$$\text{Debt-to-Equity}_{i,t-10} = \frac{\text{Total Liabilities}_{i,t-10}}{\text{Total Equity}_{i,t-10}} \tag{2.8}$$

Where $\text{Total Liabilities}_{t-10}$ and $\text{Total Equity}_{t-10}$ refer to the values from the most recent quarterly report available at 10 days before the rights issue announcement date for issuing firms, or 10 days before the matching start date for matched firms.

Share price momentum

Share price momentum is included in the model as another control variable to capture any recent performance trends leading up to the start date of the BHR measurement period. In finance, momentum refers to a well-documented effect of the continued positive performance of stocks that have performed well in the recent past and vice versa for bad performers. To capture this phenomenon, the model is augmented with a momentum variable to potentially explain the BHR. In this study, the momentum is included as the 6-month share return leading up to the announcement (or the matched date for non-issuing firms). To avoid any potential speculations or leakage effects surrounding the upcoming rights issue, the end date for the 6-month window is set at 10 days before the start date. Hence, the variable is derived as:

$$\text{Momentum}_{i,\,[-6\text{m}]} = \frac{P_{i,\,t-10\text{d}}}{P_{i,\,t-6\text{m}}} - 1 \tag{2.9}$$

where $\text{Momentum}_{i,\,[-6\text{m}]}$ represents the 6-month return of stock i, ending 10 days prior to the event date t. $P_{i,\,t-10\text{d}}$ is the price of stock i 10 days before t, and $P_{i,\,t-6\text{m}}$ is the price 6 months prior to that. In existing literature, momentum is a well-documented predictor for future returns. Work published by Jegadeesh and Titman (1993) shows a relationship between stocks with high returns in the past 3 to 12 months tend to continue outperforming in the future, making it a relevant variable to include in this study.

Market return

The last control variable that is included in the model is a proxy for the overall market return. The purpose of including this variable in the model is to capture broad, market-wide influences that may also affect individual stock returns. The overall market sentiment serves as an indicator of the market as a whole, and it is fair to assume that individual firms included in this sample are influenced to a large extent by the general direction of the market. As this study is focused on the Swedish market, the benchmark is the OMXS30. This should allow for examining the isolated portion of the long-term stock returns that is driven by the issuing dummy rather than market movements. As the y-variable takes three forms, i.e., three different intervals for the BHR, the OMXS30 index return is also included with three different time intervals. To avoid issues with multicollinearity among the three time periods as three separate independent variables, the model specification will vary with the inclusion of the corresponding time-interval return for the BHR. Thus, the model estimation for the 1-year BHR is estimated with the 1-year total return for OMXS30 and so forth. The variable is calculated for each of the issuing and matching firms, with the start date of the benchmark return being the start date of the measurement period for the BHR, hence:

$$R_{\text{OMXS30},\,n\text{y}} = \frac{P_{t+n\text{y}} - P_t}{P_t} = \frac{P_{t+n\text{y}}}{P_t} - 1 \tag{2.10}$$

where $R_{\text{OMXS30},\,n\text{y}}$ represents the total return of the OMXS30 index over n years starting from the rights issue announcement date, P_t is the index level at the announcement date, and $P_{t+n\text{y}}$ is the index level n years after that date.

2.2.3 Summary statistics

Table 2.3 below represents descriptive statistics for the full sample of 1,730 observations that is included in the analysis. The mean 1-year, 3-year, and 5-year buy-and-hold returns (BHRs) are 5.7%, 24.4%, and 29.6%, respectively. The BHR appears to be skewed, with the median values substantially lower, particularly over the longer horizons. This indicates that a small number of firms experience very

large post-issue returns, influencing the mean. The typical firm in this sample has a negative BHR across all time horizons, as represented by the median. This may initially seem strange and like a mistake in the data, but this pattern is consistent with the nature of long-term stock return distributions, especially among small-cap firms, which are overrepresented in this sample. The mean and median Log (MVE) of around 4.5 corresponds to a market capitalization of approximately SEK 30 million. These smaller firms often exhibit skewed return profiles, with a small number of high performers and many underperformers or delisted stocks. The average firm in the sample has a book-to-market ratio of 0.51 and relatively high leverage, with a mean debt-to-equity (D/E) ratio of 3.24. Profitability is highly dispersed, as seen in the wide standard deviations for both net profit margin and EBITDA margin.

Table 2.3: Summary Statistics for the Full Sample

	Mean	**Median**	**Standard Deviation**	**Max.**	**Min.**
1Y BHR	0.057	-0.109	0.801	7.98	-0.987
3Y BHR	0.244	-0.166	1.60	22.1	-0.998
5Y BHR	0.296	-0.403	2.56	39.9	-1.000
ISSUE	-	-	-	-	-
MVE	4.66	4.39	1.83	12.8	0.607
B/M	0.505	0.260	0.829	15.5	0.000114
D/E	3.24	0.170	52.8	1859	0
6M_MOM	0.215	0	3.33	124	-1.000
OMX 1Y	0.098	0.111	0.152	0.690	-0.455
OMX 3Y	0.342	0.310	0.203	0.972	-0.349
OMX 5Y	0.643	0.642	0.266	1.69	-0.117
NPM	-23.3	-0.210	220	188	-5264
EBITDA_M	-20.9	-0.138	218	177	-5206
IPO_AGE	2490	1610	2333	13452	3

Note: This table presents summary statistics for the full sample of $n = 1{,}730$ firm observations. Buy-and-hold returns are measured over 1-, 3-, and 5-year horizons (*1Y BHR*, *3Y BHR*, *5Y BHR*). Firm characteristics are derived from the most recent quarterly report available 10 days before the announcement date. Market value of equity (*MVE*) is the log of market capitalization 10 days before the measurement period, and the book-to-market ratio (*B/M*) is based on book value from the same quarerly report. Leverage (*D/E*) is total liabilities over equity. Momentum (*6M_MOM*) is the stock's 6-month return ending 10 trading days before the announcement. *OMX* variables capture the OMXS30 index returns over each BHR horizon. Profitability is measured using net profit margin (*NPM*) and EBITDA margin (*EBITDA_M*). Firm age (*IPO_AGE*) is the number of days since IPO.

To get an indication of how the independent variables differ for the issuing and

non-issuing companies, Table 2.4 summarizes the mean and median for the issuing firms, matching firms, and total. A pattern seems to emerge from the comparable table: the issuing companies appear to be associated with lower long-term returns than the non-issuers. The non-issuers generally have solid mean BHR across all the periods, while the issuers show much lower and negative returns. Generally, issuing firms have lower book-to-market ratios, which suggests higher market valuations when compared to the book value of equity. Furthermore, the overall picture is that issuers report large negative profit margins while non-issuers are profitable at the median level. This suggests that the firms that issue new stock may be subject to financial pressure by the time they resolve the rights issue. The financial leverage also differs between the two groups. While the mean debt-to-equity ratio is substantially larger for the non-issuers, the medians of the two groups are very similar. This indicates that a small number of very leveraged firms skew the average. In summary, these statistics show that firms that issue new stock are in a weaker financial position, but more importantly for this thesis, they indicate that issuing firms may have lower long-term returns. Later sections will conduct statistical tests in order to draw definitive conclusions on the potential underperformance.

Table 2.4: Summary of Independent Variables: Issuers vs Non-issuers

	Issuers		**Non-issuers**		**Total**	
	Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**
1Y BHR	2.0%	−14.9%	9.3%	−6.9%	5.7%	−10.9%
3Y BHR	9.7%	−28.9%	39.1%	−6.3%	24.4%	−16.6%
5Y BHR	0.9%	−58.9%	58.3%	−21.8%	29.6%	−40.3%
MVE (SEK M)	4.64	4.40	4.68	4.39	4.66	4.39
B/M	0.42	0.20	0.59	0.36	0.50	0.26
NPM	−43.38	−0.66	−4.63	0.02	−23.28	−0.21
EBITDA_M	−40.67	−0.46	−2.44	0.02	−20.94	−0.14
D/E	1.91	0.15	4.65	0.19	3.24	0.17

Note: This table presents comparable summary statistics (mean and median) for key independent variables across issuing and non-issuing firms. Buy-and-hold returns are measured over 1-, 3-, and 5-year horizons (*1Y BHR*, *3Y BHR*, *5Y BHR*). Firm characteristics are derived from the most recent quarterly report available 10 days before the announcement date. Market value of equity (*MVE*) is the natural logarithm of market capitalization (in SEK million), measured 10 trading days before the announcement. The book-to-market ratio (*B/M*) is a measure of firm valuation. Leverage (*D/E*) is total liabilities over equity. Momentum (*6M_MOM*) is the stock's 6-month return ending 10 trading days before the announcement. Profitability is measured using net profit margin (*NPM*) and EBITDA margin (*EBITDA_M*). Firm age (*IPO_AGE*) is the number of days since IPO.

As noted several times throughout this thesis, the existing literature is unambiguous in its conclusion that firms going public through IPOs subsequently underperform. This motivated the inclusion of *days since IPO* as an independent control variable in the model, as this is likely to affect the future returns of the companies. To gain an understanding of when the firms issue stock relative to the IPO date, figure 2.4 shows the distribution of the number of days since the firm's IPO at the time of the rights issue announcement. Keeping in mind that Loughran (1993) reported that the underperformance of IPOs ends after five years, it is particularly interesting to see whether the majority of the issues are conducted sooner or later than five years after the company went public. When looking at the plot, it is clear that a large share of the rights issues are conducted within the first years following the IPO. The distribution is skewed to the left, with a clear concentration in the early years, gradually decreasing over time. With a median of around 1500 days and an average of approximately 2000 days, translating into to 4 and 5.5 years, respectively, the tendency appears to be that the rights issues are announced around the time when IPOs no longer underperform. This is an important observation for this study, as it may indicate that the variable *days since IPO* is not particularly relevant or statistically significant in the model.

Before moving into the model estimation, a few visualizations will be presented of the dependent Y-variables. The three plots below show the density of the Buy-and-Hold Returns across 1-year, 3-year, and 5-year horizons across issuing and non-issuing firms. Generally, there is a consistent pattern across the three time horizons: issuing firms tend to be more clustered on the negative side of the distribution. In the short term, returns of issuing firms exhibit a tighter distribution centered around low returns, whereas the distribution of non-issuers displays a slightly wider distribution with a fatter tail to the right. This suggests greater potential for larger returns for non-issuers. When looking at the 3-year BHR, the difference in return distribution becomes even clearer with the large spike of non-issuers between -1 and 0 and a much flatter distribution of the matching firms, showing potential for good returns. By the 5-year mark, the divergence becomes even more pronounced. The distribution for issuers shifts leftward and becomes more concentrated in the lower return range, while non-issuers continue to display a broader, right-skewed

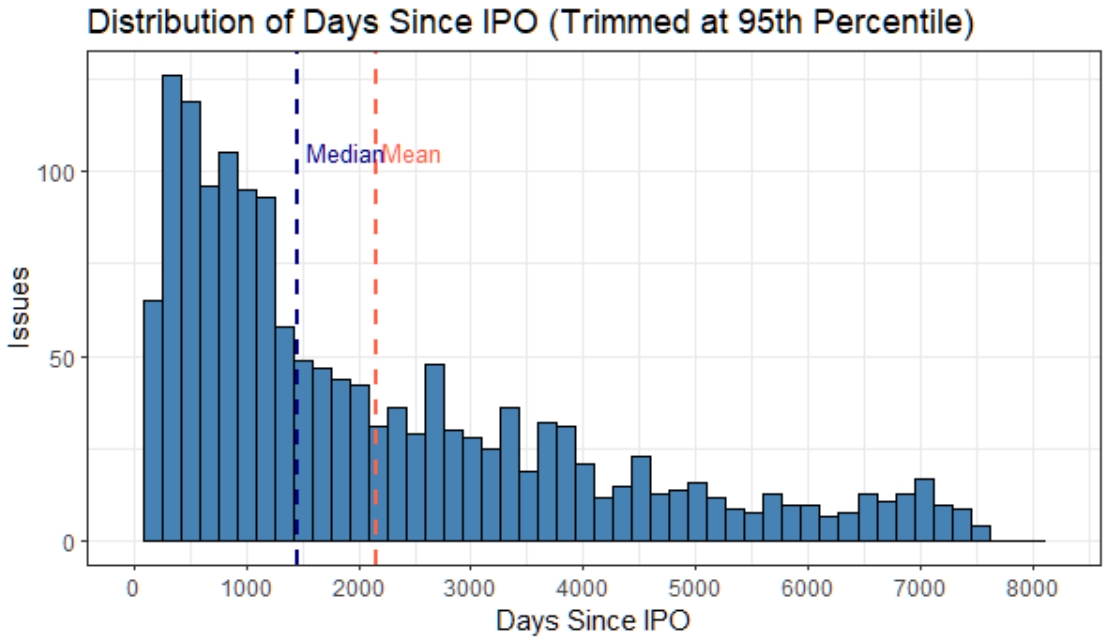


Figure 2.4. *Note*: This histogram displays the distribution of the number of trading days between a firm's IPO and the announcement of its rights issue or matched start date. The sample is trimmed at the 95th percentile to reduce the influence of extreme values. The mean and median are indicated by vertical lines. This figure provides context for how seasoned the issuing firms are at the time of capital raising.

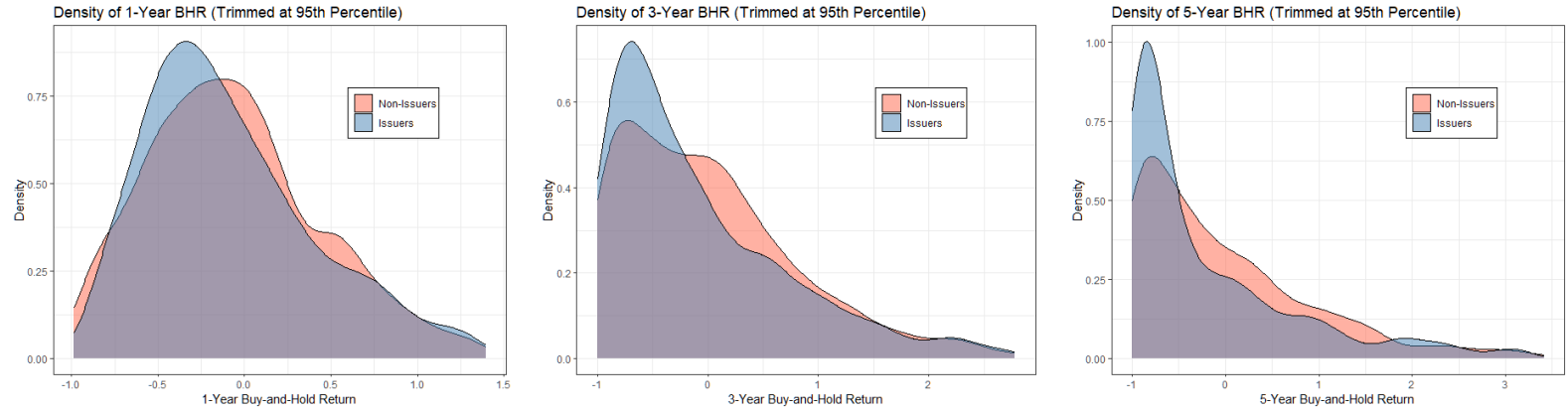
distribution that reflects superior long-term value creation. These plots support that the main hypothesis for this thesis is relevant, as rights issuance may cause lower returns.

As the last thing in this EDA section, a correlation matrix among the independent variables is presented. As the existence of high correlation among independent variables can lead to serious violations of the assumption of no multicollinearity, the correlation table is important. The correlation matrix in Table 2.5 generally shows low correlations among the independent variables, with most coefficients close to zero. The only exception is among the EBITDA_M and NPM, i.e., the profitability ratios. This correlation is important to be aware of in the model specifications, and one of the profitability margins will be dropped if proven significant to avoid multicollinearity. Moderate correlations are observed between variables OMX_1Y, OMX_3Y, and OMX_5Y. This makes sense as these variables represent the OMX benchmark for different return horizons (1Y, 3Y, and 5Y) and are not included in the same regression specifications. As such, these correlations do not pose a concern.

Table 2.5: Correlation matrix of independent variables

	ISSUE	MVE	B/M	6M_MOM	D/E	OMX_1Y	OMX_3Y	OMX_5Y	NPM	EBITDA_M	IPO_AGE
ISSUE	1	−0.010	−0.098	−0.026	−0.022	−0.002	0.0003	0.0001	−0.088	−0.088	−0.111
MVE	−0.010	1	−0.043	0.047	0.032	−0.065	0.006	0.040	0.031	0.276	
B/M	−0.098	−0.043	1	−0.027	0.004	0.078	0.046	0.080	−0.059	−0.096	0.173
6M_MOM	−0.026	−0.022	−0.027	1	−0.013	−0.011	−0.007	−0.019	0.006	0.006	0.009
D/E	−0.022	0.047	0.004	−0.013	1	0.026	−0.020	0.004	0.012	0.011	0.039
OMX_1Y	−0.002	0.032	0.078	−0.011	0.026	1	0.463	0.626	−0.031	−0.026	0.080
OMX_3Y	0.0003	−0.065	0.046	−0.007	−0.020	0.463	1	0.605	0.005	0.006	−0.021
OMX_5Y	0.0001	0.006	0.080	−0.019	0.004	0.626	0.605	1	0.001	−0.005	0.018
NPM	−0.088	0.040	−0.059	0.006	0.012	−0.031	0.005	0.001	1	0.998	0.070
EBITDA_M	−0.088	0.031	−0.096	0.006	0.011	−0.026	0.006	−0.005	0.998	1	0.068
IPO_AGE	−0.111	0.276	0.173	0.009	0.039	0.080	−0.021	0.018	0.070	0.068	1

Note: *ISSUE* is a dummy equal to 1 if the firm conducted a rights issue, 0 otherwise. *MVE* is the natural logarithm of the market value of equity 10 days before the announcement. *B/M* is the book-to-market ratio based on the book value of the equity and the market capitalization 10 days before the announcement. *6M_MOM* is the stock return over the 6 months leading up to 10 days before the announcement. *D/E* is the debt-to-equity ratio, calculated as total liabilities over total equity. *OMX_1Y*, *OMX_3Y*, and *OMX_5Y* represent the OMXS30 index return over 1-, 3-, and 5-year periods starting from the announcement date. *NPM* is the net profit margin and *EBITDA_M* is the EBITDA margin, both derived from the latest quarterly financial reports available before the announcement or match date. *IPO_AGE* is the number of days since the firm's IPO at the time of the announcement or match date. All variables are defined in Appendix A.



(a) 1 Year BHR (b) 3 Year BHR (c) 5 Year BHR

Figure 2.5. *Note*: This figure presents the density of 1-, 3-, and 5-year buy-and-hold returns (BHRs) for rights-issuing firms and their matched non-issuing counterparts. The returns are trimmed at the 95th percentile to reduce the influence of extreme outliers. The purpose of the figure is to illustrate the distributional differences in post-announcement performance between the two groups across different investment horizons.

2.2.4 Fixed effects

As most firms in the dataset issue stock multiple times, and the fact that a control firm can be chosen as a matching firm more than once, the dataset is a panel structure. For this reason, this thesis employs a fixed effects framework due to the need for control of unobserved, firm-specific characteristics that do not vary over time but may affect long-term returns. This unobserved heterogeneity may include characteristics such as managerial quality, strategy, or firm culture, all factors which are difficult to measure directly but could influence the dependent variable. By applying fixed effects, the OLS model effectively controls for these time-invariant characteristics while allowing for within-firm variation to estimate the impact of the rights issue on long-term performance. In addition to firm fixed effects, year fixed effects are also included to control for time-specific shocks and macroeconomic events that affect all firms within a given year. This makes the model robust and produces unbiased estimates of the true relationship between the issue event and the long-term returns, as it mitigates the risk of omitted variable bias, which in turn could affect the OLS estimates. Furthermore, the use of FE regression is consistent with existing empirical research within corporate finance, where unobserved firm-level heterogeneity is common. Therefore, the fixed effects model serves as the main model for this thesis when deriving inferences. To formally justify the choice of

the fixed effects rather than random effects, a Hausman test is performed, as it tests whether the unique errors are correlated with the regressors. Under the null hypothesis of the Hausman test, no correlation exists, which implies that a random effects model is consistent and efficient. If, however, the null is rejected, it indicates the need for a fixed effects model. In this case, the fixed effects model provides consistent estimates where random effects would not.

2.2.5 Hypothesis

As the focus of this dissertation is to examine the long-term return of companies that conduct rights issues, the hypothesis revolves around this. The underlying motivation for the hypothesis is founded in existing empirical findings within the field of corporate finance, where it is well-documented that firms that issue new equity subsequently underperform in the long run. Hence, this thesis hypothesizes that firms conducting rights issues exhibit a return profile that differs significantly from non-issuing firms in the long run:

> **H1:** Firms conducting rights issues exhibit long-term stock returns that significantly differ from those of comparable non-issuing firms.

While the hypothesis test is two-sided, existing empirical literature and theoretical considerations suggest that the effect is likely negative, i.e., that firms conducting rights issues tend to underperform non-issuing firms in the long run. In case the null is rejected, the direction and magnitude are derived from the OLS regression estimates. As the hypothesis test is based on an OLS regression, the hypothesis revolves around the coefficient estimate for the issuing dummy variable. As the hypothesis is that an issue effect existist in rights issuing firms, the hypothesis is expressed formally as:

$$H_0: \quad \beta_{\text{ISSUE}} = 0$$
$$H_1: \quad \beta_{\text{ISSUE}} \neq 0$$

The rationale behind the hypothesized issuing effect is manifold. One of the most well-established explanations for the potential underperformance of issuing compa-

nies is that the firm managers take advantage of high share price valuations by the time of issue. Essentially, the reason for the long-term underperformance amongst SEOs is that the new stock is issued at high valuations, and the share price eventually converges to lower valuations.

Results

3.1 Average buy-and-hold returns

For each of the issuing firms and matching firms, the equally weighted mean return for the 3 and 5-year holding period is computed, respectively, for each calendar year for comparison. The average T-year buy-and-hold return is measured as

$$R_{\tau,T} = \frac{1}{n}\sum_{i=1}^{n} R_{iT} \tag{3.11}$$

where $R_{\tau,T}$ denotes the percentage buy-and-hold return for firm i in holding period T. To provide context for the average BHR and enable comparison between issuing and matching firms, a wealth relative is calculated for each cohort year. This metric represents the ratio of end-of-period wealth from holding a portfolio of issuing firms to that of a portfolio of matching firms with similar initial market capitalizations. The wealth relative is defined as:

$$\text{Wealth Relative} = \frac{\sum_{i=1}^{N}(1 + R_{iT})}{\sum_{i=1}^{N}(1 + R_{mT})} \tag{3.12}$$

Where:R_{iT} is the buy-and-hold return for Rights issue firm i in cohort year T, R_{mT} is the corresponding return for the matched non-issuing firm, and N is the number of Rights-issuing firms in that cohort. For example, in year 2007 rights-issuing firms yield an average five-year return of -57% and the matched firms yield -27%, the wealth relative is calculated as $\frac{1-0.57}{1-0.27} = \frac{0.43}{0.73} \approx 0.59$. This indicates that investors in rights-issuing firms would have accumulated approximately 59% of the wealth compared to investors in matched firms over the same period, reflecting

significant underperformance.

Table 3.6: Mean Buy-and-Hold Returns for Rights Issues and Matching Firms

		3 Years			5 Years		
Cohort Year	Number Of Rights Issues	Rights Issues	Matching Firms	Wealth Relative	Rights Issues	Matching Firms	Wealth Relative
2006	23	−30%	−18%	0.85	−11%	−8%	0.96
2007	16	−52%	−47%	0.90	−57%	−27%	0.59
2008	19	1%	56%	0.65	12%	52%	0.74
2009	42	−2%	52%	0.64	51%	93%	0.78
2010	43	−11%	−19%	1.09	57%	26%	1.25
2011	33	49%	−41%	2.50	6%	−22%	1.36
2012	40	45%	102%	0.72	25%	245%	0.36
2013	46	10%	35%	0.82	11%	69%	0.66
2014	59	5%	101%	0.52	−1%	72%	0.58
2015	65	13%	42%	0.80	29%	32%	0.97
2016	95	5%	6%	0.99	57%	53%	1.03
2017	93	4%	79%	0.58	−9%	205%	0.30
2018	141	43%	29%	1.11	−22%	−17%	0.95
2019	135	−10%	56%	0.58	−49%	40%	0.36
2020	15	−19%	−10%	0.90	−87%	−40%	0.22
Average	58	4%	28%	0.91	1%	52%	0.74

Note: This table reports average buy-and-hold returns (BHRs) for firms conducting rights issues and their matched peers, measured from the announcement date over 3-year and 5-year horizons. Wealth relatives are computed as the ratio of the sum of one plus the BHRs for rights-issuing firms to the sum of one plus the BHRs for matched firms: $\left[\sum_{i=1}^{N}(1+R_{iT})/\sum_{i=1}^{N}(1+R_{mT})\right]$. Matching firms are selected based on market capitalization and exclude firms that have issued stock in the last five years. All returns are buy-and-hold raw returns.

The initial results are presented in table 3.6. The comparison of wealth relatives suggests that there may be an indication of lower returns associated with companies conducting rights issues compared to matching firms. For the 3-year returns, 12 out of the total 15 examined years were subject to issuing underperformance, while 11 of the 15 years saw underperformance of issuing firms. With an average wealth relative in the 5 years of 0.74, this indicates that investors in rights issue firms would have earned just 74% of the wealth that would otherwise have been generated by the matched firms in the same period. It is important to note that the wealth relatives are based on average returns in the cohort years. This means that the mean BHR can be influenced and skewed by extreme values from individual firms with extreme performance in specific years. An example of this is likely the case for the cohort

year of 2011, whtih a 3-year BHR wealth relative of 2.50. These skewed values may, in turn, also inflate the average wealth relative across the years. More robust techniques could include using median returns or applying trimming or winsorizing to the data in order to mitigate potential skewness caused by extreme outliers.

3.2 Model estimation

As mentioned in the methodology section, the models are estimated using a general-to-specific approach, which ensures that the final model specifications are well-suited to the data. This allows for the initial inclusion of a broad selection of independent variables, which are then systematically reduced based on statistical significance, economic relevance, and overall model fit. This approach guards against potential overfitting and enhances the interpretability of the results. The following sections detail the model estimations before moving into hypothesis testing and model diagnostics.

3.2.1 Pooled OLS models

First, the pooled OLS models are estimated to give initial patterns and coefficient magnitudes. After the pooled OLS model is presented, a fixed effects model estimation is performed and analyzed. The regression output presented in table 3.7 summarizes the pooled OLS model outputs across the 1-year, 3-year, and 5-year return periods and includes only the variables that add value to the regression. The identification of the inclusion of the variables is based on a stepwise regression procedure and removes predictors based on the Akaike Information Criterion *AIC*. The initial model included all the independent variables described in section 2.2.2, where each variable was added or removed one at a time only to retain changes if it led to a reduction in the overall AIC.

Across the three OLS models, some patterns emerge. The issue dummy consistently has a negative coefficient estimate that grows in magnitude as the period for the dependent variable increases. However, it is not statistically significant at the 1-year horizon, but becomes strongly significant at the 3- and 5-year marks. This suggests that the short-term effects of rights issues on share returns are modest or

Table 3.7: The Effect of Rights Issues on Buy-and-Hold Returns: Pooled OLS Estimates for Swedish Firms, 2006–2020

	Dependent variable: Buy-and-Hold Return		
	1Y BHR	3Y BHR	5Y BHR
ISSUE	−0.061	−0.324***	−0.473***
	(0.045)	(0.091)	(0.118)
MVE		0.052**	0.099***
		(0.024)	(0.031)
B/M			0.217**
			(0.090)
6M_MOM	0.033***	0.053***	0.102***
	(0.005)	(0.011)	(0.014)
OMX	0.727***	0.766***	0.690***
	(0.157)	(0.232)	(0.236)
Constant	−0.027	−0.146	−0.634***
	(0.035)	(0.157)	(0.233)
Observations	1,730	1,730	1,730
R^2	0.063	0.051	0.095
Adjusted R^2	0.060	0.047	0.090
Residual Std. Error	0.701 (df = 961)	1.415 (df = 960)	1.820 (df = 959)
F Statistic	21.515*** (df = 3; 961)	12.998*** (df = 4; 960)	20.074*** (df = 5; 959)

Note: *p<0.1; **p<0.05; ***p<0.01

Model specification: The table reports pooled OLS regressions of 1-, 3-, and 5-year buy-and-hold returns (BHRs) as the dependent variable. The key independent variable, *ISSUE*, is a dummy equal to 1 if the firm conducted a rights issue, and 0 otherwise. Control variables include the natural logarithm of market value of equity (*MVE*), the book-to-market ratio (*B/M*), 6-month pre-announcement momentum (*6M_MOM*), and OMXS30 index returns over the post-issue horizon (*OMX*). All financial data for the independent variables are derived from the latest quarterly report available 10 days before the start date. No fixed effects are included in these models, but they will be re-estimated with firm and year fixed effects.

noisy, and no significant conclusions can be drawn for the 1 year period. Nevertheless, the estimates indicate a significant underperformance that materializes over the long term for companies that conduct rights issues. With coefficient estimates of -0.324 and -0.473 for the 3- and 5-year periods, respectively, translating into approximately 32% and 47% lower returns than matching non-issuers, this indication of potentially lower returns is remarkable. The results remain robust even when controlling for other variables such as firm size, valuation metrics, share price momentum, and underlying market trends, implying that the act of issuing equity could inherently be associated with lower long-term returns.

The firm-level characteristics included in the model (size, and book-to-market) show increasingly important roles at longer time horizons. The size factor plays an important role in the 3-year and 5-year returns and is significant in both cases. The coefficient estimates indicate that larger firms have better long-term returns than smaller firms. The book-to-market estimate is only significant in the 5-year regression, where higher B/M (value firms) significantly outperform lower B/M (growth firms). In the 1-year model, neither size nor B/M was significant and thus excluded from the model specifications following the general-to-specific model approach. This suggests the existence of a value premium and the disadvantage of being a small firm when issuing new equity through right.

The momentum factor, *6M_MOM*, is consistent and strong across all three models. The coefficients roughly double from the 1-year to the 5-year horizons (0.033 to 0.102) while remaining highly significant across all periods. This indicates that pre-issue stock performance is a robust predictor of post-issue returns, even several years ahead. One explanation for the importance of the momentum factor is that recent momentum may capture aspects of company performance that persist, i.e., a company doing well tends to continue doing well due to operational momentum or sustained investor enthusiasm.

The last significant variable is the market return, represented by the OMXS30 index return. The coefficient estimates are all positive and significant, which confirms that a large portion of firm-specific long-term stock returns is influenced by overall market performance during the relevant period. The inclusion of these market variables helps clearly distinguish market-driven returns from idiosyncratic performance. Furthermore, these variables contribute significantly to model fit—without them, the R^2 would likely be even lower.

3.2.2 Fixed effects OLS models

Now that the pooled OLS model is estimated, this next section will dig a step further and estimate the three fixed effects models to address potential unobserved heterogeneity across the firms. In addition to firm fixed effects, time fixed effects will also be included to control for unobserved factors that vary over time but affect

all firms equally, such as macroeconomic conditions, regulatory changes, or market-wide shocks. By controlling for time-invariant firm-specific characteristics, the fixed effects specifications allow for better isolation within the firm variation as they offer a more robust identification of the relationship between the decision to issue new equity and the subsequent long-term stock performance. The motivation for estimating fixed effects models is to mitigate omitted variable bias arising from unobservable firm-specific characteristics that are constant over time but may influence both long-term returns and the likelihood of conducting a rights issue.

The three regressions are estimated with the same specifications as the pooled OLS models. Table 3.8 below summarizes the FE OLS model outputs across the 1-year, 3-year ,and 5-year return period:

Table 3.8: The Long-Run Performance of Rights-Issuing Firms: Firm and Year Fixed Effects Estimates, 2006–2020

	Dependent variable:		
	1Y BHR	3Y BHR	5Y BHR
ISSUE	−0.047	−0.241***	−0.439***
	(0.041)	(0.083)	(0.141)
MVE		0.050*	0.130**
		(0.030)	(0.051)
B/M			0.065
			(0.091)
6M_MOM	0.043***	0.094***	0.142***
	(0.007)	(0.015)	(0.025)
OMX	0.672	0.552	0.547
	(0.840)	(1.185)	(1.903)
Observations	1,730	1,730	1,730
R^2	0.035	0.052	0.049
F Statistic	12.358*** (df = 3; 1025)	13.919*** (df = 4; 1024)	10.679*** (df = 5; 1023)

Note: *p<0.1; **p<0.05; ***p<0.01

Model specification: This table reports results from firm- and year-fixed effects regressions of 1-, 3-, and 5-year buy-and-hold returns (BHRs) on the indicator variable *ISSUE*, which equals 1 if the firm conducted a rights issue, and 0 otherwise. Control variables include the natural logarithm of market value of equity (*MVE*), the book-to-market ratio (*B/M*), pre-announcement 6-month momentum (*6M_MOM*), and OMXS30 index returns over the respective return horizon (*OMX*). All accounting data are derived from the latest available quarterly report 10 days before the announcement date. The model includes firm and year fixed effects to account for unobserved heterogeneity.

1-year BHR

The 1-year return regression model includes three variables. The issue dummy, momentum, and OMX market return as predictors. The issuing dummy coefficient estimate is -0.047, but not statistically significant at convincing levels. Economically, this estimate implies that on average, a firm's one-year BHR is 4.7% points lower compared to non-issuers in the following year. As this estimate is modest and insignificant, there is no evidence of short-term underperformance associated with rights issue share insurance.

The momentum variable has a positive coefficient of 0.043 and is highly significant. This indicates that firms with high stock returns in the 6 months leading up to the announcement of the rights issue (or matching start date for control firms) tend to continue the positive trend and the variable acts as a reliable predictor for the 1-year return. To put this estimate into context and perspective, it translates to a 10% increase in the pre-period return is associated with 0.43% higher 1-year BHR, everything else being equal. Even though this might seem like a small effect in absolute terms, it is economically meaningful in the context of 1-year returns. Over a longer investment horizon, modest improvements in return performance can compound substantially, making momentum an important factor for investors assessing post-issue outcomes.

The last variable for the 1-year model is the OMX market return. This coefficient on the market's return over the same one-year period as each firm in the sample is 0.672 but not significant. The interpretation of this estimate would be that a 10% increase in the return of the index translates into a 6.72% increase in the firm's 1-year returns. This variable reflects the fact that a large portion of any individual firm's return is driven by the overall market conditions. However, the estimate is not statistically significant in this specification, weakening the case for controlling market movements when explaining one-year stock returns.

The lack of significant coefficient estimates for the issue dummy in the 1-year model suggests no effect on the return in the short term. This result echoes findings that short-term underperformance is limited, where most studies conclude a much

stronger underperformance over longer periods. When a company conducts a rights issue, it usually aims to raise capital for approximately 12 months of runway. This implies that after the finalization of the issue, the firms are often financially set and stable for about a year. This may have relaxing effects on the market perception of the firm and its financial situation. In turn, investors may be less worried about the company and deem it less risky and hence less eager to sell the share or potentially even buy more with the expectation that the business is now funded and operational investments should yield a great return on investment *ROI*.

3-year BHR

For the 3-year model, the variables included the issue dummy, market value of equity, momentum, and OMX market return as the independent variables.

The main variable of interest, the issuing dummy, is estimated to have a coefficient of -0.241 and is highly significant, as opposed to the 1-year model. This estimate indicates that when a firm conducts a rights issue, its three-year return is, on average, about 24.1% lower than non-issuing matching firms in that same period, holding other factors constant. This indicates the potential for a significant underperformance and is economically very interesting. For instance, if a non-issuing firm averaged a 10% yearly return for 3 years, i.e., 30% total return, the issuing firm should expect only 5.9% over the three years following the rights issue. The significance of this coefficient estimate further indicates the potential existence of an issuing effect, and firms conducting rights issues are associated with lower returns in the 3 years following the announcement. In this fixed-effects context, this is a within-firm comparison, which implies that the lower returns are not due to permanent firm characteristics but rather related to the act of the issue itself. In summary, this model suggests that, by the three-year mark, issuers significantly lag their matching non-issuers, indicating a negative post-issue effect on stock prices.

For the size factor, the coefficient is 0.050 and is statistically significant. The positive estimate suggests that when a firm's market capitalization is higher, it tends to experience better 3-year returns. A one-unit increase in the log of MVE (approx. 2.7x increase in market cap) is associated with a 5.0% higher return in the

3 years. In essence, this estimate suggests that smaller firms underperform and could reflect the lower risk associated with larger firms in this part of the market. This finding is somewhat opposite to the general understanding of sizing effects on stock returns, where the established consensus is that there is a size premium in smaller firms, which tend to outperform large firms. One explanation for this difference is that this sample is highly overrepresented by small firms, as few very large firms raise equity through rights issues. With a median firm size of approximately SEK 25 million, the underperformance of smaller firms is likely explained by the increased risk and higher chance of bankruptcy, influencing the investor appetite.

The momentum variable also proves significant explanatory power in the 3-year model. With a coefficient estimate of 0.094, the results indicate a positive relationship between 6-month momentum and the 3-year buy-and-hold return. Specifically, a 1-percentage point increase in the 6-month pre-announcement return is associated with a 0.094 percentage point increase in the 3-year return. This suggests that firms with strong momentum going into the measurement period tend to continue the positive trend over the following 36 months. This result is somewhat surprising, as classical momentum studies find that the momentum factor disappears after 12 months.

The OMX variable coefficient of 0.552 is not statistically significant and indicates a weaker role for the overall market return in explaining firm-level variation over the 3-year period.

The fact that this indication of underperformance emerges in a fixed-effects model means it's not just the influence of poor-performing firms choosing to issue; rather, even firms that might normally do fine experience a return shortfall in the window following the announcement of a rights issue. For the 5-year model, we will see that this association of lower returns of issuing firms persists and deepens, which is consistent with many studies on long-run post-issuance performance.

5-year BHR

The last model is estimated with the 5-year buy-hold-return as the dependent variable. This model includes a total of 5 independent variables: Issue dummy, market

value of equity, book-to-market ratio, momentum, and the OMX market return. This longest-horizon regression captures the long-term performance differences in firms that conduct rights issues and those that do not. The issue dummy estimate is -0.439 and is highly statistically significant. This indicates that firms conducting equity issuance with rights are associated with a 43.9% lower five-year return relative to their non-issuing matched firms. This is an enormous economic effect and would, for perspective, mean that if a firm had earned a 50% return over the 5 years, a similar firm that issued equity would return roughly 6.1% over the same five years, all else being equal. The high statistical significance (significant at the 0.1% level) reinforces that this result is not just due to random chance. Within-firm, over five-year spans, issuing equity with rights appears to be associated with weak stock returns. This finding confirms the pattern observed at the 3-year post-issue performance and worsens by year 5. The magnitude is approximately the same as the estimated in the pooled OLS model that was estimated initially, hinting that once controlling for firm-specific differences, the decision to conduct a rights issue is very detrimental for a 5-year horizon.

In the 5-year BHR model, the size factor shows an important role with a coefficient estimate of 0.130 and a convincing p-value. This implies that when the firm's size, measured as market capitalization, is larger, it correlates with a higher 5-year return. A one-unit increase in the log MVE is associated with about an 13% increase in the 5-year return. This positive effect was also found in the 3-year model but is even more prominent in this 5-year horizon. Essentially, this finding suggests that smaller firms tend to underperform more severely in the long run. In the context of SEOs, this finding is aligned with several studies, including Huang et al. (2014), who also reports that size is inversely related to post-SEO performance, potentially due to small firms being more prone to overvaluation or having riskier prospects (Huang et al., 2014).

In the pooled OLS model, a higher Book-to-market ratio was associated with significantly higher returns. This suggested that growth firms represented by low book-to-market ratios underperformed value firms in the long run, consistent with the well-known value premium. In this FE model, the book-to-market is no longer

statistically significant. This discrepancy indicates that the earlier relation was purely cross-sectional, i.e., firms that are generally "value" firms did better than "growth" firms. When comparing a firm to itself over time, variations in the book-to-market don't predict return differences. In plain terms, this finding indicates that underperformance cannot be attributed to a within-firm shift to a lower book-to-market.

The persistence of momentum's significance in the fixed effects model for the 5-year BHR means this is not just a selection artifact – even within the same firm, if it has a price surge, the following returns tend to be higher than if it hadn't. The estimated coefficient of 0.142 suggests that a one-unit increase (corresponding to 100%) in the 6-month return before the rights issue is associated with a 14.2% higher return over five years, revealing surprisingly important insights. One interpretation in the context of SEOs is that companies that were doing well before the issue due to strong fundamentals, continue to outperform their peers in absolute terms over five years, despite the general underperformance trend for issuers. One might have expected momentum to reverse over the 3-5 years, but the regression results show no evidence of a reversal in the share price of companies that have performed well. Momentum remains a positive predictor even at the 5-year horizon. The control for momentum is important because many SEO studies find that issuers have abnormal run-ups before the announcement of the issue.

The coefficient on the 5-year market return is 0.547, but not statistically significant. The impact on the general market trend is not a reliable predictor for the 5-year BHR in this sample. A possible explanation for this change could be that the performance of a stock relative to the market can diverge substantially due to individual firm-specific factors such as strategy and investments.

The issue dummy estimate of -0.439 in the 5-year model serves as a strong indication of the potential existence of a long-run underperformance associated with companies conducting rights issues. This underscores that the performance gap widens over time. Already after 5 years post issue, the issuing firms have dramatically lagged their matched non-issuers by losing more than 43% in relative terms over five years. This finding is aligned with some of the largest and most prominent studies

on issue underperformance. Importantly, the long-run underperformance remains statistically significant even after controlling for factors such as size and valuation, suggesting the underperformance is not fully explained by these traditional factors. In sum, the issue event strongly indicates a pronounced and long-term underperformance in share price returns.

Before proceeding to hypothesis testing, a specification test is conducted to determine whether the fixed effects or random effects model is more appropriate for this dataset. This is done by running the Hausman test on both a Fixed Effect model and a Random Effects model. Table 3.9 showcases the result of the Hausman test for the 5-year model. The null hypothesis assumes the random effects model is appropriate. As per table 3.9, the low p-value allows for rejecting the null, which indicates the need for an FE model. The Hausman test for 1-year and 3-year models is reported in the appendix.

Table 3.9: Hausman Test for Model Consistency (5Y BHR)

Model	**Test Statistic (χ^2)**	**Degrees of Freedom**	**p-value**
5Y BHR	88.696	5	$< 2.2 \times 10^{-16}$

Note: The Hausman test compares the consistency of the random effects estimator with that of the fixed effects estimator. The null hypothesis is that the difference in coefficients is not systematic, implying the random effects model is consistent and efficient. The alternative hypothesis is that the random effects estimator is inconsistent. A highly significant test statistic ($p < 0.01$) leads to rejection of the null, supporting the use of fixed effects. The result shown indicates that the fixed effects model is preferred for explaining variation in 5-year buy-and-hold returns. Hausman tests for 1-year and 3-year models are reported in the appendix.

3.3 Hypothesis testing

As the models have been estimated for the 1-year, 3-year, and 5-year returns, it is now time to test the hypothesis of this thesis. Since the primary focus is to examine the existence of an issue effect in the Swedish stock market for companies conducting rights issues, this is tested using a linear hypothesis. Under the null hypothesis, the effect of the rights issue on the long-term returns of the company is 0, i.e., no underperformance. Under the alternative, the *ISSUE* coefficient is different from 0, and the direction and magnitude would be derived from the OLS estimations. Recalling that the hypothesis is:

H1: Firms conducting rights issues exhibit long-term stock returns that significantly differ from those of comparable non-issuing firms.

Table 3.10: Hypothesis Test for the *ISSUE* Coefficient in Fixed Effects Models

Model	Null Hypothesis	Test Stat (χ^2)	Residual DF	p-value
1Y BHR	$\beta_{\text{ISSUE}} = 0$	1.3179	1025	0.251
3Y BHR	$\beta_{\text{ISSUE}} = 0$	8.5398	1025	0.0035**
5Y BHR	$\beta_{\text{ISSUE}} = 0$	9.7546	1023	0.0018**

Note: This table reports Wald tests for the null hypothesis that the *ISSUE* coefficient is equal to zero in fixed effects regressions of 1-, 3-, and 5-year buy-and-hold returns. The test evaluates whether conducting a rights issue has a statistically significant effect on long-run performance. *p<0.05; **p<0.01; ***p<0.001.

The hypothesis test results confirm the pattern observed in the regression results. As indicated by the p-values, the hypothesis testing shows that the ISSUE coefficient is statistically insignificant for the 1-year horizon, suggesting no short-term underperformance following a rights issue. However, for the 3-year and 5-year horizons, the coefficient for the test becomes statistically significant at the 5% and 1% levels, respectively. This allows for the rejection of the null hypothesis and indicates that the issuing effect is not 0. This pattern supports the hypothesis that firms conducting rights issues are associated with lower returns in the long run, consistent with the existence of an issue effect in the Swedish stock market.

3.4 Diagnostics

As mentioned in the methodology section, a number of diagnostic tests are applied to the OLS model to check for the potential violation of important assumptions. The importance of testing and detecting violations of key assumptions is an important step in econometrics in order to obtain unbiased results. First, an assessment of the presence of multicollinearity is conducted. This is done using a VIF test.

The VIF values are presented in table 3.11 and support the indication of multicollinearity not being a concern in the models. All VIF values are close to 1 and well below the common threshold of 10, which is typically used as a rule of thumb for identifying problematic levels of multicollinearity. This indicates that the independent variables included in each model are not highly linearly correlated with

Table 3.11: Variance Inflation Factors (VIF) for Each Model

Variable	1Y BHR	3Y BHR	5Y BHR
ISSUE	1.0005	1.0003	1.0101
MVE		1.0050	1.0070
B/M			1.0205
6M_MOM	1.0014	1.0015	1.0016
1Y_OMX	1.0014		
3Y_OMX		1.0040	
5Y_OMX			1.0050

Note: This table reports variance inflation factors (VIF) for all independent variables included in the 1-, 3-, and 5-year buy-and-hold return regressions. VIF values assess the degree of multicollinearity among regressors. Values close to 1 indicate negligible multicollinearity, confirming that multicollinearity is not a concern in any of the model specifications.

one another. These findings suggest that the estimated coefficients are unlikely to be biased due to multicollinearity.

Moving to the test for normality and heteroskedasticity in the model residuals, a Jarque-Bera test and a Breusch-Pagan test are conducted. The results of the Jarque-Bera test are presented in table 3.12 and indicate that the residuals from all three OLS models deviate significantly from a normal distribution. With all test statistics being extremely large, leading to very low p-values well below the conventional level of 0.05, this indicates that the tests are reliable and suggests strong evidence for rejection of the null hypothesis of normally distributed residuals. Hence, the tests indicates that the residuals exhibit non-normal behavior across all models.

Table 3.12: Jarque-Bera Test for Normality of Residuals

Model	Test Statistic (χ^2)	Degrees of Freedom	p-value
1Y BHR	7,175.8	2	$< 2.2 \times 10^{-16}$
3Y BHR	16,390	2	$< 2.2 \times 10^{-16}$
5Y BHR	339,649	2	$< 2.2 \times 10^{-16}$

Note: This table reports results from the Jarque-Bera test for normality of residuals from fixed effects regressions of 1-, 3-, and 5-year buy-and-hold returns. The null hypothesis is that the residuals are normally distributed. Large test statistics and highly significant p-values indicate strong rejection of normality, suggesting that residuals deviate substantially from a normal distribution.

Similar results are found in the test results of the BG test presented in table 3.13.

In essence, the BG tests whether the variance of the model residuals is constant or varies with the level of explanatory variables. Again, the test statistics are highly significant with all associated p-values well below the 0.05 level. These results allow for rejection of the null hypothesis of homoskedasticity, indicating the existence of heteroskedasticity in all models. As both of these tests the violation of key OLS assumptions, it is important to be aware of the impact this may have on the validity of inference, including confidence intervals and hypothesis testing, as standard errors may be biased, potentially leading to incorrect conclusions about the significance of significance of explanatory variables. To address these issues, robust standard errors are applied to the model to account for the. Therefore, the models are re-estimated with robust errors to base reliable inference and conclusions upon.

Table 3.13: Breusch-Pagan Test for Heteroskedasticity (1Y, 3Y, and 5Y BHR)

Model	**BP Statistic**	**Degrees of Freedom**	**p-value**
1Y BHR	486.85	3	$< 2.2 \times 10^{-16}$
3Y BHR	1845.9	4	$< 2.2 \times 10^{-16}$
5Y BHR	548.71	5	$< 2.2 \times 10^{-16}$

Note: This table presents Breusch-Pagan test results for heteroskedasticity in the residuals of fixed effects regressions for 1-, 3-, and 5-year buy-and-hold returns (BHR). The null hypothesis assumes homoskedasticity, while the alternative implies heteroskedasticity. Highly significant test statistics indicate rejection of the null hypothesis, suggesting the presence of heteroskedasticity. All subsequent regressions use heteroskedasticity-robust standard errors.

3.5 Robust Inference and Hypothesis Re-testing

As mentioned in the methodology section on diagnostics, econometric analyses such as OLS depend on a set of assumptions in order to produce valid and reliable inference. The diagnostics tests presented in section 3.4 reveal notable violations of key assumptions, including heteroskedasticity and non-normal residuals. This chapter revisits the FE regression results using heteroskedasticity-consistent and robust standard errors. This is done to assess whether the statistical significance of the explanatory variables holds when robust standard errors are applied.

Table 3.14 reports the fixed effects regression models using robust standard errors. As expected, coefficient estimates remain unchanged since the model is not re-estimated. The differences lie in the estimated standard errors and, consequently,

the statistical significance of the variables. A few notable changes happened in terms of the statistical significance of the estimates. The coefficient estimate for the momentum variable in the 3-year model loses its statistical significance under robust standard errors and is no longer a reliable predictor for the 3-year performance of the company return. At the same time, the coefficient estimate for the *MVE* variable in the 3-year model also loses its statistical significance and is no longer statistically different from zero. In the 1-year model, the momentum variable weakens and becomes only marginally significant at the 10% level. For the 5-year model, the *MVE* estimate becomes statistically significant at the 5% level, and the *6M_MOM* variable remains significant but at a lower confidence level than before. The significance of the estimates concerning the issue dummy remains unchanged and stable, indicating that the conclusions of the long-term underperformance of companies conducting rights issues remain unchanged and are robust in a model with robust standard errors.

In addition to the robust coefficient inferences, the hypothesis of the thesis is retested using heteroskedasticity-consistent standard errors. Recalling from table 3.10 that the hypothesis with the non-robust standard errors indicated the rejection of the null, i.e., the indication of an issuing effect on long-term returns. As per table 3.15, the test statistics and in turn the p-values differ slightly from the original hypothesis test. In the 1-year model, the hypothesis test result is virtually identical, where the p-value remains high and non-significant. For the 3-year model, the p-values change slightly from 0.0287 to 0.0018, but the null hypothesis is still rejected at the 5 percent level. In the 5-year model, the p-value shifts from 0.0024 to 4.68e−05, leading to the same conclusion of rejecting the null at the 1 percent level.

Overall, the re-testing confirms the robustness of the main findings. The statistical significance of the issue dummy coefficient remains the same under robust inference, with only minor adjustments to the test statistics and p-values. This provides further support for the conclusion that rights issues are associated with negative long-term stock performance, particularly over the 3- and 5-year horizons.

Table 3.14: Buy-and-Hold Returns Following Rights Issues: Robust Fixed Effects Regression Results, 2006–2020

	Dependent variable:		
	1Y BHR	3Y BHR	5Y BHR
ISSUE	−0.047	−0.241***	−0.439***
	(0.040)	(0.077)	(0.108)
MVE		0.049	0.130**
		(0.033)	(0.042)
B/M			0.065
			(0.091)
6M_MOM	0.043*	0.094	0.142**
	(0.022)	(0.048)	(0.057)
OMX	0.672	0.552	0.547
	(0.687)	(1.231)	(1.902)
Observations	1,730	1,730	1,730
R^2	0.035	0.052	0.049
F Statistic	12.358*** (df = 3; 1025)	13.919*** (df = 4; 1024)	10.679*** (df = 5; 1023)

Note: *p<0.1; **p<0.05; ***p<0.01

Model specification: This table reports results from firm- and year-fixed effects regressions of 1-, 3-, and 5-year buy-and-hold returns (BHRs) with robust standard errors on the indicator variable *ISSUE*, which equals 1 if the firm conducted a rights issue, and 0 otherwise. Control variables include the natural logarithm of market value of equity (*MVE*), the book-to-market ratio (*B/M*), pre-announcement 6-month momentum (*6M_MOM*), and OMXS30 index returns over the respective return horizon (*OMX*). All accounting data are derived from the latest available quarterly report 10 days before the announcement date. The model includes firm and year fixed effects to account for unobserved heterogeneity. Standard errors are heteroskedasticity-robust.

Table 3.15: Hypothesis Test for the *ISSUE* Coefficient Using Robust Standard Errors

Model	**Null Hypothesis**	**Test Stat (χ^2)**	**Residual DF**	**p-value**
1Y BHR	$\beta_{\text{ISSUE}} = 0$	1.3971	1025	0.2372
3Y BHR	$\beta_{\text{ISSUE}} = 0$	9.8397	1024	0.0018**
5Y BHR	$\beta_{\text{ISSUE}} = 0$	16.5750	1023	4.68e−05***

Note: This table reports Wald tests of the null hypothesis that the *ISSUE* coefficient is equal to zero in fixed effects regressions of 1-, 3-, and 5-year buy-and-hold returns (BHRs). The tests are based on heteroskedasticity-robust standard errors and assess whether conducting a rights issue has a statistically significant effect on long-run stock performance. *p<0.05; **p<0.01; ***p<0.001.

Discussion

The regression results for rights issues conducted in Sweden from 2006-2020 underscore the existence of a long-term underperformance phenomenon following rights issues in the subsequent 3 and 5 years, in line with historical global evidence. The economic impact of the issue dummy variable is substantial, highlighting that investors deciding to hold the stock of the issung firm will likely suffer substantial relative losses in the following years.

In summary, the results of this analysis strongly align with the existing literature's conclusions on SEOs in general. The magnitude of the underperformance found in this study of approximately -20% to -45% over 3–5-year horizons, is consistent with the findings reported in seminal studies. Spiess and Affleck-Graves (1995) documents how U.S. firms issuing new stock between 1975 and 1989 were subject to an average abnormal return of -23.15% over the first three years following the issue and -17.51% over five years, even after adjusting for size and book-to-market ratio. Loughran and Ritter (1995) found similar results of an underperformance of issuers of approximately 30% over a 5-year period.

This study also confirmed some of the other drivers identified in prior work: smaller firms with high valuations are most prone to underperformance, consistent with Brav et al. (2000). Furthermore, the fact that the momentum variable was a key factor is consistent with numerous articles, e.g., the market timing hypothesis of Lucas and McDonald (1990) and empirical evidence in Ritter (1991) for IPOs, extended to SEOs by these later studies.

By using fixed-effect models, this analysis adds evidence that underperformance is not just due to weak firms choosing to issue stock. After accounting for a firm's time-

invariant characteristics, the equity issuance marks a period of worse performance for that stock. This finding leads to interesting discussions regarding the explanations for the underperformance and may be attributed to behavioral explanations like investor optimism or market timing. Furthermore, managers may take advantage of high share prices and issue stock when the price is overvalued.

The reasons for the underperformance may be manifold and are not established in the literature; hence, the phenomenon is popularly referred to as the issue puzzle. One widely cited explanation is that the issues are conducted at times when the company stock is overvalued. In essence, managers are often believed to have better and more detailed information than the market. This information asymmetry may include data that significantly changes the intrinsic value of the firms, and managers may time the capital raises to exploit the inflated valuations. This hypothesis posits that firms strategically issue stock when valuations are high, locking in favourable issue terms, which in turn raises the most amount of money for the company. As share prices typically revert to reasonable and fair valuations, assuming an efficient market, this leads to disappointing long-term returns, consistent with the findings that the underperformance effect grows in magnitude as time passes.

A second explanation for the issue of underperformance may lie in the nature of companies raising new equity and the idiosyncratic risk associated with them. Equity raises are often divided into defensive and aggressive issues. The distinction between the two is related to the motivation behind the issue and, in turn, the use of proceeds. A defensive issue is often conducted to clean out the balance sheet, i.e., refinance debt or prevent insolvency. In an aggressive issue, the proceeds from the capital raise often go towards growth initiatives, including strategic investments or M&A activities. Defensive issues often signal elevated risk, and from an investor's point of view, you would rather have your newly invested money go towards explanation and growth rather than refinancing outstanding debt. This may lead to lower participation, and if the rights issue is unsuccessful, defined as a low number of shares being subscribed for, the company's financing options may be exhausted, and it is unlikely to survive due to obligations that are difficult to meet. This could be an argument and explanation for the long-term underperformance of issuing firms.

If the company conducts an unsuccessful issue, they are more likely to go bankrupt as it can't finance the business.

This leads to a broader question and discussion: are rights issues inherently value-destroying rather than thanvalue-creatingg for shareholders? Of course, the answer is nuanced, but due to the nature of rights issues, they give the existing shareholders the opportunity to retain their ownership share of the company to avoid dilution. In reality, this is not always the case as rights issues rarely are subscribed to 100% by just the shareholders. This means that the existing investors are subject to both dilution and long-term underperformance. However, it must be acknowledged that raising capital through rights issues sometimes is the only viable option, particularly for firms with high leverage. In such cases, rights issues are often the only option the company has to survive and maintain its operations. On one side, rights issues may appear value-destroying due to discounted subscription prices, dilution effects, and long-term underperformance, but in some cases, the alternative is that the company files for bankruptcy.

Another potential explanation could be anchored in behavioral finance. There may be a systematic overreaction to the announcement of rights issues due to the dilution, financial distress, or the lack of other funding options. The overreaction may add pressure to the stock price beyond what the fundamental impact of the issue may justify. Additionally, elements of loss aversion may lead existing shareholders to avoid participating in the rights issue or to sell their shares instead, which can contribute to lower returns.

In sum, the results from this study, together with existing literature, indicate that equity issuance is a high-stakes corporate event. For firms, it is often the last resort and a way to recapitalize and avoid insolvency. For investors, it may signal risk, dilution, and negative long-term returns. The long-term underperformance has important implications for investment decision-making and corporate finance strategies. Despite the non-dilute nature of rights issues, the evidence suggests that participating in rights issues is not value-enhancing. Therefore, investors should be cautious when assessing potential investment opportunities. Furthermore, in the investment decision process, investors should carefully assess the chances of a

company needing to conduct a rights issue in the future, as this event likely will lead to lower returns.

For corporate managers, the underperformance of the share price after a rights issue also raises considerations. Managers should recognize that conducting a rights issue may be perceived negatively by the market, especially if the issue is defensive. In order to mitigate adverse market reactions, the announcement of the rights issue should come together with a clear and transparent communication about the motivation and long-term value creation plans. Furthermore, the issue should provide the investors with confidence that the business is financed for a while and does not need to seek financing solutions again shortly. Lastly, the results of this thesis highlight the need for robust disclosure requirements and transparency regulations when issuing new stock through rights. An enhanced quality and standardization of the information requirements for the issue prospectus on information such as use of proceeds would add information that allows investors to make more informed decisions and more carefully asses the level of risk associated with the investment.

Conclusion

This thesis set out to examine whether companies conducting rights issues on the Swedish stock market experienced long-term underperformance in the share price returns. As most existing papers analyzed SEOs in general, this research sheds new light on rights issues in particular. By analyzing a comprehensive sample of 865 rights issues distributed across 14 years, it provides the most extensive empirical investigation within the Swedish market to date. Analyzed with a fixed effects panel regression model and robust inference techniques, this study concludes clear evidence that rights issues are associated with statistically significant and economically meaningful underperformance over long-term horizons.

Recalling that the research question of this thesis is:

Do companies conducting rights issues on the Swedish stock market experience long-term underperformance in share price returns?

The empirical analysis provides a clear answer to the research question that firms that issue new equity through rights significantly underperform non-issuing firms over the three- and five-year horizon. No statistically significant underperformance was found in the 1 year. Furthermore, the magnitude of the underperformance gets more pronounced with time. On average, the underperformance is 24.1% in the first 3 years following the rights issues and 43.9% in the 5-year horizon. These results are robust under both conventional and robust standard error specifications, which confirms the reliability of the observed underperformance. Furthermore, the underperformance remains significant in the 3-year and 5-year periods after controlling for firm characteristics such as firm size, valuation, profitability, leverage, and market returns.

The findings and conclusion of this thesis align with a significant portion of international literature on SEOs, including key studies by Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995), who initially documented the long-term underperformance of issuing firms in the U.S. In Sweden, where rights issues are a popular choice of equity financing, the observed underperformance appears even more substantial than when analyzing SEOs as a combined category.

The reasons behind the issue of underperformance may be grounded in several mechanisms. In academia, speculations are that an element of information asymmetry may cause managers to issue equity when the market valuations are higher than the intrinsic value of the company. Incentivized by the possibility to raise as much money as possible, firms may time the issue to take advantage of inflated market valuations, which in turn leads to lower long-term performance as the share price converges. Another explanation may lie in the companies that issue. Perhaps these are firms that were unable to secure debt financing or attract strategic investors willing to take part in a private placement. In these cases, the financing options are limited for the firms, and a deeply discounted rights issue may be the only viable solution to secure the financing needs.

From an investor's standpoint, these findings provide important insights into the decision-making process when considering investing in a company that recently conducted a rights issue. Furthermore, it suggests caution when holding shares of a firm that is undergoing a rights issue. The significant underperformance indicates that investments in such a company have a high chance of poor returns.

5.1 Limitations and further research

While this thesis provides strong empirical evidence of long-term underperformance for firms conducting rights issues in Sweden in the years 2006-2020, several limitations of the research design and study methodology should be acknowledged. Furthermore, the conclusions of the theses raises several interesting questions that would be interesting to shed light on in further research. The first limitation of this study revolves around the matching procedure of the control group. When gathering

the matching firms for the issuing companies, the approach was one-dimensional as it was based solely on a market capitalization criterion. Although the market capitalization is an accepted proxy for firm size and is frequently used in academia, it does not capture other essential firm characteristics that may also influence long-term returns. Ideally, the matching control group should consist of firms operating within the same industry as the issuing firm and be matched on financial performance and capital structure.

A second limitation of the research is that all rights issues are treated equally. The motivation for conducting the rights issue is not included in this study but would likely influence the long-term returns. Essentially, rights issues are motivated by either aggressive or defensive factors. It is a fair assumption that the defensive issues are likely conducted by firms that are already financially distressed before issuing the new stock. This would likely lead to even lower long-term returns and should ideally have been included in the study as a simple dummy variable taking the value 1 if defensive an 0 if aggressive: $Motivation_i = \begin{cases} 1 & \text{if firm i conducted a defensive rights issue} \\ 0 & \text{if firm i conducted an aggressive rights issue} \end{cases}$. This distinction would have increased the explanatory power of the model by accounting for heterogeneity in the motivations behind equity issuance.

The results of this research motivate interesting questions for potential further research. In addition to the above-mentioned distinction between aggressive and defensive issues, it would be interesting to further differentiate the long-term returns of issuing firms by exploring potential patterns in the magnitude of the underperformance. For instance, an interesting study could examine the potential relationship between long-term returns and transaction-specific characteristics, such as the subscription rate, the subscription price discount, or the size of the issue relative to the firm's market capitalization at the time of the offering.

As the underperformance is so prominent after 3 and 5 years, it would also be interesting to attempt to empirically explain the drivers of this underperformance. The underlying causes of the lower returns remain unknown. Future research could attempt to isolate the mechanisms behind the underperformance by examining behavioral finance theories such as overreaction, signaling effects, or market timing. Furthermore, it would be interesting to research the possibility of predicting which

firms will raise equity through rights in the future. Given the massive underperformance, it would be beneficial for portfolio constructions and investment assessments to be able to predict if a given firm will likely end up in a rights issue. Investigating patterns in profitability, cash flows, or leverage could potentially provide interesting indicators of future equity issuance and, in turn, long-term returns.

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Appendix

Table A.1: Variable Definitions

Variable Name	**Symbol**	**Variable Definition**
1-year Buy-and-Hold Return	*1Y BHR*	Buy-and-hold return over 12 months from the announcement/start date.
3-year Buy-and-Hold Return	*3Y BHR*	Buy-and-hold return over 36 months from the announcement/start date.
5-year Buy-and-Hold Return	*5Y BHR*	Buy-and-hold return over 60 months from the announcement/start date.
Issuing Dummy	*ISSUE*	Dummy variable equal to 1 if the firm conducted a rights issue, and 0 otherwise (matching firm).
Days Since IPO	*IPO_AGE*	Number of trading days from the firm's IPO to the announcement/start date.
Market Value of Equity	*MVE*	Natural logarithm of market capitalization (price $\times$ shares outstanding), calculated 10 trading days before the announcement.
Book-to-Market Ratio	*B/M*	Book value divided by market value of equity, from the latest quarterly report available 10 days before the announcement.
Net Profit Margin	*NPM*	Net income divided by total sales, from the latest quarterly report available 10 days before the announcement.
EBITDA Margin	*EBITDA_M*	EBITDA divided by total sales, from the latest quarterly report available 10 days before the announcement.
Leverage	*D/E*	Total liabilities divided by total equity, from the latest quarterly report available 10 days before the announcement.
Share Price Momentum	*6M_MOM*	Six-month stock return ending 10 days before the announcement/start date.
Market Return	*OMX*	Cumulative OMXS30 index return over the BHR horizon, starting from the announcement/start date.

Table A.2: Hausman Test for Model Consistency (1Y and 3Y BHR)

Model	**Test Statistic (χ^2)**	**Degrees of Freedom**	**p-value**
1Y BHR	4.6872	3	0.1962
3Y BHR	56.132	4	1.88×10^{-11}

Note: The Hausman test evaluates whether the random effects estimator is consistent by comparing it to the fixed effects estimator. A significant test statistic indicates rejection of the null hypothesis and supports the use of fixed effects.

Table A.3: List of Rights Issues Included in the Study

Nordic LEVEL Group AB, 14-03-2006	Hexagon AB, 15-03-2006	Medcap AB, 30-03-2006
Doro AB, 05-05-2006	Tethys Oil AB, 19-05-2006	Ortivus AB, 19-05-2006
Ortivus AB, 19-05-2006	AFRY AB, 13-06-2006	Cortus Energy AB, 16-08-2006
Nischer Properties AB, 05-09-2006	Catella AB, 06-09-2006	Catella AB, 06-09-2006
Sotkamo Silver AB, 27-09-2006	Corem Property Group AB, 03-10-2006	Fingerprint Cards AB, 04-10-2006
Concejo AB, 11-10-2006	Precise Biometrics AB, 19-10-2006	Image Systems AB, 09-11-2006
Bredband2 i Skandinavien AB, 17-11-2006	Medivir AB, 06-12-2006	Midsona AB, 13-12-2006
Midsona AB, 13-12-2006	Active Biotech AB, 18-12-2006	Neobo Fastigheter AB, 17-01-2007
Sileon AB, 22-02-2007	Transferator AB, 17-04-2007	Suntrade Group AB, 11-05-2007
Sotkamo Silver AB, 31-05-2007	Stille AB, 25-06-2007	SSAB AB, 25-07-2007
SSAB AB, 25-07-2007	Corem Property Group AB, 17-08-2007	Nidhogg Resources Holding AB, 13-09-2007
NGS Group AB, 02-10-2007	CTT Systems AB, 17-10-2007	Impact Coatings AB, 19-10-2007
Gruvaktiebolaget Viscaria, 22-10-2007	Storytel AB, 30-10-2007	Guideline Geo AB, 09-11-2007
Getinge AB, 01-02-2008	Fortnox AB, 22-02-2008	Star Vault AB, 20-03-2008
Binero Group AB, 27-03-2008	Active Biotech AB, 07-04-2008	Tagmaster AB, 30-04-2008
Gruvaktiebolaget Viscaria, 06-05-2008	Novus Group International AB, 14-05-2008	Saxlund Group AB, 14-05-2008
Medimi AB, 22-05-2008	Precomp Solutions AB, 05-06-2008	Sileon AB, 05-06-2008
C-RAD AB, 04-09-2008	Neobo Fastigheter AB, 19-09-2008	Nordic LEVEL Group AB, 20-10-2008
Swedbank AB, 27-10-2008	Getinge AB, 24-11-2008	Consensus Asset Management AB, 24-11-2008
Genovis AB, 19-12-2008	VNV Global AB, 07-01-2009	Sileon AB, 12-01-2009
Gruvaktiebolaget Viscaria, 19-01-2009	Image Systems AB, 23-01-2009	Binero Group AB, 02-02-2009
Guideline Geo AB, 03-02-2009	Skandinaviska Enskilda Banken AB, 05-02-2009	Skandinaviska Enskilda Banken AB, 05-02-2009
Husqvarna AB, 20-02-2009	Husqvarna AB, 20-02-2009	LightAir AB, 27-02-2009
Ellen AB, 27-03-2009	Active Biotech AB, 06-04-2009	EasyFill AB, 07-04-2009
Cortus Energy AB, 17-04-2009	Eniro Group AB, 27-04-2009	Medimi AB, 19-05-2009
Precomp Solutions AB, 27-05-2009	Wonderful Times Group AB, 05-06-2009	K33 AB, 08-06-2009
Vivesto AB, 22-06-2009	Billerud Aktiebolag, 23-07-2009	Gruvaktiebolaget Viscaria, 27-07-2009
Precise Biometrics AB, 30-07-2009	SinterCast AB, 04-08-2009	Bredband2 i Skandinavien AB, 17-08-2009
Swedbank AB, 17-08-2009	Genovis AB, 20-08-2009	Fingerprint Cards AB, 15-09-2009
Rottneros AB, 02-10-2009	Miris Holding AB, 05-10-2009	Guideline Geo AB, 16-10-2009

Note: This table presents all the rights issues included in the study. All issues are sourced from Bloomberg using the *IPO* module.

Table A.4: List of Rights Issues Included in the Study

Sotkamo Silver AB, 03-11-2009	Generic Sweden AB, 05-11-2009	Midsona AB, 06-11-2009
Midsona AB, 06-11-2009	Eolus Vind AB, 11-11-2009	TradeDoubler AB, 17-11-2009
Nischer Properties AB, 01-12-2009	Ellen AB, 22-12-2009	Senzime AB, 23-12-2009
Nordic LEVEL Group AB, 30-12-2009	Gruvaktiebolaget Viscaria, 19-01-2010	C-RAD AB, 25-01-2010
Nidhogg Resources Holding AB, 28-01-2010	Everysport Group AB, 01-02-2010	Dignitana AB, 02-02-2010
Impact Coatings AB, 03-02-2010	LightAir AB, 10-02-2010	Sagax AB, 15-02-2010
Mavshack AB, 24-02-2010	Safe at Sea AB, 24-02-2010	Hansa Biopharma AB, 04-03-2010
Note AB, 08-03-2010	NGS Group AB, 18-03-2010	Mycronic AB, 26-03-2010
Medivir AB, 29-03-2010	ADDvise Group AB, 30-03-2010	Abliva AB, 09-04-2010
Image Systems AB, 16-04-2010	First Hotels AB, 20-04-2010	Cortus Energy AB, 22-04-2010
Free2move Holding AB, 03-05-2010	Nordic Flanges Group AB, 05-05-2010	K33 AB, 10-05-2010
Arctic Minerals AB, 21-05-2010	Auriant Mining AB, 27-05-2010	Saxlund Group AB, 27-05-2010
NFO Drives AB, 27-05-2010	Amnode AB, 17-06-2010	Hexagon AB, 07-07-2010
Elanders AB, 15-08-2010	GRANGEX AB, 18-08-2010	Stockwik Forvaltning AB, 31-08-2010
LightAir AB, 13-09-2010	Sensys Gatso Group AB, 12-10-2010	Botnia Exploration Holding, 13-10-2010
Corem Property Group AB, 15-10-2010	Hexpol AB, 18-10-2010	Vivesto AB, 19-10-2010
Eniro Group AB, 28-10-2010	Dios Fastigheter AB, 01-11-2010	Mysafety Group AB, 01-11-2010
LC-Tec Holding AB, 03-11-2010	Nidhogg Resources Holding AB, 16-11-2010	SensoDetect AB, 04-01-2011
Suntrade Group AB, 04-01-2011	AIK Fotboll AB, 10-01-2011	Senzime AB, 27-01-2011
Image Systems AB, 04-02-2011	Tagmaster AB, 14-02-2011	Star Vault AB, 17-02-2011
Binero Group AB, 28-02-2011	Genovis AB, 07-03-2011	LightAir AB, 16-03-2011
Saxlund Group AB, 21-03-2011	Precise Biometrics AB, 28-03-2011	Swedish Orphan Biovitrum AB, 29-03-2011
Episurf Medical AB, 12-04-2011	Orexo AB, 04-05-2011	Egetis Therapeutics AB, 06-05-2011
Medimi AB, 16-05-2011	Miris Holding AB, 20-05-2011	Micropos Medical AB, 24-05-2011
Nordic LEVEL Group AB, 27-05-2011	Sustainion Group AB, 01-06-2011	Safe at Sea AB, 17-06-2011
Mavshack AB, 23-06-2011	GRANGEX AB, 19-07-2011	Umida Group AB, 07-09-2011
EcoRub AB, 09-09-2011	Northbaze Group AB, 14-09-2011	PharmaLundensis AB, 22-09-2011
Dios Fastigheter AB, 22-09-2011	Viking Supply Ships AB, 05-10-2011	LightAir AB, 07-10-2011
Binero Group AB, 25-10-2011	WntResearch AB, 09-11-2011	Sivers Semiconductors AB, 04-01-2012
Clinical Laserthermia Systems AB, 11-01-2012	Image Systems AB, 12-01-2012	Free2move Holding AB, 16-01-2012

Note: This table presents all the rights issues included in the study. All issues are sourced from Bloomberg using the *IPO* module.

Table A.5: List of Rights Issues Included in the Study

Cloetta AB, 24-01-2012	Star Vault AB, 27-01-2012	Anoto Group AB, 31-01-2012
BioInvent International AB, 14-02-2012	Sensys Gatso Group AB, 24-02-2012	Elekta AB, 05-03-2012
AroCell AB, 12-03-2012	Botnia Exploration Holding, 14-03-2012	Abliva AB, 15-03-2012
iZafe Group AB, 13-04-2012	LightAir AB, 20-04-2012	K33 AB, 24-04-2012
Syncro Group AB, 27-04-2012	Clinical Laserthermia Systems AB, 27-04-2012	Crown Energy AB, 04-05-2012
Kancera AB, 11-05-2012	Enzymatica AB, 16-05-2012	Nidhogg Resources Holding AB, 16-05-2012
Medimi AB, 21-05-2012	Sotkamo Silver AB, 22-05-2012	Ellen AB, 29-05-2012
FormPipe Software AB, 04-06-2012	Sivers Semiconductors AB, 04-07-2012	Suntrade Group AB, 08-08-2012
Precise Biometrics AB, 09-08-2012	Gruvaktiebolaget Viscaria, 28-08-2012	Dignitana AB, 06-09-2012
Nordic LEVEL Group AB, 16-09-2012	Binero Group AB, 28-09-2012	Micropos Medical AB, 04-10-2012
NFO Drives AB, 17-10-2012	Nordic Flanges Group AB, 23-10-2012	Saxlund Group AB, 01-11-2012
Latvian Forest Co AB, 06-11-2012	Vestum AB, 07-11-2012	Billerud Aktiebolag, 29-11-2012
Free2move Holding AB, 23-01-2013	Sivers Semiconductors AB, 24-01-2013	Genovis AB, 19-02-2013
Consensus Asset Management AB, 20-02-2013	SensoDetect AB, 25-02-2013	C-RAD AB, 27-02-2013
Precise Biometrics AB, 22-03-2013	Egetis Therapeutics AB, 03-04-2013	Senzime AB, 15-04-2013
Nelly Group AB, 17-04-2013	Arctic Minerals AB, 19-04-2013	Viking Supply Ships AB, 23-04-2013
Mavshack AB, 24-04-2013	Impact Coatings AB, 15-05-2013	Miris Holding AB, 16-05-2013
Umida Group AB, 27-05-2013	DIAMYD MEDICAL AB, 03-06-2013	Episurf Medical AB, 03-06-2013
Ellen AB, 04-06-2013	Botnia Exploration Holding, 05-06-2013	Westpay AB, 11-06-2013
Bong AB, 17-06-2013	BioInvent International AB, 19-06-2013	Image Systems AB, 28-06-2013
Vestum AB, 28-08-2013	Fastator AB, 20-09-2013	EcoRub AB, 20-09-2013
Gruvaktiebolaget Viscaria, 26-09-2013	Safe at Sea AB, 07-10-2013	Glycorex Transplantation AB, 17-10-2013
Anoto Group AB, 17-10-2013	Micropos Medical AB, 30-10-2013	EasyFill AB, 30-10-2013
Polyplank AB, 04-11-2013	Hexatronic Group AB, 04-11-2013	Genovis AB, 04-11-2013
Sivers Semiconductors AB, 06-11-2013	Binero Group AB, 06-11-2013	Hedera Group AB, 08-11-2013
Cell Impact AB, 08-11-2013	Slottsviken Fastighetsaktiebolag AB, 08-11-2013	LightAir AB, 12-11-2013
Umida Group AB, 13-11-2013	Abliva AB, 20-11-2013	Transferator AB, 20-11-2013
Transferator AB, 20-11-2013	Saxlund Group AB, 02-01-2014	BE Group AB, 20-01-2014
Elanders AB, 27-01-2014	GRANGEX AB, 05-02-2014	Stendorren Fastigheter AB, 11-02-2014
Sotkamo Silver AB, 17-02-2014	Enzymatica AB, 17-02-2014	Sileon AB, 18-02-2014

Note: This table presents all the rights issues included in the study. All issues are sourced from Bloomberg using the *IPO* module.

Table A.6: List of Rights Issues Included in the Study

Obducat AB, 18-02-2014	BioInvent International AB, 24-02-2014	ECOMB AB, 17-03-2014
Latvian Forest Co AB, 19-03-2014	Suntrade Group AB, 20-03-2014	Viking Supply Ships AB, 20-03-2014
Egetis Therapeutics AB, 24-03-2014	WntResearch AB, 28-03-2014	Mendus AB, 02-04-2014
Spago Nanomedical AB, 07-04-2014	Syncro Group AB, 11-04-2014	Guard Therapeutics International AB, 14-04-2014
Profilgruppen AB, 23-04-2014	Kentima Holding AB, 25-04-2014	Free2move Holding AB, 28-04-2014
Vestum AB, 29-04-2014	Prostalund AB, 16-05-2014	Arctic Minerals AB, 16-05-2014
Impact Coatings AB, 20-05-2014	Umida Group AB, 26-05-2014	Online Brands Nordic AB, 05-06-2014
EQL Pharma AB, 23-07-2014	Nordic LEVEL Group AB, 31-07-2014	Binero Group AB, 31-07-2014
Fable Media Group AB, 05-08-2014	Consensus Asset Management AB, 14-08-2014	Consensus Asset Management AB, 14-08-2014
Ellen AB, 25-08-2014	SyntheticMR AB, 29-08-2014	AroCell AB, 29-08-2014
Anoto Group AB, 04-09-2014	Sustainion Group AB, 05-09-2014	Sivers Semiconductors AB, 09-09-2014
Everysport Group AB, 25-09-2014	EcoRub AB, 26-09-2014	Hedera Group AB, 29-09-2014
Miris Holding AB, 14-10-2014	Clinical Laserthermia Systems AB, 20-10-2014	Nelly Group AB, 22-10-2014
Egetis Therapeutics AB, 24-10-2014	Doxa AB, 27-10-2014	Briox AB, 04-11-2014
Active Biotech AB, 05-11-2014	Senzime AB, 07-11-2014	Vivesto AB, 11-11-2014
Umida Group AB, 20-11-2014	Karolinska Development AB, 03-12-2014	EasyFill AB, 12-12-2014
Stockwik Forvaltning AB, 16-12-2014	Dignitana AB, 29-12-2014	GRANGEX AB, 29-12-2014
Serstech AB, 07-01-2015	SensoDetect AB, 09-01-2015	Transferator AB, 09-01-2015
Transferator AB, 09-01-2015	Eniro Group AB, 06-02-2015	Byggnadsbolaget i Norden AB, 10-02-2015
Alteco Medical AB, 11-02-2015	Nordic LEVEL Group AB, 11-02-2015	Micropos Medical AB, 24-02-2015
Hansa Biopharma AB, 24-02-2015	Hexatronic Group AB, 02-03-2015	Nidhogg Resources Holding AB, 03-03-2015
Igrene AB, 04-03-2015	Guard Therapeutics International AB, 12-03-2015	BioInvent International AB, 23-03-2015
Image Systems AB, 27-03-2015	BE Group AB, 07-04-2015	Axichem AB, 08-04-2015
Nicoccino Holding AB, 13-04-2015	Crown Energy AB, 13-04-2015	Tagmaster AB, 27-04-2015
Cortus Energy AB, 29-04-2015	Kancera AB, 29-04-2015	ScandiDos AB, 12-05-2015
Scandinavian Enviro Systems AB, 13-05-2015	Latvian Forest Co AB, 13-05-2015	Mavshack AB, 13-05-2015
Saxlund Group AB, 13-05-2015	Northbaze Group AB, 26-05-2015	Prostalund AB, 03-06-2015
Kentima Holding AB, 05-06-2015	Kakel Max AB, 12-06-2015	Polyplank AB, 15-07-2015
Hanza AB, 21-07-2015	Episurf Medical AB, 30-07-2015	Midsona AB, 07-08-2015
Midsona AB, 07-08-2015	Blick Global Group AB, 18-08-2015	SensoDetect AB, 27-08-2015

Note: This table presents all the rights issues included in the study. All issues are sourced from Bloomberg using the *IPO* module.

Table A.7: List of Rights Issues Included in the Study

Syncro Group AB, 01-09-2015	NanoCap Group AB, 04-09-2015	PharmaLundensis AB, 08-09-2015
EmbeddedArt Group AB, 14-09-2015	Arcoma AB, 18-09-2015	Sileon AB, 18-09-2015
Suntrade Group AB, 24-09-2015	Free2move Holding AB, 01-10-2015	Sivers Semiconductors AB, 08-10-2015
Exalt AB, 09-10-2015	Humble Group AB, 12-10-2015	VEF AB, 22-10-2015
SpectrumOne AB, 26-10-2015	Spago Nanomedical AB, 27-10-2015	Sweco AB, 03-11-2015
Sweco AB, 03-11-2015	Peptonic Medical AB, 05-11-2015	Motion Display Scandinavia AB, 05-11-2015
AroCell AB, 06-11-2015	K33 AB, 23-11-2015	Umida Group AB, 26-11-2015
Vestum AB, 07-12-2015	Obducat AB, 08-12-2015	Briox AB, 16-12-2015
Hifab Group AB, 17-12-2015	GRANGEX AB, 28-12-2015	Amnode AB, 04-01-2016
Clinical Laserthermia Systems AB, 13-01-2016	Greater Than AB, 18-01-2016	Nidhogg Resources Holding AB, 18-01-2016
OptiCept Technologies AB, 22-01-2016	DIAMYD MEDICAL AB, 28-01-2016	Phase Holographic Imaging PHI AB, 29-01-2016
Serstech AB, 03-02-2016	Miris Holding AB, 16-02-2016	Corline Biomedical AB, 22-02-2016
BioInvent International AB, 23-02-2016	Abliva AB, 29-02-2016	Aptahem AB, 04-03-2016
AddLife AB, 07-03-2016	Saxlund Group AB, 11-03-2016	C-RAD AB, 15-03-2016
Gabather AB, 16-03-2016	Cortus Energy AB, 21-03-2016	Enzymatica AB, 22-03-2016
Perpetua Medical AB, 23-03-2016	Nanexa AB, 23-03-2016	Anoto Group AB, 24-03-2016
Kancera AB, 06-04-2016	Scandinavian Real Heart AB, 07-04-2016	WntResearch AB, 07-04-2016
Medimi AB, 12-04-2016	Castellum AB, 13-04-2016	Guard Therapeutics International AB, 15-04-2016
SSAB AB, 22-04-2016	Mendus AB, 25-04-2016	Infant Bacterial Therapeutics AB, 27-04-2016
Humble Group AB, 28-04-2016	Senzime AB, 03-05-2016	European Institute of Science AB, 03-05-2016
Clemondo Group AB, 04-05-2016	Sotkamo Silver AB, 06-05-2016	Zenergy AB, 11-05-2016
Double Bond Pharmaceutical AB, 11-05-2016	Dignitana AB, 17-05-2016	SensoDetect AB, 18-05-2016
Kontigo Care AB, 23-05-2016	NFO Drives AB, 25-05-2016	Premium Snacks Nordic AB, 01-06-2016
Vestum AB, 07-06-2016	Envirologic AB, 08-06-2016	LIDDS AB, 09-06-2016
Tele2 AB, 21-06-2016	Tele2 AB, 21-06-2016	Mysafety Group AB, 15-07-2016
ScandiDos AB, 19-08-2016	Polyplank AB, 19-08-2016	Star Vault AB, 22-08-2016
Gaming Corps AB, 25-08-2016	Alteco Medical AB, 25-08-2016	Nanologica AB, 26-08-2016
DexTech Medical AB, 26-08-2016	Holdflight AB, 31-08-2016	Nibe Industrier AB, 31-08-2016
Midsona AB, 02-09-2016	Midsona AB, 02-09-2016	Elanders AB, 02-09-2016
Igrene AB, 05-09-2016	SolTech Energy Sweden AB, 06-09-2016	Sagax AB, 07-09-2016

Note: This table presents all the rights issues included in the study. All issues are sourced from Bloomberg using the *IPO* module.

Table A.8: List of Rights Issues Included in the Study

Scandinavian Enviro Systems AB, 09-09-2016	Provide IT Sweden AB, 14-09-2016	Immunovia AB, 14-09-2016
Insplorion AB, 16-09-2016	Safe at Sea AB, 26-09-2016	EasyFill AB, 26-09-2016
Micropos Medical AB, 28-09-2016	Probi AB, 29-09-2016	PExA AB, 06-10-2016
FX International AB, 06-10-2016	Heliospectra AB, 11-10-2016	Egetis Therapeutics AB, 20-10-2016
Platzer Fastigheter Holding AB, 21-10-2016	Amhult 2 AB, 24-10-2016	FastPartner AB, 27-10-2016
EmbeddedArt Group AB, 28-10-2016	Obducat AB, 28-10-2016	Amnode AB, 31-10-2016
Tobii AB, 07-11-2016	Syncro Group AB, 10-11-2016	VBG Group AB, 11-11-2016
Miris Holding AB, 14-11-2016	Active Biotech AB, 15-11-2016	Cell Impact AB, 18-11-2016
Prostalund AB, 21-11-2016	Brinova Fastigheter AB, 22-11-2016	Free2move Holding AB, 22-11-2016
Dios Fastigheter AB, 22-11-2016	Spiffbet AB, 24-11-2016	Viking Supply Ships AB, 25-11-2016
Cantargia AB, 20-12-2016	Mediacle Group AB, 04-01-2017	Combigene AB, 10-01-2017
Recyctec Holding AB, 13-01-2017	Fable Media Group AB, 17-01-2017	Episurf Medical AB, 19-01-2017
Gruvaktiebolaget Viscaria, 30-01-2017	PharmaLundensis AB, 03-02-2017	Invent Medic Sweden AB, 06-02-2017
Guard Therapeutics AB, 07-02-2017	Vibrosense Dynamics AB, 10-02-2017	First Hotels AB, 13-02-2017
Senzime AB, 16-02-2017	Blick Global Group AB, 28-02-2017	Rejlers AB, 07-03-2017
Alimak Group AB, 09-03-2017	White Pearl Technologies AB, 15-03-2017	DIAMYD MEDICAL AB, 16-03-2017
Briox AB, 30-03-2017	Saxlund Group AB, 03-04-2017	Exalt AB, 04-04-2017
BrainCool AB, 06-04-2017	Tagmaster AB, 10-04-2017	SaltX Technology Holding AB, 11-04-2017
Sivers Semiconductors AB, 12-04-2017	Advenica AB, 13-04-2017	Ortivus AB, 13-04-2017
Ortivus AB, 13-04-2017	Peptonic Medical AB, 18-04-2017	Cortus Energy AB, 18-04-2017
Tessin Nordic Holding AB, 19-04-2017	Botnia Exploration Holding, 19-04-2017	Ellen AB, 20-04-2017
Maha Energy AB, 24-04-2017	Kancera AB, 03-05-2017	Boho Group AB, 04-05-2017
BrandBee Holding AB, 08-05-2017	Zenergy AB, 08-05-2017	Sustainable Energy Solutions Sweden AB, 16-05-2017
Eltel AB, 19-05-2017	Appspotr AB, 29-05-2017	Latvian Forest Co AB, 30-05-2017
NanoCap Group AB, 02-06-2017	Vivesto AB, 12-06-2017	Vestum AB, 30-06-2017
Expres2ion Biotech Holding AB, 28-07-2017	Scandinavian Real Heart AB, 01-08-2017	Polyplank AB, 05-08-2017
Getinge AB, 18-08-2017	Spago Nanomedical AB, 22-08-2017	Aptahem AB, 24-08-2017
Ependion AB, 28-08-2017	Perpetua Medical AB, 29-08-2017	OptiCept Technologies AB, 01-09-2017
WntResearch AB, 05-09-2017	European Institute of Science AB, 05-09-2017	Gold Town Games AB, 06-09-2017
AcadeMedia AB, 12-09-2017	Real Fastigheter AB, 14-09-2017	Medimi AB, 22-09-2017

Note: This table presents all the rights issues included in the study. All issues are sourced from Bloomberg using the *IPO* module.

Table A.9: List of Rights Issues Included in the Study

Eyeonid Group AB, 25-09-2017	Nanexa AB, 25-09-2017	Sensys Gatso Group AB, 25-09-2017
BrightBid Group AB, 28-09-2017	Sileon AB, 02-10-2017	Holdflight AB, 09-10-2017
Mysafety Group AB, 11-10-2017	Nidhogg Resources Holding AB, 13-10-2017	Aerowash AB, 16-10-2017
Svenska Aerogel Holding AB, 23-10-2017	Ecoclime Group AB, 23-10-2017	Eniro Group AB, 24-10-2017
Scibase Holding AB, 26-10-2017	Gabather AB, 26-10-2017	Alteco Medical AB, 26-10-2017
EmbeddedArt Group AB, 30-10-2017	Impact Coatings AB, 31-10-2017	Amnode AB, 01-11-2017
Mendus AB, 02-11-2017	Respiratorius AB, 07-11-2017	Irisity AB, 08-11-2017
Suntrade Group AB, 09-11-2017	Agtira AB, 13-11-2017	Doxa AB, 13-11-2017
SolTech Energy Sweden AB, 16-11-2017	Abelco Investment Group AB, 23-11-2017	Infant Bacterial Therapeutics AB, 24-11-2017
Rolling Optics Holding AB, 24-11-2017	Double Bond Pharmaceutical AB, 27-11-2017	Dignitana AB, 05-12-2017
Transferator AB, 11-12-2017	Transferator AB, 11-12-2017	NP3 Fastigheter AB, 15-12-2017
Minesto AB, 22-12-2017	Serstech AB, 08-01-2018	Prostalund AB, 12-01-2018
Expres2ion Biotech Holding AB, 16-01-2018	Toleranzia AB, 18-01-2018	Hanza AB, 18-01-2018
Northbaze Group AB, 18-01-2018	Sprint Bioscience AB, 19-01-2018	Frontwalker AB, 19-01-2018
Combigene AB, 22-01-2018	Relevance Communication Nordic, 23-01-2018	BrandBee Holding AB, 23-01-2018
Cell Impact AB, 26-01-2018	Jumpgate AB, 05-02-2018	Nilsson Special Vehicles AB, 06-02-2018
Qlosr Group AB, 07-02-2018	Guideline Geo AB, 09-02-2018	Eurobattery Minerals AB, 14-02-2018
Abliva AB, 15-02-2018	Active Biotech AB, 15-02-2018	Ourliving AB, 16-02-2018
Obducat AB, 16-02-2018	Transiro Holding AB, 01-03-2018	AcouSort AB, 05-03-2018
Guard Therapeutics AB, 06-03-2018	Gapwaves AB, 09-03-2018	Sustainable Energy Solutions Sweden AB, 12-03-2018
Nanologica AB, 12-03-2018	AroCell AB, 12-03-2018	Vestum AB, 13-03-2018
Invent Medic Sweden AB, 15-03-2018	Starbreeze AB, 15-03-2018	Starbreeze AB, 15-03-2018
PharmaLundensis AB, 16-03-2018	Annexin Pharmaceuticals AB, 20-03-2018	Sjostrand Coffee Int AB, 20-03-2018
SynAct Pharma AB, 23-03-2018	Hedera Group AB, 26-03-2018	Nexar Group AB, 27-03-2018
Vo2 Cap Holding AB, 27-03-2018	Tourn International AB, 28-03-2018	Nordic LEVEL Group AB, 29-03-2018
K33 AB, 29-03-2018	Kancera AB, 03-04-2018	Online Brands Nordic AB, 03-04-2018
Cortus Energy AB, 04-04-2018	Logistea AB, 05-04-2018	Sagax AB, 05-04-2018
Sagax AB, 05-04-2018	Sagax AB, 05-04-2018	CHOSA Oncology AB, 09-04-2018
Litium AB, 10-04-2018	Peptonic Medical AB, 10-04-2018	Gasporox AB, 11-04-2018
Polyplank AB, 16-04-2018	Amnode AB, 16-04-2018	Mysafety Group AB, 16-04-2018

Note: This table presents all the rights issues included in the study. All issues are sourced from Bloomberg using the *IPO* module.

Table A.10: List of Rights Issues Included in the Study

Blick Global Group AB, 19-04-2018	Scandinavian ChemoTech AB, 25-04-2018	Clinical Laserthermia Systems AB, 02-05-2018
European Institute of Science AB, 15-05-2018	Phase Holographic Imaging PHI AB, 17-05-2018	Perpetua Medical AB, 18-05-2018
Agtira AB, 21-05-2018	Zenergy AB, 22-05-2018	Teneo AI AB, 23-05-2018
Gold Town Games AB, 24-05-2018	Prolight Diagnostics AB, 25-05-2018	Seafire AB, 28-05-2018
Gaming Corps AB, 29-05-2018	Secits Holding AB, 01-06-2018	Absolicon Solar Collector AB, 05-06-2018
Arbona AB, 07-06-2018	Aino Health AB, 26-06-2018	Clemondo Group AB, 05-07-2018
Simris Group AB, 06-07-2018	MEKO AB, 06-07-2018	Vicore Pharma Holding AB, 12-07-2018
Hitech & Development Wireless AB, 16-07-2018	Transtema Group AB, 09-08-2018	Star Vault AB, 10-08-2018
Igrene AB, 21-08-2018	Inhalation Sciences Sweden AB, 22-08-2018	Combigene AB, 22-08-2018
Crunchfish AB, 24-08-2018	OXE Marine AB, 28-08-2018	Micropos Medical AB, 30-08-2018
Mavshack AB, 30-08-2018	Ellen AB, 30-08-2018	Appspotr AB, 31-08-2018
Medimi AB, 31-08-2018	Anoto Group AB, 07-09-2018	Enrad AB, 10-09-2018
Online Brands Nordic AB, 10-09-2018	AcuCort AB, 11-09-2018	SpectraCure AB, 11-09-2018
European Institute of Science AB, 11-09-2018	NP3 Fastigheter AB, 13-09-2018	Premium Snacks Nordic AB, 13-09-2018
Finepart Sweden AB, 14-09-2018	Vaxxa AB, 18-09-2018	Mantex AB, 20-09-2018
Spiffbet AB, 21-09-2018	Cortus Energy AB, 24-09-2018	LightAir AB, 26-09-2018
PharmaLundensis AB, 28-09-2018	Umida Group AB, 03-10-2018	Aptahem AB, 10-10-2018
Zaplox AB, 17-10-2018	EQL Pharma AB, 17-10-2018	Enzymatica AB, 18-10-2018
Enorama Pharma AB, 23-10-2018	Saab AB, 23-10-2018	Alzinova AB, 24-10-2018
SaltX Technology Holding AB, 25-10-2018	Relevance Communication Nordic, 26-10-2018	EmbeddedArt Group AB, 26-10-2018
Scandinavian Enviro Systems AB, 26-10-2018	Image Systems AB, 26-10-2018	Safe at Sea AB, 29-10-2018
Glycorex Transplantation AB, 31-10-2018	BibbInstruments AB, 02-11-2018	EmbeddedArt Group AB, 02-11-2018
Mendus AB, 08-11-2018	ECOMB AB, 08-11-2018	GomSpace Group AB, 12-11-2018
Ecoclime Group AB, 12-11-2018	FX International AB, 16-11-2018	Dignitana AB, 16-11-2018
GRANGEX AB, 19-11-2018	Unibap AB, 21-11-2018	Scandinavian Real Heart AB, 21-11-2018
Ovzon AB, 22-11-2018	AddLife AB, 26-11-2018	Saxlund Group AB, 06-12-2018
Abliva AB, 10-12-2018	Africa Resources AB, 17-12-2018	Advenica AB, 18-12-2018
Axichem AB, 18-12-2018	SpectrumOne AB, 19-12-2018	Transiro Holding AB, 20-12-2018
Greater Than AB, 21-12-2018	Ortivus AB, 23-01-2019	Ortivus AB, 23-01-2019
Fram Skandinavien AB, 28-01-2019	K33 AB, 29-01-2019	Guard Therapeutics AB, 05-02-2019

Note: This table presents all the rights issues included in the study. All issues are sourced from Bloomberg using the *IPO* module.

Table A.11: List of Rights Issues Included in the Study

OXE Marine AB, 06-02-2019	Camurus AB, 06-02-2019	Smoltek Nanotech Holding AB, 11-02-2019
Nidhogg Resources Holding AB, 13-02-2019	Crunchfish AB, 14-02-2019	NOSIUM AB, 15-02-2019
Terranet AB, 18-02-2019	Nordic LEVEL Group AB, 19-02-2019	Heliospectra AB, 22-02-2019
Eurobattery Minerals AB, 24-02-2019	Amnode AB, 25-02-2019	BioInvent International AB, 25-02-2019
Hitech & Development Wireless AB, 28-02-2019	Xbrane Biopharma AB, 28-02-2019	WntResearch AB, 28-02-2019
European Institute of Science AB, 01-03-2019	Svenska Aerogel Holding AB, 04-03-2019	Mysafety Group AB, 04-03-2019
Nexar Group AB, 08-03-2019	Sileon AB, 11-03-2019	Vibrosense Dynamics AB, 19-03-2019
AFRY AB, 20-03-2019	Topright Nordic AB, 22-03-2019	Double Bond Pharmaceutical AB, 22-03-2019
EasyFill AB, 27-03-2019	Moment Group AB, 01-04-2019	Zenergy AB, 01-04-2019
ScandiDos AB, 02-04-2019	Clean Motion AB, 03-04-2019	PharmaLundensis AB, 04-04-2019
Metacon AB, 05-04-2019	Episurf Medical AB, 05-04-2019	Logistea AB, 05-04-2019
Lumito AB, 08-04-2019	Evolear AB, 08-04-2019	Briox AB, 09-04-2019
SpectrumOne AB, 11-04-2019	Cereno Scientific AB, 12-04-2019	Ambea AB, 16-04-2019
Prostalund AB, 16-04-2019	EatGood Sweden AB, 17-04-2019	Blick Global Group AB, 17-04-2019
AAC Clyde Space AB, 18-04-2019	2cureX AB, 24-04-2019	Fagerhult Group AB, 26-04-2019
CHOSA Oncology AB, 29-04-2019	SolTech Energy Sweden AB, 02-05-2019	Tagmaster AB, 03-05-2019
NextCell Pharma AB, 08-05-2019	DexTech Medical AB, 09-05-2019	PharmaLundensis AB, 09-05-2019
Perpetua Medical AB, 10-05-2019	Insplorion AB, 15-05-2019	Northbaze Group AB, 15-05-2019
Peptonic Medical AB, 20-05-2019	Bio-Works Technologies AB, 27-05-2019	Ourliving AB, 27-05-2019
Bodyflight Sweden AB, 28-05-2019	Absolicon Solar Collector AB, 03-06-2019	Gruvaktiebolaget Viscaria, 06-06-2019
Enrad AB, 11-06-2019	Thinc Collective AB, 12-06-2019	Frontwalker AB, 12-06-2019
Xbrane Biopharma AB, 21-06-2019	SensoDetect AB, 16-07-2019	Attana AB, 18-07-2019
Dicot Pharma AB, 23-07-2019	EmbeddedArt Group AB, 06-08-2019	Hedera Group AB, 06-08-2019
BrandBee Holding AB, 19-08-2019	Arbona AB, 21-08-2019	Incoax Networks AB, 22-08-2019
Westpay AB, 22-08-2019	European Institute of Science AB, 22-08-2019	AcuCort AB, 27-08-2019
Terranet AB, 30-08-2019	BrainCool AB, 30-08-2019	Appspotr AB, 02-09-2019
NanoCap Group AB, 03-09-2019	Medimi AB, 12-09-2019	Gabather AB, 19-09-2019
Agtira AB, 20-09-2019	Igrene AB, 20-09-2019	Cardeon AB, 23-09-2019
Simris Group AB, 23-09-2019	Gold Town Games AB, 25-09-2019	Sileon AB, 26-09-2019
Midsona AB, 01-10-2019	Midsona AB, 01-10-2019	PMD Device Solutions AB, 04-10-2019

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Table A.12: List of Rights Issues Included in the Study

Toleranzia AB, 04-10-2019	European Institute of Science AB, 11-10-2019	Chordate Medical Holding AB, 14-10-2019
SaltX Technology Holding AB, 15-10-2019	Raytelligence AB, 18-10-2019	Suntrade Group AB, 21-10-2019
Hitech & Development Wireless Sweden AB, 25-10-2019	Obducat AB, 25-10-2019	Obducat AB, 25-10-2019
Heliospectra AB, 25-10-2019	Adverty AB, 30-10-2019	Serstech AB, 30-10-2019
Botnia Exploration Holding, 31-10-2019	PExA AB, 01-11-2019	Miris Holding AB, 07-11-2019
Nordic Iron Ore AB, 08-11-2019	Minesto AB, 08-11-2019	iZafe Group AB, 08-11-2019
AroCell AB, 11-11-2019	Mavshack AB, 11-11-2019	Senzagen AB, 12-11-2019
PharmaLundensis AB, 13-11-2019	Vivesto AB, 13-11-2019	Hoodin AB, 15-11-2019
Samhallsbyggnadsbolaget i Norden AB, 15-11-2019	European Institute of Science AB, 14-02-2020	Eyeonid Group AB, 15-11-2019
Vaxxa AB, 19-11-2019	KebNi AB, 22-11-2019	Jumpgate AB, 25-11-2019
Boho Group AB, 03-12-2019	Touchtech AB, 12-12-2019	Teneo AI AB, 12-12-2019
Irlab Therapeutics AB, 12-12-2019	Amnode AB, 13-12-2019	Svenska Aerogel Holding AB, 16-12-2019
Clinical Laserthermia Systems AB, 18-12-2019	Transtema Group AB, 20-12-2019	Annexin Pharmaceuticals AB, 23-12-2019
Transiro Holding AB, 30-12-2019	Nidhogg Resources Holding AB, 07-01-2020	XmReality AB, 08-01-2020
Nosa Plugs AB, 13-01-2020	Kancera AB, 13-01-2020	Invent Medic Sweden AB, 16-01-2020
Finepart Sweden AB, 21-01-2020	Double Bond Pharmaceutical AB, 28-01-2020	Nanexa AB, 31-01-2020
Agtira AB, 07-02-2020	Absolicon Solar Collector AB, 07-02-2020	Nanologica AB, 07-02-2020
Episurf Medical AB, 07-02-2020	Crunchfish AB, 12-02-2020	Nexam Chemical Holding AB, 14-02-2020

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