Does Sponsor Holding Period Affect post-IPO Performance?

Evidence from Nordic Private Equity Backed IPOs

by

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ABSTRACT

This study examines the impact of private equity sponsors' holding period on aftermarket performance of Nordic Initial Public Offerings ("IPOs"). A manually obtained sample of 121 sponsor backed IPOs executed on the main Nordic stock exchanges between 2000 and 2016 is used to analyze one- and three year buy-and-hold excess returns depending on pre-IPO sponsor holding period. The sample IPOs are divided into three groups based on sponsor holding period length prior to the IPO, and are split as follows; firms held for 0-3 years (quickflips), firms held for 3-7 years (average holdings), and firms held for seven years or more (longholds). The paper does not provide evidence of holding period impact on sponsor backed IPOs' trailing market performance. The model is extended by additional independent variables; firm size and sponsor type. The former can not be evidenced. Significantly proven, though, is the impact of sponsor type. There is a positive impact of a firm being buyout ("BO") backed rather than venture capital ("VC") backed prior to the IPO on its excess return level. Despite not providing significant results on the main hypothesized questioning of an inverse U-shaped relationship between holding period and post-IPO performance, the paper contributes with findings on how sponsor specific traits play a significant role on private equity backed IPOs' aftermarket behavior.

Keywords: Private Equity, Holding Period, Financial Sponsor, Buyout Capital, Venture Capital, Nordic IPOs, Post-IPO Performance

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1. INTRODUCTION

Ever since the private equity ("PE") industry emerged, the interest in how the ownership form creates value has been huge. By acquiring a significant ownership stake in a firm, the private equity actors have the opportunity, for a limited period of time, to implement efficient measures and thus improve profitability (McKinsey, 2019).

The private equity industry is constantly growing and during the 2000s, the net asset value of private equity has increased more than sevenfold, outpacing other asset classes such as public market equities and traditional bank loans (McKinsey, 2019). In combination with favorable market conditions, this rise has resulted in a large number of initial public offerings ("IPOs") led by private equity sponsors (PwC, 2018). The performance of such sponsor backed IPOs have drawn a lot of attention and thus been subject to empirical research. In order to explore if and how the sponsors generate additional value to the IPO firms, previous studies[1] investigate post-IPO behavior of these, and include factors such as firm size, sponsor type, and market timing, potentially having explanatory effects.

What has not received as much focus in existing literature, though, is the impact of holding period (the time which the private equity firm holds the company investment up until IPO) on the companies' performance once listed. Holding period is a crucial aspect for the sponsors to consider for many reasons. For instance, it limits the time the sponsor has to introduce changes in the acquired company, and it must match the lifetime of the private equity fund. Also, the holding period may indicate if the sponsor is trying to time the market, or if the sponsor owned company is experiencing problems and thus cannot be exited in reasonable time. Based on findings by Kaplan & Strömberg (2008) and Söderblom (2011) among others, the median private equity backed holding period has historically been circulating around five years. They argue that holding periods shorter than three years or longer than seven years are unusually short and long, respectively. Schöber (2008) and Cao & Lerner (2009) expand the research on post-IPO performance by adding holding period as an explanatory factor. They present empirical findings on the US market showing an inverse U-shaped relationship between holding period and market performance, and argue that it stems from the inconvenience of exiting a portfolio firm too quick due to short-term return focus, or after too long when forced upon fund closure. Assets exited through IPOs under either of these circumstances are viewed as non-optimal for the firm's trailing market performance, forcing the inverse U-shaped pattern.

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[1] Including Holthausen & Larcker (1996); Brav & Gompers (1997); Schöber (2008); Cao & Lerner (2009); van der Geest & van Frederikslust (2001)

The main purpose of this paper is to investigate the influence of holding period on the market performance of sponsor backed IPOs. The study will be applied on the Nordic market, a geographical area chosen for several reasons. The asset class emerged in the Nordics in the late 1980s, making the Nordic private equity market relatively young in a global perspective (Spliid, 2013). Today, the Nordic private equity market has grown to be one of the most active and successful in Europe and the world, dominated by large private equity firms such as EQT Partners, Nordic Capital, Altor and Equip Capital (Argentum, 2020). The overall IRR of all Nordic countries' funds amounted to 13.8% in 2019. This implies that the Nordics outperformed all other global private equity markets and had one of the most attractive risk-return profiles. Furthermore, the Nordic Total Value to Paid-In multiple was measured at the highest global level of 1.86x, making the region the "most mature market globally, with around 90% of the value already distributed" (eFront, 2020). The Nordics are also very active on the IPO market, despite its relatively small population and economy size. Between 2014 and 2019, the Nordic countries represented between 22 and 35 percent of all European IPOs. In 2020, almost half of Europe's IPOs came from either Sweden, Norway, Denmark or Finland (Jakobsen, 2020). Notwithstanding, research on performance of sponsor backed IPOs has not yet been presented on the Nordic market.

In this paper, two hypotheses are formulated and tested for. Prior to analyzing the holding period effect, it is relevant to examine whether sponsor backed IPOs have a positive influence on succeeding market performance in the Nordics. We hypothesize that beneficial attributes linked to private equity ownership, such as the corporate governance structure, play a significant role in the performance behavior. To test the first hypothesis, the paper examines how sponsor backed IPOs perform relative to the overall market. The second hypothesis is developed to study the impact of holding period, and other relevant factors, on post-IPO performance for sponsor backed firms. In accordance with the findings of Schöber (2008) and Cao & Lerner (2009), it is hypothesized that the performance follows an inverse U-shaped pattern depending on holding period.

Our sample comprises 121 sponsor backed IPOs from the largest Nordic exchanges between 2000 and 2016. The sample IPOs are divided into three groups based on sponsor holding period length prior to the IPO, and are split as follows; firms held for 0-3 years (quickflips), firms held for 3-7 years (average holdings), and firms held for seven years or more (longholds).

This study finds no evidence of outperformance of Nordic sponsor backed IPOs relative to the market, nor can any significant relationship between sponsor holding period and post-

IPO performance be found. What does seem to drive the performance of sponsor backed IPOs, though, is the nature of the sponsor itself, namely if the sponsor is a buyout capital- or venture capital firm.

The paper is structured as follows. Section 1.1 provides background information to private equity as an ownership form and private equity fund structure. Section 2 contains a review of existing literature on the topic. Section 3 presents the study hypotheses, explains the methodology and goes through the data collection process. The section includes detailed descriptive statistics of the sample and variable descriptions linked to the econometric model. The results are presented in Section 4 and discussed in Section 5. Section 6 concludes the paper and proposes future research avenues.

1.1. Background to Private Equity

Private equity is an ownership form where portfolio companies are privately owned through fund structures and hence not publicly traded. Private equity firms are often referred to as financial sponsors and consist of a variety of fund types. The two main categories are buyout capital ("BO") and venture capital ("VC"). A firm of the former type typically acquires majority stakes of already existing and mature companies. This is commonly done through leveraged buyouts, where a large portion of debt is taken on. When a firm previously taken private through a leveraged buyout is brought back to the public market, it is called a reversed leveraged buyout, RLBO (Cao & Lerner, 2009). Venture capital firms, however, typically invest in younger firms with minority ownership stakes and control. Despite including both buyout- and venture capital, the private equity term is often related to buyout firms. A third fund sort is growth capital, often targeting minority stakes but in relatively mature firms (Kaplan & Strömberg, 2008). In this paper, the term private equity backed investments will be used interchangeably with sponsor backed investments and include both buyout- and venture capital unless otherwise is stated.

Kaplan & Strömberg (2008) present private equity funds as vehicles through which private equity firms raise money. The investors commit certain amounts of money to the often "closed-end" funds, and the raised capital is used to fund portfolio firms and cover for management fees. The legal structure of a PE fund is "limited partnership", in which the Limited Partners (LPs) provide the fund with capital, and the General Partners (GPs) manage the fund and portfolio investments, in return of a preset management fee and carried interest. A buyout fund typically has a ten year timeframe, of which the first five are considered as the investing period and the remaining years are aimed at returning capital to the fund investors.

Beyond the ten years, funds commonly allow for two to three additional exit years. The most common exit sources are i) initial public offerings (IPOs), ii) sale to strategic buyers or iii) sale to other private equity funds through secondary buyouts. The private equity backed IPOs are more commonly buyout backed than venture capital backed. This paper will focus on the first exit alternative, the IPO process, allowing for post-exit performance analysis.

2. LITERATURE REVIEW

2.1. Holding Period

Kaplan & Strömberg (2008) argue for a historical average holding period of 6 years, based on data of over 17,000 LBO transactions backed by financial sponsors and made worldwide between 1970 and 2007. They do, however, argue that the median holding period has varied over time. Particularly, it was below 5 years for LBOs executed in the early 1990's, resulting from the "hot" IPO markets that took place later that decade. The authors further argue for an increased holding period since the 1990's. In 2015, Strumillo & Lawrence conducted an in-depth analysis of global private equity backed exits. They present evidence of how investment period has increased between 2008 and 2015, with an average of 4.1 years in 2008 and 5.9 years in 2015. They further reveal differences depending on geographical and industrial variations. Also capitalization size matters, with larger capitalizations having relatively shorter holding periods, but with the different groups trending in the same way, i.e. increasing holding periods between 2008 and 2015. On the same topic, Heebøll et al. (2017) presented a footprint analysis of Swedish private equity backed firms. They argue that out of 300 Swedish PE backed firms with exits between 2007 and 2017, the average holding period was 5 years and only 10 percent of the firms had holding periods less than 4 years.

A recent report conducted by MacArthur in 2019 reveals how the trend has faded and turned. New macro challenges and economic instability have impacted the IPO timing and general partners (GPs) seem interested in exiting once they get a good chance rather than holding on to investments longer than needed. Up from a peak of 5.9 years in 2014, MacArthur identifies a median holding period of 4.5 in 2018. One considerable aspect is the increased number of so-called "quickflips". These are assets held for less than a three-year period, and they have since 2012 increased in terms of stake of total investments, but are still on a significantly lower level than they were at the last high cycle previous to 2008 (MacArthur, 2019). Reasons to why a sponsor might hold on to a portfolio firm as short as 3 years or less may include the sponsor's aim at timing the market (Benninga et al., 2005). The relationship between quickflips and hot IPO markets, studied by Kaplan & Strömberg (2008) among others, is further discussed in Section 2.2.

Söderblom (2011) states how buyout- and venture capital investments tend to differ in terms of holding period, with the former usually being between 3 and 5 years and the latter between 5 and 7 years. This is linked to the venture capital fundamental of investing in earlier stages of the targets' lives, not rarely leading to longer horizons before exiting these

investments. Given the finite life of private equity funds, a holding period of more than seven years is unusual. Alongside this argument, the author presents how even venture capital funds most often exit their assets within a seven year period. Further, Kaplan & Strömberg (2008) make it clear that fund structure in itself affects the possibilities of deciding upon target firm holding period, as one may have to exit even though it is not the optimal solution due to fund liquidation.

Based on the above discussed findings, the median private equity backed holding period has historically been around 5 years. The presented evidence all agree on median or average holding periods somewhere in between 3 and 7 years, and express holding periods shorter than 3 years as "quickflips". Moreover, a holding period of 7 years or more seems unusually long, and will henceforth be referred to as "longholds".

2.2. IPO Timing

Several existing papers examine the fundamental reasons to why firms decide to go public, and when they make such decisions. As firms do not face now-or-never terms regarding whether or not to go public, they can always wait and go through with an IPO at another point in time. Hence, other reasons than simply weighting costs against benefits of being listed exist as a basis for the decision making. Benninga et al. (2005) states how firms being able to *time* their IPOs is one such important factor.

"Hot issue markets" is a phenomenon describing the effect of IPO waves, periods when a large number of IPOs are performed due to favorable market conditions (Ritter, 1984). Ritter & Welch (2002) state that the single most important market condition for attracting IPOs is access to higher than usual valuations, making owners and entrepreneurs willing to exit all or part of their holdings and capture relatively high gains. Pastor & Verenosi (2005) describe "optimal IPO timing" as the event of owners and/or entrepreneurs having the ability to simply wait for better market conditions before going ahead with a planned IPO exit. This reasoning is further declared by Benninga et al. (2005) who present evidence on large clusters of IPOs during times of high market valuations. Lerner (1992) and Cao (2011) present a negative correlation between sponsor holding periods and boiling stock market conditions. Building further on this topic, Kaplan & Strömberg (2008) present evidence on shorter holding periods during "hot markets", and also describe the quickflip phenomenon of simply taking quick advantage of market conditions rather than exercising the normal buyout value creation procedure. However, firm owners are not completely free in their exit decisions. As the fund

structure of buyout capital limits the possibilities of pushing IPO exits further on to the future beyond the fund lifetime, a sponsor might have to pursue an IPO sooner than optimal in terms of market timing. The firm could, though, be exited through a strategic or secondary sale if the market timing is relatively bad upon the forced exit date, enabling an IPO pursued by the next owner at a later stage.

Existing research of IPO timing also includes the "pseudo market timing" notion examined by Schultz (2003). The study presents evidence of the negative post-IPO effects of IPO market timing. By listing a firm at peaking market conditions and thus raising overvalued equity, firms tend to fail on creating value and sufficient return on equity, potentially leading to financial distress. Yung et al. (2008) discuss evidence on the higher tendency of delisting for performed hot-market-IPOs than their cold-market equivalents.

Based on discussed existing evidence of IPO market timing, there are two important conclusions to draw. First, there is such a thing as "optimal IPO timing", making firms wait with going public until they may gain relatively high market valuations. Second, this market timing might come with negative consequences, as firms may fail to deliver sufficient returns. Alongside examining the effect of holding period on post-IPO returns, the paper touches upon the relative importance of market timing for both holding period directly and post-IPO performance indirectly.

2.3. Performance of Sponsor Backed IPOs

Various studies examine whether sponsor backed IPOs outperform non sponsored backed IPOs as well as the market itself. Often, the papers are analyzing the effect of either buyout- or venture capital, with the majority based on the US market. Already in 1996, Holthausen & Larcker (1996) investigated the topic by studying a sample of 62 RLBOs in the US from 1983-1988. For the four years after the IPO, they concluded that these firms outperformed their industry peers in terms of accounting performance. One year later, Brav & Gompers (1997) examined over 4,000 VC backed and non VC backed IPO listings in the US 1972-1992 and concluded that the aftermarket stock performance, with equally weighted returns, was significantly higher for the VC backed IPO firms. Potential explanations to the superior market returns for the VC backed firms included the corporate governance structure of the listed companies, as well as the VC-fund screening process. Moreover, Schöber (2008) presents evidence that BO backed IPOs, compared to other listings and the whole market, have a positive effect on the long-term stock price return, by analyzing 921 BO backed US IPOs between 1990-

2001. The same is confirmed by Cao & Lerner (2009), studying a sample of 496 RLBOs on the US market during 1980-2002.

In addition to the US research, van der Geest & van Frederikslust (2001), Bergström et al. (2006) and Levis (2011) have documented evidence regarding BO backed IPOs from the European markets. Van der Geest & van Frederikslust (2001) find that performance of BO backed IPOs outform non BO backed by analyzing data from the Amsterdam Stock Exchange between 1985-1998. Similarly, results presented by Bergström et al. (2006), comparing BO backed IPOs with non BO backed IPOs in Paris and London during 1994-2004, indicate superior performance of the BO backed firms. Additionally, they find that on average large sponsor backed IPOs outperform smaller, potentially explained by investors being less subject to overoptimism for larger IPOs. Also Levis (2011), studying a dataset of 1,595 IPOs in the UK between 1992 and 2005, finds evidence of outperformance for BO backed IPOs against other listings but also the stock market in general, both with equally and value weighted returns for a period of three years following the IPO. He suggests that higher leverage in the sponsor backed firms and that the sponsor itself keep a stake in the company after the listing contribute to the superior performance. For VC backed IPOs, Coakley et al. (2007) studied 571 UK IPOs between 1985 and 2000, but were not able to find differences in performance between VC and non VC backed firms. Neither did Rindermann (2003), who studied 303 IPOs between 1996 and 1999 in France, Germany and the UK.

Altogether, based on US and European research, the academic consensus seems to be that BO backed IPOs perform superior to other listings and to the market as a whole. However, regarding VC backed IPOs, evidence of outperformance is still rather mixed. Noticeably, no research regarding the topic on the Nordic markets has been found.

2.4. Impact of Holding Period on post-IPO Performance

Evidence of whether sponsor holding period has influence on market performance of the listed firm is limited. This is especially true for comparisons to the overall stock market. Regarding buyout backed IPOs, Schöber (2008) and Cao & Lerner (2009) provide evidence on firms' relative post-IPO market performance depending on pre-IPO sponsor holding period. The groups are; firms held less than 12 months, firms held three to five years, and firms held above-median, respectively. The two studies both show an inverse U-shaped influence of holding period to market performance, meaning that firms held for a period within the median-bracket of three to five years outperform the two other groups on post-IPO basis. Two fundamental reasons describe this pattern. First, IPOs pursued in less than a year after the sponsor investment

are likely affected by the BO fund hunting market timing and thus introducing a listing of a firm that is not optimally ready. Second, one explanation behind longer-than-median holding periods seem to be organizational restructuring problems. If that is the case, a somewhat problematic firm held for longer-than-median investment period might mismatch with the BO fund's closed end and hence be forced to exit before an optimal timing. Worth noting, though, is that these IPOs perform better than other-than-median held firms, i.e. quickflips.

When it comes to venture capital backed IPOs, evidence is presented by Napier et al. (2001) and Hsu (2009). The former studied a small sample of 133 venture capital backed IPOs already in 1999, and found that a longer holding period indicated stronger post-IPO performance. The latter examined a larger sample, consisting of 1,755 venture capital backed IPOs, within the period 1980 to 2004. The result for this paper is in line with that of Napier et al. (2001). Both papers found positive effects of VC firms' holding periods on post-IPO market performance. The main driver was suggested as a longer holding period allowing for i) larger extent of patents to be overcome, and ii) stronger financial position managed.

A reasonable conclusion regarding BO backed IPOs is thus that listings of firms not optimally ready, but rather forced due to market timing attempts or closing funds, perform worse than IPOs of firms held between than three to five years. As for VC backed IPOs, the crucial aspect seems to be factors connected to firm development rather than market timing or fund closure.

2.5. Geographical Research Gap

Due to its size, the majority of the existing research within the private equity area is based on empirical research from, or in other ways related to, the US market (Spliid, 2013). In a paper, Spliid investigates whether research conducted on the US private equity market is applicable to the Nordic region (including Sweden, Norway, Denmark and Finland) by comparing general characteristics of the two. Given differences in environment, including cultural, economic and political distinctions, Spliid argues that it is difficult to apply findings from the US on the Nordic region. For example, in the Nordics, fundraising is more complicated because of the dependence of international investors. Also, there is less diversity in financing options than on the US credit market. Even though the US empirics may provide relevant insights to the Nordic market, separate research is necessary for the field to de facto cover the Nordic region and provide independent observations of the market.

3. METHODOLOGY AND DATA

3.1. Hypotheses

To fulfil the purpose of this paper and examine the impact of holding period on post-IPO performance of previously sponsor backed firms, two hypotheses have been developed. Hypothesis 1 touches on a broader spectrum of the subject, and acts as a relevant starting point for better understanding the purpose of our main research topic formulated in Hypothesis 2. In the paper, most emphasis is put on the latter which focuses on the specific impact of holding period on sponsor backed IPO market performance.

Market performance of sponsor backed IPOs

Private equity backed IPOs seem to have several beneficial characteristics beyond that of the overall market. Despite the mixed results existing papers have presented on historical sponsor backed IPO market outperformance, we hypothesize that these beneficial attributes play a significant role in performance behavior and thus that the ownership form has a positive influence on succeeding market performance. The first hypothesis of this paper speaks in favor of private equity ownership and its effect on IPO firms' trailing market performance.

Hypothesis 1: Sponsor backed IPOs outperform the stock market and generate excess returns in the Nordic market.

Impact of Sponsor Holding Period

Quickflips, i.e. firms exited within a three year holding period, are in some cases results of the sponsor's aim at timing the market rather than the target firm's optimal exit situation. Similarly, longholds, i.e. firms exited after at least seven years of holding, might go through an IPO inconveniently due to closure of the sponsor's fund. These arguments speak for how quickflips and longholds might go public at times based on reasons other than what is optimal for the specific firm and its long term success. It is thus hypothesized that such firms perform worse on a post-IPO basis in relation to those held for an average holding period, i.e. between three and seven years, prior to the IPO.

Hypothesis 2: Sponsor holding period and post-IPO performance has an inverse U-shaped pattern, meaning that firms held for an average holding period are superior in terms of market

outperformance compared to quickflips and longholds. The hypothesis applies to the Nordic market.

3.2. Testing and Regression Framework[2]

For *Hypothesis 1*, we run a one-tailed single sample t-test in order to test for market outperformance of sponsor backed IPOs. This is done by examining whether the excess return of sponsor backed IPOs is significantly greater than zero. For *Hypothesis 2*, we want to investigate the impact on excess return of several independent variables and eliminate the impact of time-specific events. Thus, the statistical framework used for the regression of this study is a Fixed Effects Multivariate Ordinary Least Squares model. The standard Ordinary Least Square ("OLS") model determines a function of one dependent variable to one or several explanatory variables. The model uses least squares to estimate a linear regression of certain unknown variables, and then measures the minimum squared distance of each data point in relation to the estimated regression. The squared distances should be as small as possible in order for the model to best fit the data, and thus works as a better estimator for predicting a function of the studied hypothesis (Aiken et al., 1991). When using the Fixed Effects Multivariate OLS model, we may control for potential hidden effects of the control variables, and hence remove the risk of creating a function that assumes all explanatory effects are due to holding period explicitly. This will allow a more complex estimation of the relationship between holding period and aftermarket performance than just a simple linear regression relationship. The control variables are in our case based on firm size, sponsor type characteristics, and time invariant effects, and are further presented in Section 3.5. By using the extended model, an unobserved effect term will be added to the function and represent the extra effect on the response variable (post-IPO performance) that the main explanatory variable (holding period) cannot predict in the estimated function (Wooldridge, 2015).

In order for standard OLS regression to guarantee clear results, several underlying assumptions need to hold (Wooldridge, 2015). For example, Wooldridge argues that it is important to control for heteroscedasticity, endogeneity and multicollinearity when performing a linear regression. With heteroscedasticity in the data, the variance of the residuals is not constant, while endogeneity means that an independent variable is correlated with the error

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[2] To perform the methodology necessary for the analysis of this paper's research questions, we use the statistical software STATA. STATA allows us to both manage our data sample and to produce outputs for analyzing how holding period and other control variables affect aftermarket returns.

term. To account for the potential problem of heteroscedasticity in the error terms of our data sample, we will investigate whether usage of robust standard errors in the regression is necessary, and to test for endogeneity, we will explore the correlation between the error terms of the regression and the independent variables (Wooldridge, 2015). To further confirm that our model is valid, we will test for multicollinearity. Multicollinearity suggests that independent variables in the regression model are highly correlated and can cause reduced precision of the coefficients and make them very sensitive to small model changes. To detect potential multicollinearity, we calculate the Variance Influence Factor ("VIF"), which explains the influence of multicollinearity on the variance of the coefficient estimate and where higher VIF values indicate existence of multicollinearity (Mansfield and Hems, 2012). A general guideline is that concern should arise if any VIF value exceeds 5.0 (Menard, 2001).

3.3. Data

3.3.1 Collection of Sample Data

The sample was based on a list of all Nordic initial public offerings between January 2000 and December 2016, retrieved from the SDC Platinum database. Given interrelated market factors such as governance, regulations and taxation, as well as cultural aspects, the Nordic countries are often viewed as one coherent market and belong to the same OMX stock exchange umbrella (Spliid, 2013). Due to the small size of its economy and thus low IPO and private equity activity, Iceland, which is by definition a Nordic country, is not included in the study. The time frame was chosen to allow for a sufficient number of firms for the data set, and also enable analysis of three year excess return measures post-IPO.[3] To filter the initial list to only include IPO firms relevant for the purpose of this paper, we excluded according to the steps below;

   i) Non-sponsored backed IPOs, i.e. firms not backed by buyout- or venture capital funds prior to the listing,

   ii) List transfers from minor lists to main lists,

   iii) Secondary offerings, and

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[3] The reasoning behind excluding IPOs made in 2017 is linked to avoiding potential skews resulting from the turbulent COVID-19 outbreak in 2020.

iv) Listings made on stock markets other than; OMX Oslo, Nasdaq Stockholm, Nasdaq Helsinki, Nasdaq Copenhagen, First North Stockholm, First North Oslo, Spotlight.

After collecting a list of sponsor backed IPOs in line with the above criteria, the main task was to identify pre-IPO ownership. In some cases, ownership was shared among multiple simultaneous investors. The selection criteria was thus to choose the largest financial sponsor at the time of IPO. To perform this task, SDC Platinum was used and cross-checked with other sources. These include the respective IPO firms' investor relations' websites, IPO prospectuses, and other academic papers primarily using Preqin, Zephyr, and Bloomberg. After cross-controlling the different sources, a sample of 154 firms, including owner prior to the IPO, was established. During the process of manually analyzing the initial sample, five additional firms were excluded. This was either due to i) that the ownership stake of the sponsor was perceived as insignificant, or ii) that the sponsor was not one of the three largest owners at the time of the IPO.

The following step was to retrieve holding period prior to the IPO for all firms in the processed sample. The method was to manually collect data for investment time point and compare to listing date. The investment points were collected from either public reports, media articles, IPO prospectuses, the firms' investor relations websites, or the pre-IPO owner's (the sponsor's) website. Investment point itself depends on investor type. Holding period of venture capital backed firms is measured from the day of the VC investor's initial investment in the firm. Investment dates for buyout backed firms are simply the buyout dates, or purchase dates if the target firm is bought from another financial sponsor. For some of the included companies, only the year, and not the exact date, when the investment occurred could be found. If no further information was found, the investment point was estimated at mid-year (i.e. June 30). For firms where an exact date was missing but the communication suggested that the investment took place either in the beginning or in the end of a specific year, the investment date was estimated at January 1 and December 31, respectively. When IPO dates were collected, only the year and not the exact IPO date was available for some sample listings. For these, the IPO date was assumed to be at either the beginning, middle, or end of the respective IPO years.[4] While performing this task, a total of 15 firms were excluded due to non-available data.

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[4] The benchmark was to choose mid-year if the month was lacking. If, however, we manually managed to retrieve an indication of whether the IPO was executed in either the beginning or end of the certain year, the IPO date was adjusted accordingly.

A last step of attaining the final sample was to collect post-IPO return measures. These measures were obtained from Datastream (providing financial research data published by Thomson Reuters), and include firm specific one- and three year after the IPO trailing total return indices. Total return indices were chosen over price indices since these incorporate dividends, interest, right offerings and other distributions, and thus reflect the actual shareholder return in a better way. 13 firms were exited from the stock markets, either by delisting or bankruptcy, within the three year timeframe and were hence excluded from the sample. Firms delisted or liquidated after the three year time frame were included in the sample to minimize potential risk of survivorship bias. The final sample consists of 121 firms. In *Table A1* and *Table A2* in Appendix, a complete list of the 121 final sample firms, as well as an overview of the sample cleaning process described above, is presented.

3.3.2 Collection of Excess Returns

When evaluating the performance of the sponsored backed IPOs, the so called buy-and-hold abnormal return ("BHAR") has been computed. According to Barber & Lyon (1997), the return for a buy-and-hold investment in a specific firm can be expressed the following way:

$$BHAR_{1,T}^i = \prod_{t=1}^{T}(1 + R_t^i) - \prod_{t=1}^{T}(1 + R_t^{i,BM})$$

where R_t^i represents the simple return of company *i* in period *t*, $R_t^{i,BM}$ represents the simple return of the comparable index in the same time period, and T denotes the time period.

BHAR is the difference between the compounded stock return and the compounded benchmark index return, and thus represents the average multi-year excess return an investor would experience by investing in the specific stock instead of the benchmark index for a given period of time. What is convenient with the BHAR measure is that only four data points are required for its computation (stock price and index level at IPO and after the chosen time frame, respectively). Also, the BHAR indicator is what is mostly seen in previous presented literature, for example Holthausen & Larcker (1996) and Cao & Lerner (2009).

The chosen time span for measuring post-IPO performance, i.e. total excess market return, is one and three years respectively. The advantage of including both one and three year

returns is to avoid relying on one-time events. The one year total return indices aim to capture the short run effect of holding period, while the three year indices examine potential long term effects. In this paper, we use a three-year period for two reasons. First, it allows for measuring long run effects differentiating from those of the one year measure. This, at the same time as it limits the risk of an extensive number of delistings, carve-outs, or bankruptcies, that would increase with even longer periods and thus minimize sample size. Second, the three-year time frame makes our paper comparable and relevant to other studies within the field. For instance, the three year measure was used in the works of Cao & Lerner (2009) and Levis (2011).

The sample's IPO dates were adjusted to end-of-month for all respective months. This, in order to avoid underwriting problems and to simplify the data collection process. The former by excluding the first one or two weeks of market stock returns on average, and the latter by gathering collection points for both firm one- and three year total return indices, and the corresponding market returns.

In order to compute the excess returns for the sponsored IPOs in relation to the market, broad equity indices representing each of the Nordic stock markets were collected from Datastream, at each IPO-date, as well as one- and three years after the IPO. To avoid potential currency effects, each index was collected in local currency. The equity indices chosen to represent the market in Sweden, Norway, Denmark and Finland were the OMX Stockholm All share, Oslo Børs All share, OMX Copenhagen All share and OMX Helsinki All share, respectively. From 2002 and backwards, the Swedish market has been represented by OMX Stockholm 30, because of lack of access to the OMX Stockholm All Share index. One could argue that it would be more accurate to use the equity index that represents the specific list that the IPO took place on, especially for smaller companies listed on for example First North. However, due to lack of data in Datastream farther back in time for smaller indices, in order to keep the sample size large, the use of the four broad equity indices was determined to be reasonable.

3.4. Descriptive Statistics of Final Sample

The final sample consists of 121 Nordic sponsor backed IPOs, of which 81 is BO backed and 40 is VC backed. In *Figure 1* below, we explore the distribution of sponsor backed IPOs between the Nordic countries, and the type of sponsor that backed the IPO.

Figure 1. Distribution of Sponsor Backed IPOs in the Nordics
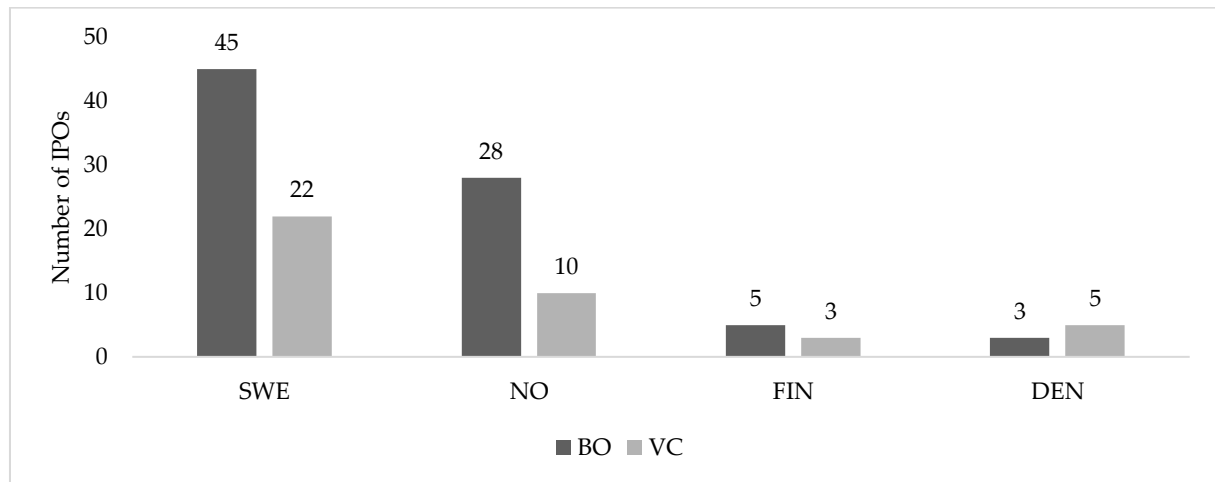
The figure presents the number of sponsor backed IPOs made across each of the Nordics countries, respectively. The distribution is split by sponsor type, where BO refers to buyout capital funds and VC to venture capital funds.

Most of the sample IPOs have taken place in Sweden (67 IPOs), followed by Norway (38 IPOs). In Denmark and Finland, the number of sponsor backed listings amounts to 8 IPOs each. We argue that the sample distribution constitutes a fair reflection of reality.[5] Furthermore, in Sweden, Norway and Finland, we find that, as for the whole sample, approximately two thirds of all listings were backed by BO, and the rest by VC. In Denmark, the opposite is true.

Figure 2. IPO Activity Timeline
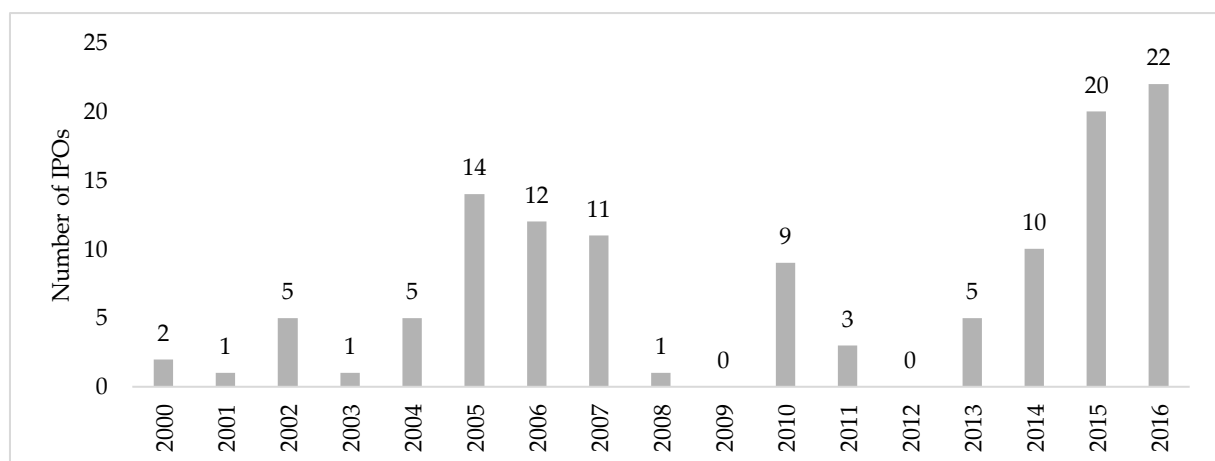
The figure presents the total number of sponsor backed IPOs per year within our sample

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[5] Historically, the majority of the Nordic IPOs have taken place in Sweden, and Norway has been the second largest driver to the region's high IPO activity (Jakobsen, 2020).

Our sample shows clear variations in number of sponsor backed IPOs per year within the chosen time frame. As shown in *Figure 2*, our sample validates the IPO cyclicality that has taken place during the last decades (BNP Paribas, 2020), where booming periods such as 2005 to 2007 and 2014 and onwards had clearly higher numbers of IPOs than other periods. In 2008 and 2009 together, there was only one sample IPO taking place, further strengthening what previous studies have suggested about cold post-crisis IPO markets. These patterns are shown even though our sample only includes sponsor backed IPOs. Hence, sponsor backed IPOs seem to go hand in hand with the general IPO market activity.

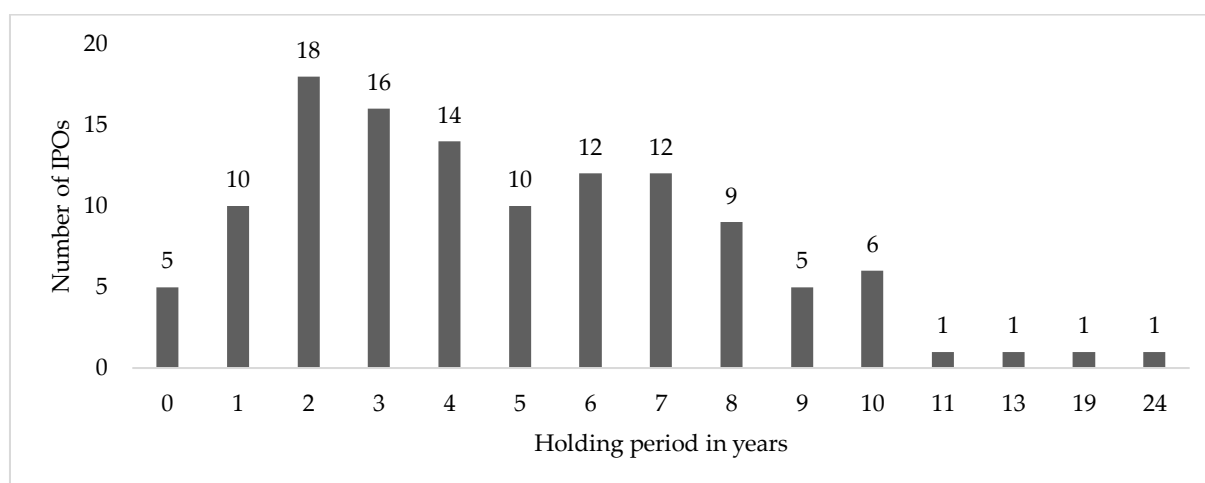By including a broad time interval ranging from 2000 to 2016, the sample illustrates the IPO cycles discussed. A smaller sample focused on a specific time period might have failed to present such differences and thus biased the interpretations of the time invariant IPO activity.

Figure 3. Holding Period Distribution

The figure presents the number of IPOs per holding period length within our sample. Note that each x-axis label signifies a holding period between the stated number and the following, e.g. 0 means 0 to 1 and so forth.

Holding periods previous to the public offerings varied among the 121 sample firms, as shown in *Figure 3*. The shortest holding period was slightly lower than half a year. The average holding period amounts to 5.5 years, while the median holding period was measured at 4.8 years. The estimates are well in line with previous research's suggestions on average holding period, and thus reflects the reality. Holding periods of above 10 years was uncommon, explained by the typical closed-end fund structure of the sponsors. However, four outliers had holding periods of 11, 13, 19, and 24 years respectively. With marginal difference between

mean and median values, there is no significant concern regarding outliers that we need to control for when analyzing the sample.

Interestingly, even though a holding period of approximately five is the average, a period between two and three years is the most common. This reflects a positively skewed sample, with the distribution of holding periods being predominant to the left.

Figure 4. Holding Period Group Split
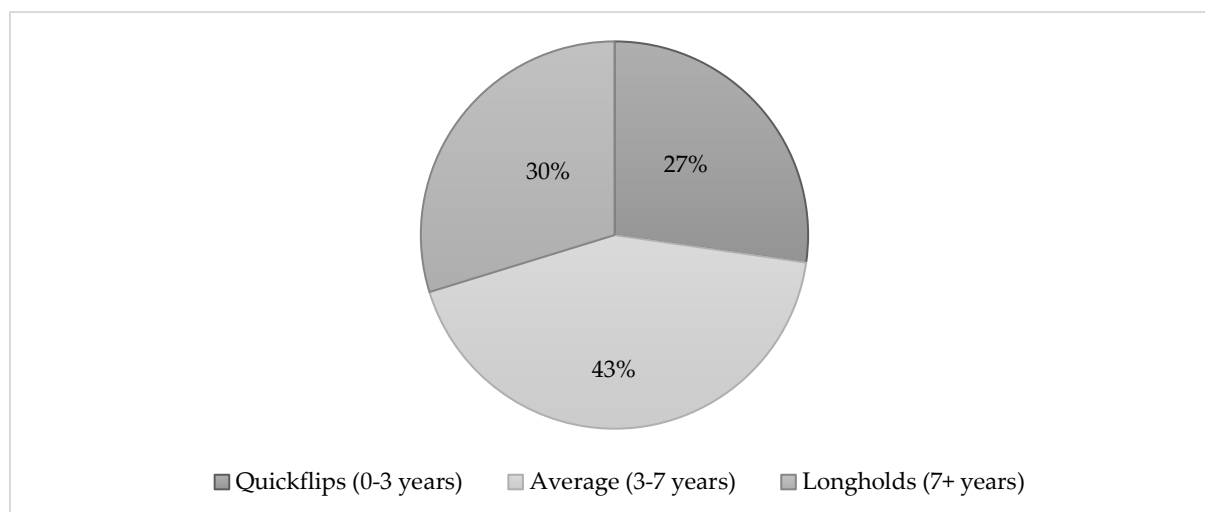
The figure displays a pie chart of the sample's distribution of firms per holding period group.

For the sake of this paper's main analysis, the sample is divided into three groups based on holding period. The groups are established based on what has been presented in previous literature (Benninga et al., 2005; Kaplan & Strömberg, 2008; Schöber, 2008; Söderblom, 2011).

The first group, quickflips, includes 33 firms held between zero and three years. The second, average holdings, includes 52 firms held for between three and seven years. The third and last group, longholds, includes 36 firms held for seven years or more. The distribution of holding period groups are displayed in *Figure 4*. We note that the most common individual holding period length is two to three years (see *Figure 3*), which is included in the quickflip group. However, on average it is more common for a sample IPO to belong to one of the average group's years, than to zero to three or more than seven.

To clarify the variations in holding period per respective IPO year, *Figure 5* splits each IPO year amount into these three groups.

Figure 5. IPO Timeline Split by Holding Period Group
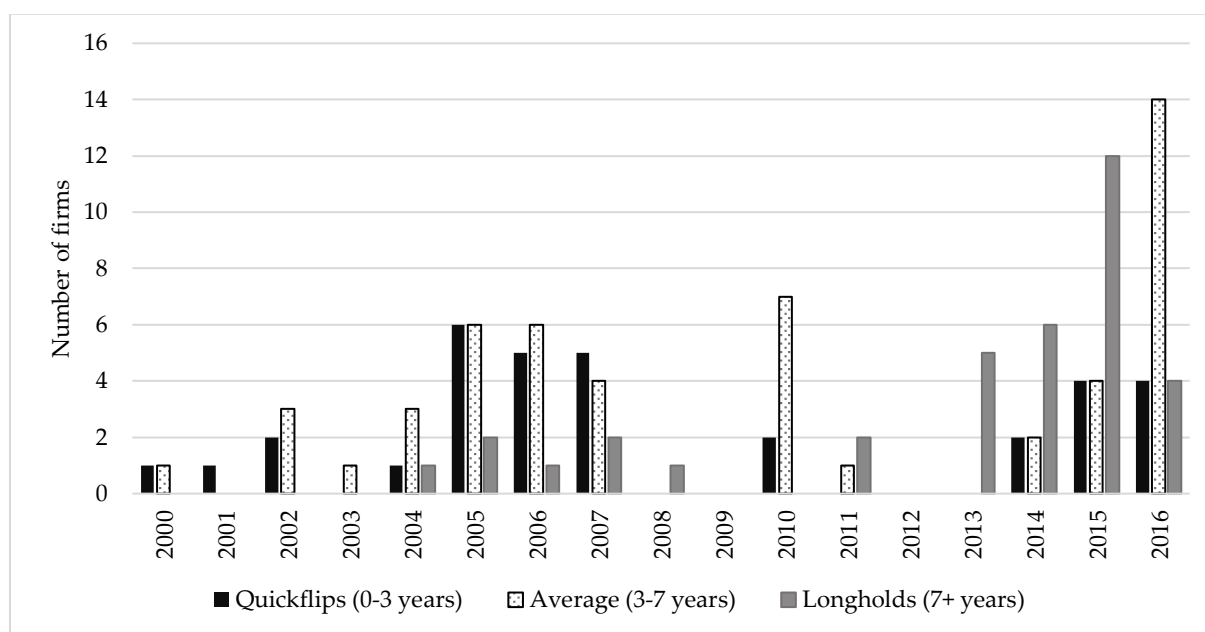
The figure presents a bar chart of the amount of IPOs per year, split by the three holding period groups.

The relative distribution of short holdings is higher in earlier years, while average and longer holdings seem to dominate IPOs taking place in the later years of the studied time period. A reasonable argument of why longholds are relatively more common in the later years is related to the private equity market being fairly young. Longholds have been held longer than IPOs included in the other holding period groups, meaning that these have required a longer private equity market history to even exist. During later years, the Nordic private equity market has existed and grown for enough time, to facilitate a larger relative amount of longhold-IPOs. Our sample does not include any sponsor backed IPO in either 2009 or 2012.

Table 1. Post-IPO Excess Return Statistics across Different Holding Period Groups

Statistics summary - Annual excess returns

Holding period	Mean	Median	St Dev.	Min.	Max.
Excess 1y					
Quickflips	8.0%	-5.8%	47.5%	-71.6%	369.2%
Average holdings	-5.8%	-9.0%	31.7%	-84.2%	167.0%
Longholds	2.3%	-1.7%	24.6%	-71.5%	66.8%
Excess 3y					
Quickflips	0.8%	-9.6%	25.7%	-46.6%	124.6%
Aveage holdings	-0.1%	-7.7%	25.3%	-43.7%	204.2%
Longholds	-1.0%	1.3%	16.7%	-43.7%	43.6%

The table presents mean, median, standard deviation, minimum, and maximum values of post-IPO annual excess returns on both one and three year horizons. The statistics are split by the three holding period groups, respectively.

The return mean is highest for quickflips, both for the one year and three year performance. For the one year performance, the mean amounts to 8.0%, which is more than three times the mean of the second best performing group, which is the longholds, of 2.3%. The one year mean for average holdings is negative at -5.8%. When evaluating the three year performance, the spread of means among the different holding period groups is not as large. It differs 1.8 percentage points between the highest and lowest means. Regarding the median, we see mostly negative values. The median one year excess return is negative for all three holding period groups, varying between -1.7% (longholds) and -9.0% (average holdings). For the three year time horizon, the median is slightly positive for longholds of 1.3%, but negative for the two other holding period groups. Thus, in terms of median excess return, longholds show the best performance.

What should be noted is that, except for three-year longholds, the mean excess returns are influenced by a small number of extraordinary performing firms within each holding period group, resulting in a somewhat overstated performance. This is further supported by the median values, which compared to the means are consistently lower. Regardless, based on the mean and median values, there is no clear indication of market outperformance of the sponsor backed IPOs, neither at one- or three year time frame. Rather, at a first glance, there seems to be a tendency of underperformance, even though further analysis is required to be able to draw any conclusions.

As presented in Section 2.4, patterns in line with Napier et al.'s and Hsu's findings of longer holding periods resulting in greater post-IPO performance, or the findings of Schöber and Cao & Lerner of a hump shaped influence from holding period, is not apparent in our data. There neither seems to be any relationship between the mean and median excess returns and time frame. For quickflips, the mean and median excess return is higher for the one year period than the three year period, while for average holdings the results are the opposite. For longholds, there is no clear pattern at all.

Furthermore, we see that the minimum values are pretty similar for all holding period groups for the one year period and three year period, respectively. However, when comparing the two, the minimum values are almost twice as low for the shorter compared to the longer time frame. Among the maximum values, there is a big spread, varying between 66.8% and 369.2% for one year excess returns and 43.6% and 204.2% for three year excess returns. Overall, the standard deviation is higher for all holding period groups in the one year- than the three year time frame. A possible explanation to the somewhat lower standard deviations among the three year excess returns, is that the sample firms have had more time to stabilize during three years instead of only one. As the excess returns are expressed on a one year basis, extreme one-time events have less impact on the return measure.

Figure 6. Performance per IPO Year
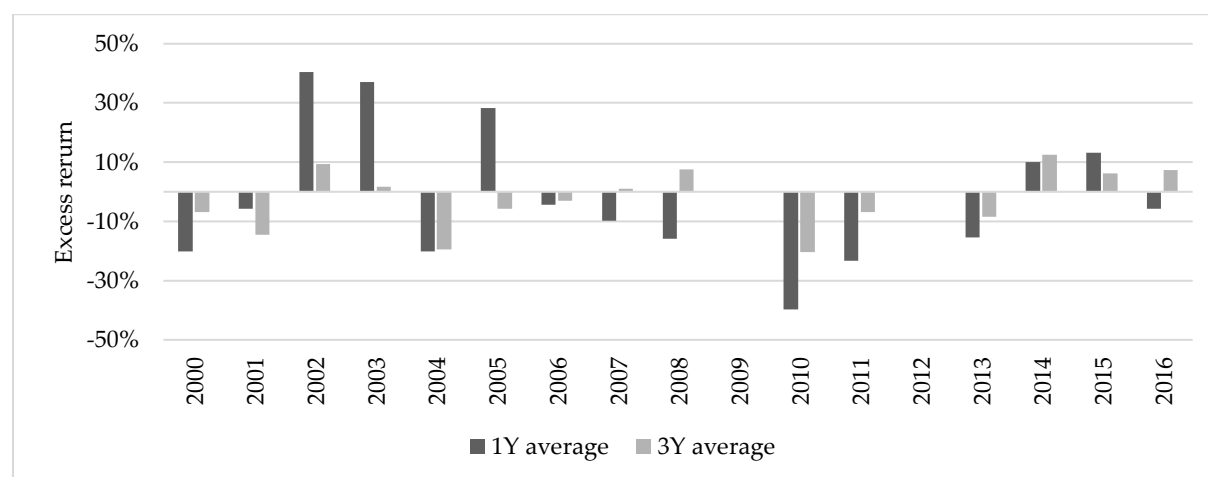
The figure presents 1Y and 3Y excess returns averages for all firms listed per each IPO year, respectively.

Figure 6 displays the mean excess returns on one year and three year bases for IPOs undertaken during each sample year respectively. Overall, we see significant variations in excess returns among firms undertaking its IPO during the respective years. There is no clear pattern, however, the sample strengthens the higher standard deviations for the one year excess returns as

discussed above. For most years, the average one- and three year excess returns are both either positive or negative. This is true for all years except for firms performing the IPO in 2005, 2007, 2008, and 2016. For 2005, the spread is fairly big between the two measures. The one year return measure is positive at 28.4%, while the three year mean is negative. A possible explanation is that the 14 IPOs undertaken during the year on average performed well, but were affected by the financial crisis in 2008 on the three year measure. On the contrary, the 12 firms that went public in either 2007 or 2008 on average display a negative one year return measure, while managing a positive mean three year return. This could be explained by the general market recovery following the 2008 crisis.

Table 2. Basic Statistics of Sample Market Values (MV) at IPO

Size statistics (SEKm)				
Mean	**Median**	**St Dev.**	**Min.**	**Max.**
2 892.27	1 113.00	4 439.35	18.90	33 792.00

The table presents basic statistics [mean, median, standard deviation, minimum, and maximum values] of the sample's market value (MV) measures, stated in SEKm at the respective IPO dates.

Table 3. Size Distribution across Holding Period Groups

Size distribution across holding period groups				
Size group	**Total sample**	**Quickflips**	**Average holdings**	**Longholds**
Small (MV 0-500)	41	13	18	10
Mid (MV 500-3000)	42	13	19	10
Large (MV 3000+)	38	7	15	16
Total	121	33	52	36

The table presents the number of IPOs per each of the three size groups. The amounts are presented for i) the total sample, and ii) the three holding period groups, respectively.

Market values at time of the initial public offerings varied from 19 million to 34 billion SEK. *Table 2* shows basic statistics of the final sample's market values in million SEK. The final sample was split into three different groups based on size, i.e. market value at the time of the IPO. *Table 3* summarizes the sample split and showcases the number of firms per size group. 41 firms belong to the small size group, 42 firms to the medium size group, and 38 firms to the big size group.

It further divides the groups based on holding period belonging. Interestingly, of the 38 largest IPOs (>SEKbn 3,000 in MV), 16 are attributed to the longer holding period group, whilst

only seven are attributed to the shorter holding period group. This might suggest a relationship between holding period and market value at the time of the IPO, reasonably explained by exits taking place later in the target firms' lives, or that sponsors need more time with larger holdings. For small- and medium sized firms, though, the number of firms belonging to each holding period group is evenly distributed. In Appendix, *Figure A1* graphically presents the distribution of IPOs based on holding period among the three size groups respectively.

As the two sponsor types included in the sample differ in several operating ways, we examine how size differs among the two. Table A3 in Appendix presents the mean, minimum, and maximum values of firm MV at IPO for buyout- and venture capital backed firms, respectively. VC backed firms are approximately six times smaller than BO backed firms in our sample.

Figure 7. Distribution of Sponsor IPO Activity
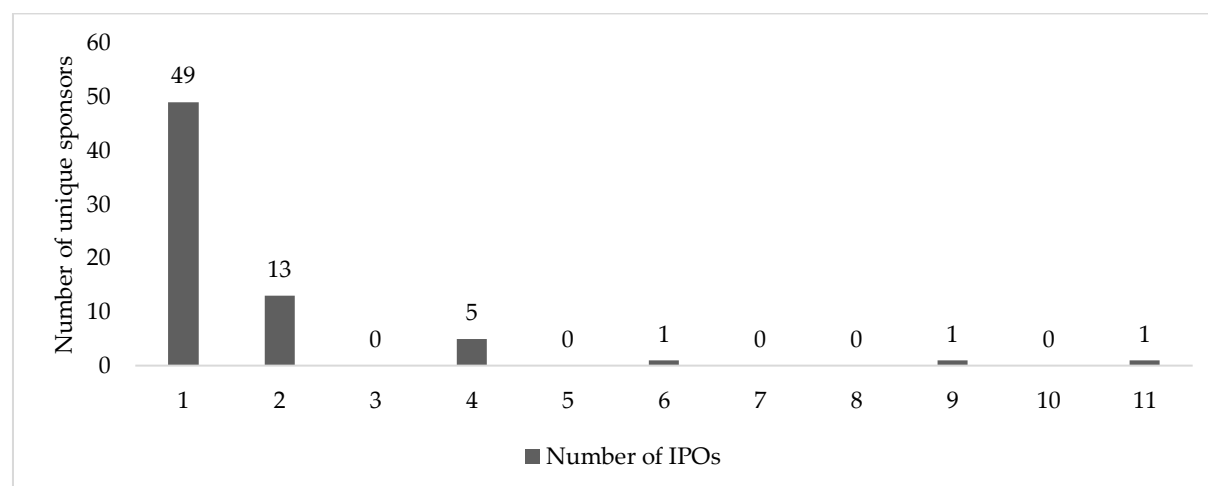
The figure presents the number of unique sponsors per amount of performed IPOs, where 49 private equity funds backed only 1 IPO, 13 funds backed two IPOs, and 5 funds backed four IPOs. Three funds backed six, nine, and 11 IPOs, respectively.

Lastly, we examine the number of unique sponsor firms, as well as the number of backed IPOs per unique sponsor. In our sample, there are 70 unique sponsors, of which a clear majority (49) backed only one IPO during the period from January 2000 until December 2016. The number of sponsors that backed two to four IPOs is calculated to 18 sponsors. The three sponsors that were involved in the largest number of IPOs are EQT, Nordic Capital and Health Cap, backing 11, 9 and 6 IPOs, respectively.

At a first glance, it might seem reasonable to control for sponsor experience when analyzing *Hypothesis 2*, to remove potential biases of having a certain sponsor backing the IPO.

However, based on the methodology used in this study, several reasons not to include sponsor experience in the regression are assessed. First, an IPO backed by one of the so called "experienced" sponsors, would incorrectly be assessed as experienced-backed if it was one of the specific sponsor's first IPOs. Second, bias would appear as a result of high performing sponsors in the earlier years continuing their IPO activity, while sponsors of bad performing IPOs might go out of business or switch focus and thus fall out of our sample as time goes by. Third, as the Nordic private equity market and coherent IPO activity has evolved much during the sample time period, the above suggested way of measuring sponsor experience might be irrelevant. For example, a sponsor backing its first IPO in 2016 will have more historical data to rely on compared to a sponsor completing its first IPO in 2000. Solely relying on number of IPOs undertaken might not be enough to measure sponsor experience.

3.5. Description of Independent Variables

Below, a summarizing table of the variables used in the regression model can be found, followed by a more detailed description of each independent variable.

Table 4. Definitions of Variables

Variable	Description	Denotation
Firm return	Buy-and-hold return for firm i, on one- and three year basis from IPO date	$r_{i,t}$
Index return	Return of the corresponding index y of firm i (OMX Stockholm All-Share, Oslo Børs All share, OMX Copenhagen All share and OMX Helsinki All share), at the same time period as firm i return measures	$r_{index\ y,t}$
Excess return	Firm return over market index return during the very same time period (BHAR)	$r_{i,t} - r_{index\ y,t}$
Holding period	Dummy variables of three groups respectively, defined by time between initial investment of sponsor and IPO exit. The variables take on the value of 1 firm i belong to the holding period group, and 0 if not	$quickflips_i$ $average_i$ $longholds_i$
Size	Dummy variables of three groups respectively, defined by market value of the firm at IPO. The variables take on the value of 1 if firm i belongs to the size group, and 0 if not	$small_i$ $medium_i$ $large_i$
Time	Year fixed effects dummy variables of all IPO years. The variables take on the value of 1 if IPO of firm i happened in the year category, and 0 if not	μ_t
Sponsor type	Dummy variable for sponsor type, specifying if the IPO firm was BO- or VC backed. The variable takes on the value of 1 if the firms was BO backed, and 0 if not	$buyout_i$ $venture_i$

The table presents our regression model inputs by short descriptions and formula denotations.

Holding period

Holding period is referred to as the time between sponsor investment and IPO date and is the main independent variable in this study. After estimating all holding periods, the sample was divided into three groups in order to facilitate regressional comparisons necessary for answering the main hypothesis of this paper. The groups were split according to the following; firms held for three years or less, firms held for between three and seven years, and firms held for seven years or more. This split matches what was stated in the literature review regarding quickflips, average holdings, and longholds.

Time

Existing research suggests usage of fixed effect models in regression analyses where some variables are time-invariant and studied over time. One example pointed out by Yung et al. (2008) is the effect of hot and cold IPO markets, making some IPOs more successful than others dependent on timing of higher average returns in the market. Such scenario would imply higher post-IPO excess returns for firms that time the market well, making other variables' effect on excess returns biased. The descriptive statistics of the sample illustrated clear differences over time among several variables, including number of IPOs undertaken, excess return and holding period. This further argues for the inclusion of year fixed effects in the regression model. To reduce exposure to the unwanted effect of market cyclicality, a year fixed effect model should be adapted. In our study, we add one dummy variable for each of the IPO years. All fixed year dummies respectively tell if an IPO was performed during a specific year or not, i.e. a year dummy takes on the value of 1 if it was and 0 if it was not. This method regards market timing as an omitted variable that may correlate with other independent variables in a study, in our case is 'holding period', without causing bias.

Size

Size premium is one of the factors in the well-known Fama-French three-factor model, and thus a common aspect to account for when analyzing excess returns. According to Fama and French (1992), on average, firms with smaller market capitalization outperform firms with larger market capitalization. Because of this, size is used as a control variable in the regression, defined as the market capitalization of a company at the time of IPO, retrieved from Datastream. The sample is divided into three groups based on market value at the time of the IPOs; 0-500 SEKm, 500-3,000 SEKm, and 3,000+ SEKm, as illustrated in Figure 3. Dummy variables for

these three groups were created to enable controlling of size impact, and take on a value of 1 if the target firms belong to the specific groups respectively.

Sponsor type

Given differences in nature between buyout- and venture capital and as presented in Section 2.3, existing literature tends to focus on one of the sponsor types when analyzing post-IPO performance, and not the two combined. To investigate whether type of sponsor has an effect on the post-IPO performance of a company in our study, we include the type of sponsor as a control variable, taking on the value 1 if the sponsor type is BO and 0 if it is VC. The information regarding type of sponsor (i.e. BO or VC) for each IPO in our sample was retrieved from SCD Platinum and, if needed, supplemented with information from the sponsor's website.

3.6. Econometric Model

In order to predict one- and three year following IPO excess returns of sponsor backed IPOs, to test *Hypothesis 2*, the following model has been obtained:

$$r_{i,t} - r_{index\ y,t} =$$
$$\beta_0 + \beta_1 quickflips_i + \beta_2 longholds_i + \beta_3 small_i + \beta_4 large_i + \beta_5 buyout_i + \mu_t + u_i$$

where $r_{i,t} - r_{index\ y,t}$ equals excess return of firm i at measurement period t, β_0 is a constant representing the intercept, $\beta_1 quickflips_i$, $\beta_2 longholds_i$, $\beta_3 small_i$, $\beta_4 large_i$ and $\beta_5 buyout_i$ represent the different regression dummy variables respectively, μ_t represents year fixed effect at measurement period t, and u_i reflects the residual term.

Several dummy variables are included in the regression; two for the three holding period groups, one for the two sponsor types, and two for the three size groups. Note that only two dummy variables are included for holding period and size, respectively, despite these factors de facto consisting of three groups each. This, as one dummy must be omitted due to multicollinearity and thus becomes embodied in the model's default set-up. For the purpose of *Hypothesis 2*, average holding period and medium sized firms were excluded from the formula and thus embodied in the interpretation of the results. The presented results of quickflips'- and longholds' effect on excess returns, are based on relative measures of that of average holdings. The same methodological fundamental lies behind that of the other independent variables, type and size, as well.

4. RESULTS

4.1. Empirical Findings

To analyze the question linked to *Hypothesis 1*, i.e. whether sponsor backed IPOs outperform the overall market or not on one- and three year horizons respectively, the sample of sponsor backed IPO firms were compared to the coherent market index on one-and three year total return basis. This was done through a one-sample t-test executed in STATA, including total sample excess returns on the two time horizons, as well as three additional t-tests for all holding period groups respectively. This latter part was also executed on both one- and three year excess return horizons. To analyze the question linked to *Hypothesis 2*, we adapt the econometric model presented in Section 3.6.

Table 5. T-test Results of Market Outperformance

	T-test results			
Excess 1y	**Total sample**	**Quickflips**	**Average holdings**	**Longholds**
mean	0.3843%	8.0349%	-5.7936%	2.2949%
t-test	0.0783	0.5615	-0.9709	0.4364
p-value	0.4689	0.2892	0.8319	0.3326
Excess 3y				
mean	-0.1216%	0.7736%	-0.0862%	-0.9933%
t-test	-0.0375	0.1163	-0.0848	-0.2775
p-value	0.5149	0.4541	0.5059	0.6085

The table presents the results of a single-sample t-test of sponsor backed IPO market outperformance, based on excess return estimates on one and three year horizons, respectively. We test for i) the total sample consisting of 121 firms, ii) the group of quickflips consisting of 32 firms, iii) the average holdings group consisting of 56 firms, and iii) the longholds group consisting of 36 firms. The table presents means, t-test, and p-values for all groups on the two performance horizons.

In the first column of *Table 5,* the results of total sample excess return, i.e. market outperformance, is presented. None of the estimates are significant. The one- and three year mean excess return for the total sample is measured at 0.38% and -0.12%, respectively. The remaining columns present market outperformance results for each of the three holding period groups respectively, on both one- and three year return horizons. Despite not being significant result, the table showcases a relatively big spread in mean values among the three holding period groups on the one year return basis. Our results indicate that quickflips, with an average

excess return of 8.03%, are superior to both average holdings and longholds in terms of market outperformance. Lowest mean excess return in our sample is identified for average holdings, at -5.79%. On the three year return basis, all estimated mean values are close to 0%. All in all, we cannot reject the null hypothesis that sponsor backed IPOs have similar or lower performance than that of the market.

Table 6: Regression Results

	(1) Excess 1y			(2) Excess 3y		
	coeff.	t-statistics		coeff.	t-statistics	
Holding period						
quickflips	10.3829	(0.84)	*(0.71)*	0.3354	(0.04)	*(0.04)*
longholds	3.5462	(0.25)	*(0.37)*	-9.0327	(-0.93)	*(-1.17)*
Additional variables						
buyout	29.6714**	(2.39)	*(2.02)*	17.5066**	(2.05)	*(1.85)*
small	13.1646	(1.05)	*(0.75)*	-1.3574	(-0.16)	*(-0.12)*
large	-6.9917	(-0.51)	*(-0.54)*	-14.6100	(-1.55)	*(-1.37)*
Year Fixed Effect	Yes			Yes		
Constant	-61.5457**	(-1.51)	*(-2.58)*	-23.7970**	(-0.85)	*(-2.00)*
R2	0.1904			0.1242		

The table presents the results of our main regression models for all independent variables, respectively. The coefficients predicted by model (1) are based on a fixed OLS regression based on one year post-IPO excess return as the dependent variable. Coefficients predicted by Model (2) are instead based on a three year performance period. T-statistics are presented in parentheses, where italic t-values correspond to robust standard errors. Significance levels at 10%, 5%, and 1% are demonstrated with *, **, and ***, respectively, and do not change with robust standard errors.

Table 6 presents the results obtained from the regression constructed for *Hypothesis 2*. None of the results presented for the main independent variable, holding period, is significant and the model does not provide sufficient support for *Hypothesis 2*. As the table reveals, the coefficient for quickflips is positive at 10.38 on one year excess return in relation to that of average holdings. Also longholds seem to perform better than the average holding group under the same model, but to a somewhat lower extent (3.55). When testing the model on three year excess return measures, the results are somewhat different. Quickflips still have a slightly positive coefficient, however, it is close to zero and its effect is hence not more explanatory than that of the default group consisting of average holdings. For longholds, the coefficient now shows a

negative effect of -9.03 percentage points over that of the average holding. Based on the presented results, it is not possible to demonstrate outperformance of average holdings to either quickflips or longholds.

None of the results provided for the size variables are significant on any of the two horizons. The small firm coefficient is positive at 13.16 when testing one year excess return impact. The large firm coefficient, though, is negative at -6.99. The coefficients imply that it is better to be small sized than medium- or large in terms of market value at the IPO date, when it comes to outperforming the market in the short-term. They do not imply that small sized firms always outperform the market, or that large sized firms always underperform the market, but instead indicate the additional impact of being smaller or bigger than the average IPO firm has. As *Table 6* further presents, both the small- and large firm coefficients are negative when testing for impact on three year excess returns, at -1.36 and -14.61 respectively. Even though the interpretations of these results are not supported by significant estimates, the negative large size coefficients for each return period indicate that larger sized firms are inferior to small- and medium sized firms when controlling for holding period and sponsor type.

As opposed to the holding period and size variables, the results linked to sponsor type provided significant estimates. On a one year excess return basis, *Table 6* presents a coefficient of sponsor type, i.e. effect of the IPO firm previously being buyout backed instead of venture capital backed, of 29.67. The coefficient explains that the buyout sponsor type has a positive effect on one year excess returns, when controlling for holding period and firm size. The coefficient is significant at a 5% significance level, both with and without testing for robust standard errors. On a three year excess return basis, the sponsor type coefficient is 17.51. It is significant at a 5% significance level. Altogether, this independent variable adds to the model by significantly stating the positive effect of sponsor type. In other words, buyout backed firms outperform venture capital backed firms when controlling for holding period and firm size.

4.2. Test Diagnostics

R-squared values of the two regression models are expressed in *Table 6* in Section 4.1. These measures interpret the strength of the constructed models, or the explanatory capacity, and specify how much of the response variable that can be explained by adopting the model. The first model, with a one year horizon, has an R-squared value of 0.1904 and thus succeeds in predicting 19.04% of the variance in sponsor backed IPOs aftermarket excess return performance. The second model, with a three year horizon, manages to explain 12.42% of the

intended excess return prediction. As presented in the regression result table, the regressions were performed both with and without using robust standard errors. However, the results were unaffected by the inclusion of robust standard errors.

As described in Section 3.2, we calculate the VIF in order to check for multicollinearity. The output of the VIF values are presented in *Table A4* in Appendix. The highest VIF value among our model's independent variables is 1.82 and belongs to *longholds*. We thus argue that multicollinearity is not a severe problem in our regression. To test for endogeneity, we also investigated the correlation between the error term of the regression and any independent variable. The results did not create reason for concern.

4.3. Limitations of Data Sample

The data used in the study has several limitations. During the task of selecting our final sample, several steps may have caused bias problems. 15 firms were excluded due to lack of complete data. Sample data was obtained through multiple sources, as discussed in the data collection section, and the fallout of sample firms due to missing data could thus have been biased by our source selection process. One such potential concern regards IPOs taking place in the earlier years of the studied time period, as source alternatives and access to data might be minor to that of later years.

A second limitation of the study is the sample size itself. Even though the selected geographical scope, the Nordic market, covers the four submarkets of Sweden, Norway, Denmark, and Finland, the number of sponsor backed IPOs during the chosen time frame is limited to 121 firms. Further, a fairly broad time horizon of all years [including and] between 2000 and 2016 was adapted. Including additional countries or an increased period farther back in time of time would make our particular research topic less relevant. A sample of Nordic sponsor backed IPOs of 121 firms could thus be viewed as adequate, but it is still relatively small when compared to similar research.

A third concern is the inclusion of not only four different countries, but also several market places within these. For the Swedish sponsor backed IPOs, both First North Stockholm and Nasdaq Stockholm were included in the selection criteria. For Norwegian IPOs, OMX Oslo and First North Oslo were included. For Danish and Finnish IPOs, the main markets Nasdaq Copenhagen and Nasdaq Helsinki were used respectively. In addition to these, the Nordic growth focused list Spotlight was included in the selection criteria. Despite facilitating

constructing a larger sample, potential hidden biases could exist when testing for market performance on several diverse market places.

Another potential limitation worth mentioning is underpricing. Underpricing is defined as the difference between IPO price and the closing price at the first day of trade, and is extensively studied in previous literature. Underpricing thus affects first day returns directly, and the phenomenon would bias the excess return estimates (Dietrich, 2012). To account for this, first day returns are fully excluded from the estimations. Starting date of the one- and three year time periods respectively are equal to our estimated IPO dates, which are assumed to be the last day of the actual IPO month. However, some IPOs will thus be rounded to closing price at the actual IPO date, whereas others will be assumed to have taken place even weeks afterwards. As underpricing can be somewhat turbulent, it may impact not only first day returns but also the following days or weeks, meaning that it might get through our control action. Further, the level of underpricing might differ among buyout- and venture capital backed IPO firms, as level of experience, pricing processes, and ownership fundamentals differ. It thus raises an additional source of bias within the sample. Altogether, the arguments flag for a potential limitation in terms of underpricing bias, and are controlled for in the most applicable way.

The hypothesis testing in this paper required collection of pre IPO-ownership data. As the process of obtaining both sponsor type data and holding period estimates included manual considerations, it might have created bias and limited the sample effectiveness. First, the decision of whether the sponsor was buyout- or venture capital structured was in some cases hard to determine. Some sponsors had multiple focus areas, or went out of business many years ago making it hard to access fund information. Under these circumstances, manual considerations were made. In other cases, the sample firm was owned by several sponsors simultaneously, after which the largest owner at IPO was selected. This selection criteria seemed most relevant, but might have caused selection bias. Second, holding period was estimated by measuring the period in between the sponsor investment date and exit, i.e. IPO date. In some cases, the investment date was rather unclear, either because the sponsor made several investments during a period of time, or because the firm had multiple private equity sponsors simultaneously. In these cases, the investment date was assumed to be the day of the initial, first, investment made by the largest sponsor at IPO.

The chosen approach to measure excess return of sponsor backed IPOs was to compare the stock return of each sponsor backed firm with the return of the whole market over the same time period. One could argue that it would have been more appropriate to create a control group

of non-sponsor backed IPOs each year and then compare the return of the sponsor backed firm with the control group. The broad market indices to a large extent contain companies with stable cash flows that have been publicly traded for a very long time, and might not constitute a fair benchmark to newly listed companies, which often are younger with less stable cash flows. However, this would require a completely different statistical framework compared to the one we have used, and data limitations further complicates such study.

5. DISCUSSION

5.1. Market Performance of Sponsor Backed IPOs

No significant results are identified related to sponsor backed IPOs' market outperformance in the Nordics. Our model does hence not provide sufficient support for rejecting the null hypothesis linked to *Hypothesis 1*. The results differ from several previous studies brought up in the literature section. Schöber (2008) and Cao & Lerner (2009) both presented evidence of BO backed firms outperformance on the US market. Further, van der Geest & van Frederikslust (2001), Bergström et al. (2006) and Levis (2011) did the same on the European market. These studies, however, were generally conducted on samples considerably larger than that of ours. They further consisted of IPOs made notably earlier than those in our sample, most of them adapted a time horizon ranging from the 80's or 90's until early 2000. Moreover, the studies were executed on markets other than the Nordic, giving rise to geographical differences that might explain more than a public firm simply being previously sponsor backed or not.

The results do, however, contribute with an interesting remark linked to market outperformance. On the one year horizon, the mean estimates for each of the three holding period groups differ with a spread ranging from -5.79 percent for average holdings to 8.03 percent for quickflips. On the three year horizon, the spread is negligible with excess return means close to 0 and in no case below -1 percent or above +1 percent. A plausible explanation to the descending spread in excess returns (between the one year and three year horizons) among the groups, is the favorable IPO market conditions that quickflips commonly enjoy while being subject to the sponsors' market timing actions. The results indicate that these benefits diminish on the longer term, probably as the negative aspects linked to not being optimally prepared for public trading kick in. Holding period thus seems to have an impact on post-IPO performance at a first glance. However, as the spread decreases it looks like the effect of holding period is overcome by other factors over time. Moreover, opposite to the inverse U-shaped effect of holding period hypothesized in *Hypothesis 2,* the one year horizon results of *Hypothesis 1* indicate a normal U-shaped pattern (with quickflips and longholds being superior to average holdings). Despite not being significant results, the dispersed findings raise possible conclusions connected to holding period's effect on the relative market performance. It is still interesting to analyze the results of the econometric model, including relevant control measures, to better understand the effect of holding period on sponsor backed IPOs aftermarket performance. In the following section, we thus dig deeper into the what among the sponsor backed IPOs that actually affect post-IPO excess return.

5.2. Holding Period Influence on post-IPO Performance

No significant results are identified regarding outperformance of firms held between three and seven years prior to IPO, in relation to either quickflips or longholds, neither when using one- or three year excess return as the performance measure. Our model does hence not provide evidence of any effect of holding period on post-IPO performance among Nordic sponsor backed IPO firms. The hypothesized outcome was that an average holding period is superior to both quickflips and longholds in terms of preparing a firm for a public listing. Aftermarket performance should thus be affected in an inverse U-shaped pattern dependent on holding period. As the study does not provide such evidence, the null hypothesis cannot be rejected and *Hypothesis 2* is thus not significantly supported.

A crucial aspect to consider is the fundamental behind our formulated hypothesis. The inverse U-shaped pattern evidenced by previous literature (Schöber, 2008; Cao & Lerner, 2009) is based on studies including firms backed by buyout capital solely. A plausible explanation to why our study fails at supporting our main hypothesis is that it comprises sample firms backed by both sponsor types. Research of holding period impact applied on venture capital backed firms has contributed with findings on a straight relationship between holding period and performance, implying superior returns of longer held firms (Napier et al., 2001; Hsu, 2009). Our study includes venture capital backed firms in the sample while still adapting the hypothesis of an inverse U-shape pattern (that has, in previous research, only been evidenced for buyout firms). The fundamental behind this chosen methodology was to gain a sufficient sample to enable the research on the Nordic market, while still assessing the sponsor types as fairly similar in owner characteristics. Further, the complete set of existing literature presented altogether led to our assessment that an inverse U-shaped relationship was most plausible to hypothesize. Another remark regards the difference in sample size between previous literature and this paper. The studied samples of Schöber (2008) and Cao & Lerner (2009) comprise 921 and 495 sponsor backed IPOs, respectively, while ours contains 121.

Several additional reasons that may explain the insignificant results connected to *Hypothesis 2* are identified. First, despite not being significant, we find a negative relation between firm size and performance. This is in line with the three-factor-model of Fama & French (1992), suggesting that smaller firms perform superior to larger firms on the public market. Such relationships could bias the result of holding period effect on trailing market performance, as shorter held quickflips are likely to be small in relation to firms that have

developed and matured under a sponsor's holding for a longer time. Second, the sponsors' ability to time the market is a possible source of bias. A sponsor can exit a portfolio firm through an IPO at either an earlier or later stage than what is de facto optimal for the firm's conditions to perform well as a public firm. An IPO performed after six years of sponsor holding, i.e. in the later stage of the average holding period span, would possibly have been better off under sponsor holding for a few more developing years before going public. In that case, the firm is subject to market timing benefiting the sponsor in terms of favorable exit valuations increasing their investment multiple, at cost of the portfolio firm's lower success as a publicly owned company. The scenario exemplifies how market timing might bias the effect holding periods actually has on aftermarket performance of sponsor backed IPOs. Third, our study significantly proves an effect of sponsor type by a positive relation between being BO backed, rather than VC backed, and aftermarket performance. This aspect further influences market timing and size components, as buyout- and venture capital sponsors commonly differ in such ways. We conclude that sponsor specific traits have relatively stronger influence over post-IPO trailing performance than the other studied variables. Hence, the sponsor itself seems to be the most interesting aspect driving the results of this paper. As the model of our study includes both of the two sponsor types, the identified significant effect of the variable might bias the estimations of the remaining independent variables.

5.3. Sponsor Type Influence on post-IPO Performance

We find that VC backed IPOs significantly underperform those that are BO backed previous to the IPO, measured on an aftermarket excess return on one- and three year horizons. The findings of the relative differences in performance amongst the two are further strengthened in existing literature. The academic consensus is that BO backed IPOs are superior to the market (Bergström et al., 2006; Schöber, 2008; Cao & Lerner, 2009; Levis, 2011), while similar studies on VC backed IPOs are mixed. Possible reasons justifying our results are linked to the fundamentals of venture capital relative to those of buyout funds. VC funds typically own minority stakes and thus face less control mechanisms during the holding period prior to the IPO. This causes two main structural disadvantages, including i) the fund's ability to influence the firm to become optimally ready for the public listing, and ii) the fund's power to time the market.

The former can be connected to the less refined corporate governance structures within the VC fund, appearing as a result of being dependent on shareholder agreements including

multiple owners. The main aspects analyzed in this paper include the effect of previously sponsor backed firms, and several aspects of how the ownerships of these were structured before going through an IPO. Hence, focus is directed at the sponsor and not the firm itself. With this in mind, it can easily be understood how the hypothesized question whether sponsor holding period affects post-IPO performance or not becomes somewhat less relevant when the sponsor is more constrained due to preset shareholder agreements, lower ownership stakes, and less mandates to impose certain improvements within the portfolio company. However, the study does not achieve significant results of either under- or outperformance of sponsor backed firms relative to the overall market. We must thus remember that being less able to influence as a private equity sponsor does not automatically mean lower performance of the portfolio company. Within our sample, there is no significance in that either VC- or BO ownership is positive for future achievements of a target firm. What we do find, however, is that those firms previously BO-backed significantly outperform those previously VC-backed. The latter of the two disadvantages, i.e. the fund's ability to time the market, is simply linked to a minority shareholder's lower power to decide upon exit time. VC sponsors commonly need to take other owners' opinions into account and may thus lose the power to time the market, even though they possess the capacity of doing so.

The significant underperformance of VC backed firms is extra noticeable when assessing one year excess return measures. As presented in the result section, the coefficients of being BO backed rather than VC backed are 29.67 and 17.51 for the one year- and the three year excess return estimates, respectively. This means that a BO backed firm is by our model predicted to perform on average 29.67 or 17.51 percentage points better than a VC backed firm for the two aftermarket periods. It does not determine how much better than the overall market the target firm will perform, but explains a significant difference by being backed by one of the two sponsor types. One possible interpretation regarding the additional effect shown for excess return on the shorter time period is that the target firm has been less affected by the market and being a public firm. During the first year of public trading, a firm can to a larger extent rely on pre-IPO characteristics and fundamentals put forward when preparing the firm for an IPO. In other words, impact of previous ownership is likely to be reduced over time and less significant after three years of public trading.

Worth noting is that VC- and BO backed firms in our sample differ in terms of size. A positive relationship between sponsor type and firm size at IPO was identified, meaning that a BO backed firm on average had a six time higher market value than a VC backed firm at the IPO date. By connecting the Fama & French findings to our observed effect of sponsor type

and identified size characteristics in the sample, one possible conclusion is that our model would have predicted even stronger sponsor type effects if the sample was evenly split in terms of size per the two sponsor backed groups.

6. CONCLUSION

The aim of this paper is to analyze if private equity backed IPOs in the Nordics outperform the market over a one- and three year period, respectively, and whether the holding period of the financial sponsor up until IPO affects the post-IPO performance. It is hypothesized that sponsor backed IPOs do outperform the market, and that an average holding period is superior to a shorter or longer one in terms of aftermarket performance. The major findings, based on a sample of 121 sponsor backed IPOs from the largest Nordic exchanges between 2000-2016, are as follows.

First, we conclude that outperformance of sponsor backed IPOs relative to the market, over one- and three year periods, is not statistically significant. When splitting the sponsor backed IPOs into three holding period groups, there is no significant evidence of outperformance either. However, the one year performance of quickflips stands out and indicates a relative higher return. A possible reason is the interrelation between quickflips and market timing. Second, our study does not provide significant evidence of an inverse U-shaped relationship between holding period and stock market performance of sponsor backed IPOs in the Nordics. Unlike what was hypothesized, there is no evidence that a firm held for an average holding period performs better post-IPO than firms held for shorter or longer periods. Contrary to previous literature that provides evidence of such relationship (Schöber, 2008; Cao & Lerner, 2009), our study applies to the relatively unexplored Nordic market, is limited to 121 sample firms, and contains both buyout- and venture capital backed IPOs rather than buyout only. We argue that the lack of support of our main hypothesis further may be linked to size, market timing, or sponsor type biases. Lastly, we find a significant effect of sponsor type on post-IPO performance and identify that BO backed firms outperform VC backed firms, both on the one year- and three year horizon. The existence of structural distinctions between the sponsor types, such as governance impact and ability to time the market, affects the sponsor's capacity to make a positive impact on the portfolio firm prior to the IPO. The results showcase how sponsor specific traits impact private equity backed IPOs' aftermarket performance, and are hence considered a real driving force to the studied topic.

The contribution of this paper to existing literature of sponsor backed IPO performance is valuable for a variety of reasons. The number of sponsor backed IPOs is growing and an increased understanding of driving forces behind their aftermarket performance is thus relevant. This applies to several parties including, inter alia, the sponsors themselves, companies aiming for IPO, and private investors. Further, the study is performed on the Nordic PE market. Even

though the Nordic region is a top performing private equity market of the world, most of the existing research on performance of sponsor backed IPOs is based on the US- and UK markets. Also, the specific topic of holding period influence is relatively unexplored, adding a new perspective to the research field.

6.1. Future Research

To increase the explanatory value of our model investigating holding period impact, we suggest future researchers to separate sponsor types in the main regression model. As impact was significantly found among the distinction of being BO- or VC backed, it would be of interest to analyze the holding period variable unbiased from a sample including both sponsor types. However, such analysis would require a larger sample than what was feasible in our case. As the market in our study was limited to the Nordics and included sponsor backed IPOs between 2000 and 2016 only, the final sample was not more than 121 firms. To increase the sample size, the geographical area could be extended to include additional countries in Northern Europe. Another method is to increase the time horizon. We suggest other researchers not to include IPOs taking place before 2000, though, as private equity market characteristics differed severely from those of later years and thus might affect the comparability within the sample. A significant number of IPOs has taken place during the last years in the Nordics, and it is thus encouraged to include these when possible to gain a larger sample.

Another suggestion is to include additional independent variables to increase the explanatory value of the model. One relevant factor to add would be sponsor experience. This could be done by studying the sponsors' experience in terms of number of executed IPOs, their witnessed prestige and reputation, and GP track record. Such study would clarify more of the sponsor/IPO firm relationship, reduce potential sponsor experience bias, and create better fundamentals for predicting the effect of holding period. One reason why this variable was excluded from our model is that several concerns regarding reverse causality appeared. Measuring the number of IPOs as a criteria for experience gives rise to time invariant effect issues. Collecting data for reputation and expertise, or GP track record, would further imply loads of manual tasks and potentially lacking data limitations. If these issues could be overcome, including sponsor experience is highly suggested. One last recommendation based on our findings is to investigate market timing and its interrelation with holding period further. A qualitative analysis including interviews with eminent players within the private equity field would increase the understanding of the relationship and thus the relevance of the topic.

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8. APPENDIX

Table A1. List of Nordic Sponsor backed IPOs between 2000 and 2016

IPO firm	IPO date	Country	Sponsor name	Sponsor type
Expert Eilag	2000-05-31	NO	NorgesInvestor	BO
Webcenter Unique	2000-06-30	NO	Norvestor Equity	BO
Scribona	2001-05-31	NO	Norvestor Equity	BO
Apptix	2002-04-30	NO	Convexa Capital	VC
Alfa Laval	2002-05-31	SWE	Industri Kapital	BO
Intrum Justitia	2002-06-30	SWE	Industri Kapital	BO
Ballingslöv	2002-06-30	SWE	EQT	BO
Nobia	2002-06-30	SWE	Industri Kapital	BO
NextGenTel	2003-12-31	NO	Northzone Ventures	VC
Oriflame Cosmetics	2004-03-31	SWE	Industri Kapital	BO
Catch Communications	2004-03-31	NO	Kistefos Group	VC
Mamut	2004-05-31	NO	Northzone Ventures	VC
Findexa	2004-05-31	NO	Texas Pacific Group	BO
Björge	2004-12-31	NO	Norvestor Equity	BO
Polimoon	2005-04-30	NO	CVC Capital Partners	BO
AffectoGenimap	2005-05-31	FIN	CapMan	VC
VIA Travel Group	2005-06-30	NO	FSN Capital	BO
Topotarget	2005-06-30	DEN	HealthCap	VC
Kongsberg Automotive	2005-06-30	NO	IK Investment Partners	BO
Revus Energy	2005-06-30	NO	HitecVision	BO
Hemtex	2005-10-31	SWE	Skandia Investment	BO
Cermaq	2005-10-31	NO	NorgesInvestor	BO
Biotec Pharmacon	2005-11-30	NO	NorgesInvestor	BO
TradeDoubler	2005-11-30	SWE	Tower Brook	BO
Orexo	2005-11-30	SWE	HealthCap	VC
Odim	2005-11-30	NO	Verdane Capital	BO
Grenland Group	2005-12-31	NO	NorgesInvestor	BO
Funcom	2005-12-31	NO	Northzone Ventures	VC
KappAhl	2006-02-28	SWE	Nordic Capital	BO
Salcomp	2006-03-31	FIN	EQT	BO
Gant Company	2006-03-31	SWE	LV Investment	BO
AGR	2006-07-31	NO	Altor Equity Partners	BO
Trolltech	2006-07-31	NO	Teknoinvest	VC
SOBI	2006-09-30	SWE	Priveq Investment	VC
Marine Farms	2006-10-31	NO	Marin Forvaltning	BO
Akva Group	2006-11-30	NO	Teknoinvest	BO
LifeCycle Pharma	2006-11-30	DEN	NB Capital	VC
BE Group	2006-11-30	SWE	Nordic Capital	BO
Lindab	2006-12-31	SWE	Creades	BO
Reservoir Exploration Technology	2006-12-31	NO	Lime Rock Partners	BO
NEAS	2007-03-31	NO	Reiten & Co Capital Partners	BO
Algeta	2007-03-31	NO	HealthCap	VC
Electromagnetic Geoservices	2007-03-31	NO	Warburg Pincus	BO
Nederman	2007-05-31	SWE	EQT	BO
SCAN Geophysical	2007-05-31	NO	Norvestor Equity	BO
Dibs Payment Services	2007-06-30	SWE	Verdane Capital	BO
Endomines	2007-06-30	SWE	Noweco Partners	VC
Pronova BioPharma	2007-10-31	NO	Herkules Capital	BO
HMS Networks	2007-10-31	SWE	Segulah	BO
Norwegian Energy Company	2007-11-30	NO	HitecVision	BO
Duni	2007-11-30	SWE	EQT	BO
Global IP Solutions	2008-07-31	NO	Kistefos Venture Capital	VC
North Energy	2010-02-28	NO	ProNord	BO
ScandBook	2010-03-31	SWE	Accent Equity Partners	BO
Bridge Energy	2010-05-31	NO	Lime Rock Partners	BO
Byggmax Group	2010-06-30	SWE	Altor	BO
CHR Hansen	2010-06-30	DEN	PAI Partners	BO
MQ	2010-06-30	SWE	CapMan	BO
CellCura	2010-10-31	NO	Maturo Kapital	VC
Isconova	2010-11-30	SWE	Innovationskapital	VC
Zealand Pharma	2010-11-30	DEN	BioFund Management	VC
FinnvedenBulten	2011-05-31	SWE	Nordic Capital	BO

IPO firm	IPO date	Country	Sponsor name	Sponsor type
Transmode	2011-05-31	SWE	Amadeus Capital Partners	VC
Boule Diagnostics	2011-06-30	SWE	Siem Capital	BO
Asetek	2013-03-31	DEN	Northzone	VC
Munksjö	2013-06-30	FIN	EQT	BO
Matas	2013-07-31	DEN	CVC Capital Partners	BO
Sanitec	2013-12-31	SWE	EQT	BO
Napatech	2013-12-31	DEN	Northzone Ventures	VC
Bufab	2014-02-28	SWE	Nordic Capital	BO
ISS	2014-03-31	DEN	EQT	BO
Verkkokauppa.com	2014-04-30	FIN	Rite Internet Ventures Holding	VC
Com Hem	2014-06-30	SWE	BC Partners	BO
Scandi Standard	2014-06-30	SWE	Cap Vest	BO
Zalaris	2014-06-30	NO	Reiten & Co	BO
Inwido	2014-09-30	SWE	Ratos	BO
XXL	2014-10-31	NO	EQT	BO
Nextstim	2014-11-30	FIN	Healthcap	VC
Thule	2014-11-30	SWE	Nordic Capital	BO
Dustin	2015-02-28	SWE	Altor	BO
Eltel	2015-02-28	SWE	3i	BO
Asiakastieto	2015-03-31	FIN	Investcorp Group	BO
Nordic Nanovector	2015-03-31	NO	HealthCap	VC
Troax	2015-03-31	SWE	FSN Capital	BO
Tobii	2015-04-30	SWE	Investor Growth Capital	VC
Alimak	2015-06-30	SWE	Triton	BO
Coor Service Management	2015-06-30	SWE	Cinven	BO
Europris	2015-06-30	NO	Nordic Capital	BO
Nobina	2015-06-30	SWE	Lone Star Funds	BO
Pihlajalinna	2015-06-30	FIN	Sentica Buyout	BO
Scibase	2015-06-30	SWE	SEB Venture Capital	VC
Capio	2015-06-30	SWE	Nordic Capital	BO
Bravida	2015-10-31	SWE	Triton	BO
Attendo	2015-11-30	SWE	IK Investment Partners	BO
Dometic	2015-11-30	SWE	EQT	BO
Minesto	2015-11-30	SWE	BGA Invest	BO
Camurus	2015-12-31	SWE	Sandberg Development	BO
Scandic Hotels	2015-12-31	SWE	EQT	BO
Stillfront	2015-12-31	SWE	Acacia Asset Management	VC
FastOut	2016-01-31	SWE	New Equity Venture International	VC
Sjöstrand Coffee	2016-02-28	SWE	New Equity Venture International	VC
Xbrane Biopharm	2016-02-28	SWE	Serendipity Ixora	BO
Humana	2016-03-31	SWE	Argan Capital	VC
Plejd	2016-04-30	SWE	Almi Invest	VC
Tokmanni	2016-04-30	FIN	Nordic Capital	BO
Resurs	2016-04-30	SWE	Nordic Capital	BO
Wilson Therapeutics	2016-05-31	SWE	HealthCap	VC
AcadeMedia	2016-06-30	SWE	EQT	BO
Brandbee	2016-06-30	SWE	New Equity Venture International	VC
Nordic Waterproofing	2016-06-30	SWE	Axcel	BO
Ahlsell	2016-10-31	SWE	CVC	BO
Index Pharamceuticals	2016-10-31	SWE	Industrifonden	VC
Embracer Group	2016-11-30	SWE	Lars Wingefors	BO
Crunchfish	2016-11-30	SWE	Midroc Invest	VC
Acarix	2016-12-31	SWE	Sunstone	VC
Appspotr	2016-12-31	SWE	Almi Invest	VC
Arcus	2016-12-31	NO	Ratos	BO
Edgeware	2016-12-31	SWE	Amadeus Capital Partners	VC
Finepart Sweden	2016-12-31	SWE	Almi Invest	VC
Seatwirl	2016-12-31	SWE	Almi Invest	VC
Smart Eye	2016-12-31	SWE	Fouriertransform	VC

The table presents our final sample consisting of 121 Nordic sponsor backed IPOs, performed between January 2000 and December 2016. The table includes i) IPO firm name, ii) IPO date, iii) country in which the firms was listed at, iv) the main sponsor's name, and v) sponsor type.

Table A2. Data Cleaning Process

Cleaning process	
Initial sample size	154
Data Cleaning Criteria	
i. Not sponsored backed	5
ii. Non-available data	15
iii. Lack of excess return data during measurement period (bankruptcy, delisting)	13
Final sample size	**121**

The table presents the data cleaning process, ranging from the initial retrieved sample of 154 sponsor backed IPOs, to the final sample of 121 firms.

Table A3. Size Statistics split by Sponsor Type

| Size statistics split by sponsor type (SEKm)				
Sponsor type	**No of observations**	**Mean**	**Min.**	**Max.**
VC	40	650.41	18.9	4979.8
BO	81	3999.36	120.82	33792.00

The table presents size statistics [mean, minimum, and maximum values] of the sample's market value (MV) measures, stated in SEKm at the respective IPO dates. The statistics are split by firms backed by the two sponsor types, respectively.

Table A4. Variance Inflation Factor "VIF" test

Variable	VIF	1/VIF
quickflips	1.32	0.757103
longholds	1.82	0.550700
type	1.47	0.679908
small	1.51	0.660540
large	1.75	0.571520
Mean VIF	1.57	

The table presents the VIF values of our main independent variables, and the coherent mean VIF value.

Figure A1. Size Distribution across Holding Period Groups
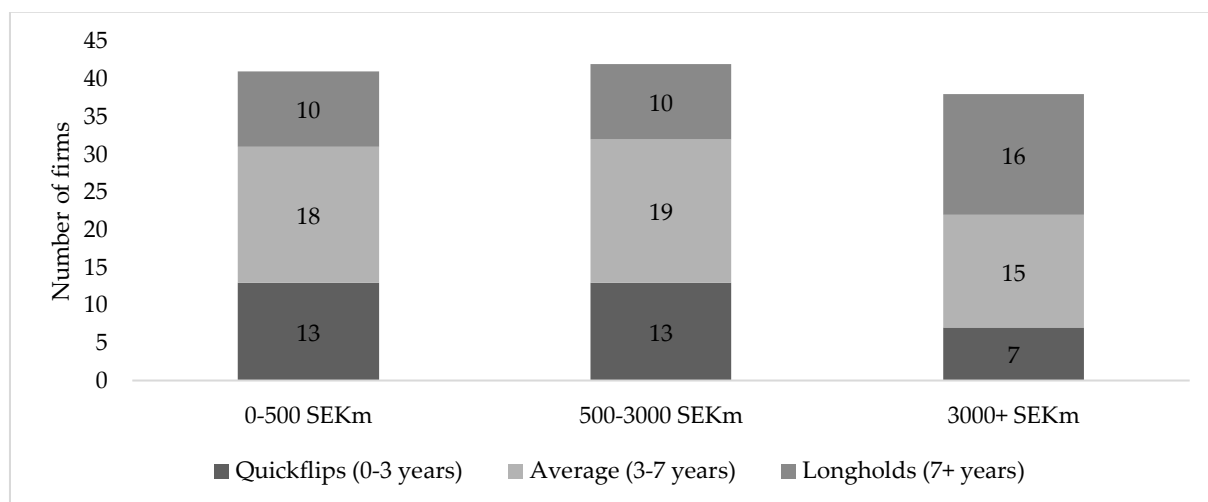
The figure presents the number of IPOs per each of the three size groups, split by holding period group.