Cornerstone Investor Allocation in Initial Public Offerings: Empirical Evidence from the Nordics

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Master Thesis in Finance

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Spring 2017

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Abstract

The 2014-2016 Nordic hot issue IPO market raised a record SEK 156 billion. 37% of which were raised through the newly emerged mechanism of cornerstone investors, where large portions of new issues are allocated pre-IPO. We analyse the impact of the cornerstone mechanism on initial returns to investors using a new dataset of 121 Nordic IPOs of which 31 are cornerstone backed.

First, cornerstone IPOs impose higher underpricing with up to 4.4% higher stock price appreciation 1 to 20 days' post IPO. Second, cornerstone investors receive larger allocations in heavily underpriced issues at the cost of non-cornerstone investors. Using an instrumental variable approach, we determine the causal effect of the presence of cornerstone investors on underpricing.

We propose that the positive relationship between underpricing and IPO cornerstone investors is explained by bandwagon-, crowding-out effects and valuation discounts as compensation for cornerstone investor participation. Our findings are relevant for issuers, underwriters and investors as the short–term costs of cornerstone backing for issuers and profits for IPO investors are quantified.

Keywords: Nordic IPOs, IPO underpricing, money left on the table, cornerstone investors

JEL Classification: G11, G14, G24

Acknowledgements: *We wish to thank our tutor, Assistant Professor Daniel Metzger for his valuable inputs and guidance throughout the thesis writing process. We also want to thank Sebastian Vogel, Ph.D. Candidate in Finance at the Swiss Finance Institute for his comments.*

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List of Abbreviations

2SLS Two-stage Least-Squares

CFE Country Fixed Effects

Cooks D Cooks Distance

EMH Efficient Market Hypothesis

IPO Initial Public Offering

IV Instrumental variables

LIML Limited-information maximum likelihood estimator

MLOT Money left on the table

MTF Multilateral Trading Platforms

PE Private Equity

TFE Time fixed effects

UP Underpricing

VC Venture Capital

VIF Variance In Inflation

VW Value Weighted

I. Introduction

This study focuses on the new trend of cornerstone investors in the recent Nordic Initial Public Offering (IPO) hot market and investigates underpricing and its association with respective cornerstone investors. We further analyse short term returns attributable to cornerstone investors, while controlling for a large set of factors known to influence IPO underpricing.

The Alibaba IPO in 2014 marks the largest IPO to date, raising total funds of USD 25 billion (Forbes, 2014). Saudi Arabia plans to list its national oil company Saudi Aramco in 2018, valued at over USD 2 trillion selling a mere 5% would already raise funds in excess of USD 100 billion (CNN, 2017), over four times the proceeds raised by Alibaba. These examples provide an intuitive picture of the scope and economic impact of IPOs. IPOs benefit (1) the economy, (2) founders and (3) pre-IPO investors like Private Equity (PE) or Venture Capital (VC) funds (OECD, 2013). This is in line with Steven Kaplan from Chicago booth, according to whom IPOs are crucial for an economy as they both foster innovation and allow for wealth generation (CNBC, 2012). The two main advantages per the textbook definition by Berk and DeMarzo (2014) are both improvements in liquidity and access to capital. There are three broadly accepted IPO anomalies: (1) hot issue markets, (2) underpricing and (3) long run underperformance which all have been researched extensively. There is no single explanation for any of these phenomena, however much of it is associated to factors such as information asymmetry due to the lack of historical stock market data and uncertainty about demand for IPO shares (Ibbotson et al., 1994).

A trend from Asia has recently emerged in Europe's IPO landscape known as cornerstone investors. In comparison to traditional anchor investors, allocations awarded to cornerstone investors are guaranteed before the IPO prospectus is issued and the IPO roadshow kicks off. This not only impacts the traditional IPO process but also skews allocations. By August 2016, 46% of the equity offered on the Hong Kong stock exchange year to date had been allocated to cornerstone investors, and is expected to surpass the 50% mark by the end of the year (Financial Times, Hughes, 2016). Empirical implications of this phenomenon as

reported by McGuinness (2014) include higher firm valuation using Tobin's Q in the first 30 days of trading as well as stronger earnings growth post listing.

In a European context, the most renowned cornerstone IPO was Glencore's 2011 dual listing in London and Hong Kong, other prominent examples include Zalando and Rocket Internet on the Frankfurt Stock Exchange in 2014. Given the historical dominance of the cornerstone phenomenon around Hong Kong and Asia, existing studies are not only limited in number but also focused on Asia. Further, almost all existing studies have neglected the impact of cornerstone investors on IPO underpricing outside of the Hong Kong market, which is subject to particular dynamics and regulation. This is understandable as the cornerstone method has historically had a narrow geographic adoption with limitations in both availability of empirical data as well as relevance of the phenomenon itself.

Sweden is currently the only non-Asian country that has adopted the practice of cornerstone backed IPOs extensively. Since the current IPO window in the Nordics opened in Q4 2013 as many as 58 IPO's have closed, raising a total capital of over SEK 150 billion in Sweden, Denmark and Finland. 31 or over 40% of these IPOs are cornerstone investor backed, a phenomenon not earlier recorded in the Nordic markets. These cornerstone investors are commonly renowned financial institutions, investment companies or industrial investors. The absolute majority of Nordic cornerstone IPOs has occurred in the Swedish market, namely 28 of 31. SEK 7.4 billion money was left on the table in these 31 IPOs, where significant profits have been reaped by cornerstone investors receiving large allocations in heavily underpriced issues.

This is also reflected in the attention cornerstone investors and the cornerstone practice overall has received amongst media and other stakeholders, with opinions about the mechanism being wide in amplitude. Prominent stock market pundits such as Gunther Mårder, the previous CEO of Swedish Shareholder Association, voiced significant concerns over cornerstone allocations, arguing that only crumbs remained for retail investors after the cornerstone investors have taken their fair share (Dagens Industri, Jakobsson, 2015). Journalists from the prominent leading Swedish financial daily Dagens Industri, the bench-

mark reviewer of upcoming IPOs as well as investment bankers has praised the existence of cornerstone investors as it both signals and provides for strong long term ownership of the firm which is taken for IPO (Dagens Industri, Strandberg, 2015). Altogether, it is evident that IPO investors as well other stakeholders put significant weight on the profile and amount of ownership allocated to cornerstone investors.

To shed further light on the topic we deploy a new dataset of 121 IPOs including 31 cornerstone backed IPOs from the major Nordic markets which are part of Nasdaq. An analysis of Nordic IPOs in the cornerstone context is particularly relevant given the unique adoption of the cornerstone phenomenon outside of Hong Kong, allowing for empirical analysis with statistical inference.

One key finding of this study is that presence of cornerstone investors has a positive relationship with IPO underpricing. In line with recent IPO research methodology (Bernstein, 2015) we attempt to determine the direction of the causal relationship between cornerstone investors and underpricing using a Two-Stage Least Squares (2SLS) instrumental variable regression to address simultaneity. We use 2015-2016 year dummies as instruments for cornerstone participation alight of the exogenous variation between the emergence and domination of cornerstone IPOs and respective year dummies. The estimated coefficients using 2SLS regression being significant and larger than that of a standard OLS regression, suggest that cornerstone investors are not merely good "stock-pickers" which invest in the most attractively priced IPOs.

We acknowledge that we are unable to control for time fixed effects in our IV regression, which could violate the IV second stage exclusion restriction criterion. We contemplate that the positive relationship between cornerstone investors and IPO underpricing is consistent with *bandwagon, crowding-out* and *fundamental valuation discount* hypotheses. Cornerstone investors make it harder for other institutional and retail investors to receive allocations in popular IPOs. To compensate respective investors for these lower allocations in well-performing stocks, underpricing has to be higher than it would be in the absence of cornerstone investors. Alternatively, cornerstone investors negotiate a discount to the

fundamental value of the firm when setting the IPO offer price as compensation for their participation.

Our study documents important implications on the overall impact of cornerstone investors on the ability of firms to raise capital: The impact of cornerstone backing is quantified with up to 4.4% higher underpricing 1 to 20 days' post IPO. Whether this higher underpricing is caused by *bandwagon-* and *crowding-out* effects or is due to a discount to the fundamental value of the firm in exchange for cornerstone participation should be investigated further. We further caveat that a degree of the observed underpricing could be due to time fixed effects.

Of course, there might also be other ways in which cornerstone investors may impact the ability of firms to raise capital that go beyond mere underpricing. Determining these other channels is beyond the scope of this study. One should therefore not jump to the conclusion that the overall effect of cornerstone investors on the ability of firms to access capital is biased towards either direction.

With this study, we contribute to a total of five research topics: (1) IPO literature, (2) the cornerstone phenomenon, (3) the underpricing phenomenon, (4) the hot issue market phenomenon and (5) Nordic markets.

II. Theoretical framework

IPOs are important for companies as they not only allow to raise equity capital but also establish a public secondary market in which founders and other existing shareholders have the opportunity to convert their stocks into cash (Ritter and Welch, 2002). Due to both lack of historical stock market data and demand for IPO shares, there is a high degree of uncertainty associated with the issuing firm compared to firms already trading in the secondary market. This uncertainty adds to the complexity of the IPO process overall (Ibbotson et al., 1994)

We hypothesise that the presence of cornerstone investors helps to mitigate some of this uncertainty through *bandwagon* and *informational cascades effects* (Low, 2009; McGuinness, 2012; Tan and Ong, 2013), and *certification effects* (Barry et al., 1990; Megginson and Weiss, 1991). McGuinness (2012) finds a positive relationship between the presence of cornerstone investors and underpricing.

Existing literature recognises three IPO anomalies: (1) hot issue markets, (2) initial underpricing and (3) long-run underperformance. These IPO phenomena challenge the Efficient Market Hypothesis (EMH) and puzzle many of its advocates. Given the unique adoption of the Asian cornerstone investor mechanism in the Nordics, we focus our theoretical review on precedent research of cornerstone IPOs, theories of underpricing and Nordic IPOs as these areas are all relevant for analysing IPO underpricing in the context of this study.

A. Cornerstone IPOs

According to Practical Law Magazine (2015) the following informal criteria need to be fulfilled by an investor in an IPO in order to be classified as a cornerstone investor:

1. Subject to a formal or informal lock-up period after the IPO, usually six months
2. Disclosed in the prospectus, i.e. commitment to buy shares before the offering period
3. Acquisition of shares at the offering price

4. Does not seek board representation

Tan and Ong (2013) highlight that cornerstone investors should be distinguished from "anchor investors". While likewise investing large amounts, anchor investors place their orders during the bookbuilding process, and their allocations are not guaranteed. Further, anchor investors are not disclosed in the prospectus and not subject to lock-ups.

Cornerstone investor backed IPOs emerged in Hong Kong, with the IPO of Nine Dragons Limited in May 2006 which included three prominent tycoons as cornerstone investors in the USD 435 million listing. To date Hong Kong is the jurisdiction with the highest occurrence of cornerstone IPOs seen both in number of IPOs as well as in proceeds raised (Espenlaub and Saadouni, 2016). Cornerstone IPOs became standard practice in Hong Kong after the USD 22 billion float in 2010 of Agricultural Bank of China, at the time the world's largest IPO (Tan and Ong, 2013). Recently, the share of offer allocated to cornerstone investors in Hong Kong has surged to record levels above 50%, concerning many stakeholders due to low free float and limited liquidity in the secondary market (Financial Times, Hughes, 2016).

In Europe, cornerstone investor backed IPOs are a recent phenomenon with no legal definition or framework to date. Practical Law Magazine (2015) refers to the IPO of Glencore in 2011 on the London Stock Exchange as the first major cornerstone backed IPO in Europe, with over 30% of the offer allocated to twelve cornerstone investors. Examples of other notable cornerstone backed IPOs in Europe are Zalando and Rocket Internet on the Frankfurt Stock Exchange as well as the debut Swedish cornerstone IPO of Lifco on Nasdaq Stockholm, all in 2014.

While an abundance of literature is available on IPO underpricing, cornerstone backed IPOs have been studied to a limited extent with an almost exclusive focus on Hong Kong. *Appendix A* provides a summary of precedent research on cornerstone backed IPOs.

A.1. Issuer and underwriter benefits

The reason for the emergence of cornerstone investors in Europe is unclear but could be linked to the same logic why cornerstone investors became popular in Asia. Low (2009), McGuiness (2012) and Tan and Ong (2013) argue that signalling and halo effects through the cornerstone backing help provide the necessary confidence and stability needed to support IPOs in otherwise difficult market conditions. Having household names as cornerstone investors in an offering raises the profile of a transaction by demonstrating interest in the offering, lending credibility and stimulating demand. Together these phenomena should have a positive effect on the offer price. These theories however do not explain the presence of cornerstone investors in IPO hot markets, as seen in Hong Kong during 2015 and 2016.

Tan and Ong (2013) further point out that in challenging market conditions the cornerstone tranche does not only serve as a tool to attract retail investors, but can be critical to whether an IPO closes successfully. By guaranteeing that a proportion of the deal will be sold the investment banks have less shares to sell, which clearly assists the success rate of an IPO, especially sizeable ones.

The importance and use of cornerstone investors was already predicted in a study made by Ljungqvist et al. (2006). They concluded that the best way of maximising shareholder value in an IPO is to gradually sell shares to large institutions who can later benefit from strong investor sentiment. The partially selling shareholders can then look forward to share price appreciation of the retained shares in the time leading up to the end of the lock-up period. Loughran and Ritter (2004) also predict the rise of cornerstone investors, suggesting that the best way for an underwriter to conduct an IPO is to allocate as many shares as possible to buy and hold institutions in order to avoid any costly price stabilisation due to share flipping.

McGuiness (2014), Tan and Ong (2013) and Low (2009) studied several effects that cornerstone investors had on the Asian IPO market and concluded that cornerstone backed IPOs show higher post IPO valuation in the first 30 days of trading and higher earnings growth post IPO. By looking at the Tobins Q of cornerstone and non-cornerstone backed

IPOs, McGuiness (2014) concludes that cornerstone investor backing increases valuation. In line with the main sales argument of Asian underwriters, sellers should approach investment banks with good relationships to potential cornerstone investors as it has proven to increase value, suggesting that cornerstone investors are a sign of quality. The results of this study coincide with Boehmer et al. (2006) who suggest that large institutions tend to get better allocations in good issues and that share flipping and noise trading tend to lead to worse performance for newly issued shares. Therefore, underwriters should aim to sell the book in as large chunks as possible while still complying with the listing requirements.

A.2. Cornerstone investor benefits

Low (2009) argues that the rise of the cornerstone phenomenon was due to institutions seeking a guarantee for substantial share allocations in hot issues. Cornerstone investors fulfil this guarantee through commitment to buy large stakes prior to the book building period and by being subject to lock-up periods in Asia. Due to the strong seasonality and hot market pattern of the Asian IPO markets, large share allocations in hot IPOs turned out to be very profitable, resulting in an increasing demand among leading institutional investors to become cornerstone investors. The same rationale of cornerstone investors is also found in secondary offerings and offerings of hybrid capital such as preference shares or convertibles. These offerings are often guaranteed by well-respected investors, sending strong signals to the market.

A.3. Criticism of cornerstone investors

Like all new features in the economy, the rise of cornerstone investors is a debated topic. The main question discussed in Asia and Europe is if cornerstone investors are good or bad for retail investors. Gunther Mårder, the former CEO of the Swedish Shareholders' Association wrote in Dagens Industri (2015) that he is very critical of cornerstone investors, claiming they make it harder for retail investors to participate in popular IPOs. McGuinness (2014) confirms this criticism finding that firms that IPO with cornerstone backing also

experience higher earnings growth post-IPO. McGuiness also criticised cornerstone investors in a similar way claiming that they squeeze out retail investors in attractive IPOs. Further, cornerstone investors also crowd-out non-cornerstone institutional investors.

B. Theories of IPO underpricing

In order to understand the determinants and drivers of IPO underpricing in the context of cornerstone investors, a general understanding of IPO underpricing theories is required. As such we introduce the most broadly acknowledged underpricing theories. As of today, there is a broad spectrum of existing literature addressing underpricing with research documenting positive first day returns as early as 1969 (Reilly and Hatfield, 1969).

Underpricing has severe economic implications as it allows for a transfer of wealth from existing to new shareholders. In the U.S. alone more than USD 27 billion were left on the table during the period of 1990-1998 (Loughran and Ritter, 2004). A multitude of theories attempt to explain the underpricing phenomenon for new issues. These theories are focusing on various aspects of the relationships between investors, issuers, the investment bankers taking the firms public and the flow of information between respective parties. In general, these theories are not mutually exclusive. Furthermore, a given theory can be more applicable to some IPOs than to others.

We follow Ljungqvist (2007) who categorises IPO underpricing theories into four broader categories: (1) asymmetric information, (2) institutional reasons, (3) control reasons and (4) behavioural reasons. We briefly extend Ljungqvist's categorisation with (5) allocation theories alight of the inherent share allocation considerations in a cornerstone IPO as well as valuation theories. *Appendix B* summarises existing studies based on these categories.

B.1. Asymmetric information

Amongst underpricing theories, those based on asymmetric information have the strongest empirical foundation. Here either issuer, investor or intermediary has access to private information.

Winner's curse theory: One of the most famous and widely recognised contributions in the literature on information asymmetry is Akerlof's (1970) market for lemons, which can be directly applied to financial markets. If investors are not able to evaluate the quality and subsequent value of a company, they are only willing to pay an average price for its stock. As such, it is more attractive for owners of bad firms to offer their firms equity than for owners of good firms. Eventually the equity offered to investors would be worth less than the average value of good and bad firms and investor won't even be willing to pay an average price. Rock's (1986) *Winner's curse theory* is based on the findings of Akerlof where underpricing helps to compensate uninformed investors for information asymmetry. Furthermore, the investors that suffer from the winners' curse, also referred to as the least informed, will only ask for shares if they are sufficiently underpriced so that the underpricing covers the loss of compensation from the "unfair" allocation of shares. Rock views underpricing as a necessary measure to maintain participation of uninformed investors in the IPO market.

Market feedback hypothesis: The market feedback hypothesis results from the pricing stage of the IPO-process. Benveniste and Spindt (1989) who introduced the theory were the first ones to view IPO underpricing as a compensation mechanism to extract truthful information from investors. Where bookbuilding is applied, investment bankers may underprice IPOs in order to induce regular investors to reveal information during the pre-offer period, which can then be considered while pricing the issue. In order to incentivise regular investors to truthfully reveal their valuations, investment bankers use underpricing as a form of compensation for respective investors to make them reveal truthful information for a given IPO. Investment bankers must underprice issues for which favourable information is revealed more than those for which unfavourable information is revealed. This leads to a prediction that there will only be a partial adjustment of the offer price from the one initially contained in the preliminary prospectus. Therefore IPOs for which the offer price is revised upwards will be more underpriced than those with a downward price revision.

Benveniste and Spindt conclude that underpricing is a form of compensation for investors to ensure they reveal their true interest and view of the firm's value.

Certification hypothesis: Barry et al. (1990) and Megginson and Weiss (1991) show through what they call the *Certification hypothesis* that venture capital backing results in significantly lower underpricing and gross spreads. Venture capital backing in issuing firms serves to lower the total costs of going public and to help maximise net proceeds of the offering firm. In addition, they document that venture capitalists retain significant portions of their holdings post-IPO.

B.2. Institutional reasons

Lawsuit avoidance hypothesis: Logue (1973) and Ibbotson (1975) contemplated that especially US firms deliberately offer their stocks at a discount to avoid potential future litigation. Underpricing is regarded as an insurance premium by Tinic (1988) in order to reduce legal liabilities on the issuers side. However, the liability issue is rather US specific and as such many studies outside the US find the risk of lawsuits economically insignificant. Examples are the findings of Ljungqvist (1997) for Germany and those of Rydqvist (1995) for Sweden. In a more current study, Ritter and Welch (2002) even argue that the risk of legal liabilities is an insignificant driver of IPO underpricing.

Taxation hypothesis: The second institutional explanation deals with tax advantages of IPO underpricing. Ljungqvist (2007) brings up two examples of tax impacting underpricing. Firstly, Rydqvist (1997) raises the issue in the case of Sweden where capital gains taxes were lower than income taxes before the tax reform in 1990. Therefore, an incentive mechanism was in place to compensate employees through stock rather than salary. The tax reform put an end to this practice and subsequently underpricing in the Swedish market dropped from an average of 41% in the 1980's to an average of 8% in the period of 1990-1994. Secondly, Taranto (2003) points out the incentivisation of underpricing due to the structure of U.S. law. A common way of compensation for managers is through

stock options, which incentivise them to initially price IPOs low to maximise their personal monetary profit through respective options.

B.3. Control reasons

One characteristic of public companies is the distinction between ownership and control. Owners put control in the hands of managers who are supposed to act in the shareholder's best interest. Therefore, managers favour ownership dispersion, as it allows them to exercise control given their own best judgement. This dispersion is achieved through underpricing which leads to excess demand and as such to smaller allocations. This argument is in line with Brennan and Franks (1997) who argue that managers protect themselves and their control through underpricing, which leads to agency costs, i.e. reduced IPO proceeds.

Stoughton and Zechner (1998) argue that it might be in the firms' best interest to allocate large stakes to investors as it increases monitoring. To further increase monitoring and incentivise such investors to take on large stakes which might conflict with their portfolio diversification, underpricing is an additional treat. Underpricing could potentially have a positive effect on the offer price, as underpricing without large investors might have been even larger as uninformed investors would likely ask for a discount in anticipation of agency costs.

B.4. Behavioural reasons

In addition to the previous underpricing theories in line with Ljungqvist (2007), we would like to discuss behavioural explanations to shed further light on the underpricing phenomenon.

The bandwagon hypothesis: Welch (1992) argues that potential investors not only pay attention to their own information about a new issue, but also to whether other investors are buying respective stocks, leading to potential *bandwagon* effects. If an investor observes that no one else wants to buy, he may decide not to buy despite being in possession of favourable information. To prevent this from happening, issuers might underprice an issue

to induce the first few potential investors to buy, and induce a *bandwagon*, or *informational cascade*. As this effect works in both sides, high initial demand for a stock can lead investors to neglect negative information and purchase the issue nevertheless. These informational cascades strengthen the negotiation power of early investors as they can ask for higher underpricing to commit to a respective IPO and subsequently initiate a favourable cascade.

B.5. Allocation theories

Aggarwal et al. (2002) find a positive relationship between institutional allocations and IPO underpricing for U.S. IPOs between 1997-1998. Their analysis finds support for two different explanations. Firstly, the higher allocations to institutional investors is related to the *Market feedback hypothesis* where underwriters desire to price IPOs as high as possible and allocations are traded off against information about pre-market demand. The second explanation they find is based on private information and *Winner's curse theory*. They find evidence for both, the possession of private information by institutional investors which leads to lower participation in underperforming IPOs and the possession of private information by underwriters, who subsequently ensure that institutional investors get limited allocations in underperforming IPOs.

B.6. Valuation theories

An immediate question raised by the difference between the offer price and the first-day market price is whether issuers or the stock market is pricing offerings in line with a firm's fundamentals. The most common method for valuing firms going public is the use of comparable company multiples. Unfortunately, accounting data in many cases is an unreliable measure of valuation since many firms going public are being valued on the basis of their growth projections, not their historical financials. Houston et al. (2006) clarify the relationship between fundamental value discount and IPO underpricing using forecasted earnings data and comparable company valuation provided in IPO initiating coverage research re-

ports. They find that IPOs were priced both at a premium and a discount to comparable companies.

C. IPO underpricing in the Nordics and country variation

IPO underpricing is a global phenomenon, with underpricing observed in every market studied. However, the degree and extent of underpricing exhibits significant variation across geographies. Since this particular study is delimited to a specific geography we provide a short introduction to precedent IPO underpricing research in the Nordic region and country variation.

Loughran et al. (2004; 1994), through summarising existing studies spanning 25 and later 38 countries, conclude that underpricing is observed across all countries with an enormous difference in degree of underpricing spanning between 3.3% in Russia to 239.8% in Saudi-Arabia. Furthermore, they find a positive relationship between IPO hot markets, the inflation-adjusted level of the stock market and IPO underpricing. The authors theorise that the intra-country variation might be due to differences in contractual arrangements such as government interference and IPO mechanism specifics.

Examining the Nordic region, Loughran et al. (2004) find underpricing for 162 Swedish IPOs between 1980-90 to be 38.2% on average. Building on Loughran et al. (1994), Rydqvist (1997) uses an expanded dataset of 335 Swedish IPOs between 1980–1994. He finds that the lower underpricing seen after 1990 is partly explained by the tax wedge between ordinary income and capital gains, which was partly abolished in 1990. After the implementation of the reform average underpricing drops from 41% to 8%.

Westerholm (2006) investigates underpricing in the Nordics between the years 1991 and 2001 with 247 IPO observations. He concludes that underpricing is present and economically significant being 17% on average with 16% in Sweden, 8% in Denmark, 22% in Finland and 22% in Norway. Westerholm also suggest that underpricing is linked to certain hot sectors and time periods, such as the dotcom bubble during 1997-2000, in accordance to the industry clustering theory. Borg and Engberg (2016) report underpricing across the Nordics

to be 9% for both the periods 2005-07 and 2013-16. Further, they show a statistically significant effect of the presence of cornerstone investors on underpricing.

D. Research question and hypothesis

Existing empirical literature has studied IPO markets in terms of (1) underpricing, (2) cornerstone investors and (3) western markets. However, to our knowledge this is the first study analysing all of these factors combined. Borg and Engberg (2016) used a dataset of 20 Swedish cornerstone IPOs during 2014-2015, however we expand this dataset with additional observations constructing the most exhaustive dataset to date containing cornerstone IPOs outside of Asia. Alight of the recent introduction and dominance of cornerstone structured IPOs in the Swedish market, the surge of IPO underpricing during the same period and the lack of precedent research using recent Nordic data, we formulate the following research question:

> *Does the presence of cornerstone investors affect IPO underpricing and the distribution of "money left on the table"?*

In order to further develop our analysis, the condition of underpricing for our sample needs to be confirmed. As preceding studies have reported, underpricing is virtually present in all countries, however the number of companies going public as well as the extent of underpricing fluctuate over time (Ljungqvist, 2007). Hence in order to answer the research question the following three-stage hypothesis needs to be adopted were each of the following null-hypothesises needs to be rejected:

H_1: Nordic IPOs are not underpriced

If $\mathbf{H}_1$ is rejected, IPO underpricing occurs in our sample. This implies that a net transfer of wealth from selling shareholders to IPO investors occurs, referred to as "money left on the table". Megginson and Weiss (1991) argue that disclosure of prominent investor backing could act to lessen information asymmetries by certifying issuer quality. Through certification of issuer quality, such agreements promote higher offer prices and should rein-

in the degree of IPO underpricing. Hypothesis $\mathbf{H}_2$ reflects such considerations. This leads us to the formulation of our second null-hypothesis:

H_2: Cornerstone backed IPOs exhibit no difference in underpricing compared to non-cornerstone backed IPOs

If $\mathbf{H}_2$ is rejected, cornerstone backed IPOs do exhibit higher underpricing and with a corresponding higher wealth transfer between selling shareholders and IPO investors, leading to more "money being left on the table" by selling shareholders. This could be due cornerstone investors validating the level of informed investor interest. As such cornerstone investors may serve to excite demand and promote higher initial returns in line with the *bandwagon* and *informational cascade* theories.

A second explanation for a positive correlation between presence and size of cornerstone investors and IPO underpricing could also stem from crowding-out effects. In the US context, Stoughton and Zechner (1998) argue that, "the ability to ration in favour of large shareholders should be positively correlated with underpricing". This can be clearly related to cornerstone investors as they often take up substantial amounts of total shares offered in an IPO. In our dataset, the highest allocation to cornerstone investors was applied in the IPO of CLX Communications in 2015. 77% of the shares were allocated to cornerstone investors, while 21% were allocated to other institutional investors, leaving only 2% for the retail tranche. This example shows how cornerstone investors crowd out both retail and other institutional investors. Based on the simple relationship of supply and demand, this is an indicator for underpricing in the presence of cornerstone investors and for a positive relationship between underpricing and cornerstone investor allocation.

A third explanation is provided by Aggarwal et al. (2002), according to whom institutional investors earn greater profits than retail investors through IPOs due to information asymmetries. This is due to institutional investors profiting more from the upside through larger allocations of hot IPO issues while sharing the downside with retail investors in less demanded issues. This framework can also be expanded towards the cornerstone – non-cornerstone relationship, supporting the notion that cornerstone investors capture a

relatively larger share of money left on the table compared to non-cornerstone investors. Drawing on this logic we build our third null-hypotheses:

H_3: There is no difference in return of cornerstone investor and non-cornerstone investor capital

IF $\mathbf{H}_3$ is rejected, more underpriced IPOs will also have a larger share of the offer allocated to cornerstone investors, leading to a positive correlation between cornerstone allocations, underpricing and subsequently return on invested capital. In line with $\mathbf{H}_2$ potential explanations for such an observation includes *bandwagon, crowding-out* and *fundamental valuation discount* effects.

III. Empirical Analysis

A. Sample construction

Our dataset comprises of IPOs floated from January 2001 to December 2016 in the Nordic region. The onset of cornerstone backed IPOs in Sweden started as late as 2014, however in order to make a robust estimation of regression control variables as well as reaching a sufficient number of IPO observations we expand the studied period to 2001. As noted by Schuster (2003), there is broad similarity in the overall and cross-sectional initial pricing and long-run performance patterns of European IPOs across countries. Westerholm (2006) also concludes that the Nordic countries are similar institutionally and economically, enabling us to group IPOs across the Nordic countries. However, in one aspect we depart from Westerholm (2006) by excluding Norwegian IPOs in our sample due to the absence of cornerstone IPOs in Norway and the different regulatory and commercial conditions beset upon the Norwegian market. As the only stock exchange not owned by Nasdaq, Oslo Börs has different listing requirements compared to its other Nordic counterparts. Oslo Börs' unique sector focus on shipping, energy and seafood as well as the generally higher risk appetite in the Norwegian market induces risk of lower comparability between IPO markets. We follow Westerholm and exclude the smallest country of the Nordics, Iceland, due to the small capitalisation of its stock market as well limited data availability.

We acknowledge that an alternative to increasing the geographic delimitation and adding multiple countries to the sample is to extend the time window of our study by going further back in time. Going back to 1990 and excluding IT bubble IPOs results in 176 observations. However, given that cornerstone backed IPOs are such a recent phenomenon in the Nordics we argue that a geographic expansion of the sample as opposed to extending the sample period further back in time yields a more robust estimation of regression control variables. This approach is supported by the methodology of Schuster (2003) as well as Westerholm (2006). The time variation of IPO underpricing, the so called "hot-market" phenomenon documented by Lowry et al. (2010) further supports this approach. Furthermore, there

are institutional differences between the equity markets of the 90's compared to that in the 2000's, such as privatisation of exchanges, EU legislation, prevalence of electronic trading and the composition of institutional investors. Regardless, we note that the clustering of our study variables in the final years of our dataset as well as the relatively small amount of observations of our study variable is a limiting factor in our analysis. We limit our sample period initiation to 2001 in order to exclude IPOs during the IT bubble. By excluding the IT bubble, we also exclude one of the strongest IPO hot market periods ever recorded, as the market conditions from the IT bubble might not be representative for the 2001-2016 IPO market.

Comparing cornerstone data collected in this study to previous studies which employed 79–179 observations as outlined in *Appendix C*, the recent streak of cornerstone IPOs in the Nordics with 31 observations provides a meaningful contribution to the set of data available for empirical research. Regardless, a drawback of the emerging Nordic cornerstone trend is the limited amount of observations to date in the Nordics compared to Hong Kong, a concern which is further discussed under statistical robustness.

Data used in this study can be divided into three groups: Firstly, a record of all IPOs during the measurement period. Secondly, information around each IPO offering and thirdly realised stock prices in the secondary market. The list of IPO firms, their listing dates as well as firm and offering characteristics are obtained from the *SDC Platinum* database, hosted by Thomson Reuters. IPO prospectuses and cornerstone allocation data is sourced from press releases, company websites and the Financial Supervisory Authority in each jurisdiction. Offer prices are obtained from *SDC Platinum*, press releases issued by the firm on the first day of trading, first-day closing stock prices and index returns come from Nasdaq. For delisted firms, price data was found using the *Retriever* database. It is common that Swedish business papers (e.g. *Dagens Industri*, *Affärsvärlden*, *Privata Affärer*) comment on the development of a share on its first day of trading. These articles are stored in the database *Retriever* which was used as complementing approach for finding closing prices on

the first day of trading, if not available through our other sources. League tables showing the rankings of underwriters were sourced from *Bloomberg*.

B. Sample description

The dataset consists of Nordic IPOs floated on the regulated stock exchanges of Stockholm, Copenhagen and Helsinki during the 2001-2016 period, amounting to a total of 121 IPOs of which 31 are cornerstone backed. Notably, the IPO of Curalogic on Nasdaq OMX Copenhagen in 2006 is the first cornerstone IPO in our sample, however the Danish market did not pick up the cornerstone trend at that time with no subsequent cornerstone backed IPOs in Denmark since 2006. The first cornerstone IPO in Sweden was that of Lifco in 2014 on Nasdaq OMX Stockholm, after which the lion's share of Swedish IPOs were floated with cornerstone investor backing. Finland caught on the cornerstone trend with two cornerstone IPOs floated in 2015 and 2016 namely Pihlajalinna and Lehto Group. We exclude IPOs in which there is cornerstone investor backing, but where the cornerstone investors constitute existing shareholders prior to the IPO. Although this exclusion is not one of the informal requirements as put forward by the Practical Law Magazine (2015), none of the cornerstone IPOs since the initiation of the trend in 2014 has had an existing shareholder as cornerstone investor. Two IPOs in our sample are structured with existing shareholders as cornerstone investors, namely the IPOs of Rezidor and Tilgin in 2006. Rezidor had a single cornerstone investor whereas Tilgin had cornerstone commitments from multiple parties.

Current listing requirements for the Nasdaq main market are the same across the small-cap, mid-cap and large-cap segments and across countries, with slight deviations only due to national legislation. We exclude IPOs on unregulated Multilateral Trading Platforms (MTF) such as Nasdaq First North as the regulatory environment and size of IPOs on these markets differ significantly from that on the regulated main market. Of the 143 main market IPOs during the period, 11 have been delisted due to buy-outs and liquidations. We include information for all delisted companies in order to avoid any skewness in our results due to survivorship bias. In total 20 IPO observations were excluded due to missing

data, of which 18 were in Denmark during 2001-2008 and two in Finland in 2002 and 2015 as reported in *Table I*. Their exclusion was mainly due to lack of IPO prospectuses and missing price data on the first day of trading. None of the excluded observations constituted cornerstone IPOs. We also exclude two Real Estate Investment Trusts (REIT) IPOs due to the difference in underpricing between REIT IPOs and industrial IPOs as reported by Buttimer et al. (2005).

Table I: Sample selection criteria

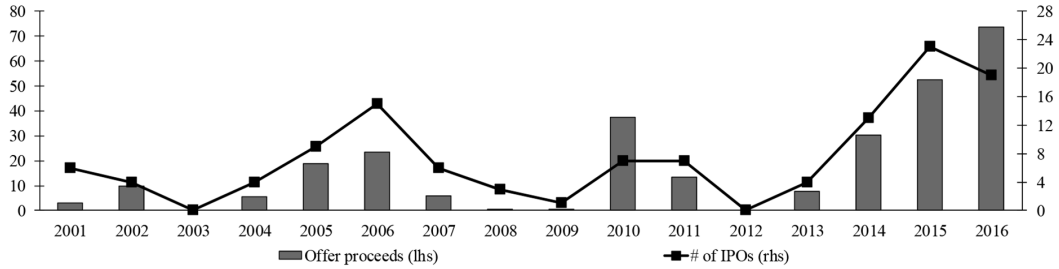
The table displays sample selection criteria used and excluded observations. Data on listings and type of listing is from SDC Platinum. Prospectuses were collected from the Swedish Financial Supervisory Authority and company websites.

Criteria	Firms	Excluded
IPO on Nasdaq Copenhagen, Helsinki and Stockholm in 2001-2016	143	
Complete prospectuses and price data available	123	20
Non-REIT, closed-end fund, private placement listing	121	2
Final sample	121	

Sweden represents the major IPO market (71%) as reported in *Table II*. Sweden's share of IPOs has particularly increased during the 2014-2016 period, where a record number of 43 companies went public. Offer proceeds experienced volatility from the beginning of the sample period until 2013 and subsequently increased sharply. The low volumes during 2003 as well as 2008-2009 are due to the shocks of the dotcom bubble and global financial crisis, respectively. Due to volatility and resulting insecurity in the market, companies naturally held back from listing their stocks through IPOs aiming to achieve higher valuations later on. Once market conditions stabilised Nordic IPOs increased, mainly driven by Sweden.

Table II: Distribution over time of Swedish, Danish and Finnish IPO proceeds and quantity

The table and figure report offer proceeds in SEK billion and total number of IPOs. Total sample consists of 121 observations over the period 2001-2016. IPOs of REITs, closed-end funds and private placement listings are excluded. Offer proceeds are shown before transaction costs. IPOs denominated in DKK or EUR are translated at FX rates of 1.33 and 9.89 respectively. The table breaks down IPO proceeds and number of IPOs per country.



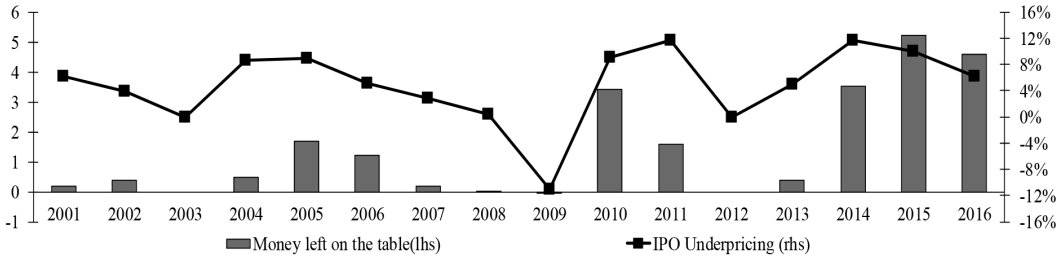
	Offer proceeds (SEK bn)				# of IPOs			
Year	**Sweden**	**Denmark**	**Finland**	**Total**	**Sweden**	**Denmark**	**Finland**	**Total**
2001	3	-	-	3	6	-	-	6
2002	10	-	-	10	4	-	-	4
2003	-	-	-	-	-	-	-	-
2004	5	-	1	6	3	-	1	4
2005	5	8	6	19	5	2	2	9
2006	16	1	7	24	9	2	4	15
2007	4	-	1	6	4	-	2	6
2008	-	-	-	-	2	1	-	3
2009	-	-	-	-	-	1	-	1
2010	3	35	-	37	3	4	-	7
2011	2	11	-	13	5	2	-	7
2012	-	-	-	-	-	-	-	-
2013	4	3	-	8	2	1	1	4
2014	27	4	-	30	12	1	-	13
2015	48	2	3	52	18	1	4	23
2016	19	48	6	74	13	3	3	19
Total	**145**	**113**	**25**	**283**	**86**	**18**	**17**	**121**

IPO underpricing develops in a similar manner as offer proceeds in regards to volatility throughout the sample period as reported in *Table III*. The highest level of underpricing in our sample period was in 2014 with 12% after which it decreased slightly in 2015 to reach 6% in 2016. The real impact of underpricing especially in the current hot market becomes apparent by looking at the amount of money left on table. By 2015 it reached the highest point in the entire sample period with SEK 5.2 billion. Even though underpricing

was higher in 2014, money left on the table reached its peak in 2015 due to record IPO offer proceeds that year.

Table III: Distribution over time of Swedish, Danish and Finnish IPO underpricing and money left on the table

The table and figure reports IPO underpricing and Money left on the table in SEK billion. Total sample consists of 121 observations over the period 2001-2016. IPOs of REITs, closed-end funds and private placement listings are excluded. IPO Underpricing is the Value Weighted (VW) first-day return for each reported period. Underpricing is calculated as the return from the IPO offer price to the closing price on the first day of trading as reported by Nasdaq. Money left on the table is calculated as the number of shares offered multiplied by the krona difference between offer price and first-day close.



	VW IPO underpricing				Money left on the table (SEK bn)			
Year	**Sweden**	**Denmark**	**Finland**	**Total**	**Sweden**	**Denmark**	**Finland**	**Total**
2001	6%	-	-	6%	0.2	-	-	0.2
2002	4%	-	-	4%	0.4	-	-	0.4
2003	-	-	-	-	-	-	-	-
2004	9%	-	6%	9%	0.4	-	0.0	0.5
2005	7%	11%	7%	9%	0.4	0.9	0.4	1.7
2006	6%	0%	5%	5%	0.9	-	0.3	1.2
2007	1%	-	7%	3%	0.1	-	0.1	0.2
2008	6%	(1%)	-	1%	-	-	-	-
2009	-	(11%)	-	(11%)	-	0.0	-	-
2010	2%	10%	-	9%	0.1	3.4	-	3.4
2011	0%	14%	-	12%	-	1.6	-	1.6
2012	-	-	-	-	-	-	-	-
2013	6%	3%	8%	5%	0.3	0.1	-	0.4
2014	10%	21%	-	12%	2.8	0.7	-	3.5
2015	10%	26%	6%	10%	4.6	0.5	0.2	5.2
2016	15%	3%	4%	6%	2.8	1.5	0.3	4.6
Total	**9%**	**8%**	**6%**	**8%**	**12.8**	**8.7**	**1.4**	**22.8**

The cornerstone structure received significant traction since 2014 as reported in *Table IV*. After the IPO of Lifco in 2014, the number of cornerstone IPOs skyrocketed in 2015 to 16 out of 23 Nordic IPOs that year. The relative share of cornerstone IPOs grew even further in 2016 to 13 out of 19 IPOs. In other Scandinavian countries with the exception of Sweden the prevalence of cornerstone investors remains limited. There were two cornerstone backed IPOs in Finland 2015-16 and only one in Denmark in 2006.

Table IV: Distribution over time of Swedish, Danish and Finnish cornerstone and non-cornerstone IPOs

The table reports IPO proceeds, number of IPOs, IPO underpricing (UP) and money left on the table (MLOT) in SEK billion split between cornerstone and non-cornerstone investors. Total sample consists of 121 observations over the period 2001-2016. IPOs of REITs, closed-end funds and private placement listings are excluded.

	Cornerstone				**Non-cornerstone**			
Year	**Proceeds**	**# IPOs**	**UP**	**MLOT**	**Proceeds**	**# IPOs**	**UP**	**MLOT**
2001	-	-	-	-	3.1	6	6%	0.2
2002	-	-	-	-	9.7	4	4%	0.4
2003	-	-	-	-	-	-	-	-
2004	-	-	-	-	5.6	4	9%	0.5
2005	-	-	-	-	18.9	9	9%	1.7
2006	0.2	1	4%	0.0	23.3	14	5%	1.2
2007	-	-	-	-	6.0	6	3%	0.2
2008	-	-	-	-	0.5	3	0%	0.0
2009	-	-	-	-	0.4	1	-11%	-0.0
2010	-	-	-	-	37.5	7	9%	3.4
2011	-	-	-	-	13.5	7	12%	1.6
2012	-	-	-	-	-	-	-	-
2013	-	-	-	-	7.7	4	5%	0.4
2014	4.2	1	32.3%	1.4	26.1	12	8%	2.2
2015	40.4	16	11.2%	4.5	12.0	7	6%	0.7
2016	12.6	13	12.2%	1.5	60.9	6	5%	3.1
Total	**57.5**	**31**	**12.9%**	**7.4**	**225.2**	**90**	**6.8%**	**15.4**

C. Empirical specifications

First, we describe how we measure underpricing which is followed by our methodology used to test Hypothesis I-III. Results and robustness are presented and discussed in section IV.

C.1. Measurement of underpricing

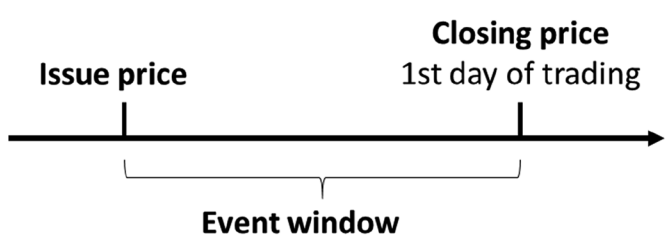
The general formula for measuring underpricing in IPOs is simple but Schöber (2008) points out three issues to be considered as previous studies have employed different definitions of underpricing; the period following the IPO that is used to calculate initial return, whether to adjust for market movements and which aftermarket price to use when calculating underpricing. We employ the methodology widely adopted in modern IPO underpricing research originally advocated by Beatty and Ritter (1986) using first day closing price relative to issue price, in accordance to equation (1) and *Table V*.

$$\text{Underpricing} \quad (R_i) = \frac{P_{t_1,i} - P_{t_0,i}}{P_{t_0,i}} \tag{1}$$

Where $P_{t_1,i}$ is the closing price of share i after the first day of trading. And $P_{t_0,i}$ is the issue price.

Table V: Event window

The first day of trading is used as the event window to determine IPO underpricing, consistent with the bulk of previous studies.



When assessing the impact of an event, the return should be adjusted for the return of the firm given that the event did not take place (MacKinlay, 1997). As our event window is the first day of trading it is impossible to assess what the daily return would have been if the stock had already been listed. Beatty and Ritter (1986) found a 0.1% difference in average underpricing after having index adjusted stocks' first day raw return; comparing to average underpricing levels of 5-20% including such an adjustment would only lead to a minor change in returns. Notably the sample used in this study produces similar results, with

the average underpricing differing by a mere 0.1% after having adjusted raw underpricing returns with the corresponding market index. To make our study more comparable to other studies on underpricing, we choose not to adjust underpricing for market changes.

C.2. Hypothesis I: Underpricing in Nordic IPOs

Previous studies such as Westerholm (2006) and Johnson and Miller (1998) use parametric tests such as *t*-tests to determine existence of underpricing. We conduct a two-sided t-test to test if underpricing is equal to zero in line with Westerholm (2006).

C.3. Hypothesis II: Cornerstone IPO underpricing

Failure to reject Hypothesis II indicates that cornerstone backed IPOs exhibit a higher level of underpricing. We test Hypothesis II through regression with underpricing as the endogenous variable and allocation to cornerstone investors as the exogenous study variable paired with a set of control variables.

We define the study variable **Cornerstone_Share** as the number of shares in the offering allocated to cornerstone investors divided by the total number of shares offered in the IPO. Prior cornerstone and anchor investor backed IPO studies such as Espenlaub et al. (2016) use a binary dummy variable as parameter for the presence of corner- and anchor investors while McGuiness (2014) employs the "share of offering" approach. To preserve information content in our sample we adapt the methodology of McGuiness (2014) and use the percentage share of offering as the study variable. We define the total number of shares offered to include the number of shares sold if the offering is up-sized. We do not consider the exercise of overallotment options. The reason for this exclusion is the unreliability of information in the *SDC Platinum* new issues database. Overallotment options are present in most IPOs and are more likely to be exercised in full in the case of strong demand. We are aware of this limitation as including information on the exercise of overallotment options would strengthen the robustness of our results.

A breadth of explanatory variables has been established as determinants of IPO underpricing (Ritter and Welch, 2002; Ljungqvist, 2007), which could serve as control variables in our regression. While there is limited consensus on a single model that comprehensively explains IPO underpricing, researchers agree that there are multiple explanatory factors affecting underpricing. We overcome this lack of standardised tests by employing control variables frequently found as robust determinants of IPO underpricing (Butler and Kieschnick, 2014). We control for ten factors as described in Appendix D in addition to our study variable. Most controls are ex-ante to the first day of trading, however to control for investor pre-market demand we control for IPO price revisions. As pre-market demand is subject to disclosure of the offer price on the first day of trading in a bookbuilding IPO, it is an ex-post measure.

We formulate the following regressions in order to test Hypothesis II: A linear OLS regression (2) with IPO underpricing (**Underpricing**) as dependent variable and **Cornerstone_Share** as study variable paired with the vector X containing our additional control variables as specified in *Appendix D* and Country Fixed Effects (CFE):

$$\text{Underpricing}_i = \beta_0 + \beta_1 \text{Cornerstone_Share}_i + \gamma X_i' + \text{CFE}_i + \varepsilon_i \tag{2}$$

The previous OLS regression extended with Time Fixed Effects (TFE) (3):

$$\text{Underpricing}_i = \beta_0 + \beta_1 \text{Cornerstone_Share}_i + \gamma X_i' + \text{CFE}_i + \text{TFE}_i + \varepsilon_i \tag{3}$$

An instrument variable approach using a 2SLS regression (4) to address the underlying issue of simultaneity in the relationship between **Cornerstone_Share** and **Underpricing**, as used by Bernstein (2015). To implement the instrumental variables approach, we estimate the following first-stage regression where $\mathbf{Y2015}_i$ and $\mathbf{Y2016}_i$ are the instrumental variables:

$$\widehat{\text{Cornerstone}}_i = \delta_0 + \delta_1 \text{Y2015}_i + \delta_2 \text{Y2016}_i + \vartheta_i \tag{4}$$

The second-stage equation (5) estimates the impact of the introduction of the cornerstone mechanism on underpricing:

$$\text{Underpricing}_i = \beta_0 + \beta_1 \widehat{\text{Cornerstone}}_i + \gamma X_i' + \text{CFE}_i + \varepsilon_i \tag{5}$$

Where $\widehat{\text{Cornerstone}}_i$ are the predicted values from the first stage regression. If the conditions for a valid instrumental variable are met, β_1 captures the casual effect of the existence and size of a cornerstone tranche on IPO underpricing. We use the limited-information maximum likelihood estimator (LIML) in the instrumental variable regression since this estimator is more efficient and consistent than 2SLS for smaller sample sizes according to Wooldridge (2013).

In linear models, there are two main requirements for using an instrumental variable: first the instrumental variable must be correlated with the endogenous explanatory variable, i.e. the year dummy instruments must strongly affect the existence of a cornerstone tranche in the IPO. As discussed, cornerstone IPOs were introduced in 2014 with no cornerstone IPOs prior to this date. Over 43% of Nordic proceeds raised in 2015 and 2016 originated from cornerstone backed IPOs, while in Sweden this figure was even higher with 85% in 2015 and 65% in 2016, respectively. The correlation observed in our sample between the $\mathbf{Y2015}_i$ and $\mathbf{Y2016}_i$ year dummy variables and the **Cornerstone_Share** variable are 0.36 and 0.44 respectively and significant at the 5% level. Correlations are reported in *Appendix H*. Further, statistical tests reported in section IV.B confirm validity of the first stage regression.

Secondly, the instrument must also satisfy the exclusion restriction, i.e. that the instrument cannot be correlated with the error term in the explanatory equation. In our regression this translates to that $\mathbf{Y2015}_i$ and $\mathbf{Y2016}_i$ year dummy instruments must be related and only related to the **Cornerstone_Share** variable. In our sample $\mathbf{Y2015}_i$ and $\mathbf{Y2016}_i$ do not exhibit correlation with any other variable at the 5% level, as such we feel comfortable that the year dummy instruments also fulfil the exclusion restriction criterion. Our use of a large set of control variables also support this conclusion. Of course, it is

impossible to test the exclusion restriction fully, as we cannot judge the correlation with other variables not included in our regression analysis.

It should be noted that due to the application of a time dummy as instrument for our study variable, controlling for time fixed effects through year dummy variables (2001-2014) results in a weak instrument and multicollinearity where the exclusion restriction is not upheld. Due to the inability to control for time fixed effects in our second stage regression, we cannot completely eliminate the possibility of $\mathbf{Y2015}_i$ and $\mathbf{Y2016}_i$ year dummies also being related to time variation of underpricing due to the seasonality of IPO hot-markets. We do note however that no significant correlation exists between **Underpricing** and 2015-2016 year dummies, supporting the notion that underpricing time variation does not violate the exclusion restriction which is the only potential source of violation.

C.4. Hypothesis III: Cornerstone allocation and return on cornerstone capital

Rejection of Hypothesis III indicates that more underpriced IPOs have a larger share of the offer allocated to cornerstone investors, and that the absolute value of "money left on the table" is proportionally skewed towards the cornerstone tranche. We test this hypothesis by using the methodology of Aggarwal (2002), who investigates whether underwriters allocate more shares of issues with high pre-market demand to institutional investors. Given the higher demand for these issues, it comes naturally that they experience higher underpricing. Employing this approach on allocation to cornerstone investors we provide an economic characterisation of the cornerstone allocation differentials in IPOs. We define the return on each currency unit invested by each type of investor, say π_t, where t is the investor type as:

$$\pi_t = \frac{\sum_{i=1}^{n} x_{it} * p_i * r_i}{\sum_{i=1}^{n} x_{it} * p_i} \tag{6}$$

where i indexes the issue, x_{it} denotes the percentage of issue i allocated to investor of type t, p_i denotes the proceeds, and r_i denotes the first-day return for issue i.

The above equation provides a simple metric for judging the performance of cornerstone capital versus non-cornerstone capital. If the allocations in a given IPO are independent

of the ex-post issue returns r_i, then $\pi_1 = \pi_2$ and both cornerstone and non-cornerstone investors will experience the same return on investment. On the other hand, if cornerstone allocation tends to be high for more underpriced issues, then $\pi_1 > \pi_2$, meaning that cornerstone investors get better allocations in more underpriced IPOs resulting in higher returns.

We report the accumulated profits to cornerstone and non-cornerstone investor from investing in an issue at offer price and selling it at closing price on trading day 1, trading day 10 and trading day 20. We split the IPOs into three groups, dependent on their IPO return: (1) returns less than 0%, (2) returns between 0% and 20%, and (3) returns exceeding 20%. Further, we show aggregate data for all IPOs. We show 10-20 trading days extended time windows since day one returns may be biased by a combination of price stabilisation by underwriters and share flipping by investors. The effects of these phenomena suggest that the true profit differentials may be somewhat greater than suggested by first day returns only, and it may be useful to consider returns over not just one day but longer horizons as well. However, the longer horizon results may be less powerful due to greater likelihood of price movements unrelated to the initial IPO uncertainty. Ellis et al. (2000) note a large decline in IPO trading volume after the first two days of trading, suggesting that investors mainly adjust their IPO holdings within this initial time frame. They further show that underwriters acquire 80% of their peak aftermarket inventory in the first five trading days, with underwriter inventory starting to decline after 20 days. This suggests that price stabilization is concentrated in the first week and is altogether completed about a month post IPO. Aggarwal (2000) reports that price support activities in her sample end within 10 days of the offering date. The median stabilised IPO in her sample has zero stabilisation after a week; where most short covering is concentrated in the first few trading days during which volumes are at their peak.

To discover the true profits of IPO investors it would require us to know when each type of investor sells in the aftermarket and direct and indirect costs of selling, including diminishing future allocations. Albeit not implementable empirically, it is certainly useful

to supplement the one-day time window with a longer measurement period for control, which in our case is extended to a maximum 20-day window alight of the research findings presented above.

IV. Results

A. Hypothesis I: Underpricing in Nordic IPOs

We perform our tests on the value-weighted average underpricing, in order to capture the economic magnitude of any abnormal returns. For our sample of 121 observations we find mean underpricing of 7.6% significant on the 1% level as reported in *Table VI*. The double-sided t-test rejects that underpricing in our sample equal to zero. Hence, we conclude that IPO underpricing exist in our sample and the 95% confidence interval lies between 5-9%.

Table VI: T-test on underpricing observations

The table displays the results from a two-sided t-test testing the null hypothesis that underpricing is equal to zero.

Variable	Observations	Mean	Standard error	95% confidence interval
Underpricing	121	0.076	0.01	0.05–0.09
		$H_a : mean \neq 0$	$Pr(\|T\| > \|t\|) = 0.0000$	

Underpricing between 2001-2016 in the 121 Nordic IPOs observed is lower than in previous European and Nordic benchmark studies in both time and geographical dimensions when comparing to underpricing documented in previous literature in accordance to *Table VII*.

Table VII: IPO underpricing across Nordics, Europe and time periods

Region	**Period**	**Underpricing**	**Sample size**	**Source**
Europe	1998–2012	19%	3,677	Akyol et al (2014)
Nordics	1991–2001	17%	254	Westerholm (2006)
Sweden	1980–1989	41%	249	Rydqvist (1997).
Sweden	1991–2001	16%	88	Westerholm (2006)
Sweden	2001–2016	9%	86	Ahl, Sameni (2017)
Finland	1991–2001	16%	63	Westerholm (2006)
Finland	2001–2016	6%	17	Ahl, Sameni (2017)
Denmark	1991–2001	8%	52	Westerholm (2006)
Denmark	2001–2016	8%	18	Ahl, Sameni (2017)

Examining country variation in our sample, underpricing amounts to 8% on average with 9% in Sweden, 8% in Denmark and 6% in Finland. During the studied period, we note that the level of underpricing is relatively homogeneous with a 3% difference between Finland with the lowest underpricing (6%) and Sweden with the highest (9%). Sweden's, Denmark's and Finland's relatively lower underpricing compared to continental Europe could be due to varying listing requirements, where the Nordics impose stricter requirements on company size and financial history compared to continental Europe, as originally suggested by Westerholm (2006). Westerholm also points out that Finnish IPOs are subject to the strictest listing requirements followed by Norway, Sweden and Denmark. Stricter listing requirements should imply better performance for IPO companies, he argues. We note however that listing requirements have harmonised across exchanges since Nasdaq's acquisition and consolidation of the exchanges in Sweden, Denmark and Finland. The historically stricter listing requirements in Finland could explain the lower level of underpricing seen in Finland compared to Sweden and Denmark during the 2001-2016 period.

In regards to time variation, the degree of underpricing has decreased in both Sweden and Finland during the 1990-2016 period while it has stayed flat in Denmark. In Sweden, the high IPO underpricing of 41% between 1980-1989 is partly explained by the tax wedge between ordinary income and capital gains in the period as reported by Rydqvist (1997). The IT bubble during 1999-2000 poses a credible explanation to the gradually decreasing trend in underpricing seen during the 1980-2016 period. Notably there has been a recent uptick in Swedish IPO underpricing amounting to as much as 15% in 2016, on par with the underpricing seen in the 1990s. On a general note underpricing variation over time periods is a long known-phenomena with IPO hot markets as the most recognised explanation as originally suggested by Ibbotson (1975).

B. *Hypothesis II: Cornerstone IPO underpricing*

The following section aims to present descriptive statistics of the sample data used in our regression. *Table VIII* provides descriptive statistics for our sample and the result from the t-test test between cornerstone IPO's and non-cornerstone IPOs.

Table VIII: Descriptive statistics

*The table report descriptive statistics of total sample and cornerstone and non-cornerstone subsample variables excluding year dummies; mean, median and delta in mean between the cornerstone and non-cornerstone subsample. Total sample consists of 121 observations over the period 2001-2016. IPOs of REITs, closed-end funds and private placement listings are excluded. Significance of delta in mean is tested using t-statistics with the significance level denoted by asterisk at the ***(1%), **(5%) and *(10%) level.*

Variable	**Total sample**		**Cornerstone**		**Non-cornerstone**		**Delta**
	Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**	**in mean**
Number of observations	121	121	31	31	90	90	
UNDERPRICING	7%	5%	15%	10%	5%	3%	10%***
CORNERSTONE_SHARE	9%	0%	35%	34%	0%	0%	35%***
REVENUE	9,788	1,753	10,176	1,753	9,654	1,882	521
LIABILITIES_TO_ASSETS	0.6x	0.6x	0.6x	0.7x	0.6x	0.6x	0.05x
OVERHANG	164%	114%	162%	100%	165%	115%	2.7%
SECONDARY_SHARES	58%	71%	60%	68%	58%	73%	3%
REVISION	-1%	0%	2%	0%	-1%	0%	3%*
IB_MARKETSHARE	8%	8%	10%	9%	7%	7%	3%
FIXED_PRICE	20%	0%	35%	0%	14%	0%	21%**
BUYOUT	50%	0%	53%	100%	49%	0%	3%
VC	8%	0%	10%	0%	8%	0%	2%
FOUNDER	17%	0%	26%	0%	14%	0%	11%
DOMX30RET	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
UNDERPRICING_L30D	9%	7%	13%	12%	7%	6%	5.7%**
SWEDEN-DUMMY	71%	1	90%	1	64%	1	26%***
DENMARK-DUMMY	15%	0	3%	0	19%	0	16%**
FINLAND-DUMMY	14%	0	6%	0	17%	0	10%

Several statistically significant differences in mean between cornerstone and non cornerstone IPO cohorts of our control variables can be noted in the sample. First, we see that cornerstone backed IPOs experience 10% higher underpricing, which based on our sample indicates a statistical difference in underpricing between cornerstone and non-cornerstone

IPOs. Second, cornerstone IPOs have receive more upward revision of the IPO price from the midpoint of the offer range compared to non-cornerstone IPOs, indicating higher pre-market demand for cornerstone IPOs. Third, the higher share of fixed price IPOs could be explained as compensation for price discovery. Fourth, given that all cornerstone IPOs in our sample occurred during the current IPO hot market, it comes naturally that the underpricing in the preceding month pre-IPO was generally higher. Finally, as almost all cornerstone IPOs occurred in Sweden with two cornerstone IPOs in Finland and one in Denmark, this explains the significance of the Sweden country dummy variable.

Table IX display the results from testing hypothesis II using the regression model specified in Section III.C.3:

We conduct a total of three regressions to test the impact of **Cornerstone_Share** on **Underpricing**: (1) Using a standard OLS regression the cornerstone variable is significant at the 5% level, with a coefficient of 0.16 – implying that for each 10% of the offer allocated to the cornerstone tranche underpricing increases by 1.6%. However due to simultaneity bias it is challenging to establish causality and whether the presence of cornerstone investors drive underpricing or vice versa that cornerstone investors choose more underpriced IPOs. (2) Adding time fixed effects to the regression the cornerstone variable loses significance due to high correlation and multicollinearity between $\mathbf{Y2015}_i$ and $\mathbf{Y2016}_i$ year dummies and the **Cornerstone_Share** variable. This result is not surprising given the emergence of cornerstone IPOs in 2014 and naturally high correlation and subsequent multicollinearity between the cornerstone variable and respective year dummies, despite this **Cornerstone_Share** is significant on the 20% level; (3) Addressing the issues of simultaneity and multicollinearity, we use a 2SLS regression with $\mathbf{Y2015}_i$ and $\mathbf{Y2016}_i$ year dummies as instrumental variables. Again, the cornerstone variable is significant at the 5% level with a coefficient of 0.2. We do not include the year dummy for 2014 as an instrument as it neither statistically significant nor strongly correlated to our study variable **Cornerstone_Share**. We explain this with the limited number, namely only one cornerstone IPO in 2014.

Table IX: Regression results

*The analysed sample contains 121 IPOs from 2001-2016 of which 31 are cornerstone IPOs. The table reports estimates of a linear regression both with and without time fixed effects (TFE) and a 2SLS regression using the year dummies for 2015 and 2016 as instrumental variables (IV). The dependent variable underpricing is defined in section III.C.1. The study variable CORNERSTONE_SHARE is defined in section III.C.3. Control variables are further explained and defined in Appendix E. The heteroscedasticity robust standard error is reported in parentheses. The significance level is denoted by asterisk at the ***(1%), **(5%) and *(10%) level.*

Regression specification	**Reg. without TFE**	**Reg. with TFE**	**IV reg. without TFE**
Study variable			
CORNERSTONE_SHARE	**0.16**** **(0.07)**	**0.12** **(0.09)**	**0.20**** **(0.08)**
Control variables			
LN_REVENUE	**0.01**** (0.00)	**0.01** (0.00)	**0.03**** (0.00)
LIABILITIES_TO_ASSETS	**0.05** (0.04)	**0.06** (0.05)	**0.05** (0.04)
LN_OVERHANG	**0.01** (0.1)	**0.02** (0.01)	**0.02** (0.01)
LN_SECONDARY_SHARES	**0.00** (0.04)	**0.00** (0.04)	**0.00** (0.03)
REVISION	**0.33***** (0.10)	**0.40***** (0.15)	**0.31***** (0.10)
IB_MARKETSHARE	**0.20** (0.25)	**0.33** (0.27)	**0.16** (0.23)
FIXED_PRICE	**0.08**** (0.03)	**0.09**** (0.04)	**0.07**** (0.03)
BUYOUT	**0.02** (0.02)	**0.02** (0.02)	**0.02** (0.02)
VC	**0.05** (0.25)	**0.05** (0.05)	**0.05** (0.04)
FOUNDER	**0.04** (0.38)	**0.02** (0.03)	**0.03** (0.03)
30D_MKT_RET	**16.63***** (3.92)	**18.33***** (4.93)	**16.84** (3.76)
30D _AVG_UNDERPRICING	**-0.07** (0.09)	**-0.13** (0.10)	**-0.08** (0.08)
SWEDEN_DUMMY	**-0.02** (0.03)	**-0.03** (0.03)	**-0.03** (0.02)
DENMARK_DUMMY	**0.01** (0.01)	**-0.01** (0.04)	**0.01** (0.03)
Statistics			
Adjusted R-Square	0.44	0.47	0.43
F-Statistic	5.61	NA	NA
N	121	121	121

Statistical analysis

Regression robustness

Our findings are dependent on assumptions made and the design of variables and tests. Before any conclusion can be drawn or generalizations for other samples or populations can be made, we need to test the robustness of our findings. We examine normality, heteroscedasticity, multicollinearity, presence of outliers and influential observations.

We conduct the Shapiro-Wilks test to establish whether the variables in our sample are normally distributed as described by Wooldridge (2013) with results reported in *Appendix F*. We conclude that the variables **Underpricing** and **30D_MKT_RET** are normally distributed in our sample whereas all other variables in our sample have a non-normal distribution. As OLS and LIML regressions require normality of the dependent variable to produce reliable results, we conclude a parametric methodology using regression is viable.

We conduct the Breusch–Pagan test for heteroscedasticity in our sample as presence of heteroscedasticity may bias the estimated standard errors leading to invalid inference as described by Wooldridge (2013). We note that heteroscedasticity is especially common in cross sectional data (Long and Ervin, 2000), and that our sample data is cross-sectional. As reported in *Appendix G* we reject the null hypothesis that our sample is homoscedastic and employ heteroscedasticity robust standard errors in accordance to White (1980).

We examine the residual errors of the regression graphically to detect any statistical problems with regards to model specification and the dataset. Residual errors are depicted in *Appendix H*. Analysing the regression residual errors, unbalancing, nonlinear, large outliers, or large y-axis data points are not detected. Hence, we conclude that regression residual errors are acceptable, a strong indicator of that independent variable coefficients, coefficient t-values and the adjusted R^2 value are robust and do not suffer from material biases.

We control for influential observations using Cooks Distance (Cooks D), where Cooks D measures the effect on the residuals for all other observations deleting observation i

(Wooldridge, 2013). As reported in *Appendix I* several observations have a Cooks D value above the decision rule provided by Fox (1991) and could therefore be classified as influential observations and potential outliers. Data for these observations have been verified and confirmed for correctness. Hence we keep these observations in our sample as removing these could change the estimated coefficients. We also test whether our results from our hypothesis testing would have been different if we would have removed these observations and conclude that all coefficients in *Table IX* remain significant and similar after removing the influential observations. The regression with outlier observations removed can be found in *Appendix L*.

Multicollinearity

Alight of the large number of exogenous variables in our regressions we stress the importance of testing for multicollinearity in our study, where multicollinearity is defined as high correlation between two or more independent variables. We note that in presence of high multicollinearity, confidence intervals for coefficients widen and t-statistics decrease, as such it gets more difficult to reject the null hypothesis as coefficients must be larger to be statistically significant. Pairwise correlations exceeding $|0.8|$ are a clear sign of multicollinearity and pairwise correlations exceeding $|0.5|$ could indicate multicollinearity (Wooldridge, 2013). No correlations exceeding $|0.5|$ are observed in the sample, as reported in *Appendix J*. We further test our data for presence of multicollinearity using Variance In Inflation (VIF). VIF is an index that measure by how much the variation of a coefficient is increased due to collinearity. A VIF greater than 10 indicates a strong presence of multicollinearity (Wooldridge, 2013). The calculated VIFs are reported in *Appendix K*. None of the VIFs exceeds 10. Hence, after testing for multicollinearity using both pairwise correlation and VIF, we conclude that there is no strong presence of multicollinearity.

Goodness of fit (R^2)

We assess statistical significance and economic importance of our model. In *Table IX* we report the goodness of fit for our regression model, with the adjusted R^2 explaining 43.4% of the variation in underpricing. This result is in line with other comprehensive studies such as that of Butler et al. (2014) who report an adjusted R^2 of 45.5%. Comparing to other Nordic studies such as Westerholm (2006) who report an adjusted R^2 of 2.5%, and Rydqvist (2006) who report an R^2 of 29.6%, our model explains a large share of the underpricing in our sample and as such should sufficiently control for major factors known to affect IPO underpricing.

Instrument variable robustness

We also control the relevance of our instruments to ensure that the instruments are sufficiently correlated with the **Cornerstone_Share** study variable using Stata's ESTAT FIRSTSTAGE command. All R^2 statistics are relatively high at > 0.4, so they do not imply a weak-instrument problem. As we are using the LIML estimator, we reject the null hypothesis that the instruments are weak, as the minimum eigenvalue statistic of 29.2 greatly exceeds the critical value of 8.7.

Further, we test the first stage regression for overidentifying restrictions to verify the validity of our excluded instruments using Stata's ESTAT OVERID command. In doing so we, cannot reject the null hypothesis that our instruments are valid. All tests performed are robust to heteroscedasticity. With basis on the tests made our results appear robust and as such we deem the impact of share of offering allocated to underpricing significant when testing for the entire sample. We reject that the impact of the **Cornerstone_Share** variable on **Underpricing** is equal to zero. The amount of impact based on the regression coefficient value of our study variable **Cornerstone_Share** in the third regression using IVs is 0.20 with a standard error of 0.08. In other words, for each 10% of the offer allocated to cornerstone investors underpricing increases with an average of 2%, and with standard errors the interval is 1.2 to 2.8%. Combining this with the average cornerstone allocation of

37% of the offered shares, the **Cornerstone_Share** variable in our regression on average explains 7.4% of the underpricing in cornerstone IPOs, with an interval of 5.8% to 9.0% when taking into account standard errors. We acknowledge that a degree of the observed underpricing could be due to time fixed effects, since we are unable to control for time fixed effects when using year dummies as instruments for cornerstone IPOs.

Qualitative Analysis

As established in the above section cornerstone backed IPOs exhibit higher underpricing compared to non-cornerstone IPOs. It is important to highlight that there is likely no single explanation for this phenomenon, rather it is the result of multiple effects coming together. Using the IPO underpricing theories and precedent cornerstone IPO research presented in section II, we contemplate the theories most likely to explain the difference in underpricing between cornerstone and non-cornerstone IPOs.

The absence of an inverse relation between cornerstone investment and underpricing suggests little or no support for *certification effect* arguments (Megginson and Weiss, 1991), and therefore rejection of $\mathbf{H_2}$. However, the observed positive relationship between cornerstone investor participation and underpricing are consistent with (1) cornerstone parties drawing-in additional demand and/or *crowding-out* other investors (Stoughton and Zechner, 1998) and (2) *bandwagon* and *informational cascades* effects (Welch, 1992). This finding complements evidence in McGuiness (2012) where 'cornerstone' allocations promote greater underpricing in HKEx-listings. However, cornerstone parties may also lobby for allocations because of the prospect of strong initial returns. Nonetheless, our Two-stage Least-Squares Regression (2SLS) using year dummies as instruments control for such a two-way effect, suggesting a causality between cornerstone allocations and higher underpricing as opposed to a two-way link between the two.

Building on '*crowding-out*' effects Low (2009) further argues that the reason for the rise of the cornerstone mechanism is due to institutions seeking a guarantee for meaningful share allocations in hot issues. Stoughton and Zechner (1998) even argue that "the ability

to ration in favour of large shareholders should be positively correlated with underpricing". Cornerstone investors often take up substantial amounts of total shares offered in an IPO. Based on the simple relationship of supply and demand, this is a likely explanation for not only higher underpricing in the presence of cornerstone investors but also for the positive relationship between underpricing and cornerstone allocation. However, by allocating large blocks of shares to cornerstone investors, which are generally regarded as buy and hold investors, the issuer limits the exposure to flipping, noise trading, short term volatility and costly price stabilisation measures (Loughran and Ritter, 2004). In return the cornerstone investors get compensated for their commitment through larger underpricing.

With regard to the *market feedback hypothesis* and its relationship to cornerstone investors, an interesting observation can be made in conjunction with fixed price and bookbuilding IPOs. In bookbuilding IPOs cornerstone investors commit to subscribe to the prevailing price in the bookbuilding process which is set in an interval. As such cornerstone investors are not participating in the price discovery process, which in accordance to the *market feedback hypothesis* is the key driver behind underpricing in order to compensate investors for information and price discovery. As the IPO price intervals are relatively wide in the bookbuilding IPOs in our sample, it is not plausible to assume that cornerstone investors get compensated for pinpointing these intervals. As such, if cornerstone investors where to be compensated in accordance to the *market feedback hypothesis*, cornerstone investors would participate mainly in fixed price IPOs. Summary statistics as reported in *Table VII* indeed show a statistically higher participation of cornerstone investors in fixed price IPOs – however the casual relationship whether cornerstone investors participate in fixed price IPOs for the purpose of price discovery in accordance to the *market feedback hypothesis* or participate in fixed price IPOs due to the higher level of underpricing is very challenging to conclude alight of the issue of endogeneity.

It could also be argued that a *fundamental valuation discount* between the offer price and the value of the issuing firm is negotiated by the cornerstone investor, and as such the first-day market price reflects the firm's actual fundamental value. In turn this negotiation power

and higher underpricing can be seen as compensation for the lower IPO execution risk, an "insurance premium", due to the cornerstone investors' subscription for a large share of the offer prior to launch of the IPO. This explanation is in line with interviews made by Borg and Engberg (2016), were Swedish equity bankers considered cornerstone investor participation as a tool for lowering transaction risk. Controlling for any *fundamental valuation discount* associated with IPOs irrespective of being cornerstone backed or not would be cumbersome however as the prevailing method for valuing firms going public is the use of earnings forecasts and comparing these to comparable firm multiples. Using historical financials would be too coarse as firms going public are normally being valued on the basis of their growth options and not their historical financials. Houston et al. (2006) employ this method using forecasted earnings data and comparable valuation provided in IPO initiating coverage research reports.

It is also important to consider the popular *Winner's curse* theory as an explanatory factor behind the higher level of underpricing in cornerstone IPOs. Aggarwal (2002) suggests that the possession of private information by institutional investors leads to lower participation in underperforming IPOs and the possession of private information by underwriters, who subsequently ensure that institutional investors get limited allocations in underperforming IPOs. Applying this logic to institutional cornerstone investors vis-a-vis institutional investors, the notion of private information appears more far-fetched. Borg and Engberg (2016) report that information sharing to cornerstone investors prior to publication of the prospectus is highly regulated, and the material distributed to cornerstone investors is in final draft form. However, the possibility of underwriter's having private information and subsequently ensuring that cornerstone investors receive preferential treatment and allocations in over performing IPOs cannot be ruled out.

C. Hypothesis III: Cornerstone allocation and return on cornerstone capital

Alight of the recent surge of cornerstone investors we also investigate whether cornerstone capital concentrates in better performing IPOs, while leaving weaker performing issues to

non-cornerstone investors. In our sample, the total amount of IPO proceeds allocated to cornerstone investors amount to SEK 18.9 billion with the total amount of money left on the table amounting to SEK 3.0 billion, equalling return to one cornerstone krona of 15.9%. On the other hand, non-cornerstone investors earn first-day returns of only 11.5%, investing a total of SEK 38.6 billion for a first-day profit of SEK 4.4 billion.As such initial return difference between cornerstone and non-cornerstone investors amount to 4.4% based on first day profits, 4.3% after 10- and 4.0% after 20 days of trading. We deem this difference significant alight of that the total first day underpricing in the cornerstone IPO sample amount to 13.0%. Differences in returns are certainly likely to be lower than the differences in krona profits reported in *Table X*, since capital invested by cornerstone investors is 40% of the offering compared to 60% by other institutional- and retail investors.

Table X: Allocations and profits of cornerstone and non-cornerstone investors

The table reports total money left on the table in SEK million and its breakdown between cornerstone and non-cornerstone investors. We report the profits institutional and retail investors could hypothetically achieve by buying the respective issue at offer price and selling it on either trading day 1, trading day 10 or trading day 20. We break down our data into three categories: negative returns, positive returns of up to 20% and returns above 20%. Further we show aggregated data for all IPOs. The data consist of the 31 cornerstone IPOs offered between 2014 and 2016 in Sweden, Denmark and Finland.

Variable	**Money left on the table**				**Total proceeds raised**	**Total money left on the table**	**Under pricing**
	All IPO's	**Under-pricing** $< 0\%$	**Under-pricing** $0\% \leq 20\%$	**Under-pricing** $> 20\%$			
Sample size	31	2	22	7	31	31	31
			1D of trading				
Cornerstone	3,014	-30	1,057	1,986	18,917	3,014	15.9%
Non-cornerstone	4,439	-207	2,108	2.539	38,572	4,439	11.5%
Cornerstone share	40%	13%	33%	44%			
Non-cornerstone share	60%	87%	67%	*56%*			
			10D of trading				
Cornerstone	3,108	-30	1,209	1,930	8,917	3,108	16.4%
Non-cornerstone	4,657	-226	2,351	2,532	38,572	4,657	12.1%
Cornerstone share	40%	12%	34%	43%			
Non-cornerstone share	60%	88%	66%	57%			
			20D of trading				
Cornerstone	3,326	-25	1,492	2,046	18,917	3,326	17.6%
Non-cornerstone	5,524	-153	2,543	2,804	38,572	5,254	13.6%
Cornerstone share	39%	14%	33%	42%			
Non-cornerstone share	61%	86%	65%	62%			

Analysis

As it turns out, cornerstone capital indeed performs better than non-cornerstone capital as reported in *Table X*. We show that cornerstone capital in IPOs earn a larger proportion on the upside but share the downside in weaker issues more evenly with non-cornerstone investors, thus earning greater profits in IPOs at the expense of non-cornerstone investors.

Certain empirical observations are relevant for determining the underlying drivers of variance in return between cornerstone and non-cornerstone investors. An interesting question relates to the variation in cornerstone allocation. Are allocation schedules relatively flat, as might be suggested by a mechanical allocation rule of giving fixed percentages to institutions, or is there some variation in allocation across or within different return categories? The allocation data from *Table X* provide additional pointers. From the allocation statistics, the major variation in cornerstone allocation across IPOs comes from the fact that cornerstone investors have fewer shares in IPOs that are overpriced ex-post. In our sample variation in cornerstone allocation between underpriced and overpriced issues is significant, where mean allocation is 44% for the 7 IPOs with underpricing greater than 20% versus a mean allocation of 33% and 13% for IPOs with underpricing below 20% and with negative underpricing, respectively. Thus, the return differential between cornerstone and non-cornerstone capital is substantially driven by lower participation of cornerstone investors in negative underpricing and low underpricing IPOs, when comparing to the average cornerstone tranche size of 40% of the offering. Looking at total krona profits, over 2/3 of profits come from participation in the most highly underpriced IPOs. In summary, any favouritism on the part of underwriters seems to occur primarily via the mechanism of cornerstone investors receiving substantially lower allocations in worse performing IPOs seen to underpricing and a larger allocation in substantially underpriced issues.

Aggarwal (2002) concludes that this pattern, in her paper seen between retail and institutional investors, is due to both *market feedback* and *winner's curse* effects. We believe that this partially applies in the case of cornerstone investors. Similar to the induction made in Hypothesis II, we do not find support for the *market feedback* hypothesis since

no correlation between cornerstone allocation and price revision is observed in our sample. Rather, we argue that cornerstone investor return outperformance is likely due to renowned institutional investors adding credibility to the IPO, inducing *bandwagon* effects. They also take up large chunks of the offer, limit free float and as such further increase demand in line with *crowding-out* effects potentially in combination with *fundamental valuation discount* effects. At the same time, the extended time window up to 20 days' support the findings and analysis in Hypothesis II.

It would certainly be of relevance to benchmark the cornerstone / non-cornerstone capital underpricing return differentials with geographies beyond the Nordics, however no precedent study covering this topic is available to the best of our knowledge. Comparing to Aggarwal's (2002) benchmark between institutional and retail capital where institutional investors earn about 1.8% more than retail investors, we note that this differential is significantly smaller than the 4.4% observed between cornerstone / non-cornerstone capital in our study.

With regard to long term performance we speculate that cornerstone investors do not necessarily impact the long-term performance of the IPOed firm. While PE investors in PE backed IPOs commonly exert significant control over the firm through board representation, cornerstone investors normally do not take seats in the board of the firms they invest in and therefore act solely as financial investors. However, if cornerstone backed IPOs outperform non-cornerstone backed IPOs over longer time horizons this could indicate superior abilities of cornerstone investors to identify quality stocks.

To conclude, Hypothesis I-III as reported in this section IV support our hypotheses' that underpricing exists, cornerstone IPOs exhibit a larger degree of underpricing compared to non-cornerstone IPOs and that cornerstone investors enjoy higher initial returns, in our sample amounting up to 4.4%, compared to non-cornerstone investors on an aggregated basis.

V. Limitations

We are aware of several limitations throughout our study: (1) cornerstone regulation, (2) sample size, (3) endogeneity, (4) linear dependence between variables and (5) controlling for firm valuation:

Cornerstone regulation

We are aware of the potential drawbacks due to differing cornerstone regulations across jurisdictions. Traditionally cornerstone investors are subject to lock-up periods (Cole, 2015), however this is not the case outside of Hong Kong. In our sample, not a single cornerstone backed IPO is subject to any lock-up period. This has several implications. Without lock-up restrictions cornerstone investors are able to flip the shares right after IPO. However, they are unlikely to do so, as this would likely keep underwriters from allocating shares in future IPOs to respective investors. As we are not able to observe the actions of individual cornerstone investors post IPO, we cannot fully access the implications of the lack of lock-up periods.

Sample

Due to the limited adoption of cornerstone investors both historically as well as geographically the result is a rather small sample of IPOs. This affects our inference and limits the statistical power of the study. Further biases are caused by small sample adjustments like heteroscedasticity robust standard errors and country as well as time fixed effects.

Endogeneity

Per definition endogeneity occurs if the explanatory variable is correlated with the error term. As the error term is unobservable we cannot test for endogeneity. Consequently, there is no way to statistically ensure that an endogeneity problem has been solved. We attempt to review the potential sources of endogeneity in our study through analysing the sources of endogeneity, namely *omitted variable bias*, *simultaneity bias* and *measurement errors*. In

order to eliminate *omitted variable bias* a wide array of controls has been employed, reflected in the high goodness-of-fit of our regressions without experiencing multicollinearity.

In line with previous IPO underpricing research the unclear direction of the causality between underpricing and share of the offering allocated to cornerstone investors leads us to believe we are facing primarily problems with *simultaneity bias*, where cornerstone investors do not randomly target firms and one may be concerned that targeted firms are different in dimensions that are not easily measurable. We counter this problem using an instrumental variable approach conducting a 2SLS regression with dummy variables for the years 2015 and 2016 as instruments due to their high correlation with our explanatory variable **Cornerstone_Share**. We would like to point out that there is no intuitive foundation for the choice of instruments beyond first, the large-scale introduction of cornerstone IPOs in the 2015-2016 period and second, the strong correlation between the 2015-16 year dummies and the cornerstone variable. As determined in section III the IV approach is robust and significant, however we acknowledge the inability to control for timed fixed effects when employing the IV approach. As such it is difficult to completely rule out the possibility of a violation of the exclusion restriction, and that the variation in underpricing is instead explained by general trends over time, by definition leading to endogeneity. In such a scenario, our IV regression would falsely indicate that the share of offering allocated to cornerstone investors determines IPO underpricing while in fact time variation or another unobserved variable in fact is the determinant of underpricing.

At the same time, limited or no statistical inference can be made from the regression while controlling for time fixed effects due to multicollinearity in our sample between time dummies and the cornerstone variable. A solution to this problem is significantly increasing sample size, which in our case is not possible. An alternative method to address simultaneity bias would have been a counterfactual analysis in line with Bubna and Prabhala (2014) who measure the impact of anchor investors on underpricing using oversubscription rates. To attempt this methodology, we contacted all leading banks in the Nordics, but as IPO

oversubscription rates is private information we were not able to access a sufficient amount of data to conduct a meaningful analysis.

Failing to control for *simultaneity bias*, reverse causality could indicate that cornerstone investors are better at picking IPOs with higher underpricing, in line with superior stock picking abilities. If so, this would imply that proposed *bandwagon*, *crowding-out* and *fundamental valuation discount* theories as explanations for cornerstone IPO underpricing are voided.

The use of a large set of IPOs precedent to the studied cornerstone phenomena leads us to believe that selection bias and measurement errors due to time limitation are negligible. As the phenomena studied is almost exclusively seen in Sweden and through controlling for country variation of IPO underpricing as well as varying IPO mechanisms across countries such as fixed price vs. bookbuilding IPOs, we also deem any risk of bias due to geographical limitation to be relatively small.

Linear dependence

Fourth, as we are conducting a linear regression we might fail to capture nonlinear relationships. This is accounted for by taking the natural logarithm of several control variables as suggested by academic literature. However, in the event that we failed to capture any nonlinear relationships in our regression model, we would have specified these relationships incorrectly.

Controlling for firm valuation

As we do not control for difference in valuation between cornerstone and non-cornerstone IPOs any difference in *fundamental valuation discount*, or *IPO discount* is not controlled for in our sample. We suggest that this factor could materially explain variation in underpricing between cornerstone and non-cornerstone IPOs due to Swedish equity bankers' proposition that cornerstone investors are a tool for lowering transaction risk, and as such act as an

insurance associated with higher transaction costs through a lower offer price (Borg and Engberg, 2016).

VI. Conclusion

In this study, we examine the impact of cornerstone investors on a sample of Nordic IPOs. Our analysis focuses on three questions:

First, we verify the degree of underpricing in our sample and find that average underpricing during the period 2001-2016 amounts to 7.6%. Second, alight of the observed underpricing in the sample we test whether the presence of cornerstone investors and allocation to these investors affects IPO underpricing. We attempt to control for endogeneity with a 2SLS regression with 2015- and 2016 year dummies as instruments for cornerstone participation. Our instruments are significant and indicate a positive relationship between underpricing and the share of offer allocated to cornerstone investors. Regression coefficients indicate that the average cornerstone backed IPO with an average of 35% of shares offered allocated to cornerstone investors experience a higher underpricing of as much as 7%. However, we acknowledge that cornerstone IV regression coefficients can be impacted by time fixed effects, breaching the exclusion restriction criteria with an upward bias of the cornerstone coefficient as a result and subsequently challenging the direction of causality between cornerstone investor participation and underpricing.

Finally, in our third hypothesis we address the question whether there are higher returns on cornerstone than on non-cornerstone capital up to 20 days' post IPO. Our findings show that cornerstone capital performs better with 4.0-4.4% higher returns in the period of one to twenty days' post IPO. Our findings also show that cornerstone capital subscribes for a larger share of the offering in hot issues and correspondingly a lower share in weaker issues, thus earning greater profits in IPOs at the expense of non-cornerstone investors.

Even though there is no one single explanation for either IPO underpricing nor the participation of cornerstone investors, we contemplate that the differential in underpricing between cornerstone and non-cornerstone IPOs can be partially explained by *bandwagon* and *crowding-out* effects in line with Welsh (1992) and Stoughton and Zechner (1998). These effects suggest that the presence of cornerstone investors signals higher quality of the issue and adds prestige to any given IPO, but they also crowd-out other institutional and retail

investors, ceteris paribus leading to a given demand for a lower number of shares available for non-cornerstone investors. A third reason behind higher underpricing in cornerstone backed IPOs could be due to a discount to the fundamental value of the firm, negotiated by the cornerstone investors in exchange for their participation and thus decreased execution risk. Finally, any failure to control for simultaneity bias and reverse causality could simply imply that cornerstone investors are better at picking IPOs with higher underpricing, in line with superior stock picking abilities, voiding other explanatory theories.

Hence in line with our three research hypotheses this study concludes with three main findings: (1) Underpricing is present in the Nordics for the period of 2001-2016, (2) cornerstone backed IPOs experience higher underpricing than non-cornerstone backed IPOs likely due to *bandwagon*, *crowding-out* or *fundamental valuation discount* effects (3) cornerstone capital enjoys higher returns than non-cornerstone capital of up to 4.4% shortly post-IPO.

With regards to cornerstone literature we contribute to previous IPO literature through (1) using a 2SLS approach with a novel selection of instrument variables in the study of cornerstone IPOs for the purpose of controlling for endogeneity, (2) the measurement of the actual return differential between cornerstone and non-cornerstone capital, and (3) by analysing the Nordic hot issue market of 2014 to 2016 with record levels of IPO activity. Our findings have several implications for a variety of IPO stakeholders including issuers, underwriters as well as both cornerstone and non-cornerstone investors. IPO investors can use this information to make more informed estimates of initial day one returns based on the findings of this study, and unless crowded out by cornerstone allocations also enjoy more favourable initial returns. From the perspective of the underwriters, this study also brings benefits as it quantifies the impact of cornerstone participation in the offering.

An important limitation in inference is that we do not control for fundamental valuation relative to comparable firms at the time of IPO, as such we cannot establish whether the underpricing associated with cornerstone investors also imply greater transaction costs through a higher *IPO discount*, or if the observed underpricing is purely due to *crowding-out* and *bandwagon* effects.

The introduction of cornerstone investors in the Swedish market is the most dramatic change to the Nordic IPO landscape since the introduction of book-building in the 1990's. At the same time, the Swedish IPO market is one of the most vibrant and well-functioning equity capital markets in Europe. Although this thesis do not seek an answer as to the reasons behind the recent IPO hotmarket in the Nordics, understanding and quantifying the impact of cornerstone investors on contemporary IPO markets is of great importance alight of the large sums transacted and the importance of well-functioning equity markets for the national economy.

A. Further research

Building on these findings additional avenues for research are available in the Nordic market as well as in Asian markets where cornerstone IPOs are more prevalent. Concerning the Nordic geography, the most obvious suggestion is the expansion of sample size to include more cornerstone IPOs. As many as 9 more IPOs floated in the first five months of 2017, all of which cornerstone backed and launched on Nasdaq Stockholm and Nasdaq Helsinki. Second, longer-term performance of cornerstone backed IPOs can be studied and compared with the short-term effects of cornerstone investors on underpricing as longer event windows become available. The third and perhaps most interesting avenue of research, is determining any causality between cornerstone investors and IPO volumes, that is whether cornerstone investors helps to improve firm's access to equity capital markets alight of the record IPO offer proceeds seen on Swedish and Finnish exchanges.

It would also be of interest to control for any differential in fundamental valuation discount, or *IPO discount*, between cornerstone and non-cornerstone IPOs using forecasted earnings data and comparable valuation provided in IPO initiating coverage research reports in accordance to Houston et al. (2006). Second, examining whether the size or reputation of a cornerstone investor has any impact on underpricing and aftermarket performance, where a suggested research question would be whether it is worth giving up value in underpricing in order to attract high-profile cornerstone investors. Thirdly, in the Asian markets it would

be of interest to investigate and quantify any difference in return between cornerstone and non-cornerstone capital in accordance to Aggarwal (2002), as notably to date no such studies have been made. Whereas measurement of an underpricing differential has been attempted in Asian markets, no quantification of any difference in dollar returns between the two cohorts of investors has been investigated.

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Appendices

Appendix A.

Table XI: Previous peer-reviewed original research articles on cornerstone IPOs

Author	**Geographic focus**	**Metric(s)**	**Impact of cornerstone investor**
Espenlaub et al. (2016)	Hong Kong	Tenure of listing after IPO (IPO survival)	Increases the period IPOed firms remain listed
McGuiness (2014)	Hong Kong	Market to Book, Tobins Q	Associated with higher valuation
Tan and Ong (2013)	Hong Kong	Qualitative and descriptive analysis	Critical to the success of IPOs
McGuiness (2012)	Hong Kong	Offer allocation, P/E ratio, Industry clustering, Underpricing	Positive relationship between underpricing and cornerstone backing, P/E ratio and industry clustering
Low (2009)	Hong Kong	Qualitative and descriptive analysis	Large share of offer allocated to cornerstone investors breaching the requirement of equal treatment among investors

Appendix B.

Table XII: Theoretical models for underpricing

Numerous explanatory models for underpricing phenomenon have been employed in previous studies. In this table we provide a summary of the most common hypotheses and devide them into five broader categories: asymmetric information, institutional reasons, control considerations as well as behavioural reasons (Ljungqvist, 2007), and allocation theories (Ritter and Welch, 2002).

Type	**Theory**	**Description**
Asymmetric information	Winners curse hypothesis (Rock, 1986)	Informed investors buying underpriced stock, drive both demand and price upwards. Uninformed investors however will only receive allocations in the least desirable issues, known as winners curse. As a result, uninformed investors will only subscribe to issues if they are, on average, underpriced.
Asymmetric information	Market feedback hypothesis (Benveniste and Spindt, 1989)	Underwriters' Underwriters underprice during the subscription period in order to lead investors to disclose their true valuations of the stock, which will then be incorporate while pricing the issue.
Asymmetric information	Monopsony power hypothesis (Baron, 1982)	Investment bankers do take advantage of their relative bargaining power as well as their superior knowledge relative to issuers and underprice issues in order to meet investor demands.
Asymmetric information	Assymmetric information hypothesis (Beatty and Ritter, 1986)	Issuers are in pocession of private information and as such more informed about an IPO-firms intrinsic value than underwriters or investors. Underpricing is a result of investor uncertainty of an issuing firms' fair value leading to offer prices being downward biased.
Institutional	Implicit insurance hypothesis (Tinic, 1988)	Underpricing serves as insurance against law suits therefore violating terms of required information disclosure.
Institutional	Risk-averse underwriter hypothesis (Neuberger and La-Chapelle, 1983)	Risk averse underwriters underprice issues in order to prevent losses and to avoid ending up with an unsuccessful IPO.
Control theory	Ownership dispersion hypothesis (Booth and Chua, 1996)	Issuers underprice to increase demand, attracting many individual investors resulting in increased liquidity and less large stakes threatening managements authority
Behavioral	Money left on the table hypothesis (Loughran and Ritter, 2002)	Issuers experience a positive surprise by amounts raised in IPOs and which more than compensates for underpricing, and resulting *money left on the table* to first day investors.
Allocation	Speculative bubble hypothesis (Ritter, 1984)	Inital excess demand may lead investors with small or no allocations to speculate on the stock price in the initial trading period.

Appendix C.

Table XIII: Previously studied samples of cornerstone IPO's

Author	**Geographic focus**	**Period**	**Sample size**
Espenlaub et al. (2016)	Hong Kong	1990-2010	903 IPOs o/w 179 cornerstone investor backed o/w 202 Strategic investor backed
McGuiness (2014)	Hong Kong	2005-2009	269 IPOs o/w 79 cornerstone investor backed o/w 15 Strategic investor backed
McGuiness (2012)	Hong Kong	2005-2009	269 IPOs o/w 79 cornerstone investor backed o/w 15 Strategic investor backed

Appendix D.

Table XIV: Summary of control variables

We employ control variables following contemporary IPO literature with variable selection based on Butler et al. (2014).

Variable and abbreviation	**Description**	**Expected impact**
Firm Size, LN_REVENUE	Firm size is an important determinant of uncertainty, asymmetric information and subsequent IPO underpricing. Using the logarithm of total IPO issue proceeds as a proxy for firm size, Beatty and Ritter (1986) show a negative relationship between firm size and underpricing. Arugaslan et al. (2004) however argue that the proceeds from an IPO are determined by the size of the share issue, not by firm size as such making it an inappropriate proxy. For similar reasons market capitalization is also a poor measure of firm size as it is distorted by the firms' capital structure. We use firm revenue for the latest twelve-month period as reported in the IPO prospectus or alternatively from SDC Platinum, in line with Arugaslan et al. (2004). To avoid dropping early-stage or R&D firms without reported revenues in our regression, we add one unit to all firm revenues in our sample.	–
Financial Leverage, LIABILITIES_ TO_ASSETS	Barry and Mihov (2015) evidence the inverse relationship between debt and underpricing. They derive that firms with high debt levels have lower valuation uncertainty and lower first-day returns than firms without any debt. Firms with existing banking relationships are usually older and more profitable or have fewer losses the case of early-stage firms. Their esults indicate that both firms with best current as wells future prospects establish banking relationships. Barry and Mihov (2015) show that what matters are actual levels of borrowing rather the presence of borrowing. Debt levels help to access the firms' future prospects which is reflected in the valuation. The uncertainty about the value of high debt firms is lower than that of low debt firms. We measure financial leverage through the Total Debt / Total Assets ratio as reported in *SDC Platinum*.	–

Variable and abbreviation	Description	Expected impact
Share Overhang, LN_OVERHANG	Bradley and Jordan (2002) report that underpricing is positively related to "Share Overhang". Share Overhang is defined as pre-IPO shares retained by the selling shareholder divided by the number of shares issued in the IPO. $$100 * \left(\frac{\text{Shares Outstanding} - \text{Total Shares Offered}}{\text{Total Shares Offered}}\right)$$ Firms with greater share overhang suffer less dilution, such that the costs of underpricing are lower and the level of underpricing is likely to be larger. Ritter (2002) points out that only the shares sold to the public in the IPO are ever undervalued. The shares retained by insiders are valued at the prevailing price in the secondary market. Hence with underpricing kept constant, dilution which is the economic cost per retained share has an inverted relationship with share overhang. Hence firms with larger overhang are naturally more open to higher degrees of underpricing.	+
Secondary shares, LN_SECONDARY _SHARES	Aggarwal et al. (2002) report that IPOs in which insiders sell secondary shares are underpriced less. This lower underpricing results from the managers selling a majority of their secondary shares at IPO such as the maximization of IPO proceeds is more relevant to them than potential price appreciation of unsold shares, as such limiting incentives for underpricing. We control for this factor by dividing the number of secondary shares offered divided by the total number the total number of secondary shares offered into account, and not the share of secondary shares offered by management.	−
Private information/ Ex-post Price Revision, REVISION	An additional source of information prior to floatation is the book building process itself, in which underwriters acquire private information about demand from investors. Existing Bookbuilding theories argue that in order to receive information from potential institutional investors, they ask for compensation in the form of a downward price revision in the offer price. Previous studies such as Loughran and Ritter (2002) use the revision in offer price from filing to offer date to proxy for such information. We mimic this approach and define offer price revision as the percentage difference of the final offer price from the midpoint of the filing price range in the prospectus. $$100 * \left(\frac{\text{Offer Price} - \text{Original midpoint of filing price range}}{\text{Original midpoint of filing price range}}\right)$$	+

Variable and abbreviation	Description	Expected impact
Underwriter reputation, IB_ MARKETSHARE	Carter and Manaster (1990) claim that underwriters with a good reputation decrease underpricing. They argue that that low dispersion firms will try to signal their low risk to the market by choosing an underwriter with a high reputational capital at stake. These underwriters have an incentive to only choose low dispersion IPOs, thereby reducing the ex-ante risk for investors. Neuberger and de Chapelle (1983) found that underpricing is negatively related to issues with underwriters within the most prestigious tier. Hence, the use of a reputable underwriter should reduce underpricing. We use the method developed by Megginson and Weiss (1991) where the global coordinators and joint bookrunners local market share is used. We define market share as the average gross proceeds in all national offerings managed divided by total proceeds raised in all IPO offerings during the five calendar years preceding each firms IPO. Offerings lead managed by more than one bank are allocated equally across all lead managers. Underwriters that are not among the largest 25 are allocated zero percent market share. Data for the period 2001-2016 was downloaded from Bloomberg and SDC Platinum. We construct the variable Underwriter Ranking that contains the percentage market share held by the underwriter used at IPO.	−
Pricing mechanism, FIXED_PRICE	Several papers have studied the effect of different IPO pricing mechanism such as auctions, bookbuilding and fixed price on underpricing. Bookbuilding requires on average a lower discount (Benveniste and Wilhelm, 1990; Benveniste and Busaba, 1997; Loughran and Rydqvist, 1994). In Nordic markets both bookbuilding and fixed price auctions occur, with bookbuilding being significantly more prevalent. We control for the difference in IPO mechanism through a binary dummy variable taking the value of zero if pricing is determined through a bookbuilding procedure and one otherwise.	+
Selling shareholders, BUYOUT VC FOUNDER	Previous research has found that both first-day returns and aftermarket performance differ across the spectrum of different existing ownership categories. Megginson and Weiss (1991) demonstrate that Venture Capital backed IPOs have relatively lower first-day returns, which they attribute to a so-called VC certification effect that reduces information asymmetry between investors and issuing firms. Loughran and Ritter (2002) attempt to explain issuers tolerance for underpricing through prospect theory which implies the focus lies on absolute wealth rather than a change in the level of wealth. They assume that issuers will sum the money left on the table with the potentially larger wealth gain for their retained shares through price appreciation, which is likely to produce a net gain of wealth. Since founders on average reap a significant increase in personal net worth through the IPO, we also control for founders as sellers. We control for these effects using fummy variables, taking on 1 if firm belongs to categories Buyout, VC or Founder.	+/−

Variable and abbreviation	**Description**	**Expected impact**
Market return, 30D_MKT_RET	Edelen and Kadlic (2005) control for the market valuation of publicly traded comparable firms as it is readily observable in real time. Based on the limited amount of peer companies in the Nordic equity markets compared to the US, we simplify the method by using the return of each country benchmark index. The OMXS30 for Sweden, the OMXC20 for Denmark and the OMXH25 for Finland. We then compute the average cumulative daily return for the past 30 days using the formula: $$\hat{u}_t^{\text{index}} = \frac{\sum_{i=t-31}^{t-1} \text{index}}{30}$$	+
Average underpricing, 30D_AVG_UNDERPRICING	According to Benveniste et al. (2003) pricing information from other IPOs should be considered in the intermediation process as private information about a specific IPO obtained by intermediaries likely contains information which is relevant to access demand for other IPOs. Edelen and Kadlec (2005) construct two spillover measures, namely the average underpricing and average price revision of previous offerings thirty days prior to the IPO.	+

Appendix E.

Table XV: Sample distribution over time. Cornerstone IPOs in relation to all IPOs

Total sample consists of 121 observations over the period 2001-2016. Columns display IPO proceeds per year (left hand side) and the number of IPO's per year (right hand side).

Year	**Offer proceeds**			**# of IPOs**		
	Cornerstone	**Total**	**Share**	**Cornerstone**	**Total**	**Share**
2001	0.0	3.1	0%	0	6	0%
2002	0.0	9.7	0%	0	4	0%
2003	0.0	0.0	n.a.	0	0	n.a.
2004	0.0	4.9	0%	0	4	0%
2005	0.0	11.5	0%	0	9	0%
2006	0.2	17.1	1%	1	15	7%
2007	0.0	4.6	0%	0	6	0%
2008	0.0	0.4	0%	0	3	0%
2009	0.0	0.3	0%	0	1	0%
2010	0.0	28.8	0%	0	7	0%
2011	0.0	10.6	0%	0	7	0%
2012	0.0	0.0	n.a.	0	0	n.a.
2013	0.0	6.8	0%	0	4	0%
2014	4.2	30.3	14%	1	14	7%
2015	40.4	52.4	77%	16	23	70%
2016	12.2	69.1	18%	13	19	68%
Total	**57.1**	**278.2**	**21%**	**31**	**121**	**26%**

Appendix F.

Table XVI: Shapiro-Wilks test for normality

*The sample is tested for normality using the Shapiro-Wilks test as described by Newbold et al. (2012). The null hypothesis is that the data is normally distributed. The significance level is denoted by asterisk at the ***(1%), **(5%) and *(10%) level.*

Variable	**Prob>z**
UNDERPRICING	0.29000
CORNERSTONE_SHARE	0.00000***
REVENUE	0.00000***
LIABILITIES_TO_ASSETS	0.00023***
OVERHANG	0.00000***
SECONDARY_SHARES	0.00020***
REVISION	0.00000***
IB_MARKETSHARE	0.00000***
FIXED_PRICE	0.00015***
BUYOUT	1.00000
VC	0.00000***
FOUNDER	0.00008***
30D_MKT_RET	0.59268
30D _AVG_UNDERPRICING	0.00101**

Appendix G.

Table XVII: Breusch-Pagan test for heteroscedasticity

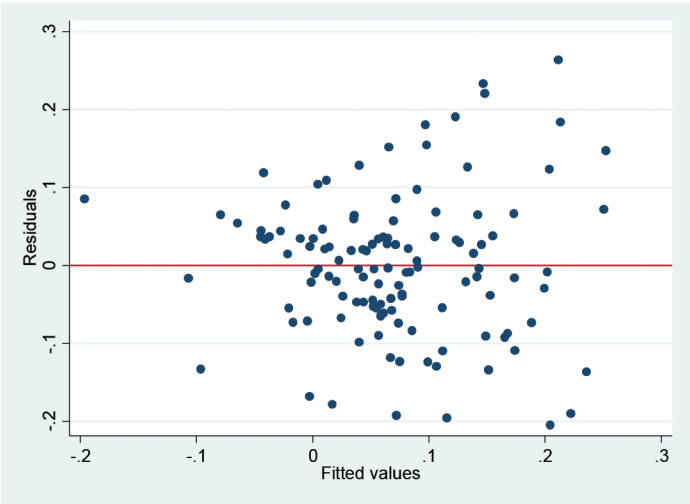
*The sample is tested for heteroscedasticity using the Breusch-Pagan test (Wooldridge, 2013). The null hypothesis is that the data is homoscedastic. The significance level is denoted by asterisk at the ***(1%), **(5%) and *(10%) level.*

Chi-Square	80.71***

Appendix H.

Table XVIII: Regression residual errors

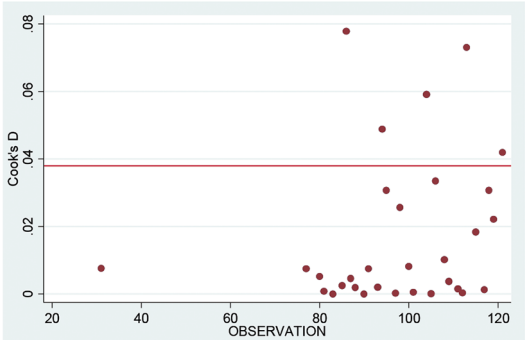
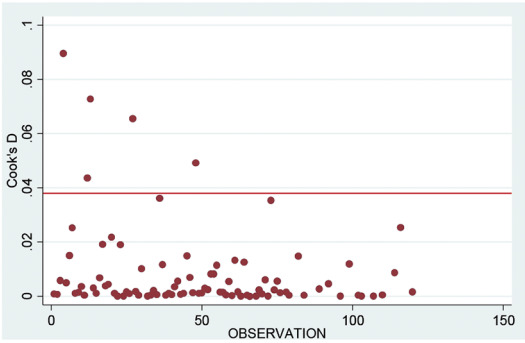
Regression Residual Error Plot depicts the distribution of residual errors. Predicted values of underpricing are plotted on the x axis and, and the prediction residual errors on the y axis.



Appendix I.

Table XIX: Cooks Distance

Cooks D measures the effect on the residuals for all other observations deleting observation i (Wooldridge, 2013). By plotting the Cooks D measure per company, we can spot potential influential observations. Fox (1991) suggest a Cooks D greater than $\frac{4}{(n-k-1)}$*, where n is the number of observations, k is the number of explanatory variables, as a cut off point for detecting influential observations and outliers. The red line indicates the decision rule provided by Fox (1991) for finding influential observations and potential outliers. Firms with a Cooks D greater than the decision rule value are listed below and have been confirmed for consistency.*

Cornerstone	**Non-cornerstone**
	

Firms with Cooks D exceeding the mean

Firm	**Cooks D**	**Firm**	**Cooks D**
Tobii	0.08	Bioinvent	0.09
Academedia	0.07	Gant Company	0.07
Garo	0.06	NOTE	0.07
Capio	0.05	Cimber	0.05
Edgeware	0,04	Sterling	0,04
		Unibet Group	

Mean 0.04

Appendix J.

Table XX: Pairwise correlation of variables used in regression.

*The significance level is denoted by asterisk at the *(5%) level.*

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	CORNERSTONE_SHARE	1.00													
2	REVENUE	0.00	1.00												
3	LIABILITIES_TO_ASSETS	0.10	0.10	1.00											
4	OVERHANG	0.03	0.05	-0.15	1.00										
5	SECONDARY_SHARES	0.14	0.07	0.27*	-0.15	1.00									
6	REVISION	0.17	0.07	0.17	0.08	0.29*	1.00								
7	IB_MARKETSHARE	0.29*	0.09	0.08	-0.11	0.17	0.06	1.00							
8	FIXED_PRICE	0.16	-0.13	-0.16	0.30*	-0.16	-0.08	-0.17	1.00						
9	BUYOUT	0.06	-0.02	0.39*	-0.27*	0.42*	0.17	0.14	-0.19*	1.00					
10	VC	0.01	-0.10	-0.32*	0.11	-0.34*	-0.12	0.13	-0.07	-0.30*	1.00				
11	FOUNDER	0.12	0.03	0.06	0.10	-0.08	0.03	-0.02	0.20*	-0.47*	-0.14	1.00			
13	30D_MKT_RET	-0.01	0.07	-0.03	0.04	0.09	0.15	-0.01	0.11	0.02	-0.17	0.09	0.12	1.00	
14	30D_AVG_UNDERPRICING	0.17	0.00	0.17	-0.10	0.03	0.18*	0.16	-0.11	0.09	-0.11	0.13	0.43*	0.21*	1.00
15	Y2014	0.03	-0.21	-0.06	0.08	-0.12	0.04	0.02	-0.09	-0.04	-0.09	-0.13	0.24	0.22	0.12
16	Y2015	0.36*	0.43*	0.23*	0.24*	-0.17	0.07	0.17	0.17	-0.05	0.19	-0.08	-0.09	0.08	0.16
17	Y2016	0.44*	0.54*	-0.05	-0.13	0.03	0.00	-0.00	0.14	0.26*	-0.06	0.07	0.13	0.04	0.31*

Appendix K.

Table XXI: Variance in Inflation, VIF

Variance in Inflation is an index that measure by how much the variation of a coefficient is increased due to collinearity. The variables are sorted after value of VIF. We use values above 10 as indicator of strong presence of multicollinearity as suggested by (Wooldridge, 2013).

	VIF		**VIF**
BUYOUT	2.16	30D _AVG_UNDERPRICING	1.40
REVENUE	1.80	FIXED_PRICE	1.33
FOUNDER	1.74	IB_MARKETSHARE	1.27
VC	1.68	LN_OVERHANG	1.26
LIABILITIES_TO_ASSETS	1.66	REVISION	1.21
SECONDARY_SHARES	1.62	DOMXS30RET	1.15
CORNERSTONE_SHARE	1.54		
Mean	1.55		

Appendix L.

Table XXII: Robustness tests – Regression excluding influencial observations

*Dependent variable is underpricing operationalized as the difference between closing price of first day of trading and issue price. T-values are reported in parentheses under each coefficient and the significance level is denoted by asterisk at the ***(1%), **(5%) and *(10%) level. The variance estimated is found using heteroscedasticity robust standard errors. The influential observations were identified as having a Cooks D above the decision rule provided by Fox (1991).*

Study variable	
CORNERSTONE_SHARE	**0,11*** **(0,06)**
Control variables	
LN_REVENUE	**0,01**** (0,00)
LIABILITIES_TO_ASSETS	**0,03** (0,03)
LN_OVERHANG	**0,02** (0,01)
LN_SECONDARY_SHARES	**–0,00** (0,03)
REVISION	**0,37***** (0,13)
IB_MARKETSHARE	**0,29** (0,18)
FIXED_PRICE	**0,05**** (0,03)
BUYOUT	**0,01** (0,02)
VC	**0,04** (0,03)
FOUNDER	**0,02** (0,03)
30D_MKT_RET	**16,1***** (3,24)
30D _AVG_UNDERPRICING	**–0,08** (0,09)
Adjusted R-Square	0,46
F-Statistic	5.67
N	111

Appendix M.

Table XXIII: List of companies in sample and value of study variable

Summary of observations included in sample. The sample consists of 121 IPOs during 2001-2016 in Sweden, Denmark and Finland, of which 31 are cornerstone IPOs. Cornerstone IPOs are classified based on offer allocations to cornerstone investors.

Firm	**IPO year**	**Cornerstone share**	**Firm**	**IPO year**	**Cornerstone share**
Dimension	2001	-	Lindab	2006	-
D. Carnegie	2001	-	Tilgin AB	2006	-
BTS Group	2001	-	FirstFarms A/S	2006	-
Bioinvent International	2001	-	Allenex (Linkmed)	2006	-
Vitrolife AB	2001	-	Terveystalo Healthcare Oyj	2007	-
rnb Retail and Brands	2001	-	Nederman Holding	2007	-
Alfa Laval	2002	-	SRV Group Plc	2007	-
Intrum Justitia	2002	-	Systemair	2007	-
Ballingslöv	2002	-	HMS Industrial Networks	2007	-
Nobia	2002	-	Duni	2007	-
Oriflame	2004	-	DGC One	2008	-
Unibet Group PLC	2004	-	NunaMinerals A/S	2008	-
NOTE AB	2004	-	Global Health Partners AB	2008	-
Kemira GrowHow	2004	-	Cimber Sterling Group A/S	2009	-
Neste Oil Corporation	2005	-	Arise Windpower	2010	-
Affecto Oyj	2005	-	Chr. Hansen Holding A/S	2010	-
Topotarget A/S	2005	-	Byggmax	2010	-
Indutrade	2005	-	MQ	2010	-
Hemtex	2005	-	Pandora A/S	2010	-
Tryg A/S	2005	-	Zealand Pharma A/S	2010	-
TradeDoubler	2005	-	TDC	2010	-
Orexo	2005	-	ISS A/S	2011	-
Hakon Invest	2005	-	Karolinska Development	2011	-
KappAhl	2006	-	FinnvedenBulten (Bulten)	2011	-
Salcomp Plc	2006	-	Moberg Pharma	2011	-
Ahlstrom Oyj	2006	-	Infinera (transmode)	2011	-

Firm	IPO year	Corner-stone share	Firm	IPO year	Corner-stone share
Gant Company	2006	-	Boule Diagnostics	2011	-
FIM Corporate Finance	2006	-	Danske Andelskassers Bank	2011	-
Diös	2006	-	Matas A/S	2013	-
Biovitrum	2006	-	Restamax Oyj	2013	-
Curalogic A/S	2006	43%	Platzer	2013	-
Outotec	2006	-	Sanitec	2013	-
BE Group	2006	-	Bufab	2014	-
Rezidor	2006	-	Hemfosa	2014	-
OW Bunker A/S	2014	-	Bravida	2015	-
Recipharm	2014	-	Dometic	2015	26%
Besqab	2014	-	Attendo	2015	61%
Com Hem	2014	-	Evli Pankki Oyj	2015	-
Bactiguard Holding	2014	-	Scandic Hotels	2015	11%
Scandi Standard	2014	-	Camurus	2015	33%
Inwido	2014	-	Consti Group Oyj	2015	-
Gränges	2014	-	Scandinavian Tobacco	2016	-
Lifco	2014	17%	Garo	2016	30%
Thule	2014	-	Humana	2016	54%
NP3 Fastigheter	2014	-	Lehto Group	2016	38%
Eltel	2015	16%	Tokmanni Group	2016	-
Dustin	2015	34%	Resurs Holding	2016	47%
NNIT A/S	2015	-	Wilson Therapeutics	2016	14%
Hoist Finance	2015	36%	Dong	2016	-
Asiakastieto Group Oyj	2015	-	Nordic Waterproofing	2016	26%
Troax	2015	75%	TF Bank	2016	45%
Tobii	2015	33%	AcadeMedia	2016	61%
Pihlajalinna Oyj	2015	11%	Nets	2016	-
Collector	2015	16%	Int. Engelska Skolan	2016	45%
Coor Service Management	2015	-	Ahlsell	2016	-
Alimak	2015	18%	Alligator BioScience	2016	31%
Nordax Bank	2015	17%	Serneke	2016	40%
Nobina	2015	-	Volati	2016	58%
Pandox	2015	20%	DNA	2016	-
Capio	2015	58%	Edgeware	2016	54%
CLX Communications	2015	77%			

Appendix N.

Table XXIV: List of companies, dependent variables, study variable and control variables

Observations in sample including dependent, study and control variables. 30D revision, underpricing and benchmark index returns are excluded. The sample consists of 121 IPOs during 2001-2016 in Sweden, Denmark and Finland, of which 31 are cornerstone IPOs. Cornerstone IPOs are classified based on offer allocations to cornerstone investors. Variable definitions are available in Appendix D.

Firm	**Date**	**Country**	**Underpricing**	**Cornerstone share**	**Revenue (SEK M)**	**Liabilities to assets**	**Share overhang**	**Secondary shares**	**Fixed interval dummy**	**Offer price revision**	**Investment bank market share**	**Buyout dummy**	**VC dummy**	**Founder dummy**
			Dependent var.	**Study var.**	**Control var.**	**Control var.**	**Control var.**	**Control var.**	**Control var.**	**Control var.**	**Control var.**	**Control var.**	**Control var.**	**Control var.**
Dimension	2001-02-20	SWE	9.0%	-	0.8	0.7	1.0	0.7	0	13%	13%	1	0	0
D. Carnegie	2001-06-01	SWE	15.7%	-	4.5	0.9	4.0	0.7	0	13%	14%	1	0	0
BTS Group	2001-06-06	SWE	3.5%	-	0.2	0.8	1.2	0.2	0	10%	24%	0	0	1
Bioinvent International	2001-06-12	SWE	-16.1%	-	0.0	0.2	2.5	0.3	0	-8%	24%	0	1	0
Vitrolife AB	2001-06-26	SWE	-7.5%	-	0.1	0.2	1.9	0.1	0	-8%	18%	0	1	0
RNB Retail and Brands	2001-06-26	SWE	-22.9%	-	0.6	0.7	0.7	0.4	0	-8%	1%	0	0	0
Alfa Laval	2002-05-17	SWE	7.7%	-	15.8	0.9	0.3	0.5	0	-16%	11%	1	0	0
Intrum Justitia	2002-06-07	SWE	6.4%	-	2.3	1.0	0.5	0.2	0	-27%	21%	1	0	0
Ballingslöv	2002-06-19	SWE	-0.8%	-	1.2	0.7	0.1	0.8	0	8%	0%	1	0	0
Nobia	2002-06-19	SWE	-9.0%	-	8.3	0.7	1.2	0.7	0	8%	14%	1	0	0
Oriflame	2004-03-24	SWE	9.2%	-	5.9	0.9	1.4	0.9	0	-7%	11%	1	0	0
Unibet Group	2004-06-08	SWE	27.8%	-	1.4	0.5	5.3	0.2	1	4%	0%	0	0	1
NOTE	2004-06-23	SWE	-8.0%	-	0.9	0.8	3.0	0.3	1	0%	0%	0	0	1

Firm	Date	Country	Underpricing	Cornerstone share	Revenue (SEK M)	Liabilities to assets	Share overhang	Secondary shares	Fixed interval dummy	Offer price revision	Investment bank market share	Buyout dummy var	VC dummy	Founder dummy
			Dependent var.	Study var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.
Kemira GrowHow	2004-10-14	FIN	5.7%	-	13.6	0.3	2.6	1.0	0	0%	8%	0	0	0
Neste (Neste Oil Corporation)	2005-04-15	FIN	7.9%	-	78.2	0.4	5.7	1.0	0	11%	7%	0	0	0
Affecto	2005-05-26	FIN	0.2%	-	0.3	0.2	0.8	0.8	1	0%	8%	1	0	0
Topotarget	2005-06-10	DNK	16.9%	-	0.0	0.4	2.2	0.0	0	0%	7%	0	1	0
Indutrade	2005-10-05	SWE	12.7%	-	3.5	0.7	0.6	1.0	0	-2%	7%	0	0	0
Hemtex	2005-10-06	SWE	18.8%	-	0.8	0.4	1.6	0.9	0	8%	11%	1	0	0
TradeDoubler	2005-11-08	SWE	0.0%	-	0.6	0.7	1.2	1.0	0	8%	10%	1	0	0
Orexo	2005-11-09	SWE	-0.8%	-	0.1	0.3	1.2	0.0	0	6%	6%	0	1	0
Hakon Invest	2005-12-08	SWE	5.8%	-	73.5	0.8	11.4	1.0	0	-8%	2%	0	0	0
KappAhl	2006-02-24	SWE	7.1%	-	3.9	0.9	1.3	1.0	0	6%	10%	1	0	0
Salcomp	2006-03-10	FIN	-0.3%	-	1.7	0.4	0.9	0.6	0	0%	7%	1	0	0
Ahlstrom	2006-03-13	FIN	11.1%	-	15.4	0.6	3.6	0.0	0	-6%	8%	0	0	1
Gant Company	2006-03-28	SWE	36.9%	-	1.1	0.9	0.7	1.0	1	-6%	6%	1	0	0
FIM Corporate Finance	2006-04-12	FIN	3.8%	-	0.8	0.0	2.1	0.6	0	0%	8%	0	0	0
Diös	2006-05-22	SWE	-12.4%	-	0.2	0.7	1.4	0.0	0	5%	0%	0	0	0
Biovitrum	2006-09-15	SWE	11.5%	-	0.9	0.4	5.7	1.0	1	-3%	12%	1	0	0
Curalogic	2006-05-31	DNK	3.8%	43%	0.0	0.1	12.6	0.0	1	-3%	7%	0	0	0
Outotec	2006-10-09	FIN	3.0%	-	61.5	0.4	0.3	1.0	0	0%	8%	0	0	0
BE Group	2006-11-24	SWE	4.8%	-	5.8	0.8	0.8	1.0	0	-9%	5%	1	0	0
Rezidor	2006-11-28	SWE	0.0%	-	5.5	0.6	0.5	1.0	0	9%	10%	0	0	0
Lindab	2006-12-01	SWE	2.5%	-	6.2	0.7	1.0	1.0	0	9%	9%	1	0	0

Firm	Date	Country	Underpricing	Cornerstone share	Revenue (SEK M)	Liabilities to assets	Share overhang	Secondary shares	Fixed interval dummy	Offer price revision	Investment bank market share	Buyout dummy var	VC dummy	Founder dummy
			Dependent var.	Study var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.
Tilgin	2006-12-05	SWE	-12.0%	-	0.2	0.6	3.3	0.0	1	9%	0%	0	0	0
FirstFarms	2006-12-11	DNK	-1.0%	-	0.1	0.1	-0.9	0.0	1	7%	7%	0	0	0
Allenex (Linkmed)	2006-12-12	SWE	-0.7%	-	0.0	0.0	0.7	0.0	0	5%	0%	0	1	0
Terveystalo Healthcare	2007-04-02	FIN	1.7%	-	0.9	0.3	1.2	0.0	0	0%	7%	0	0	0
Nederman Holding	2007-05-16	SWE	9.8%	-	0.9	0.5	0.4	1.0	0	-11%	6%	1	0	0
SRV Group	2007-06-11	FIN	10.0%	-	4.7	0.2	1.4	0.0	0	7%	8%	0	0	0
Systemair	2007-10-12	SWE	0.0%	-	0.7	0.6	1.5	1.0	0	1%	4%	0	0	1
HMS Industrial Networks	2007-10-19	SWE	-1.4%	-	0.2	0.5	0.5	1.0	0	9%	8%	1	0	0
Duni	2007-11-14	SWE	0.0%	-	4.0	0.6	0.5	1.0	0	2%	3%	1	0	0
DGC One	2008-06-16	SWE	12.1%	-	0.2	0.7	3.4	0.0	0	2%	0%	0	0	1
NunaMinerals	2008-06-18	DNK	-1.5%	-	0.0	0.0	0.2	0.0	0	5%	6%	0	0	0
Global Health Partners	2008-10-03	SWE	2.1%	-	0.2	0.4	10.2	0.0	0	5%	8%	0	1	0
Cimber Sterling Group	2009-11-30	DNK	-11.1%	-	2.6	0.4	-0.4	0.1	0	-3%	7%	0	0	0
Arise Windpower	2010-03-24	SWE	-2.3%	-	0.0	0.5	0.7	0.1	0	-55%	2%	0	0	0
Chr. Hansen Holding	2010-06-02	DNK	5.6%	-	5.1	0.9	0.8	0.3	0	-8%	8%	1	0	0
Byggmax	2010-06-02	SWE	5.4%	-	2.5	0.8	0.9	1.0	0	-12%	7%	1	0	0
MQ	2010-06-18	SWE	-0.6%	-	1.4	0.8	0.7	0.8	0	-11%	5%	1	0	0
Pandora	2010-10-05	DNK	25.2%	-	4.6	0.6	1.6	0.9	0	-4%	8%	1	0	0

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Zealand Pharma	2010-11-24	DNK	-7.6%	-	0.1	0.1	3.3	0.0	0	5%	8%	1	0	0
TDC	2010-12-09	DNK	-2.4%	-	34.7	0.7	3.7	1.0	0	-2%	9%	1	0	0
ISS	2011-02-17	DNK	14.2%	-	104.4	0.9	1.6	0.0	0	-1%	9%	1	0	0
Karolinska Development	2011-04-15	SWE	-0.7%	-	0.0	0.0	1.0	0.0	0	2%	4%	0	0	0
Finnveden-Bulten (Bulten)	2011-05-20	SWE	0.0%	-	2.6	0.1	0.6	1.0	0	1%	8%	1	0	0
Moberg Pharma (Moberg Derma)	2011-05-26	SWE	-1.0%	-	0.0	0.0	1.6	0.0	1	-4%	1%	0	0	0
Infinera (Transmode)	2011-05-27	SWE	2.8%	-	0.7	0.3	1.7	1.0	0	-17%	9%	1	0	0
Boule Diagnostics	2011-06-17	SWE	-4.3%	-	0.2	0.6	1.6	0.0	1	-10%	1%	0	1	0
Danske Andelskassers Bank	2011-07-05	DNK	4.0%	-	1.7	0.3	1.1	0.0	1	-17%	8%	0	0	0
Matas	2013-06-28	DNK	3.5%	-	4.3	0.6	0.9	1.0	0	0%	8%	1	0	0
Restamax	2013-11-28	FIN	8.0%	-	0.8	0.3	2.0	0.0	1	5%	7%	0	0	1
Platzer	2013-11-29	SWE	5.3%	-	0.4	0.7	1.8	0.0	0	0%	3%	0	0	0
Sanitec	2013-12-10	SWE	6.1%	-	7.2	0.9	0.7	1.0	0	0%	4%	1	0	0
Bufab	2014-02-21	SWE	6.5%	-	2.0	0.5	0.3	1.0	0		9%	1	0	0
Hemfosa	2014-03-21	SWE	4.8%	-	1.0	0.9	0.4	0.7	0	-2%	7%	0	0	0
OW Bunker	2014-03-28	DNK	20.7%	-	152.9	0.9	0.8	1.0	0	1%	8%	1	0	0
Recipharm	2014-04-03	SWE	9.9%	-	2.2	0.6	0.3	0.5	0	4%	9%	0	0	1

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Besqab	2014-06-12	SWE	15.8%	-	0.7	0.6	1.2	0.2	0	-1%	3%	0	0	1
Com Hem	2014-06-17	SWE	9.6%	-	4.4	0.9	-0.1	0.0	0	4%	4%	1	0	0
Bactiguard Holding	2014-06-19	SWE	-17.1%	-	0.1	0.8	0.6	0.5	0	6%	3%	0	0	1
Scandi Standard	2014-06-27	SWE	17.5%	-	5.2	0.9	0.6	1.0	0	0%	7%	1	0	0
Inwido	2014-09-26	SWE	-5.1%	-	4.3	0.5	0.3	1.0	0	10%	9%	1	0	0
Gränges	2014-10-10	SWE	2.4%	-	4.6	0.4	0.4	1.0	0	-1%	7%	0	0	0
Lifco	2014-11-26	SWE	32.3%	17%	6.0	0.6	1.0	1.0	1	-8%	9%	0	0	1
Thule	2014-11-26	SWE	11.4%	-	4.3	0.7	2.3	1.0	0	0%	15%	1	0	0
NP3 Fastigheter	2014-12-04	SWE	12.7%	-	0.1	0.6	4.3	0.0	1	1%	1%	0	0	1
Eltel	2015-02-06	SWE	7.4%	16%	10.7	0.7	0.0	0.5	0	0%	7%	1	0	0
Dustin	2015-02-13	SWE	17.0%	34%	7.4	0.9	0.8	0.9	0	9%	10%	1	0	0
NNIT	2015-03-06	DNK	26.0%	-	3.2	0.5	1.2	1.0	0	6%	7%	0	0	0
Hoist Finance	2015-03-25	SWE	14.0%	36%	1.3	0.9	0.3	0.7	0	14%	11%	1	0	0
Asiakastieto Group	2015-03-27	FIN	3.3%	-	0.4	0.5	0.3	1.0	0	10%	7%	1	0	0
Troax	2015-03-27	SWE	19.3%	75%	0.8	0.7	0.6	1.0	0	10%	12%	1	0	0
Tobii	2015-04-24	SWE	38.0%	33%	0.6	0.4	2.3	0.1	0	4%	10%	0	1	0
Pihlajalinna	2015-06-04	FIN	9.5%	11%	1.5	0.9	0.8	0.3	0	6%	8%	1	0	0
Collector	2015-06-10	SWE	15.6%	16%	0.9	0.9	3.3	0.6	1	6%	14%	0	0	0
Coor Service Management	2015-06-16	SWE	0.0%	-	6.8	0.8	-0.2	0.2	0	3%	6%	1	0	0
Alimak	2015-06-17	SWE	8.9%	18%	1.7	0.7	0.6	1.0	0	4%	9%	1	0	0

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			Dependent var.	Study var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.	Control var.
Nordax Bank	2015-06-17	SWE	-2.4%	17%	0.8	0.9	0.8	1.0	0	4%	11%	1	0	0
Nobina	2015-06-18	SWE	-5.9%	-	7.5	1.0	0.0	0.6	0	6%	7%	1	0	0
Pandox	2015-06-18	SWE	1.0%	20%	3.1	0.6	1.5	1.0	0	6%	7%	0	0	0
Capio	2015-06-30	SWE	0.0%	58%	13.2	0.7	1.4	0.7	1	3%	7%	1	0	0
CLX Communications	2015-10-08	SWE	6.5%	77%	0.8	0.9	1.3	1.0	0	0%	12%	0	0	1
Bravida	2015-10-16	SWE	7.5%	-	12.0	0.7	1.5	1.0	0	4%	9%	1	0	0
Dometic	2015-11-25	SWE	15.4%	26%	8.8	0.6	0.8	0.1	0	0%	10%	1	0	0
Attendo	2015-11-30	SWE	40.0%	61%	9.0	0.7	0.4	0.7	1	1%	11%	1	0	0
Evli Pankki	2015-12-02	FIN	24.0%	-	0.6	0.9	9.1	0.0	1	1%	6%	0	0	0
Scandic Hotels	2015-12-02	SWE	-4.9%	11%	10.8	0.7	0.6	0.6	0	1%	8%	1	0	0
Camurus	2015-12-03	SWE	15.8%	33%	208.2	0.5	1.0	0.2	0	-2%	16%	0	0	1
Consti Group	2015-12-11	FIN	3.2%	-	2.1	0.5	0.9	1.0	0	-1%	7%	1	0	0
Scandinavian Tobacco Group	2016-02-10	DNK	0.0%	-	6.6	0.4	1.8	1.0	0	-10%	8%	0	0	1
Garo	2016-03-16	SWE	39.7%	30%	0.6	0.5	1.2	1.0	1	8%	19%	0	0	1
Humana	2016-03-22	SWE	19.4%	54%	5.6	0.7	2.2	0.5	0	0%	9%	1	0	0
Lehto Group	2016-04-28	FIN	31.4%	38%	2.7	0.7	0.5	0.1	0	7%	8%	0	0	1
Tokmanni Group	2016-04-29	FIN	0.0%	-	7.5	0.9	-0.7	0.4	0	6%	8%	1	0	0
Resurs Holding	2016-04-29	SWE	0.2%	47%	2.4	0.8	1.7	1.0	0	6%	15%	1	0	0

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Wilson Therapeutics	2016-05-12	SWE	0.0%	14%	0.0	0.1	0.7	0.0	0	1%	7%	0	1	0
Dong	2016-06-09	DNK	9.8%	-	98.9	0.6	-0.7	1.0	0	-8%	9%	0	0	0
Nordic Waterproofing	2016-06-10	SWE	0.7%	26%	1.7	0.4	0.4	1.0	0	-2%	11%	1	0	0
TF Bank	2016-06-14	SWE	10.4%	45%	0.3	0.9	2.3	1.0	0	2%	11%	0	0	1
AcadeMedia	2016-06-15	SWE	47.5%	61%	8.2	0.7	2.1	0.7	1	1%	9%	1	0	0
Nets	2016-09-23	DNK	-3.3%	-	9.1	0.7	0.8	0.7	0	0%	9%	1	0	0
Internationella Engelska Skolan	2016-09-29	SWE	32.7%	45%	1.8	0.4	2.5	1.0	1	3%	4%	1	0	0
Ahlsell	2016-10-28	SWE	21.7%	-	22.6	1.0	1.9	1.0	0	0%	9%	1	0	0
Alligator BioScience	2016-11-23	SWE	17.2%	31%	0.3	0.0	3.0	0.3	1	-11%	9%	0	0	0
Serneke	2016-11-24	SWE	0.0%	40%	3.1	0.7	1.9	0.0	1	-5%	9%	0	0	1
Volati	2016-11-30	SWE	15.1%	58%	2.9	0.7	1.9	0.0	1	0%	9%	0	0	1
DNA	2016-11-30	FIN	0.0%	-	8.2	0.6	2.1	0.9	0	0%	9%	0	0	0
Edgeware	2016-12-09	SWE	1.7%	54%	0.2	0.4	0.0	0.6	0	-1%	9%	0	1	0