Lund University
School of Economics and Management

How Do Different Ownership Structures Impact Stock Liquidity?

A Quantitative Study on Nasdaq Stockholm

Master Thesis for Accounting and Finance Programme

Department of Business Administration

Spring 2022

Authors: Giovanni Fausti, Eric Ruud

Supervisor: Marco Bianco

Group number: 19

Abstract

JEL Classification: G10, G32, C58, D82

Seminar Date: 2022-06-01

Course: BUSN79, Degree Project in Accounting and Finance

Authors: Giovanni Fausti, Eric Ruud

Advisor: Marco Bianco

Key Words: controlling minority shareholders, blockholder ownership, stock market liquidity, adverse selection hypothesis, information asymmetry, pooled ordinary least squares, fixed effects, random effects

Purpose: The purpose of this study is to investigate whether or not the ownership structures, blockholder and CMS, have an impact on the stock market liquidity and how ownership structures influence liquidity through the asymmetric information channel captured by the adverse selection component of liquidity on firms listed on Nasdaq Stockholm. More specifically, we aim to bridge the knowledge gap about the CMS' impact on liquidity.

Methodology: In this paper, OLS regressions with both fixed- and random effects are conducted on an unbalanced panel data setup. Moreover, all regression models have robust standard errors clustered by firm ID to mitigate the heteroskedasticity issues. Lastly, a robustness check is included for the dependent variable CMS.

Theoretical Perspectives: The theoretical background of this study is established from the adverse selection hypothesis and stock market liquidity. These theoretical channels have been analyzed in order to establish if the investigated ownership structures impact liquidity and the adverse selection component of the bid-ask spread in Sweden.

Empirical Foundation: The data sample of this study consists of 292 firms listed on Nasdaq Stockholm from 2009 to 2019. All of the firms have their tax domicile in Sweden.

Conclusions: This paper found and supports the notion that both blockholder ownership and CMS structure negatively impacts stock market liquidity, and aggravates the information asymmetric component of the bid-ask spread. For example, a 1% increase in blockholder ownership widened the HS estimate for the adverse selection component of the bid-ask spread by 0.41%. Moreover, strong evidence was found for CMS negatively impacting stock liquidity, where 1% growth in the CMS' cash flow rights widened the relative spread by 1.446%.

Acknowledgements

The authors of this thesis would like to express our appreciation to our supervisor Marco Bianco for the guidance and support, both in person and virtually, while completing this paper.

Additionally, we would like to thank Patrik Stenberg from Holdings Modular Finance, who helped us to gather large amounts of ownership data.

In conclusion, we would like to thank each other for rewarding debates and providing useful guidance and expertise.

Giovanni Fausti

Eric Ruud

Table of Contents

Abbreviations

AMEX	American Stock Exchange
CMS	Controlling Minority Shareholders
ES	The Effective Bid-Ask Spread
FE	Fixed Effects
GLS	Generalized least squares
HFI	Herfindahl Index
HS	Huang and Stoll (1997)
Ln	Natural logarithm
LSB	Lin, Sanger and Booth (1995)
NYSE	New York Stock Exchange
NSH	Number of Shareholders
PIN	Probability of Informed Trading
POLS	Pooled Ordinary Least Squares
RE	Random Effects
RS	The Relative Bid-Ask Spread
SE	Standard Errors
UCS	Ultimate Controlling Shareholders
USDm	Millions of U.S. Dollars
Vol	Daily Volume of a traded stock in millions

1. Introduction

This chapter covers the background of the chosen field of study. It includes the problem discussion related to previous research around ownership structures and liquidity. Moreover, the purpose and the research question investigated are presented. Lastly, the main findings, our contribution to the topic as well as the limitations of the study are summarized.

1.1 Background

A much debated area within finance is the relation between ownership structures and the stock market liquidity. Furthermore, the majority of research focus on the adverse selection hypothesis, in other words the attempt to understand if ownership structures influences liquidity through the asymmetric information channel (e.g., Grossman & Stiglitz, 1980; Glosten & Milgrom, 1985; Kyle, 1985; Heflin & Shaw, 2000; Rubin, 2007; Jacoby & Zheng, 2010; Yosra & Sioud, 2011; Ginglinger & Hamon, 2012).

Stock liquidity is further reduced when active shareholders provide internal monitoring (Bhide, 1993). Cambridge Trust (2018) claimed in an article highlighting the elements of effective corporate governance that shareholder rights is a crucial element that should be considered by investors to ensure that they have equal rights as other shareholders, where multiple class shares are reviewed. Moreover, Cambridge Trust (2018) stated that proxy voting is increasingly being used by investors to influence board oversight and their commitment to improve corporate governance on issues such as climate change and shareholder proxy access.

The rise of blockholder regulations have taken place as a result of voting rights being used by investors to influence boards. Becht, Bolton and Röell (2003) argued that the existing blockholder regulations in the US are more efficient than in continental Europe, leading to less exacerbated conflicts due to the separation between voting rights and cash-flow rights, which are common in continental Europe. Among the countries that have had a high proportion of dual-class shares, we find Sweden (Cronqvist & Nilsson, 2003). The structure of the dual-class shares is defined “by both the proportion of A shares and the ratio of the number of votes per B share to the number of votes per A share” (Rydqvist, 1992, p.46). The regulations related to dual-class shares are different between countries, where Denmark, Finland, Sweden and the American Stock Exchange (AMEX) have regulation in place that require the minimum vote ratio of 1/10 whilst Canada, Israel, Netherlands, Switzerland and the US have no regulation related to dual-class shares (Rydqvist, 1992). Therefore, whether ownership structures affect the stock market liquidity or the adverse selection component of the bid-ask spread is a subject of much debate.

1.2 Problem Discussion

The case of ownership structures[1] and stock market liquidity is particularly interesting due to the strong contrasting results evidenced in previous research (e.g., Kini & Mian, 1995; Heflin & Shaw, 2000; Brockman, Chung, & Yan, 2009). The same inconsistent results were found for the case of ownership structures and the adverse selection component of bid-ask spread.

Brockman, Chung and Yan (2009) found that institutional investors increased the HS and LSB estimates[2] similarly to blockholder ownership, when controlling for trading activity. Ding, Nilsson and Suardi (2013) found that the higher the number of foreign institutional investors are, the wider the quoted spread and the relative spread (RS) are. However, inconsistent results were found with regards to the number of domestic institutions, which broadened the quoted spread but tightened the relative effective spread. Kini and Mian (1995) found no support for a significant positive relation between blockholder ownership and spreads whilst Heflin and Shaw (2000) found that increased blockholder ownership is related to wider spreads. These papers clearly have conflicting results. However, these studies refer to different sample years and sample size. Therefore, we cannot exclude the possibility that the different results in the studies may be sample specific.

On the other hand, the debate regarding UCS' impact on stock liquidity and its impact on the liquidity through the asymmetric information channel captured by the adverse selection component of liquidity is more direct. Since the articles that have investigated the field (e.g., Attig, Fong, Gadhoum & Lang, 2006; Yosra & Sioud, 2011; Ginglinger & Hamon, 2012) have established that UCS both negatively impacts stock liquidity and increases the

[1] The ownership structures analyzed in this paper are blockholder ownership and controlling minority shareholders (CMS), with their respective definitions in section 2.3 and 2.4. The main difference between the two ownership structures is that blockholders are owners with equal to or greater than 5% cash flow rights whilst CMS are owners identified by a certain % voting rights threshold, where we use the CMS' % cash flow rights.

[2] For a clear explanation about the HS and LSB estimates, please look at section 5.2.3

asymmetric information channel, we could assume that we might find similar results for CMS.

The vast majority of the research within the chosen field has been conducted on the United States (US) market, whilst this study is made on the Swedish market. This suggests that the conclusions drawn from the US market cannot directly be applied to the Swedish market. The three factors that would affect the results in different ways are how the two markets are regulated, situated and structured. A clear example of this factor is, for instance, under the Swedish tax laws a private investor only pay taxes of 0.375% on capital invested using an investment savings account (Skatteverket, 2022). Whilst, for most individuals in the US, the tax rate on net capital gains is no higher than 15% (International Revenue Service, 2022). This could arguably determine how much a single person could trade on the market. Secondly, the market size between the countries differs greatly. The US market differs significantly given its size compared to Sweden, contains more firms, might be monitored to a greater extent and has a stronger presence of foreign investors. Lastly, the dual-class share structures differ remarkably[3]. The three factors mentioned above affect our comparison between the results produced and other empirical papers.

1.3 Purpose and Research Question

The purpose of this study is to investigate whether ownership structures have an impact on stock market liquidity and how ownership structures influences liquidity through the asymmetric information channel captured by the adverse selection component of the bid-ask spread on firms listed on Nasdaq Stockholm. As a result of the debated topic regarding blockholders' effect on stock liquidity, this study aims to create a stronger understanding of their impact on the Swedish stock-market. Furthermore, being inspired by the findings of Claessens, Djankov, Fan and Lang (2002), Attig et al. (2006) researched instead how ultimate controlling shareholders (UCS) impacted stock market liquidity. Attig et al's. (2006) study was later followed by other empirical papers although on other markets (Yosra & Sioud, 2011; Ginglinger & Hamon, 2012). This study found instead a motivation and inspiration to specifically test whether CMS would have the same impact on the stock market liquidity, as the UCS and blockholder ownership. Given the results from Cronqvist and Nilsson (2003)

[3] For example, the S&P Dow Jones Index in the US prohibits firms with multiple classes of shares, such as A and B, from being in the index (Balakrishnan, 2017) compared Nasdaq Stockholm where companies have multiple classes of shares, e.g., Ericsson and BTS Group, and dual-class shares are allowed (seen in section 1.1 and 2.3)

indicating that CMS had higher agency costs than controlling majority shareholder, this study hypothesizes that CMS might have similar impact on the adverse selection components in the bid-ask spread. Moreover, given that Sweden has optimal databases on ownership structures and the CMS structures being very common, this study concluded that the conditions for researching the purpose of this study were satisfied. To address the purpose of the study, the following research question is:

- *How do different ownership structures impact stock market liquidity?*

1.4 Main Findings

This study used a sample of 292 firms listed on Nasdaq Stockholm from 2009 to 2019. We found that for every 1% increase in blockholder ownership, the effective spread (ES) increased by approximately 0.632%[4] (model 4), hence blockholders widened the spreads and lowered the stock market liquidity. Other findings with statistical significance were that CMS impacted spreads differently. For example, if CMS ownership increased its cash flow rights by 1%, this widened the RS by approximately 1.446% (model 14), which in turn implies that CMS lowered the stock liquidity. Whilst a 1% increase in the CMS' cash flow rights would tighten the ES by approximately 1.224% (model 17). The main difference between the two ownership structures investigated, was that CMS impacted ES and RS differently whilst blockholder ownership only widened the ES and RS.

Moreover, we found that the two ownership structures, blockholders and CMS, positively impacted the adverse selection component of liquidity. We found that a 1% change in blockholder ownership increased the HS estimate by approximately 0.41% (model 11), hence widening the adverse selection component of the bid-ask spread. However, no statistical significance was found for the other adverse selection measurement LSB. Lastly, for every 1% increase in CMS' fraction of cash flow rights, the HS adverse selection estimate expanded by approximately 0.850% (model 22). No statistical significance was found for CMS and the other adverse selection measurement. Regardless of statistical significance, we observed that the coefficients for both ownership structures were positive for all the regression models on adverse selection except for models 8 and 19. As for the control variables, we found that the ownership concentration variable Herfindahl index (HFI) had a

[4] The coefficient is 0.632. 0.632*0.01*100

moderating effect on blockholder ownership by improving liquidity. We also found strong evidence for the control-ownership deviation variable (VC) aggravating the negative effect by CMS structure on liquidity, by increasing the information asymmetry created by CMS. Furthermore, the HFI showed that if the ownership concentration was high amongst the five largest shareholders, it would reduce the spread, therefore, improve liquidity.

1.5 Contributions

In this empirical study, we make five distinct contributions related to the ownership structures and its impact on the stock market liquidity. Firstly, we support the notion that there is a negative effect by blockholder ownership on liquidity, which widens the spreads, thus reducing liquidity and increasing information asymmetry. Secondly, we extended Jacoby's and Zheng's (2010) study by including the control variable HFI, which captures the ownership concentration amongst the 5 largest shareholders. Our most significant contribution is bridging the knowledge gap between UCS and other ownership structures. This is by investigating the CMS structure' impact on liquidity, where we controlled for the control-ownership deviation. Furthermore, we included the HFI as a control variable for CMS ownership concentration. Lastly, this empirical study could prove to be helpful for asset managers, investors, CFOs as well as regulatory bodies in Sweden. More specifically, this study would potentially help develop efficient investment strategies whenever CMS structures are present but also develop more efficient regulations.

1.6 Limitations

This study is limited to companies listed on Nasdaq Stockholm from 2009 to 2019. Moreover, one of the main limitations of our analysis is that we used annual- instead of daily-data, like other studies. This paper also assesses whether theories concluded on older data and mostly the US market are still applicable to recent data and the Swedish market. Due to restricted access of data from S&P Capital IQ on delisted firms after 2019, a decision to disregard manually ownership data on those firms was made, hence, less firm observations. Lastly, since the theory behind the CMS structure's impact on stock liquidity is underdeveloped, to our knowledge, it is hard to provide conclusive evidence as to why we get certain results. We must therefore base our conclusions on possible reasons for the variation in results from other theories and ownership structures.

1.7 Outline

The rest of the paper is structured into eight chapters and arranged in the following way: Chapter 2.0 focuses on the theoretical background of this study. Chapter 3.0 outlines the most relevant empirical literature in order to provide a base for a better understanding and articulate the hypothesis. Chapter 4.0 summarizes the empirical literature and forms the chosen hypothesis for this study. Chapter 5.0 describes the sample universe by sample description and selection along with the dependent, explanatory and control variables. Lastly, the delimitations of this study are presented. Chapter 6.0 explains the main econometric methodology used in the study along with the statistical tests used. Chapter 7.0 presents all the descriptive statistics along with the correlation analysis. Lastly, all the regression models for stock liquidity and adverse selection are presented together with a robustness check and an endogeneity discussion. Chapter 8.0 focuses on the analysis of the results achieved in this study. Chapter 9.0 presents the conclusion from the study and suggestions for future research.

2. Theoretical Background

This chapter aims to explain the theoretical basis of this study. First, the concept of adverse selection as a by-product of ownership structure is introduced. Secondly, a discussion about the stock market liquidity and lastly, a theoretical background on specific ownership structures, which are: CMS, blockholder ownership and UCS[5].

2.1 Adverse Selection

Adverse selection exists due to asymmetric information, where one party has superior information than the other, between two parties (Ogden, Jen & O'Connor, 2003). Akerlof (1978) illustrated this problem in two scenarios. In one scenario, the car-salesman has more knowledge of the car's condition than the buyer, which causes information asymmetry. In the second scenario where health insurance is considered, the insurer has less information about the insuree's condition, especially in circumstances where the person is older, causing the insurer to offer an insurance premium (Akerlof, 1978).

Chang (2018) investigated the asymmetric information effect on liquidity. The author found that the illiquidity could be created by limited actors or fire sales, which is when the seller's

[5] We neither use nor analyze UCS. We solely include it to provide the reader with the difference and to avoid confusion between CMS and UCS.

position causes a high sale volume, not noticed by the market, negatively impacts the share prices through the trading volume. Moreover, research on the adverse selection hypothesis concludes on how greater information asymmetry created by ownership structures reduce liquidity (e.g., Grossman & Stiglitz, 1980; Glosten & Milgrom, 1985; Kyle, 1985; Heflin & Shaw, 2000; Jacoby & Zheng, 2010; Ginglinger & Hamon, 2012). Glosten and Milgrom (1985) explained the hypothesis by suggesting that in general, ask prices tend to increase whilst bid prices decrease the greater the insiders' information is, resulting in widened spreads and reduced liquidity.

2.2 Stock Market Liquidity

The two main types of liquidity are market liquidity and accounting liquidity. Brunnermeier and Pedersen (2009, p.2202) defined market liquidity as "the difference between the transaction price and the fundamental value". Moreover, Amihud and Mendelson (2006) defined an asset as liquid, if it can be traded at the predominant market price rapidly and at a low cost. Firms stocks are financial assets which are liquid assets, as described by Amihud and Mendelson (2006), that get its value from a contractual right or ownership claim.

Similarly to Brunnermeier and Pedersen (2009), Amihud and Mendelson (2006) shared the same idea of the transaction price being part of the trading of this liquid asset. The authors claimed that the concept of an asset being illiquid is associated with the execution cost of a transaction in the capital market. The authors defined three components of a transaction cost: (a) *Price-impact cost* as the difference between the buying and selling price quoted by dealers, market-makers and investors (*bid-ask spread*), (b) *Search and delay costs* which are incurred as the trader looks for better prices than those quoted, often occurring amongst block orders, where a counterparty needs to be found, (c) *Direct trading costs* that includes brokerage commission-costs, exchange fees and taxes. Amihud and Mendelson (2006) concluded that these three components are highly correlated with each other and relate to the illiquidity of an asset.

2.3 Controlling Minority Shareholders

Previous studies have focused on the CMS structure, and how it permits a shareholder to control a firm while holding only a fraction of its equity. Bebchuk, Kraakman and Triantis

(2000) originated the definition of Controlling Minority Shareholders, where a shareholder exercises control but solely maintains a fraction of equity claim. Alternatively, described as a shareholder that owns substantially more voting rights than cash flow rights (Cronqvist & Nilsson, 2003). Agnblad, Berglöf, Högfeldt and Svancar (2001) suggest that dual-class share structures are more prominent in separating votes and capital compared to pyramid-holdings companies. In most countries, publicly traded companies often have large controlling shareholders (e.g., La Porta, Lopez-de-Silanes & Shleifer, 1999). Furthermore, Cronqvist and Nilsson (2003) argued that some Swedish publicly traded firms, such as the telecom company Ericsson, have well documented CMS structures. For example, Ericsson had in 2019 a dual class share structure, where Investor, the Wallenberg owned investment company, controlled 22.53% of the voting rights and only 8.43% of the cash flow rights (Holdings, 2022). Another example of a CMS structure is BTS Group with its largest owner, Henrik Eklund, owning 42.03% of voting rights and 20.73% of the cash flow rights (Holdings, 2022).

2.4 Blockholder Ownership

Blockholders are defined as investors that have a minimum of 5% of the outstanding shares[6] (Heflin & Shaw, 2000). Investors typically own less than 5% of the outstanding shares since it incentivizes them to not monitor the performance of the firm and to not criticize the firm's decisions (Morck, Shleifer & Vishny, 1998). The blockholder regulations in the US are more efficient than those in continental Europe, according to Betch, Bolton, and Röell (2003).

2.5 Ultimate Controlling Shareholder

Claessens, Djankov and Lang (2000) used the definition of UCS as owning more than 50% and suggested computing the UCS through voting rights by the principle 'weakest link', a notion shared by Faccio and Lang (2002). This application to liquidity has been used in other empirical studies (Ginglinger & Hamon, 2012; Yosra & Sioud, 2012). The authors used a cut-off point of 20% voting rights and cash flow rights[7] to determine the UCS, i.e. the firms control over 20% throughout the control-chain. Ginglinger and Hamon (2012) explained this through the example of the retail company Casino's ownership structure:

[6] For clarification, % of outstanding shares is the same as cash flow rights
[7] Some literature may have specifically focused on a cut-off point of 20% voting rights, 20% cash flow rights or both 20% cash flow rights and voting rights

> Jean-Claude Naouri owns Euris through a listed company, Finatis. Finatis owns 84.6% of Euris, which owns 83.06% of the cash flow rights in Foncière Euris, which owns 66.92% of Rallye, which owns 51.9% of Casino. Euris cash flow rights in Casino are therefore 84.6% x 83.06% x 66.92% x 51.90% = 24.4%. According to the weakest link principle, Euris owns 59.90% of the voting rights in Casino (the minimum of 100%, 84.49%, 81.24%, 59.90%) (Ginglinger & Hamon, 2012, p. 69).

3. Literature Review

This chapter cohere the theories and concepts introduced already in the theoretical background, with previously conducted empirical studies within the field of ownership structure and stock liquidity. Moreover, it addresses adverse selection as a by-product of ownership structures.

3.1 Ownership structures & Stock Market Liquidity

Several studies have examined the effect of ownership structures on stock market liquidity. Kini and Mian (1995) investigated the relation between the bid-ask spread and ownership structures on 1,063 firms listed on the New York Stock Exchange (NYSE). They reported contradicting results for different ownership structure, with a larger insider and institutional ownership leading to narrower spread, thus greater liquidity, whilst an increase in blockholder ownership leads to wider spreads, hence reduced liquidity.

In their study on blockholder ownership and stock liquidity, Heflin and Shaw (2000) examined 259 firms listed on the NYSE and American Stock Exchange (AMEX) from 1988 to 1989. In order to capture the effect by blockholders on liquidity, they used RS and ES. They concluded that both RS and ES increased as the proportion of the firm owned by blockholders raised. This suggests that higher blockholder ownership, regardless whether the blockholders are managers or institutions, is associated with wider spreads and reduced liquidity. The authors argued this might be due to their access to value-relevant information.

Brockman, Chung and Yan (2009) examined a sample of firms traded on NYSE and AMEX between 1996 and 2001, where the relation between blockholder ownership and stock liquidity was investigated. They found that blockholders reduced trading activity which created more frictional costs[8]. The authors used quoted bid-ask spreads, RS and depths as liquidity measurements and found a statistically significant effect by blockholder ownership on spreads, where spreads increased, thus, reduced the stock market liquidity. However, they found that higher institutional ownership resulted in narrower spreads, hence greater liquidity. The authors argued that these contradicting results might be due to real friction costs.

Jacoby and Zheng (2010) revisited the relationship between blockholder ownership and stock market liquidity, including 3,576 firms listed on the NYSE, AMEX and Nasdaq for the year 1995. In order to capture the effect of ownership dispersion on stock market liquidity the authors used blockholder ownership, number of shareholder (NSH), bid-ask spread, ES, quoted depth and PIN[9]. The authors concluded that NSH had a significant positive impact on ES whilst no significance was found for its impact on PIN. Moreover, they found that higher blockholder ownership, regardless whether it is managerial or institutional, worsen the stock market liquidity. These results support Heflin's and Shaw's (2000) results, who suggested that market makers increased spreads for high block ownership since the probability of informed trading is higher, thereby lowering liquidity.

Edmans, Fang and Zur (2013) studied the relationship between stock liquidity and blockholders from the perspective of hedge-funds. The paper investigated three theories: (1) liquidity is bad for blockholders as it allows them to sell their stake in a troubled firm, (2) blockholders trade their gains and (3) the ability for blockholders to sell their shares drives the stock price down. They found that liquidity increases the probability of hedge-funds acquiring blocks and the most consistent finding was that blockholders can threaten the management team of the possibility of a sale. This could severely impact the management's personal earnings if the possibility of a sale is tied to the performance of the firm and stock price. On the other hand, they argued that the presence of blockholder may reduce stock liquidity, due to their ability to extract private benefits, impair managerial incentives and create agency costs. They also suggested that mutual funds might suffer from conflict of interests, such as the potential loss of the firm's pension plans.

Ding, Nilsson and Suardi (2013) investigated the relationship between the number of institutional investors and stock market liquidity, where liquidity was proxied by the quoted

[8] Friction cost is defined as "the total direct and indirect costs associated with the execution of a financial transaction" (Investopedia, 2020).
[9] Probability of informed trading measure PIN as in Easley, Hvidkjaer and O'Hara (2002)

bid-ask spread, RS, Amihud[10] and the relative effective spread. Their sample consisted of all shares listed on both the Shanghai and Shenzhen stock exchanges between 2004 and 2012. They found that the number foreign institutional investors widened both the quoted spread and RS. However, they found inconsistent results with regards to domestic investors, as they widened the quoted spread but tightened the relative effective spread.

By using a sample of 1,031 Canadian firms, Attig et al. (2006) investigated the relationship between UCS and stock liquidity along with focusing particularly on the control-ownership dimension. They found that the UCS widened the bid-ask spreads, thus reducing the stock liquidity. Moreover, the authors argued that these results may be due to the fact that the UCS are selfish and introduce poor disclosures, which reduces liquidity. Yosra and Sioud (2011) used 40 publicly listed Tunisian firms to investigate the relation between UCS and stock liquidity, proxied by turnover, effective relative spread and depth, during the period 2001 - 2005. The authors found that main shareholders[11] increased the effective relative spread. In addition, they considered the discrepancy between voting and cash flow rights, which they found to broaden the relative effective spread, although insignificant. They explained these results by arguing that if shareholders believe private benefits become proportional to the firm value, an incentive to sell their shares might occur. Furthermore, they argued the UCS might introduce poor disclosure policies and when the difference between cash flow rights and voting rights are extensive, institutional investors are less inclined to invest. Ginglinger and Hamon (2012) investigated the relation between ownership structure and stock liquidity during the period 1998 - 2003 for all French listed firms, resulting in 1,550 firm-observations. The authors proxied ownership structure by the percentage of capital by the main shareholder, direct and indirect (UCS), and the second largest by capital. Moreover, they proxied stock liquidity by RS and found, with statistical significance, that liquidity decreased by both the second and largest shareholder, implying that the second largest shareholder does not act as a monitor to improve information transparency emphasizing the negative impact of the largest shareholder. With regards to the discrepancy between cash flow and voting rights, they found a significant positive effect on spreads, hence wider spreads. The authors argued this might be due to: 1) selling shares where the shareholders might expect extraction of

[10] Amihud (2002) price impact measure (ILLIQ).
[11] UCS and the direct largest shareholder by capital.

private benefits, 2) private benefits becoming too great of the firm value and 3) the adoption of poor disclosure policies.

The following results set the groundwork for investigating the relationship between ownership structures and stock market liquidity.

3.2 Ownership Structure & Asymmetric Information

When discussing ownership structures many empirical papers touch upon the hidden costs of stock market liquidity. Bhide (1993, p.31) argued that "active stockholders who reduce agency costs by providing internal monitoring also reduce stock liquidity by creating information asymmetry problems". In their study on blockholder ownership and stock market liquidity, Heflin and Shaw (2000) further examined adverse selection components of liquidity through the adverse selection spread components by Lin, Sanger and Booth (1995) and Huang and Stoll (1997) designated as the LSB and HS estimates. The authors found, with statistical significance, an increase in the informed trading estimates LSB (HS) of about 0.031 U.S. cents (0.034 U.S. cents) for each increase of 1 percentage point in non-manager block ownership. These results suggested that higher blockholder ownership promotes higher adverse selection, which also leads to wider spreads and lower liquidity. Jacoby and Zheng (2010) also examined the blockholder ownership on the adverse-selection component of the bid-ask spread, their results supported those of Heflin and Shaw (2000) that blockholder ownership expanded the adverse selection component of the bid–ask spread. These empirical results are related to this empirical paper since they set out that there is a relationship between blockholder ownership and adverse selection.

Brockman, Chung and Yan (2009) also analyzed blockholder and institutional ownership and the adverse selection components of the bid ask spread proxied by the GH[12], HS and LSB estimates. They found that institutional investors tightened (widened) the HS (LSB) estimates similarly to blockholders. Although, when controlling for trading activity, the authors found that the ownership structures increased the HS and LSB estimates.

[12] Glosten and Harris (1998)

Chia, Lin and Goh (2020) argued that "if more informed investors are added to the shareholder base, such expansion exacerbates information asymmetry, increases adverse selection costs and leads to lower liquidity". Furthermore, they found that the number of shareholders had a positive effect on liquidity, to a certain extent. Then, the number of shareholders had a negative effect on liquidity primarily due to noise trading. The relationship between ownership structure and adverse selection is further strengthened by the journals above.

In the author's study on institutional ownership and stock market liquidity, Agarwal (2007) focused specifically on the effect of institutions' information advantage on liquidity, which he divided into two channels: *adverse selection* and *information efficiency*. His study, with data on firms listed on NYSE and AMEX for the time period 1980 to 2005, resulted in 4,578 unique firms. The author discovered that at lower levels of institutional ownership, improved price discovery predominates over the adverse selection effect, resulting in narrower spreads and an increase in liquidity. Yet, he found that the adverse selection effect tends to dominate the information efficiency effect associated with price discovery at higher levels of institutional ownership, resulting in higher spreads and lower liquidity. The results from Agarwal (2007) are related to this empirical paper since he establishes that higher institutional ownership yields higher adverse selection costs, resulting in broadened spreads and reduced liquidity.

In addition, Ding, Nilsson and Suardi (2013) investigated the relationship between the number of institutional investors and informed trading. They proxied informed trading by the LSB and HS estimates. The authors found consistent results for both forms of institutional ownership, which expanded both the informed trading estimates.

In Attig et al's study (2006), they found that if the UCS used forms of deviation between ownership and voting rights, then the information asymmetries were exacerbated which would consequently lead to widened bid-ask spreads. Yosra and Sioud (2011) confirmed that main shareholders[13] are associated with higher asymmetries, proxied by the HS estimate. They also found that the control-ownership dimension exacerbated information asymmetries (HS) through the use of poor disclosure policies to extract private benefits. Ginglinger and

[13] UCS and the direct largest shareholder by capital.

Hamon (2012) also investigated the impact of the main shareholders[14] and the discrepancy of cash flow and voting rights on informed trading, proxied by the HS estimate. They found that the main shareholders had a highly statistically significant coefficient that led to an increased adverse selection component, HS estimate by arguing that the UCS have the ability to trade on private information, which could be due to poor disclosure or similar.

The following contradicting result set ground for investigating the relationship between ownership structures and adverse selection component of liquidity. This empirical paper aims to cover and contribute whether CMS structures and blockholders can impact adverse selection.

4. Hypothesis Development

Empirical evidence about blockholders and liquidity, suggests that blockholders reduce liquidity (e.g., Kini & Mian, 1995; Heflin & Shaw, 2000; Brockman, Chung & Yan, 2009; Jacoby & Zheng, 2010). The authors demonstrated that the larger the proportion of blockholders the wider the spreads are, which in turn lowers liquidity. Furthermore, the authors explained the results by stating that market makers increase spreads for blockholder ownership, as there is a likelihood of informed trading taking place. In line with these findings, it could be assumed that we would find similar results for blockholders. Hence, we state the following hypothesis:

H1 : Blockholder ownership negatively impacts stock market liquidity (wider spreads)

Claessens et al. (2002) investigated the relation between UCS and firm value. They claimed that a more concentrated control by the UCS leads to reduced firm value. The authors argued this was due to the agency costs created by entrenchment effects, which were exacerbated by the deviation of cash flow- and voting rights. Cronqvist and Nilsson (2003) investigated CMS structure and firm value, and found that CMS create large agency costs. This is due to their ability to entrench themselves against pressure from corporate governance mechanisms (e.g. monitoring) by using dual-class shares and maintaining all the control private benefits and suffering negligible firm value outcomes. Bebchuk, Kraakman and Triantis (2000) found that

[14] UCS and the direct largest shareholder by capital.

the agency costs imposed by CMS can be larger than those imposed by controlling majority shareholders.

Attig et al. (2006) were motivated by Claessens et al's. (2002) findings, and decided to investigate how UCS[15] impacted the stock market liquidity. They argued that the UCS' ability to extract private benefits was a bi-product of the firm's poor disclosure policies set by the UCS, consciously made to trade on private information, which worsened information asymmetries. Other empirical papers extended Attig et al's. (2006) findings to other markets (Yosra & Sioud, 2011; Ginglinger & Hamon, 2012).

As a result, we were inspired by these studies (Cronqvist & Nilsson, 2003; Attig et al. 2006; Yosra & Sioud, 2011; Ginglinger & Hamon, 2012). However, given that there is no existent literature on the CMS' impact on liquidity, we first set out to establish the relation between CMS and liquidity, thus, formulating the following hypothesis:

> *$H2_a$: CMS impacts stock market liquidity*

If CMS ownership impacts stock market liquidity, we use the theory and earlier established results by previous literature on both block ownership and UCS ownership, and therefore, hypothesize the following:

> *$H2_b$: CMS negatively impacts stock market liquidity (wider spreads)*

Empirical papers have also analyzed the hidden costs of stock market liquidity (Heflin & Shaw, 2000; Agarwal, 2007; Jacoby & Zheng, 2010). Beyond examining the blockholder ownership's impact on stock market liquidity, they analyzed the amount of informed trading taking place on the bid-ask spreads and found that blockholder ownership promotes widened adverse selection components of the bid-ask spread (e.g., HS & LSB) and lower liquidity. Glosten and Milgrom (1985) referred to the adverse selection hypothesis where informed traders[16] obtain superior information resulting in a higher information asymmetry and reducing liquidity. Empirical studies found that the higher UCS ownership was the higher the HS estimate was (Yosra & Sioud, 2011; Ginglinger & Hamon, 2012;). Therefore, it could be

[15] They also observed the deviation between ownership and control

[16] Rubin (2007) suggested that informed traders can be insiders, institutions and blockholders but there is no definitive definition.

concluded that the adverse selection components in the bid-ask spread would be broader if we also assumed that CMS are as informed traders as UCS are. To test this we suggest the following hypothesis:

> *$H3_a$: Blockholder ownership widens the adverse selection component of the bid-ask spread*
>
> *$H3_b$: CMS widens the adverse selection component of the bid-ask spread*

5. The Sample Universe

In this section of the study the presentation of the sample universe will take place. A description and selection of the data sample will be later followed by the explanation of the chosen dependent-, explanatory- and control variables.

5.1 Sample Description & Selection

The data sample started off with 391 companies listed on Nasdaq Stockholm (large, mid and small cap) during the period 2009-2019. We collected ownership data from Holdings Modular Finance[17] for each company (e.g., the variables HFI, CMS, VC and Block). The equity (e.g., bid-price, ask-price and trading data) and financial data (e.g., MCAP and MTB) were gathered from S&P Capital IQ. However, the availability of data in S&P Capital IQ is limited, as it only allowed data for actively publicly listed firms as of the date 05.03.2022 for the composition of this paper. S&P Capital IQ also only contained a selected amount of trading data. Moreover, firms that had been delisted, acquired or filed for bankruptcy during the period were excluded from the data sample. A critical selection criteria used was to only include firms that have their tax domicile in Sweden. In addition, we manually removed firms that did not have a matching financial and ownership data, as a result over 850 observations were deleted. Other time-consuming manual labor was done by gathering data from Holdings, on the five largest shareholders per firm and for each year to calculate the HFI. The final data sample resulted in 292 companies after screening through these criteria. To find information on where each variable was collected, view Table 1 in the appendix.

5.2 Dependent Variables - Liquidity & Adverse Selection Measurements

In this subsection of the sample universe, the descriptions of the dependent variables will take place. This subsection contains detailed explanations of the adopted methods in order to

[17] Largest ownership database for listed companies in the Nordics.

calculate the variables present in the regressions. The liquidity measurements used to proxy the stock market liquidity are the ES and the RE. Moreover, to capture the informed trading components of the bid-ask spread, we have applied the LSB and HS estimates.

5.2.1 Effective Spread

We use the ES, like other existing empirical studies (e.g., Agarwal, 2007; Jacoby & Zheng, 2010; Heflin & Shaw, 2000), as a way to measure and observe the stock market liquidity. The ES is computed by the following formula:

$$ES = 2 \times \left| PRICE_{i,t} - M_{i,t} \right|, \qquad (1)$$

where we have defined the variable $PRICE_{i,t}$ as the bid-ask spread, ask-price minus bid-price, which represents the implicit transaction cost created by an inefficient market infrastructure (Schroders, 2020). Similarly to Heflin and Shaw (2000), we have termed $M_{i,t}$ as the quoted spread midpoint at time *t* for firm *i*. The quoted spread midpoint is simply the quoted ask-price plus the quoted bid-price divided by two.

5.2.2 Relative Spread

The second dependent variable with regards to liquidity is RS. Similarly, to Heflin and Shaw (2000), we calculate the RS as such:

$$RS_{i,t} = \frac{Ask_{i,t} - Bid_{i,t}}{(Ask_{i,t} + Bid_{i,t})/2}, \qquad (2)$$

where $Ask_{i,t}$ is the ask-price for firm *i* at time *t* and $Bid_{i,t}$ is the bid-price for firm *i* and *t*.

5.2.3 LSB & HS Estimate

Similarly to other empirical studies that investigated the informed trading component of the bid-ask spread (e.g., Heflin & Shaw, 2000; Agarwal, 2007; Jacoby & Zheng, 2010; Ding, Nilsson & Suardi, 2013; Ginglinger & Hamon, 2012), we apply the LSB and the HS estimates. Equation (3) illustrates the regression used to obtain the LSB adverse selection component, where we have defined the variables similarly to Heflin and Shaw (2000):

$$\Delta log\left[M_{i,t}\right] = \Phi(log\left[PRICE_{i,t-1}\right] - log\left[M_{i,t-1}\right]) + e_t, \qquad (3)$$

where $\Delta log[M_{i,t}]$ is $\log[M_{i,t}]$ - $\log[M_{i,t-1}]$, $M_{i,t}$ is the quoted midpoint spread at time t for firm i and $M_{i,t-1}$ is the quoted midpoint prior time t for firm i. $PRICE_{i,t-1}$ is the transaction price as defined in section 5.2.2.1 prior to time t, and $e_{i,t}$ is an error term as described by Heflin and Shaw (2000). The coefficient Φ_i is the LSB estimate of the percentage of the effective spread attributable to informed trading for firm i. We compute similarly to Charoenwong, Ding and Siraprapasiri (2011), the LSB estimate by taking the coefficient Φ_i times the firm's annual ES

Moreover, we obtain the HS adverse selection component spread from equation (4), where the definitions of the variables are identical to Brockman, Chung and Yan (2009):

$$\Delta M_t = \alpha\left(\frac{S_{t-1}}{2} Q_{t-1}\right) + v_t, \quad (4)$$

where ΔM_t is $(M_t - M_{t-1})$, S_{t-1} the quoted bid-ask spread at time $t-1$ and $Q_{i,t}$ equals 1 (-1) if the trade at time t was a sell (buy). Trades at prices above the current quote midpoint are market maker sells ($Q_{i,t}$ = 1) and trades below the current midpoint quote are market maker buys ($Q_{i,t}$ = -1). The coefficient α is the combined adverse selection and inventory holding cost component, and measures the % of half the quoted spread due to adverse selection and inventory holding cost. We follow Charoenwong, Ding and Siraprapasiri (2011) methods to compute HS estimate by multiplying α with half the bid–ask spread (PRICE/2).

5.3 Explanatory Variables

To capture the two different ownership structures analyzed in this study, we have used the two main explanatory variables *CMS* and *Block*.

By following Cronqvist and Nilsson (2003), we identify *CMS* as the owners with greater than or equal to 25% of the voting rights who are able to influence the firm but not control it. However, we have applied the CMS' cash flow rights on liquidity, unlike Cronqvist and Nilsson (2003) who applied the voting rights on Tobin's Q. This decision is similar to other empirical papers (e.g., Attig et al. 2006; Yosra and Sioud; 2011; Ginglinger & Hamon, 2012;), which analyzed the direct largest- and second largest shareholder as well as UCS, through a 20% voting- and cash flow rights threshold. Moreover, they used the cash flow rights owned by the owners on liquidity and the adverse selection component of the bid-ask spread.

To capture the blockholder ownership (Block) impact on both the stock market liquidity and the adverse selection component of the bid-ask spread, we follow other empirical papers (e.g., Heflin & Shaw, 2000; Jacoby & Zheng, 2010), by using the aggregate value of the cash flow rights held by owners that have at least 5%.

5.4 Control Variables

In addition, we included additional ownership variables as control variables to control for other ownership dimensions. These variables are VC, NSH and HFI (section 5.4.1).

Similarly to Cronqvist and Nilsson (2003), *VC* is the vote-to-capital (voting rights divided by cash flow rights) ratio minus 1, and set to 0 if no controlling owners exist. The inclusion of this variable is due to the interest to capture the potential of private benefits expensed by non controlling shareholders (Cronqvist and Nilsson, 2003). The inclusion of this variable is in accordance with other empirical papers (Attig et al., 2006; Yosra & Sioud, 2011; Ginglinger & Hamon, 2012), although they have calculated *VC* differently. This variable is also termed the control-ownership dimension variable in this paper.

The *NSH* variable is included to account for issues such as, a firm with no blockholders or one owner with 20% of the outstanding shares and the remaining shares split amongst 10 shareholders might not capture the full picture, argued by Jacoby and Zheng (2010). Yung and Jian (2017) as well as Agarwal (2007) suggested that the natural logarithmic value of NSH alleviates the skewness of the variable and further improves the robustness of the results.

A consensus between empirical studies was found to suggest several control variables to control for firm characteristics and market activity, such as firm size[18], return volatility, bid-ask spread, closing price and trading activity (Heflin & Shaw, 2000; Attig et al. 2006; Rubin, 2007; Brockman, Chung & Yan, 2009; Jacoby & Zhang, 2010; Ginglinger & Hamon, 2012). The following control variables are included in this study: *MCAP*, bid-ask spread (*PRICE*), *MTB* and daily volume (*Vol*). *MCAP* is calculated by multiplying the closing share prices and the shares outstanding. *PRICE* is the ask-price minus the bid-price. We include

[18] Proxied by market value of equity (MCAP)

MCAP similarly to Rubin (2007) because the author argued that MCAP is correlated to many aspects of liquidity. The same argument is applied to the share price since it is also correlated to many aspects of liquidity (Rubin, 2007). Similarly to Heflin and Shaw (2000) that have included the average bid-ask spread, we included the bid-ask spread (PRICE). However, even if the variables are not equal we can still interpret the results in the same way as Heflin and Shaw (2000). We believe that Rubin's (2007) argument on share prices is also applicable to the bid-ask spread (PRICE) because it is either a proxy for liquidity or part of the formula to calculate a liquidity proxy, such as ES. Moreover, Brockman, Chung and Yan (2009) highlighted the importance of including trading activity, since blockholder ownership impairs trading activity by reducing the amount of outstanding shares in circulation. Therefore, we control for trading activity by including *Vol,* which is the amount of shares traded measured in millions (m). Lastly, we have included MTB, which is the book value of assets minus the book value of equity plus the market value of equity to total assets. MTB allows us to control for both the risk characteristics of the firm and its growth opportunities (Rubin, 2007; Van Ness, Van Ness & Warr, 2001)

5.4.1 Herfindahl Index

To provide a further contribution to ownership dispersion, we have extended Jacoby's and Zheng's study (2010), by including the HFI as a control variable. The HFI measures ownership concentration and is used by Konijn, Kräussl and Lucas (2011), who compare the index's explanatory power to the portfolio concentration. Moreover, the authors compiled a scaled HFI, where scaling is performed using the total combined block ownership of the largest five blockholders:

$$HFI = \frac{(\%Block1)^2 + (\%Block2)^2 + \dots + (\%Block5)^2}{[(\%Block1) + (\%Block2) + \dots + (\%Block5)]^2} \qquad (5)$$

A low value of the HFI implies a high dispersion among the combined block size over the 5 blockholders. When HFI is equal to 0.5 it means that there are two equally sized blockholders, regardless of whether both blockholders collectively own 10% or 100% of the company (Konijn, Kräussl & Lucas, 2011). This index allows us to separate out the effect of dispersion from the effect of the total combined blockholder. In addition, we transform the HFI to the natural logarithm to control for skewness (*lnHFI*), equally to Maury and Pajuste

(2005) as well as Agarwal (2007). In this study the HFI is measured by the 5 largest shareholders unlike Konijn, Kräussl and Lucas (2011).

5.5 Delimitations

Firstly, this study has only included firms listed on Nasdaq Stockholm that face the same set of legal restrictions and tax domicile in Sweden. We have excluded other stock-markets in Sweden, such as First North Stockholm, Spotlight and NGM, due to their larger focus on being growth platforms for small and medium sized firms. This study only intends to examine blockholder ownership and CMS. Since this study bases the hypothesis on two ownership structures, it leads to the exclusion of other ownership structures such as institutional ownership and UCS from this paper's sample. This limitation provides a deeper understanding of how these two ownership structures behave. The selection of observations is based on certain predetermined criteria to avoid skewness in the results. All observations must have complete data about the ownership and equity data. Firms delisted after 2019 were excluded from the data sample due to restricted data (explained in section 5.1). Lastly, we excluded the Global Financial Crisis and the Covid-19 pandemic periods from our data, since we do not want these crises to contaminate the results as the stock markets were unstable and volatile in those periods.

Our data sample focused solely on Sweden because of several reasons. Cronqvist and Nilsson (2003) argued that analyzing firms under a single-set of regulations would be a superior way to examining different ownership structures since the identified firms would face the same set of legal restrictions. Moreover, La Porta, Lopez-de-Silanes and Shleifer (1999) reports that the CMS structures are very common in Sweden. The availability of quality ownership data through databases, such as Holdings Modular Finance, makes Sweden an excellent country to investigate how ownership structures affect stock market liquidity. Lastly, the main justification to solely use annual data is that ownership structures rarely change compared to other corporate events.

We believe that these delimitations would still provide robust contributions to the existing literature with regards to ownership structure and stock market liquidity.

6. Methodology

The methodology chapter firstly introduces the scientific approach, which is used throughout this paper. It is then followed by the main econometric methods, the liquidity measures and finally all the statistical tests performed.

6.1 Introduction and Scientific Approach

The research design is built upon a deductive theory and quantitative methodology, in order to quantify and generalize how different ownership structures impact stock market liquidity and the adverse selection component of the bid-ask spread.

Figure 1: *Deductive Research Approach. Source: Bryman and Bell (2015, p. 23)*

A deductive research approach consists of the six steps outlined in Figure 1 and it involves collecting data and testing whether the data supports or denies a theory. Using knowledge about a particular domain and theoretical considerations regarding that domain, the researcher formulates a hypothesis, which must then be tested empirically and the concepts embedded in the hypothesis must be translated into researchable entities (Bryman & Bell, 2015). We are using a deductive method, because, when properly conducted, the validity of the content can be assured (Holton & Burnett, 2005). Moreover, this approach allows us to generalize research findings to a certain extent since it measures concepts quantitatively.

6.2 Econometric Methodology

6.2.1 Pooled OLS, Fixed Effect and Random Effect Models

The most appropriate methodology for this study is based on a multitude of existing literature within this field. This is crucial since the field of empirical finance studies allows for many different methodological approaches. A panel data set is included in this study and will later be described further. This data set allows us to test various methodological approaches to analyze the effect of different ownership structures on the stock market liquidity and the adverse selection component of the bid-ask spread. Previous studies within the field of ownership structures have used both pooled ordinary least squares (POLS) regressions and fixed effects (FE) models (Cronqvist & Nilsson, 2003; Agarwal, 2007; Jacoby & Zheng, 2010). This study uses POLS regressions for the first models. However, to deal with endogeneity issues, it will also use fixed effects (FE) and random effects (RE) to provide more robust results.

Wooldridge (2016) stated that observations are pooled across time (or groups) and across the cross-sectional units in addition to that the structure of the panel data is ignored when using POLS regressions. Yearly dummy variables are included in the POLS to allow for the simple fact of the sample population not having equal distributions across time. The dummy variable would allow for the intercept to differ across time. It is important to note that if any unobserved heterogeneity exists that could impact the dependent variable, the POLS might be inefficient and biased. Consider the following simple regression model as an example:

$$y_{i,t} = \beta_0 + \beta_1 x_{i,t} + a_i + u_{it}, \qquad t = 1,2$$

where i is the firm, t is the period, β_0 is the coefficient, x is the effect of the estimator, a_i is the unobserved effect (fixed effect) that is time constant and u_{it} is the idiosyncratic error term that affects the dependent variable y_{it} and changes over time. Wooldrige (2016) stated that the unobserved effect a_i must be uncorrelated with x_{it} to allow the POLS to produce a consistent estimator of β_1. If not, the POLS estimation will be inconsistent and biased, resulting in biased heterogeneity (Wooldridge, 2016).

In order to mitigate the heterogeneity issue, the FE model is useful for allowing an arbitrary correlation between the unobserved effect a_i and the explanatory variables for any time period. Therefore, all the time-constant explanatory variables for all firms i will be eradicated by the FE transformation: $\ddot{x}_{it} = x_{it} - \overline{x_i} = 0$ which are subtracted by the mean for all i and t, if x_{it} is not dependent on time and constant across t (Wooldridge, 2016). Moreover, the result from the FE model is the disappearance of the unobserved effect a_i, leading to results without bias and endogeneity problems (Roberts & Whited, 2013).

However, if a problem of little or no time-variation in the explanatory variables is present, allowing a_i to be correlated with x_{it} does not make any sense since $\Delta x_i = 0$. This would not make any sense since the objective of separating the unobserved effect of a_i and y_{it} from the effect of an explanatory variable will be not achievable, only if the explanatory variable does not change over time (Wooldridge, 2016). This could potentially lead to large standard errors (SE) in $\widehat{\beta_1}$ if estimated solely by OLS. To our understanding ownership structures change rarely compared to other corporate events, which we justify to only have annual data for our main explanatory variables Block and CMS. However, we do not anticipate that the owners will remain with their current position during the time-horizon, as a result they might have to divest because of diversification guidelines or similar. Therefore, it could be argued that the FE model is sufficient and appropriate.

However, another model that would be appropriate to use considering our unbalanced panel dataset is the RE model. The assumption of a RE model is that a_i, the unobserved effect, needs to be uncorrelated with each explanatory variable in all time periods, allowing for the inclusion of any time-constant variables (Wooldridge, 2016). Moreover, the author explains that the RE estimation uses generalized least squares (GLS) to deal with any serial correlation in the composite error term. This is especially important since the standard POLS neglects any serial correlation, which causes incorrect test statistics and SE (Wooldrige, 2016). Hence, RE are more efficient than POLS as well as more applicable to use than FE only if the equation contains good controls and assumptions on any neglected heterogeneity to only include serial correlation in the composite error term (Wooldridge, 2016). To test whether blockholders or CMS affect the stock market liquidity and adverse selection, we developed the following models to test our first hypothesis (H1), our second hypothesis ($H2_{ab}$) and lastly our third hypothesis ($H3_{ab}$):

Hypothesis 1, 2 and 3 – Liquidity & Adverse Selection

Blockholders POLS

$$LIQ_{i,t} = \beta_0 + \beta_1 Block_{i,t} + \beta_2 Log(NSH)_{i,t} + \beta_3 Log(HFI)_{i,t} + \beta_4 MTB_{i,t} + \beta_5 MCAP_{i,t} + \beta_6 PRICE_{i,t} + \beta_6 Vol_{i,t} + \beta_7 Year_t + \beta_8 Industry_{i,t} + \mu_{i,t}$$

CMS POLS

$$LIQ_{i,t} = \beta_0 + \beta_1 CMS_{i,t} + \beta_2 VC_{i,t} + \beta_3 Log(HFI)_{i,t} + \beta_4 MTB_{i,t} + \beta_5 MCAP_{i,t} + \beta_6 PRICE_{i,t} + \beta_6 Vol_{i,t} + \beta_7 Year_t + \beta_8 Industry_{i,t} + \mu_{i,t}$$

Where LIQ is lnES, lnRS, lnLSB and lnHS.

6.3 Statistical Tests

6.3.1 Heteroskedasticity

The White's (1980) test will be performed to test for heteroskedasticity. The OLS regression assumes that all residuals from a population have a constant variance, which makes it necessary to conduct this test to determine whether the error term has heteroscedastic variances or not. Clustering robust SE at the POLS level mitigates the issue of heteroskedastic error terms. This will be used in all regression models if there is heteroskedasticity. If heteroskedasticity is observed at the level of POLS, and this should be expected, it will very likely cluster by the unit that constitutes the panel (in this case Firm ID). Table 6 in the appendix shows the results from the White's test. If the test shows that we reject the null hypothesis (H_0), we conclude that the error term has presence of heteroskedasticity.

6.3.2 Endogeneity test

The Hausman's (1978) test will be performed and its purpose is to distinguish whether FE or RE is the preferred regression method. Since the RE is estimated using GLS while FE by using OLS, the RE method will generally have smaller variances hence more efficient. The H_0 of the Hausman test is that the RE is consistent and efficient, hence, the appropriate model. The alternative hypothesis (H_A) is instead that FE is the preferred model and is consistent. The decision rule to decide whether to reject or accept the H_0 is if the p-value is either lower or higher than 0.05, where if it is higher, we accept H_0 and lower we reject.

7. Empirical Results

This chapter presents the descriptive statistics and the correlation analysis of our panel dataset in the first segment 7.1. It is followed by the regression results for hypothesis 1, 2_{ab} and 3_{ab}.

7.1 Descriptive Statistics and Correlation

7.1.1 Descriptive Statistics

Table 2, 3 and 4 describe the summary statistics. Table 2 presents the summary statistics for all variables used in this study. Table 3 shows NSH, block and CMS per segment. The table illustrates that the large cap segment has the most amount of observations for NSH, blockholders and CMS compared to both the mid- and small cap segment. This difference could potentially be explained by the fact that our sample may have more firms listed on the large-cap segment than the other segments or have larger market capitalization that might attract more investors, such as those that only invest at certain market capitalization cut-offs. Moreover, Table 4 demonstrates NSH, block and CMS by sector. On an overall basis, the number of observations for NSH, blockholders and CMS per industry are unevenly distributed. The most amount of observations, regardless of group, is found in the industrial sector whilst the lowest amount is seenin the energy sector. As can be seen in Figure 2 (See Appendix), we find that the distribution of the observation for the number of blockholder ownership is somewhat normally distributed and the highest number of blockholders in the firms from our data sample is 9. In Figure 3 (See Appendix), it is noticeable that the majority of firms have either one or two CMS except for two of the observations that had four CMS in the firm's ownership structure.

The liquidity measurement ES was on average (median) USD 19.52 (13.09) per share and had a high standard deviation of 24. The RS was on average 0.01% of the share price compared to Heflin's and Shaw's (2000) result, which was 0.88% of the share price. This difference of results can possibly be explained by the suggested sample difference mentioned in the problem discussion (section 1.2). The mean (median) of the LSB estimate amounts to 0.041 (0.029) of the effective spread due to informed trading. These figures are consistent with Heflin and Shaw (2000). However, the HS estimate mean (median) results in 0.4083 (0.1698) of the half spread. For example, AAK's half spread in 2019 was USD 0.01. By applying the HS average on AAK's half spread in 2019, this implies that AAK's HS estimate was USD 0.004 in 2019. Lastly, the liquidity measurements, ES and RS, are transformed to the natural logarithm to control for the potential skewness similarly to other empirical papers (e.g., Heflin & Shaw, 2000).

With regards to ownership structures, on average (median) CMS' owns 32.1% (29.3%) of the firms' cash flow rights listed on Nasdaq Stockholm. The control-ownership dimension variable VC is on average (median) 74.1% (33.4%), implying that a CMS owning 32.1% of the cash flow rights has 55.9%[19] of the voting rights. More interestingly, the HFI on average

[19] 174.1%*32.1%

was 0.34 indicating a high dispersion amongst the 5 largest shareholders. Hence, the five largest shareholders have a similar amount of cash flow rights. In general, firms listed on Nasdaq Stockholm had on average 24,500 shareholders. Lastly, the variable Block suggests that the aggregate block ownership on average controls 40.43% of the cash flow rights, similarly to the findings of Jacoby and Zheng (2010).

The average firm had a MTB ratio of 2.07. According to Investopedia (2022), a high ratio is considered by value investors as a sign that the stock is a value stock, which means it is trading cheaply compared to its book value. Moreover, they claim that stocks with a value below 1.0 may be undervalued, however, value investors often consider stocks with a value below 3. This suggests that our variable MTB is within a valid range for value investors. The average firm had a market capitalization of USD 2,540m, a bid-ask spread of USD 0.058 and a daily volume of 0.571m traded shares. From Table 2, it is noticeable that the majority of the variables have been winsorized at the 1st and 99th percentile to mitigate the issue of outliers.

Table 2: Summary Statistics

Variable	N	Mean	SD	Median	Min	Max
ES (USD per share)[1]	2,633	19.5219	24.8031	13.0961	0	176.5370
RS (%)[1]	2,537	0.0101	0.0158	0.0053	0.0001	0.2435
LSB (USD per share)[1]	2,375	0.0421	0.0500	0.0287	0.0002	0.3752
HS (USD per share)[1]	2,537	0.4083	1.8579	0.1698	0.0013	84.6752
Block	2,602	0.4043	0.1912	0.4030	0.05	0.987
CMS	1,322	0.3214	0.1634	0.2931	0.0482	0.9412
VC	1,322	0.7416	1.0635	0.3343	-0.2471	5.6639
NSH	2,633	24,500	64,600	5,,980	183	725,000
HFI	2,633	0.3410	0.1412	0.2969	0.2002	0.9552
MTB	2,608	2.0692	2.1194	1.4338	0.0519	26.6517
MCAP[1,2]	2,633	2,540	6,290	286	0	36,000
PRICE[1]	2,633	0.0586	0.0951	0.0291	0	0.6456
Vol[2]	2,633	0.5711	1.7397	0.0538	0	33.5902

Note: [1] Winsorized at the 1st and 99th percentile. [2] Reported in millions.

7.1.2 Correlation Analysis

Table 5 shows the correlation matrix among all variables used in this empirical paper. The dependent variables (1 - 4) are significant against the explanatory variable Block whilst LSB and HS are not statistically significant against CMS. From the correlation matrix, we notice that lnES is the only dependent variable which is moderately negatively correlated to two ownership structures.

From the ownership variables, we notice that Block, CMS, VC and lnNSH are highly statistically significant with regards to the liquidity variables lnES and lnRS. Furthermore, it is evident that the variables block, CMS, VC, lnHFI are weakly correlated to the dependent variables, with coefficients ranging from 0.294 to 0.013 and have different signs. However, lnNSH corroborates the weak correlation similar to other explanatory variables except for its correlation to *lnRS*, with a coefficient of -0.69.

Table 5: Pairwise Correlation Matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
(1) lnES	1.000												
(2) lnRS	-0.469***	1.000											
(3) lnLSB	0.034*	0.046**	1.000										
(4) lnHS	0.513***	0.517***	0.078***	1.000									
(5) Block	-0.072***	0.294***	0.066***	0.215***	1.000								
(6) Capital25	-0.204***	0.226***	0.021	0.041	0.718***	1.000							
(7) VC25	0.213***	-0.182***	-0.014	0.013	-0.522***	-0.623***	1.000						
(8) lnNSH	0.344***	-0.690***	-0.091***	-0.336***	-0.488***	-0.294***	0.200***	1.000					
(9) lnHFI	0.017	-0.038*	-0.015	-0.019	0.372***	0.686***	-0.483***	0.057***	1.000				
(10) MTB	0.079***	0.010	0.053**	0.086***	-0.063***	-0.113***	0.120***	-0.065***	-0.134***	1.000			
(11) MCAP[1]	0.291***	-0.515***	0.009	-0.216***	-0.266***	-0.142***	0.117***	0.671***	0.110***	-0.047**	1.000		
(12) PRICE[1]	0.357***	0.426***	0.071***	0.762***	0.095***	0.016	-0.011	-0.213***	-0.007	0.068***	-0.144***	1.000	
(13) Vol	0.014	-0.323***	0.004	-0.300***	-0.274***	-0.136***	0.066**	0.522***	0.032*	0.011	0.606***	-0.141***	1.000

*** *p<0.01*, ** *p<0.05*, * *p<0.1*

Note: [1] Winsorized at the 1st and 99th percentile

7.2 Heteroskedacity

The White's test for heteroskedasticity at the level of POLS is seen in Table 6, in the appendix. From the table, it is evident that we reject the null-hypothesis for all the POLS regression models that homoscedasticity and constant variances exist, since all of the p-values are equal to or lower than 0.01. Due to these results, clustered robust SE have been used through the models to deal with the presence of heteroskedasticity.

7.3 The Effect of Blockholders on Liquidity

The regression results between blockholder ownership and the dependent variables lnRS and lnES are reported in Table 8. The Hausman tests, illustrated in Table 7 in the appendix, show that we reject the H_0 for both the lnRS and lnES regressions since both their p-values are 0.000. This suggests that the preferred model is FE. Therefore, the appropriate models are 2 and 5.

As seen in Table 8, we find that our main explanatory variable block has a positive coefficient where the only statistical significance is found in model 4. For every 1% increase in blockholder ownership, the ES increased by approximately 0.632%[20]. Furthermore, we found strong evidence (1% s.l.) that the ownership dimension variable NSH tightened (widened) the RS (ES). This implies that for every 1% increase in the NSH, the RS decreased by approximately 0.35% (model 2) whilst the ES increased by approximately 0.40% (model 4). As observed, we found evidence for ownership concentration (HFI) constricted the ES, where for every 1% increase in HFI, the ES decreased by approximately 0.30% (model 4).

Concerning the control variables used in the regressions, MTB and Vol had contradicting results whilst for PRICE we found strong evidence (1% s.l.) which widened both the RS and ES. Moreover, we found that for every 1% increase in MTB, the ES increased by approximately 0.08% (model 4) and the RS decreased by about 0.07% (model 2). With regards to the bid-ask spread[21], we found that for every 1% increase in PRICE, the ES (RS) increased by 5.52% (4.19%) (model 4 (2)). These results are in conclusion with the anticipated economic impact since PRICE is used to calculate the liquidity measurements. Lastly, daily volumes of traded shares (Vol) seemed to have impacted RS and ES differently. For every 1% increase in Vol, the ES decreased by 0.17% (model 4) whilst the RS increased by 0.01% (model 2). The number of observations for the regressions are 2,506.

[20] 0.632*0.01*10

[21] Bid-ask spread is the same as PRICE

Table 8: Regression Results for Blockholder Ownership and Stock Liquidity Model 1 - 6

	1	2	3	4	5	6
	POLS	Fixed Effects	Random Effects	POLS	Fixed Effects	Random Effects
VARIABLES	log(RS)	log(RS)	log(RS)	log(ES)	log(ES)	log(ES)
Block	0.027	0.284	0.018	0.632**	0.134	0.338
	(0.183)	(0.250)	(0.186)	(0.278)	(0.311)	(0.271)
log(NSH)	-0.459***	-0.353***	-0.457***	0.401***	0.423***	0.357***
	(0.036)	(0.070)	(0.033)	(0.052)	(0.073)	(0.042)
log(HFI)	0.062	0.113	0.031	-0.299**	-0.259*	-0.230**
	(0.098)	(0.13)	(0.085)	(0.138)	(0.137)	(0.117)
MTB	-0.045***	-0.073***	-0.047***	0.082***	0.136***	0.121***
	(0.011)	(0.013)	(0.009)	(0.018)	(0.025)	(0.021)
MCAP[1]	-0.000***	-0.000**	-0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PRICE[1]	3.358***	4.188***	3.794***	5.523***	3.734***	4.135***
	(0.408)	(0.591)	(0.481)	(0.514)	(0.567)	(0.527)
Vol	0.047**	0.010	0.029*	-0.168***	-0.025**	-0.058***
	(0.021)	(0.018)	(0.017)	(0.040)	(0.013)	(0.016)
Constant	-0.396	-.388***	-1.477***	-3.059***	-2.436***	-1.711***
	(0.481)	(0.689)	(0.362)	(0.647)	(0.728)	(0.500)
Observations	2,506	2,506	2,506	2,506	2,506	2,506
Industry Effects	Yes	No	No	Yes	No	No
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)
R-squared	0.623	0.365		0.485	0.415	
Number of FirmID		290	290		290	290

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: [1] Winsorized at the 1st and 99th percentile

7.4 The Effect of Blockholders on the Adverse Selection Component of Liquidity

The results between blockholder ownership and the dependent variables lnLSB and lnHS are reported in Table 9. The Hausman tests, illustrated in Table 7 in the appendix, show that we fail to reject (reject) the H_0 for lnLSB (lnHS) since the p-value is 0.9423 (0.000). This suggests that the preferred model is RE (FE). Therefore, the appropriate models are 9 and 11.

From Table 9, we find that our main explanatory variable block has a positive coefficient,where the only statistical significance is found for the HS adverse selection component estimate (models 10-12). A 1% change in blockholder ownership increases the HS estimate by 0.41%[22] (model 11). No statistical significance is found for the LSB adverse selection component estimate. Further, we found evidence for the ownership dispersion variable NSH having a negative impact on the LSB and HS estimates. This implies that for every 1% increase in the NSH, the LSB (HS) estimate decreased by approximately 0.13% (0.06%) (model 7 (11)). We also found evidence for ownership concentration (HFI) having a negative impact on LSB and HS, where every 1% increase in HFI, the LSB (HS) estimate decreased by about 0.27% (0.24%) (model 7 (10)).

Regarding the control variables used in the regressions, we found strong evidence (1% s.l.) that MTB impacts the HS adverse selection component estimate positively. We found that for every 1% increase in MTB, the HS estimate increased by about 0.062% (model 11). With regards to the bid-ask spread (PRICE) we found that for every 1% increase in PRICE, the LSB (HS) estimate increased by 0.692% (8.005%) (model 9 (11)). These results are in conclusion with the anticipated economic impact. Lastly, Vol seems to impact the LSB and HS estimates differently. For every 1% increase in Vol, the HS estimate decreased by 0.121% (model 10). The number of observations is 2,327 for all the LSB regressions and 2,506 for all the HS regressions.

[22] The coefficient is 0.410. (0.410*0.01)*100 = 0.410%

Table 9: Regression Results for Blockholder Ownership and Adverse Selection Model 7 - 12

	7	8	9	10	11	12
	POLS	Fixed Effects	Random Effects	POLS	Fixed Effects	Random Effects
VARIABLES	log(LSB)	log(LSB)	log(LSB)	log(HS)	log(HS)	log(HS)
Block	0.365	-0.031	0.088	0.653***	0.410*	0.545***
	(0.262)	(0.379)	(0.296)	(0.192)	(0.227)	(0.177)
log(NSH)	-0.125**	-0.052	-0.067	-0.062*	0.063	-0.078**
	(0.051)	(0.108)	(0.063)	(0.034)	(0.056)	(0.031)
log(HFI)	-0.267*	-0.041	-0.081	-0.235**	-0.144	-0.166**
	(0.139)	(0.177)	(0.141)	(0.093)	(0.106)	(0.081)
MTB	0.028	0.020	0.020	0.036***	0.062***	0.053***
	(0.018)	(0.015)	(0.013)	(0.012)	(0.017)	(0.013)
MCAP[1]	0.000**	-0.000	0.000	0.000*	0.000***	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PRICE[1]	0.596*	0.689**	0.692***	8.946***	8.005***	8.416***
	(0.307)	(0.282)	(0.248)	(0.537)	(0.529)	(0.512)
Vol	0.018	0.018	0.024	-0.121***	-0.015	-0.058***
	(0.024)	(0.026)	(0.022)	(0.027)	(0.013)	(0.015)
Constant	-2.914***	-3.471***	-3.460***	-2.351***	-3.700***	-2.316***
	(0.608)	(1.095)	(0.676)	(0.603)	(0.564)	(0.357)
Observations	2,327	2,327	2,327	2,506	2,506	2,506
Industry Effects	Yes	No	No	Yes	No	No
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)
R-squared	0.146	0.015		0.661	0.576	
Number of FirmID		288	288		290	290

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: [1] Winsorized at the 1st and 99th percentile

7.5 The Effect of CMS on Liquidity

The results between CMS, the control ownership dimension variables and the dependent variables lnES and lnRS are reported in Table 10. The Hausman tests, illustrated in Table 7 in the appendix, show that we reject the H_0 for both the lnES and lnRS since both their p-values are 0.000. This suggests that the preferred model is FE. Therefore, the appropriate models are 14 and 17.

Table 10 illustrates that the main explanatory variable, CMS, is statistically significant for all the regression models except for model 16. Moreover, it is found that CMS is highly statistically significant (1% s.l.) for RS whilst the significance is weaker for the regression models on ES. Our results indicate that CMS increased (decreased) the RS (ES), with coefficients of 1.446 (-1.224) (model 14 (17)). This implies that the cash flow rights held by CMS has both a large negative and positive economic impact on the liquidity measurements, dependent on the liquidity measurement. For example, if the CMS structure grew its cash flow rights by 1%, this would widen the RS by about 1.446%[23]. However, by taking the perspective of its effect by ES, it would tighten the ES by approximately 1.224%.

Similarly, to the main explanatory variable CMS, our other ownership dispersion measurements, VC and HFI, were found to be both statistically significant and insignificant contingent on the model. Models 13 and 14 demonstrate that both variables have the same coefficient sign in relation to RS, however, solely model 13 has statistical significance. However, in relation to ES, the coefficient signs of the variables change. The variables statistical significance are 1% and 10% for both models (16 and 17), for VC and HFI, respectively. We found that if the VC ratio increased by 1%, ES would widen by about 0.310% (model 17). Furthermore, a 1% increase in HFI would lead to a narrower (broader) RS (ES), by -0.311% and 0.377%, respectively.

Turning to the control variables, we find that MTB, MCAP, PRICE and Vol are statistically significant but this is dependent on the model. We found strong evidence in model 16 for the control variables effect (1% s.l.). However, for model 13 only MCAP and PRICE had strong evidence (1% s.l.), similarly to model 14 that only had strong evidence for MTB and PRICE. Lastly the number of observations for the RS and ES regressions are 1,254, respectively.

[23] The coefficient is 1.446. 1.446*0.01*100 = 1.446%

Table 10: Regression Results for CMS and Stock Liquidity Model 13 to 18

	13	14	15	16	17	18
	POLS	Fixed Effects	Random Effects	POLS	Fixed Effects	Random Effects
VARIABLES	log(RS)	log(RS)	log(RS)	log(ES)	log(ES)	log(ES)
CMS	1.492***	1.446***	1.487***	-0.653	-1.224*	-1.164**
	(0.442)	(0.554)	(0.397)	(0.555)	(0.667)	(0.577)
VC	-0.167**	-0.111	-0.106*	0.249***	0.310***	0.237***
	(0.073)	(0.093)	(0.064)	(0.082)	(0.110)	(0.084)
log(HFI)	-0.672***	-0.311	-0.483***	0.416*	0.377*	0.381**
	(0.212)	(0.188)	(0.162)	(0.249)	(0.198)	(0.177)
MTB	-0.035	-0.114***	-0.070***	0.104***	0.195***	0.174***
	(0.022)	(0.018)	(0.014)	(0.026)	(0.026)	(0.027)
MCAP[1]	-0.000***	-0.000	-0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PRICE[1]	4.906***	6.262***	5.803***	4.563***	2.062***	2.336***
	(0.645)	(0.645)	(0.585)	(0.510)	(0.448)	(0.419)
Vol	-0.004	0.007	-0.034	-0.156***	-0.007	-0.019
	(0.038)	(0.028)	(0.023)	(0.041)	(0.017)	(0.016)
Constant	-4.452***	-6.465***	-6.497***	0.317	2.550***	2.586***
	(0.330)	(0.313)	(0.281)	(0.409)	(0.384)	(0.361)
Observations	1,254	1,254	1,254	1,254	1,254	1,254
Industry Effects	Yes	No	No	Yes	No	No
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)
R-squared	0.589	0.448		0.477	0.465	
Number of FirmID		178	178		178	178

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: [1] Winsorized at the 1st and 99th percentile

7.6 The Effect of CMS on Adverse Selection

The regressions between CMS*,* the control ownership dimension variables and the informed trading components of bid-ask spread, lnLSB and lnHS are found in Table 11. The Hausman tests, reported in Table 7, resulted similarly to the regressions between Block and the adverse selection components estimates. We fail to reject the null-hypothesis for the regression between CMS and lnLSB, meaning that the suggested model is the RE model. However, we reject the null-hypothesis for the regression between CMS and lnHS, meaning the prefered model is the FE model. This implies that the appropriate models are 21 and 23.

The CMS variable is statistically insignificant with its relation to the LSB estimate (models 19-21). Furthermore, in model 19, the CMS' coefficient was negative but models 20 and 21 yielded a positive sign. With regards to CMS' relation to the HS estimate, we found that *CMS* was statistically significant at 5% (model 22) but lacked statistical significance in the FE and RE model (model 23 - 24). For every 1% expansion in the CMS' fraction of cash flow rights, the LSB (HS) estimate increased by about 0.301% (0.250%) (model 21 (23)).

However, compared to our main explanatory variable CMS, we find that our other ownership dispersion measurements are on majority statistically insignificant. The VC variable is statistically significant at 10% and 5% for both models 22 and 23. The VC ratio has a positive effect on the informed trading except for model 19. We found that a 1% increase in VC lowered the LSB estimate by approximately 0.047% (model 21) and increased the HS estimate by about 0.197% (model 23). Lastly, the HFI variable is solely statistically significant at 10% on model 22. The HFI variable had negative effects on the adverse selection component of the bid-ask spreads estimates except for model 23. A 1% increase in ownership concentration (HFI) would tighten (widen) the LSB (HS) estimates by approximately 0.259% (0.061%) (model 21 (23)).

With regards to the control variables, we find that MCAP and Vol are mainly statistically insignificant. However, PRICE and MTB were found to be statistically significant on the majority of the model specifications. It is observed that MTB has highly statistical significance (1% s.l.) for all of the regressions on HS. Furthermore, on model 21, PRICE is highly statistically significant at the 1% significance level. We found strong evidence (1% s.l.) for MTB, MCAP and PRICE widening the adverse selection component of the bid-ask spread (model 23). Lastly the number of observations for the LSB and HS regressions are 1,189 and 1,254, respectively.

Table 11: Regression Results for CMS and Adverse Selection Model 19 to 24

	19	20	21	22	23	24
	POLS	Fixed Effects	Random Effects	POLS	Fixed Effects	Random Effects
VARIABLES	log(LSB)	log(LSB)	log(LSB)	log(HS)	log(HS)	log(HS)
CMS	-0.154	0.598	0.301	0.850**	0.250	0.410
	(0.614)	(0.668)	(0.538)	(0.374)	(0.568)	(0.395)
VC	-0.011	0.191	0.047	0.081*	0.197**	0.077
	(0.098)	(0.171)	(0.079)	(0.044)	(0.098)	(0.050)
log(HFI)	-0.093	-0.379	-0.259	-0.260*	0.061	-0.100
	(0.241)	(0.291)	(0.230)	(0.157)	(0.160)	(0.133)
MTB	0.062*	0.045	0.027	0.067***	0.079***	0.071***
	(0.035)	(0.034)	(0.020)	(0.017)	(0.022)	(0.017)
MCAP[1]	-0.000	-0.000	-0.000	-0.000	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PRICE[1]	0.625	0.622*	0.753***	9.534***	8.411***	8.718***
	(0.392)	(0.317)	(0.258)	(0.651)	(0.609)	(0.584)
Vol	0.031	-0.011	0.013	-0.160***	-0.001	-0.080***
	(0.034)	(0.042)	(0.033)	(0.042)	(0.024)	(0.023)
Constant	-4.758***	-4.654***	-4.369***	-3.027***	-2.871***	-2.794***
	(0.493)	(0.426)	(0.376)	(0.284)	(0.346)	(0.287)
Observations	1,189	1,189	1,189	1,254	1,254	1,254
Industry Effects	Yes	No	No	Yes	No	No
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)
R-squared	0.210	0.027		0.689	0.571	
Number of FirmID		180	180		178	178

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: [1] Winsorized at the 1st and 99th percentile

7.7 Robustness Check

To increase the robustness of our findings we include a robustness check through the inclusion of two cut-off points for CMS which are 20% and 35%, denoted CMS20 and CMS35. These results are found in Table 12. We confirmed the robustness of the results for both the results in section 7.5 and 7.6, where we found that the explanatory variable and the control ownership dimension variables had the same sign and similar magnitudes. However, the exception for this is the CMS20 relation to LSB, which has the inverse sign. In addition, with regards to both CMS20 and CMS35, they lost statistical significance with their effect on the HS estimate. For example, in CMS20 we find similar strong evidence (1%, s.1.) to RS, however, with regards to CMS35 and RS, the CMS35 becomes statistically insignificant. With regards to the ownership dimension control variables, we found strong evidence (1%, s.1.) for the VC20 variable related to RS compared to VC[24] and VC35. Moreover, we confirmed the signs and magnitudes of the HFI variable. Concerning the other control variables, we find similar results as section 7.5 and 7.6. Lastly, the number of observations for both the cut-off points 20% and 35% are 1,559 and 736, respectively. This could be explained by the logic that when the cut-off points change to 20% (35%), more (less) CMS are allowed into the data sample.

Table 12: Robustness Check Regression Results for CMS

	POLS	POLS	POLS	POLS	POLS	POLS	POLS	POLS
VARIABLES	lnRS	lnES	lnLSB	lnHS	lnRS	lnES	lnLSB	lnHS
CMS20	1.156***	-0.560	0.330	0.602*				
	(0.360)	(0.448)	(0.517)	(0.330)				
VC20	-0.159***	0.193***	-0.025	0.033				
	(0.057)	(0.074)	(0.078)	(0.046)				
CMS35					0.859	-0.213	-0.053	0.648
					(0.706)	(0.650)	(0.878)	(0.527)
VC35					-0.243*	0.272**	-0.144	0.027
					(0.128)	(0.131)	(0.105)	(0.056)
log(HFI)	-0.581***	0.375*	-0.308	-0.209	-0.694**	0.349	-0.263	-0.349*
	(0.187)	(0.216)	(0.216)	(0.142)	(0.298)	(0.299)	(0.311)	(0.198)
MTB	-0.052***	0.105***	0.037	0.053***	0.007	0.090**	0.190***	0.096***
	(0.019)	(0.024)	(0.029)	(0.015)	(0.046)	(0.045)	(0.042)	(0.020)
MCAP[1]	-0.000***	0.000***	0.000	-0.000	-0.000***	0.000***	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PRICE[1]	4.677***	4.710***	0.674*	9.464***	5.012***	3.639***	0.417	8.725***
	(0.516)	(0.475)	(0.377)	(0.602)	(0.786)	(0.600)	(0.455)	(0.670)
Vol	-0.009	-0.099**	0.003	-0.109***	-0.000	-0.178***	0.051	-0.179***
	(0.019)	(0.041)	(0.022)	(0.037)	(0.052)	(0.051)	(0.041)	(0.049)
Constant	-5.342***	2.049***	-6.615***	-2.238***	-4.275***	0.182	-4.122***	-2.980***
	(0.333)	(0.376)	(0.319)	(0.250)	(0.505)	(0.475)	(0.775)	(0.379)
Observations	1,559	1,559	1,465	1,559	736	736	693	736
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)	Cluster (firm)
R-squared	0.580	0.438	0.170	0.667	0.608	0.481	0.310	0.738

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Note: 1 Winsorized at the 1st and 99th percentile

[24] VC is the control-ownership dimension related to the CMS variable with a 25% voting rights threshold. The results are found in Table 10.

7.8 Endogeneity discussion

In this section, we discuss any potential endogeneity issues related to our two explanatory variables, CMS and block. However, we do not address this issue given the evidence in previous literature both related to UCS and block (e.g., Heflin & Shaw, 2000; Attig et al. 2006; Brockman, Chung & Yan, 2009; Ginglinger & Hamon, 2012), which suggest that endogeneity is not a serious issue in their sample. We are convinced that our main explanatory variable is not excessively influenced by the simultaneous bias, concluded by other empirical papers (e.g., Attig et al. 2006; Heflin & Shaw, 2000; Ginglinger & Hamon, 2012), and therefore, we believe that endogeneity does not affect our results. For example, Heflin and Shaw (2010) investigated whether or not non-managers were influenced by the stock market liquidity (which included the adverse selection component of the bid-ask spread) (which included the adverse selection component of the bid-ask spread) to become blockholders. They performed a two-stage least squares regression to address this concern, and they found that their Hausman-Wu test rejected the hypothesis that non-manager blockholders are endogenous because their coefficients on the residuals from the first-stage regression was zero. They concluded that their regression examining the effect between blockholders and liquidity had low probability of being impacted by the simultaneous equations bias. Hence, we argue similarly to other papers (e.g., Attig et al. 2006; Heflin & Shaw, 2000; Ginglinger & Hamon, 2012) that the ownership structures are not impacted by the stock market liquidity through the simultaneous bias. However, it is important to note that we are using different samples but believe that these papers' results can be extended to our results even if with obvious caveats.

8. Analysis

The purpose of this chapter is to discuss the results in chapter 7 in connection with the presented theories and empirical papers.

8.1 Blockholders impact on liquidity and adverse selection component of liquidity

The blockholder ownership's impact on both the stock market liquidity and the adverse selection component of the bid-ask spread has yielded results. Drawing general conclusions on liquidity alone is challenging since it embeds many components. Even if most of the regressions yielded statistically insignificant results on liquidity, we found statistically significance related to the adverse selection components of the bid-ask spread.

If we analyze the results for blockholders and liquidity only the POLS model (model 4) found significance (5% s.l.) on how blockholders widened the ES, hence lowered liquidity. Even though we find the remaining models' coefficients statistically insignificant except model 4, we observed in the results section that all of the coefficients had a positive sign (Table 8). This supports the notion that blockholders widened both the ES and the RS, hence lowered the stock market liquidity during the period 2009-2019. However, since the regression models suggested by the Hausman test (model 2 & 5) had no statistical significance, we reject the first hypothesis (H1). We conclude that we cannot statistically prove whether blockholders negatively impact the stock market liquidity or not. This finding is consistent with both the empirical papers by Kini and Mian (1995) and Jacoby and Zheng (2010), as they did not find any support for a significant positive relation between spreads and blockholdings, but nonetheless support the notion on blockholders widening the spreads although with no significance. Unlike these studies, Heflin and Shaw (2000) found, with statistical significance, that increased blockholder ownership is related to wider spreads. Both our and other papers' (e.g., Kini & Mian, 1995; Jacoby & Zheng, 2010) results support Heflin and Shaw (2000). We cannot exclude the possibility that these different results may be sample specific. Similar to Heflin's and Shaw's (2000) regressions, we also found that the constant (intercept) for blockholders was negative in the RS regressions but positive for the ES regressions.

Edmans, Fang and Zur (2013) argued that mutual funds and pension funds might be less inclined to intervene due to potential issues in the future or that they are passive-investors, and therefore, do not play an active role in trading shares. This later argument also provides a reason for reduced stock liquidity, as there are fewer stocks in circulation. In addition, the authors suggested that the mere presence of blockholders reduces stock liquidity due to their ability to impair managerial incentives, extract private benefits and create agency costs. These reasons could arguably explain the worsened liquidity by blockholders

Secondly, if we analyze the results for blockholders and the adverse selection component, we only found significance for how blockholders increased the HS adverse selection estimate (model 10 - 12), hence growing the adverse selection component of liquidity. However, by observing the other models with no significance, we found in the result section that all of the coefficients had a positive sign (Table 9), which supports the adverse selection hypothesis. Since the regression models suggested by the Hausman test had no statistical significance for the LSB estimate (model 9) and the one suggested for the HS estimate (model 11) did, we find inconclusive results as to whether we fail to accept the third hypothesis ($H3_a$) or not. The models 9 and 11 are the model specifications where hypothesis 3a is tested. The blockholder coefficient in model 9 was 0.088 whilst model 11's was 0.410 (1% s.l.). From these results, we found evidence that we reject the third hypothesis (H3a) with model 9 since the coefficient did not have any significance but we fail to reject H3a with model 11. By taking this into account, we test hypothesis 3a by model 11 as we have established that model 9 rejected H3a null-hypothesis. Consequently, we find that we fail to reject the null hypothesis for H3a, as we find that blockholder ownership widens the adverse selection component of the bid-ask spread, thus reducing liquidity during the period 2009-2019. This finding is in line with other empirical papers (e.g., Heflin & Shaw, 2000; Brockman, Chung & Yan, 2009; Jacoby & Zheng, 2010). Heflin and Shaw (2000) found evidence that higher blockholder ownership leads to higher HS and therefore, place e.g., brokerage firms at a higher likelihood of informed trading occurring. Brockman, Chung and Yan (2009) found that, when controlling for trading activity, higher blockholder ownership leads to higher HS. In addition, Jacoby and Zheng (2010) did also find a positive correlation between blockholder ownership and the adverse selection component of the bid-ask spread. Lastly, our figures for the adverse selection spread component HS are compatible with those in the papers mentioned above.

These results could be explained by several reasons. Heflin and Shaw (2000) suggested that the negative impact on liquidity by blockholders might be due to their access to value-relevant information via their role as monitors of the firms' operations. Jacoby and Zheng (2010) extended Heflin's and Shaw's (2000) suggestion, by proposing that the blockholders combined private information and trading increases the adverse selection risk faced by market makers, which in turn forces the market makers to widen the spreads and trade less, therefore reducing the liquidity of the stock. Furthermore, Chia, Lin and Goh (2020) argued that if more informed investors, such as block owners, are added to the ownership structure, then as a consequence information asymmetries are increased.

8.2 Blockholder Ownership dispersion's effect on liquidity and the adverse selection

The ownership dispersion dimensions impact on both stock market liquidity and the adverse selection component of liquidity has provided results. Even if most of the regressions yielded statistically insignificant results on the adverse selection component of spreads, we found statistical significance related to the NSH and liquidity. The same significance was found for the ownership dispersion measurement HFI.

If we start with the results on NSH, only the regression models for liquidity found highly statistical results (1% s.l., model 1-6). Whilst, for the adverse selection poor significance was only found in 3 out of the 6 regressions (model 7, 10, 12). Interestingly enough, regardless of the LIQ[25] measures and significance, all of the coefficients were negative for the ownership dispersion measurement NSH except for all regressions on the ES (models 4 - 6) and the FE model on the HS estimate (model 11). However, since the regression models on liquidity, suggested by the Hausman test (model 2 & 5), had statistical significance, we focus the analysis solely on those. We find that we cannot statistically prove whether NSH negatively impacts the stock market liquidity since the models have opposite coefficient signs. These results contradict neither Jacoby and Zheng (2020) nor Chia, Lin and Goh (2020), since they find that NSH had a positive effect on liquidity to a certain threshold. If we instead view the regression models on adverse selection suggested by the Hausman test (model 9 & 11), we do not find any statistical significance for the two dependent variables and we can also observe that the coefficients have opposite signs. However, by comparing the POLS models on LSB and HS, we find significance and similar negative impact on the adverse selection component of the bid-ask spread by NSH. This would mean that the higher the number of shareholders are the lower the information asymmetry component would be. To conclude, the NSH seems to not impact the stock market liquidity and information asymmetry in any specific way.

However, if we analyze the HFI results, we find poor significance if ownership concentration (HFI) would impact the stock market liquidity and information asymmetry in any specific way. Our results showed that HFI has a negative coefficient sign except for the regressions on RS (model 1-3). However, since the regression models on liquidity, suggested by the Hausman test, had only statistical significance in model 5, we focus the analysis on it. As

[25] LIQ are the dependent variables used in this paper which are RS, ES, LSB and HS.

observed in Table 8, the FE model 5 showed that the higher the concentration[26] of the combined block size the lower the effective spreads are, the greater liquidity. These findings could be argued to make economical sense because blockholders with a similar amount of cash flow rights would have lower chances of being more informed than the other blockholders. If we instead observe the regression models on adverse selection suggested by the Hausman test (model 9 & 11), we do not find any statistical significance for the two dependent variables and we can also recognize that the coefficients have the same negative signs for all of the regressions. However, by comparing the POLS models on the LSB and HS estimates, we find significance and similar negative impact on the adverse selection component of the bid-ask spread. Models 7 and 10 showed that the higher the concentration of the combined block size (HFI), the lower the LSB and HS estimates are. These results suggest that if the control of cash flow rights is low dispersed then the information asymmetry component would be less, hence tightening the spreads and improving the stock market liquidity. To conclude, even if we cannot statistically prove the effect of HFI on the stock market liquidity, we find support that HFI has a positive effect on liquidity and reduces the asymmetric information component of the bid-ask spread if the concentration of the block size is high.

8.3 CMS' impact on liquidity and the adverse selection component of liquidity

The debate between CMS structures and the stock market liquidity, to our knowledge, has not been analyzed previously. We, therefore, attempt to shed some light on possible reasons for different results, which we accomplish by drawing a parallel to the UCS structure and other papers that have investigated CMS and firm value.

Section 7.5 analyzed the results by the regression models between CMS ownership and stock market liquidity. By analyzing the results from a POLS perspective, we can determine that we found inconclusive evidence on CMS' effect on liquidity. From this section, models 14 and 17 were determined by the Hausmen test to be the model specifications where hypotheses 2a and 2b are tested. The coefficient on CMS in model 14 was 1.446 (1% s.l.) whilst for model 17 it was -1.224 (10% s.l.). From these coefficients, we find support in evidence that we reject the null-hypothesis (2a) with model 14 but fail to reject the null-hypothesis (2a) with model 17, since the latter model is not statistically significant at the 5% significance level. By

[26] A HFI value of 0.5 and above equals a high concentration and low dispersion.

taking this into account, we test hypothesis 2b by model 14, as we have established that model 17 rejected the null-hypothesis 2a. Consequently, we find that we accept the null hypothesis 2b, as we find that CMS widened the ES, thus reducing the stock market liquidity during the period 2009-2019. Our results related to the RS are consistent with regard to the coefficient's sign by those found in other empirical papers that have also analyzed different types of spread measurements (e.g. Attig et al. 2006; Heflin and Shaw, 2000; Jacoby & Zheng, 2010; Yosra & Sioud, 2011; Ginglinger & Hamon, 2012). However, the magnitude of the coefficient can be explained by the sample difference, as others have investigated the relation between either block or UCS and liquidity compared to this study that determined the relationship between CMS and liquidity, which has different characteristics. In addition, the magnitude of the coefficient can be justified by different measures of liquidity proxies, as some articles may have used effective relative spread or the average quoted bid-ask spreads divided by the bid-ask midpoint for an interval. One of the most similar coefficients to our study was Heflin's and Shaw's (2000) manager block coefficient of 0.301 to the natural logarithm of RS. Furthermore, it could be suggested that CMS has higher agency costs than controlling majority shareholders (Bebchuk, Kraakman & Triantis, 2000). This could potentially explain why the CMS' results are different from UCS. However, this is not underpinned by any theory or research, and is therefore, not conclusive. In addition, it is important to note that the inverse sign between CMS and the stock market liquidity proxies (lnRS and lnES) could potentially be due to the two variables being constructed in different ways. Even though other papers (e.g., Ding, Nilsson & Suardi, 2013) found inverse signs related to ownership structure and liquidity measurements, they did not suggest any reasons to them. Therefore, the difference in signs cannot be either rationalized or supported by any theories or other explanations suggested by other empirical papers.

A factor that could explain the poor liquidity resulting from the CMS structure might be the poor shareholder protection in Sweden, with Swedish regulations being more geared towards the protection of CMS' owned firms through the allowance of dual-class shares (La Porta, Lopez-de-Silanes & Shleifer, 1999; Cronqvist and Nilsson, 2003). Consequently, resulting in the low extraction cost of private benefits for CMS structures (Cronqvist & Nilsson, 2003), which arguably could create less incentives for investors to invest in CMS owned companies, and thus, explain the reduced liquidity seen in CMS' owned firms.

In addition, we examined the CMS structures impact on the adverse selection component of bid-ask spread (section 7.6). This section indicated, by the Hausman test, that the appropriate models to test the hypothesis were 21 and 23. In models 21 and 23, we found that both our CMS variables were statistically insignificant to the two adverse selection components of the bid-ask spread measurements with coefficients of 0.598 and 0.250, respectively. Therefore, we reject the null hypothesis (3b) that CMS widens the adverse selection component of the bid-ask spread. However, it is important to highlight that we found robust regression results of both the coefficient magnitude and signs in support of the adverse selection hypothesis except for model 19, found in Table 11. Model 14 was the only statistically significant model (5% s.l.) and it demonstrated a positive coefficient for CMS of 0.850 to *lnHS*. This would suggest that we support the notion of CMS' widening the informed trading component of the bid-ask spread, thus increasing information asymmetries. Therefore, it could be argued that these results imply that CMS are informed traders.

To summarize, we found strong evidence that CMS impacts stock liquidity. In addition, we support the notion of the adverse selection hypothesis by our regression results, however, by the models that we test the hypotheses with, we reject our hypothesis.

8.4 CMS Ownership dispersion's effect on liquidity and the adverse selection

In addition, we controlled for two different forms of ownership dispersion measurements, VC and HFI. With regards to the liquidity measurements, we found strong evidence but inconclusive results that both the variables impacted liquidity. However, this impact might have been determined by the CMS. For instance, when CMS has a negative impact on liquidity, then the impact of VC and HFI on the liquidity would be positive, and vice versa.

By taking the perspective from the models established to test the hypothesis (models 14, 17, 21, 23), we find support for the theory that the discrepancy between cash flow rights and voting rights (VC) leads to wider spreads, decreased liquidity and widened informed trading components of bid-ask spread. This can be seen in the models 17 and 23, with coefficients of 0.31 (1%, s.l.) and 0.197 (5%, s.l.), respectively. These results are consistent with other empirical studies (Attig et al. 2006; Yosra & Sioud, 2011; Ginglinger & Hamon, 2012). However, for the models 14 and 21, we found the coefficients to be -0.111 and 0.047. We found that the control-ownership dimension (VC) counteracts the CMS' influence in terms of liquidity, however, exacerbates the CMS's influence on the adverse selection component of the bid-ask spread. The difference in magnitude can be sample specific or measurement specific (explained in section 1.2 and 8.3). Few articles have investigated this, but Attig et al. (2006) suggested that the larger the deviation between control-ownership is, the greater the information asymmetry. They argued this was mainly due to the ability to introduce poor disclosure policies, by for example delaying or preventing them, thus creating the ability for UCS to trade on private information. This argument has been supported by other studies (Yosra & Sioud, 2011; Ginglinger & Hamon, 2012), who also argued that a larger deviation between control and ownership leads to a stronger ability for the UCS to maintain control over the firm (Ginglinger & Hamon, 2012; Yosra and Sioud, 2011). These arguments can be applied to the case for CMS structures, as they also maintain control through corporate governance mechanisms such as dual-class shares, consequently leading to CMS entrenching themselves against market pressure and monitoring (Cronqvist & Nilsson, 2003). By this logic, institutional investors or active investors might be less inclined to intervene by buying shares, as they would have limited control and say over firms decisions.

If we look at HFI, we find, by the models of which we tested the hypothesis, that they yielded insignificant results as the coefficients have inverse signs both in relation to the liquidity measurements and the adverse selection component of the bid-ask spreads. However, from Table 10 which shows the regression results of CMS structures and liquidity, where we find that the HFI has an inverse sign to CMS depending on the liquidity measurement. This result is not consistent with those found in Table 11, which examined the HFI impact on the adverse selection component of the bid-ask spread. From these results, we argue that if the dispersion amongst the five largest shareholders is low, a mitigating effect on the information asymmetry produced by CMS structures would take place as all regression models except model 23 had a negative sign. Nevertheless, due to the inconsistency of the regression results related to the stock market liquidity, we cannot speculate on the HFI's effect.

9. Conclusions

Corporate governance continues to be challenged by today's market conditions and regulatory systems, where blockholders and CMS have an important role. This study investigated the impact of blockholders and CMS on both the stock market liquidity and the asymmetric information channel captured by the adverse selection component of the bid-ask spread on

Nasdaq Stockholm from 2009 to 2019. By using clustered robust FE and RE regression models as well as a robustness test, this study found that blockholders widened the adverse selection component of the bid-ask spread, thus reducing liquidity during the period 2009-2019, and therefore, found support for the adverse selection hypothesis. We found that a 1% change in blockholder ownership increased the HS estimate by 0.41% (model 11). Moreover, we found strong evidence for CMS negatively impacting stock liquidity. A 1% increase in the CMS' amount of cash flow rights widened the RS by 1.446%. These results remain intact even after the inclusion of the robustness test with two different cut-off points. The results found for blockholders and stock market liquidity and the adverse selection component of the bid-ask spread were in line with previous studies.

The main contribution of this study is to bridge the knowledge gap between UCS and other ownership structures, by providing evidence and support that CMS' negatively impact the stock market liquidity and increased the information asymmetry component, which is consistent with the results found in blockholder ownership and UCS studies. However, due to the limited amount of studies that have analyzed this, there is no supporting theory about CMS' impacting the stock market liquidity, hence, we must draw our own conclusions from the UCS perspective given the similar characteristics.

It is believed that these findings are valuable for asset managers, investors, CFOs as well as regulatory bodies in Sweden. More specifically, this study would potentially help develop efficient investment strategies whenever CMS structures are present but also develop more efficient regulations. Both asset managers and investors may recognize these findings as interesting since these results support that CMS structures and blockholder ownership negatively affect the liquidity and increase the information asymmetry. Because, when willing to purchase dual-class shares of firms listed on Nasdaq Stockholm, they can incorporate these findings in their evaluation of the shares since the dynamics of liquidity and pricing is significantly impacted by ownership structures. Regulatory bodies and organizations, such as Swedish central banks and Nasdaq, may find these results as supportive for the regulation of such ownership structure, with the objective of both reaching price stability in the market.

For future research, an interesting research would be to benchmark results on not only blockholders, as done in this paper, but also on UCS. As mentioned in the literature review, several studies found that UCS are associated with higher information asymmetries which consequently leads to wider bid-ask spreads (Attig et al. 2006; Yosra & Sioud, 2011; Ginglinger & Hamon, 2012). This may be valuable since it may ensure more robust results. Moreover, to provide further robust results it may be interesting to use daily data if the data and time is not restricted. Daily data might capture smaller events or even days of the week that have different patterns which can be identified at this level. For instance, several studies have used daily number of trades and daily average trade size to control for trading activity and they also used daily averages for ES and RS (Heflin & Shaw, 2000; Jacoby & Zheng, 2010). Further research could also investigate the effect of the Global Financial Crisis and the COVID-19 pandemic on the stock market liquidity, given that it would provide an interesting perspective to see if ownership structures had a different effect.

References

Agarwal, P. (2007). Institutional Ownership and Stock Liquidity, *SSRN,* Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1029395 [Accessed 10 April 2022]

Agnblad, J., Berglöf, E., Högfeldt, P., & Svancar. H. (2001). Ownership and Control in Sweden: Strong Owners, Weak Minorities, in F. Barca & M. Becht (eds), *The Control of Corporate Europe*, Oxford University Press, pp.228-258

Akerlof, G. A. (1978). The market for "lemons": Quality uncertainty and the market mechanism, in P. Diamond & M. Rothschild (eds), *Uncertainty in Economics*, University of Chicago Press, pp.235-251

Amihud, Y., & Mendelson, H. (2006). Stock and bond liquidity and its effect on prices and financial policies, *Financial Markets and Portfolio Management*, vol. 20, no. 1, pp.19–32, Available online: https://doi.org/10.1007/s11408-006-0001-y [Accessed 11 April 2022]

Attig, N., Fong, W. M., Gadhoum, Y., & Lang, L. H. (2006). Effects of large shareholding on information asymmetry and stock liquidity, *Journal of Banking & Finance*, vol. 30, no. 10, pp.2875-2892, Available online: https://doi.org/10.1016/j.jbankfin.2005.12.002 [Accessed 29 April 2022]

Bebchuk, L. A., Kraakman, R., & Triantis, G. (2000). Stock Pyramids, Cross-Ownership, and Dual Class Equity: The Mechanisms and Agency Costs of Separating Control from Cash-Flow Rights, in K.M. Randall (ed), *Concentrated Corporate Ownership*, University of Chicago Press, pp.295-318

Becht, M., Bolton, P., & Röell, A. (2003). Corporate governance and control. In Handbook of the Economics of Finance (Vol. 1, pp. 1-109). Elsevier.

Balakrishnan, A. (2013). Snap is falling again as Wall Street worries about the company's corporate structure, CNN, 1 August, Available Online: https://www.cnbc.com/2017/08/01/snapchat-excluded-from-sp-500-what-does-it-mean.html [Accessed 21 April 2022]

Bhide, A. (1993). The hidden costs of stock market liquidity, *Journal of Banking & Finance*, vol. 34, no. 1, pp.31-51, Available online: https://doi.org/10.1016/0304-405X(93)90039-E [Accessed 29 April 2022]

Brunnermeier, M. K., & Pedersen, L. H. (2009). Market Liquidity and Funding Liquidity, *The Review of Financial Studies*, vol. 22, no. 6, pp.2201-2238, Available online: https://doi.org/10.1093/rfs/hhn098 [Accessed 21 April 2022]

Brockman, P., Chung, D., & Yan, X. (2009). Block ownership, trading activity, and market liquidity, *Journal of Financial and Quantitative Analysis*, vol. 44, no. 6, pp.1403-1426, Available online: https://doi.org/10.1017/S0022109009990378 [Accessed 24 April 2022]

Bryman, A. & Bell, E. (2015). Business research methods, 5th ed, Oxford: Oxford University Press

Cambridge Trust. (2018). Six Essential Elements of Effective Corporate Governance, Available online: https://www.cambridgetrust.com/insights/investing-economy/six-essential-elements-of-effective-corporate-gove [Accessed 1 May 2022]

Claessens, S., Djankov, S., & Lang, L. H. (2000). The separation of ownership and control in East Asian corporations, *Journal of Financial Economics*, vol. 58, no. 1-2, pp.81-112, Available online: https://doi.org/10.1016/S0304-405X(00)00067-2 [Accessed 17 April 2022]

Claessens, S., Djankov, S., Fan, J. P., & Lang, L. H. (2002). Disentangling the incentive and entrenchment effects of large shareholdings, *The Journal of Finance*, vol. 57, no. 6, pp.2741-2771, Available online: https://doi.org/10.1111/1540-6261.00511 [Accessed 12 April 2022]

Charoenwong, C., Ding, D. K., & Siraprapasiri, V. (2011). Adverse selection and corporate governance, *International Review of Economics & Finance*, vol. 20, no. 3, pp.406-420, Available online: https://doi.org/10.1016/j.iref.2010.11.011 [Accessed 11 April 2022]

Chang, B. (2018). Adverse Selection and Liquidity Distortion, *The Review of Economics Studies*, vol. 85, no. 1, pp.275-306, Available online: https://doi.org/10.1093/restud/rdx015 [Accessed 29 April 2022]

Chia, Y. E., Lim, K. P., & Goh, K. L. (2020). More shareholders, higher liquidity? Evidence from an emerging stock market, *Emerging Markets Review*, vol. 44, Available online: https://doi.org/10.1016/j.ememar.2020.100696 [Accessed 29 April 2022]

Cronqvist, H., & Nilsson, M. (2003). Agency costs of controlling minority shareholders, *Journal of Financial and Quantitative Analysis*, vol. 38, no. 4, pp.695-719, Available online: https://doi.org/10.2307/4126740 [Accessed 29 April 2022]

Ding, M., Nilsson, B., & Suardi, S. (2013). Foreign institutional investors and stock market liquidity in China: State ownership, trading activity and information asymmetry, Department of Economics, working paper, no.2013-14, Lund University School of Economics and Management

Edmans, A., Fang, V. W., & Zur, E. (2013). The effect of liquidity on governance, *The Review of Financial Studies*, vol. 26, no. 6, pp.1443-1482, Available online: https://doi.org/10.1093/rfs/hht012 [Accessed 15 April 2022]

Easley, D., Hvidkjaer, S., & O'hara, M. (2002). Is information risk a determinant of asset returns?, *The Journal of Finance*, vol. 57, no. 5, pp.2185-2221, Available online: https://doi.org/10.1093/rfs/hht012 [Accessed 15 April 2022]

Ekholm, A., & Maury, B. (2014). Portfolio concentration and firm performance, *The Journal of Financial and Quantitative Analysis*, vol. 49, no. 4, pp.903-931, Available online: https://doi.org/10.1017/S0022109014000635 [Accessed 17 April 2022]

Ginglinger, E., & Hamon, J. (2012). Ownership, control and market liquidity, *Finance*, vol. 33, no. 2, pp.61-99, Available online: https://doi.org/10.3917/fina.332.0061 [Accessed 17 April 2022]

Glosten, L. R., & Milgrom, P. R. (1985). Bid, ask and transaction prices in a specialist market with heterogeneously informed traders, *Journal of Financial Economics*, vol. 14, no. 1, pp. 71-100, Available online: https://doi.org/10.1016/0304-405X(85)90044-3 [Accessed 1 May 2022]

Grossman, S. J., & Stiglitz, J. E. (1980). On the impossibility of informationally efficient markets, *The American Economic Review*, vol. 70, no. 3, pp.393-408, Available online: https://www.jstor.org/stable/1805228 [Accessed 29 April 2022]

Hausman, J. A. (1978). Specification tests in econometrics, *Econometrica*, vol. 46, no. 6, pp. 1251-1271, Available online: https://doi.org/10.2307/1913827 [Accessed 29 April 2022]

Heflin, F., & Shaw, K. (2000). Blockholder Ownership and Market Liquidity, *Journal of Financial and Quantitative Analysis*, vol. 35, no. 4, pp.621-633, Available online: https://doi.org/10.2307/2676258 [Accessed 29 April 2022]

Huang, R. D., & Stoll, H. R. (1997). The components of the bid-ask spread: A general approach, *The Review of Financial Studies*, vol. 10, no. 4, pp.995-1034, Available online: https://doi.org/10.1093/rfs/10.4.995 [Accessed 29 April 2022]

Holdings Modular Finance. (2022). [Ownership Database]. Webpage. https://www.modularfinance.se/products/holdings?l=sv

Holton, E. F., & Burnett, M. F. (2005). The basics of quantitative research, in R.A. Swanson & E. F. Holton (ed), *Research in Organizations: Foundations and Methods in Inquiry*, Berett-Koehler Publishers, pp.29-44

International Revenue Service. (2022). Topic No. 409 Capital Gains and Losses, Available online: https://www.irs.gov/taxtopics/tc409

Investopedia. (2020). Friction Cost, Available online: https://www.investopedia.com/terms/f/frictioncost.asp#:~:text=What%20Is%20Friction%20Cost%3F,costs%20associated%20with%20a%20transaction [Accessed 22 March 2022]

Investopedia. (2022). Price-to-Book (P/B) Ratio, Available online: https://www.investopedia.com/terms/p/price-to-bookratio.asp [Accessed 22 March 2022]

Jacoby, G., & Zheng, S. X. (2010). Ownership dispersion and market liquidity, *International Review of Financial Analysis*, vol. 19, no. 2, pp.81-88, Available online: https://doi.org/10.1016/j.irfa.2010.01.008 [Accessed 29 April 2022]

Kini, O., & Mian, S. (1995). Bid‐ask spread and ownership structure, *The Journal of Financial Research*, vol. 18, no. 4, pp.401-414, Available online: https://doi.org/10.1111/j.1475-6803.1995.tb00574.x [Accessed 29 April 2022]

Konijn, S. J., Kräussl, R., & Lucas, A. (2011). Blockholder dispersion and firm value, *Journal of Corporate Finance*, vol. 17, no. 5, pp.1330-1339, Available online: https://doi.org/10.1016/j.jcorpfin.2011.06.005 [Accessed 29 April 2022]

Kyle, A. S. (1985). Continuous auctions and insider trading, *Econometrica*, vol. 53, no. 6, pp. 1315-1335, Available online: https://doi.org/10.2307/1913210 [Accessed 29 April 2022]

La Porta, R., Lopez‐de‐Silanes, F., & Shleifer, A. (1999). Corporate Ownership Around the World, *The Journal of Finance*, vol. 54, no. 2, pp.471-517, Available online: https://doi.org/10.1111/0022-1082.00115 [Accessed 29 April 2022]

Lin, J. C., Sanger, G. C., & Booth, G. G. (1995). Trade Size and Components of the Bid-Ask Spread, *The Review of Financial Studies*, vol. 8, no. 4, pp.1153-1183, Available online: https://doi.org/10.1093/rfs/8.4.1153 [Accessed 29 April 2022]

Maury, B., & Pajuste, A. (2005). Multiple large shareholders and firm value, *The Review of Financial Studies*, vol. 29, no. 7, pp.1813-1834, Available online: https://doi.org/10.1016/j.jbankfin.2004.07.002 [Accessed 29 April 2022]

Morck, R., Shleifer, A., & Vishny, R. W. (1988). Management ownership and market valuation: An empirical analysis, *Journald of Financial Economics*, vol. 20, pp.293-315, Available online: https://doi.org/10.1016/0304-405X(88)90048-7 [Accessed 29 April 2022]

Ogden, J. P., Jen, F. C., & O'Connor, P. F. (2003). Advanced corporate finance: Policies and strategies. Upper Saddle River, N.J: Prentice Hall.

Roberts, M. R., & Whited, T. M. (2013). Endogeneity in empirical corporate finance. in G. Constantinides, M. Harris, & R. Stulz (eds), *Vol. 2. Handbook of the economics of finance,* Elsevier, pp.493–572

Rubin, A. (2007). Ownership level, ownership concentration and liquidity, *Journal of Financial Markets*, vol. 10, no. 3, pp.219-248, Available online: https://doi.org/10.1016/j.finmar.2007.04.002 [Accessed 29 April 2022]

Rydqvist, K. (1992). Dual-class shares: a review, *Oxford Review of Economic Policy*, vol. 8, no. 3, pp.45-57, Available online: https://www.jstor.org/stable/23606245 [Accessed 29 April 2022]

Schroders. (2020). The transaction costs manual: What is behind transaction cost figures and how to use them, Available Online: https://www.schroders.com/nl/sysglobalassets/digital/insights/2020/october/transaction-costs/transaction-costs-manual.pdf

Skatteverket. (2022). Skatt på investeringssparkonto, Available online:https://www.skatteverket.se/privat/skatter/vardepapper/investeringssparkontoisk.4.5fc8c94513259a4ba1d800037851.html [Accessed 29 April 2022]

S&P Global Market Intelligence. (2022). [Ownership Database]. Webpage. https://www.capitaliq.com/

Van Ness, B. F., Van Ness, R. A., & Warr, R. S. (2001). How Well Do Adverse Selection Components Measure Adverse Selection?, *Financial Management*, vol. 30, no. 3, pp.77-98, Available online: https://doi.org/10.2307/3666377 [Accessed 29 April 2022]

Wooldridge, J. (2016). Introductory Econometrics, 6th ed, Boston: Cengage Learning

White, H. (1980). A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity, *Econometrica*, vol. 48, no. 4, pp.817-832, Available online: https://doi.org/10.2307/1912934 [Accessed 29 April 2022]

Yung, K., & Jian, Y. (2017). Effects of the shareholder base on firm behavior and firm value in China, *International Review of Economics & Finance*, vol. 49, pp.370-385, Available online: https://doi.org/10.1016/j.iref.2017.03.001 [Accessed 29 April 2022]

Yosra, G., & Sioud, O. B. O. (2011). Ultimate ownership structure and stock liquidity: empirical evidence from Tunisia, *Studies in Economics and Finance*, vol. 28, no. 4, pp. 282-300, Available online: https://www.emerald.com/insight/content/doi/10.1108/10867371111171546/full/html?casa_token=gZImu0wHWPgAAAAA:FbP6YnTOdEuNpw0Fh0ERVTFiVX5__sQ6HnkBKI1qB9dAGK14FL1RCkOJLRYpY7xO1kzQLrTFsYy09Pn7Ij3qAwTJinxZXjd04xEZOHbmt2Igmllje435 [Accessed 29 April 2010]

Figures

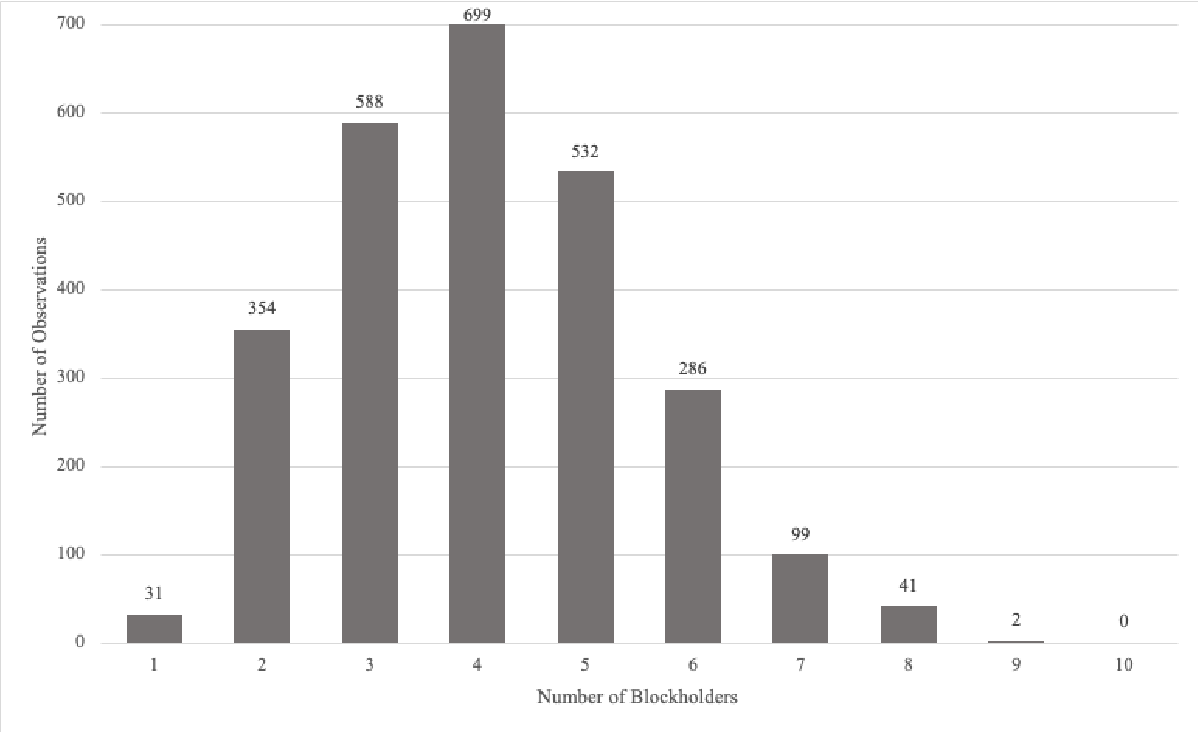

Figure 2: Statistics on blockholder ownership and the number of observations

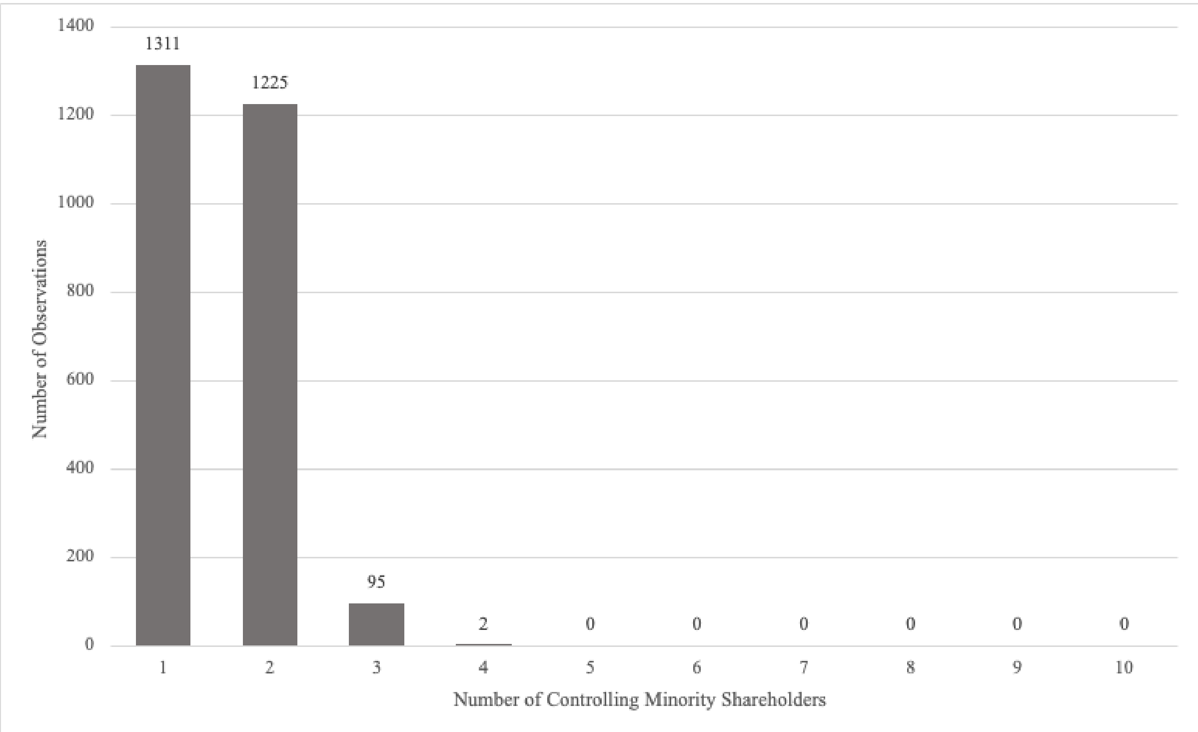

Figure 3: Statistics on CMS structure and the number of observations

Tables

Table 1: Variable Descriptions

Dependent Variables	Description	Source/Origin
LSB	Is the adverse selection component of the bid-ask spread developed by Lin, Sanger and Booth (1995)	(a)
HS	Is the informed trading component of the bid-ask spread developed by Huang and Stoll (1997)	(a)
RS	The relative spread in (%)	(a)
ES	The effective spread	(a)
Explanatory Variables		
CMS	The fraction of cash flow rights held by the controlling minority shareholder	(b)
Block	The aggregate % of capital held by blockholders	(b)
Control Variables		
NSH	Number of shareholders	(b)
VC	Vote to capital ratio minus 1	(b)
HFI	The Herfindahl index calculated on the 5 largest owners	(b)
MCAP	Is measured by multiplying the firm's closing share price by the shares outstanding	(a)
PRICE	The measured bid-ask spread (ask price - bid price); also proxied as the transaction cost	(a)
Vol	The daily volume traded in units of millions	(a)
MTB	Book value of assets minus the book value of equity plus the market value of equity to total assets.	(a)

Source: (a) S&P Capital IQ; (b) Holding Modular Finance
Period: 2008-12-31 to 2019-12-31

Table 3: Summary Statistics by Segment

Variable	Segment	N	Mean	Median	SD	Min	Max
# of Shareholders	Large Cap	1 014	54 000	20 800	96 700	296	725 000
# of Blockholders		1 014	2.7160	3	1.3918	0	7
# of CMS		554	1.0415	1	0.1997	1	2
# of Shareholders	Mid Cap	871	7 352	4 621	8 494	183	80 100
# of Blockholders		871	3.4971	3	1.5476	0	8
# of CMS		433	1.1432	1	0.3636	1	3
# of Shareholders	Small Cap	748	4 592	3 106	4 440	284	30 400
# of Blockholders		748	3.0548	3	1.2731	0	8
# of CMS		335	1.0418	1	0.2004	1	2
# of Shareholders	Total	2 633	24 500	5 984	64 600	183	725 000
# of Blockholders		2 633	3.0706	3	1.4512	0	8
# of CMS		1 322	1.0749	1	0.2690	1	3

Table 4: Summary Statistics by Sector

Variable	Sector	N	Mean	Median	SD	Min	Max
# of Shareholders	Energy	20	4 457	3 222	3 451,24	2 294	17 300
# of Blockholders		20	2	2	1,57	1	5
# of CMS		0	0	0	0	0	0
# of Shareholders	Real Estate	254	10 500	5 769	10 600	388	56 800
# of Blockholders		254	3	3	1,48	1	7
# of CMS		139	1	1	0,38	1	3
# of Shareholders	Finance	293	53 900	15 800	84 100,	209	36 800
# of Blockholders		293	3	2	1,33	0	6
# of CMS		154	1	1	0,16	1	2
# of Shareholders	Trade and Goods	265	26 500	9 185	45 500,	775	268 000
# of Blockholders		265	3	3	1,38	0	6
# of CMS		147	1	1	0,24	1	2
# of Shareholders	Health care	367	6 653	4 140	8 248,11	416	44 900
# of Blockholders		367	3	3	1,41	1	7
# of CMS		166	1	1	0,29	1	2
# of Shareholders	Industrials	599	20 300	4 910	39 300,	284	250 000
# of Blockholders		599	3	3	1,39	0	8

# of CMS		342	1	1	0,31	1	2
# of Shareholders	IT	256	32 300	4 500	113 00,	183	725 000
# of Blockholders		256	3	3	1,58	0	7
# of CMS		72	1	1	0,32	1	2
# of Shareholders	Materials	81	36 100	14 400	38 400,	2 261	122 000
# of Blockholders		81	3	2	1,36	1	6
# of CMS		60	1	1	0,00	1	1
# of Shareholders	Raw Materials	64	40 500	34 500	37 700	849	118 000
# of Blockholders		64	1.5469	2	0,92	0	4
# of CMS		12	1	1	0,	1	1
# of Shareholders	Rare purchases	97	13 800	9 676	13 600,	321	80 100
# of Blockholders		97	3	3	1,60	0	7
# of CMS		28	1	1	0,19	1	2
# of Shareholders	Telecommunications and Media	25	289 000	66 100	254 000	35 300	650 000
# of Blockholders		25	1	1	0,59	1	3
# of CMS		24	1	1	0,	1	1
# of Shareholders	Services	312	6 666	4 238	7 338,89	434	41 500
# of Blockholders		312	3	3	1,37	0	8
# of CMS		178	1	1	0,17	1	2
# of Shareholders	Total	2 633	24 500	5 984	64 600	183	725 000
# of Blockholders		2 633	3	3	1,45	0	8
# of CMS		1 322	1	1	0,27	1	3

Table 6: Test for Endogeneity

White test	H0	Chi-Squared	P-value	Decision	Heteroskedasticity?
Stata Test - Block ES	Homoskedasticity	594.92	0.0000	Reject	Yes
Stata Test - Block RS	Homoskedasticity	215.68	0.0000	Reject	Yes
Stata Test - Block LSB (in cents)	Homoskedasticity	73.75	0.0001	Reject	Yes
Stata Test - Block HS (in cents)	Homoskedasticity	556.31	0.0000	Reject	Yes
Stata Test - CMS ES	Homoskedasticity	182.35	0.0000	Reject	Yes
Stata Test - CMS RS	Homoskedasticity	165.85	0.0000	Reject	Yes
Stata Test - CMS LSB (in cents)	Homoskedasticity	57.20	0.0103	Reject	Yes
Stata Test - CMS HS (in cents)	Homoskedasticity	334.34	0.0000	Reject	Yes

Table 7: Hausman Test

Hausman Test	H0	Chi-Squared	P-value	Decision	Endogeneity?
Stata Test - Block ES	Preferred Model is RE	210.44	0.0000	Reject	Yes
Stata Test - Block RS	Preferred Model is RE	95.39	0.0000	Reject	Yes
Stata Test - Block LSB (in cents)	Preferred Model is RE	8.93	0.9423	Accept	No
Stata Test - Block HS (in cents)	Preferred Model is RE	155.59	0.0000	Reject	Yes
Stata Test - CMS ES	Preferred Model is RE	76.65	0.0000	Reject	Yes
Stata Test - CMS RS	Preferred Model is RE	70.86	0.0000	Reject	Yes
Stata Test - CMS LSB (in cents)	Preferred Model is RE	17.69	0.4089	Accept	No
Stata Test - CMS HS (in cents)	Preferred Model is RE	63.44	0.0000	Reject	Yes