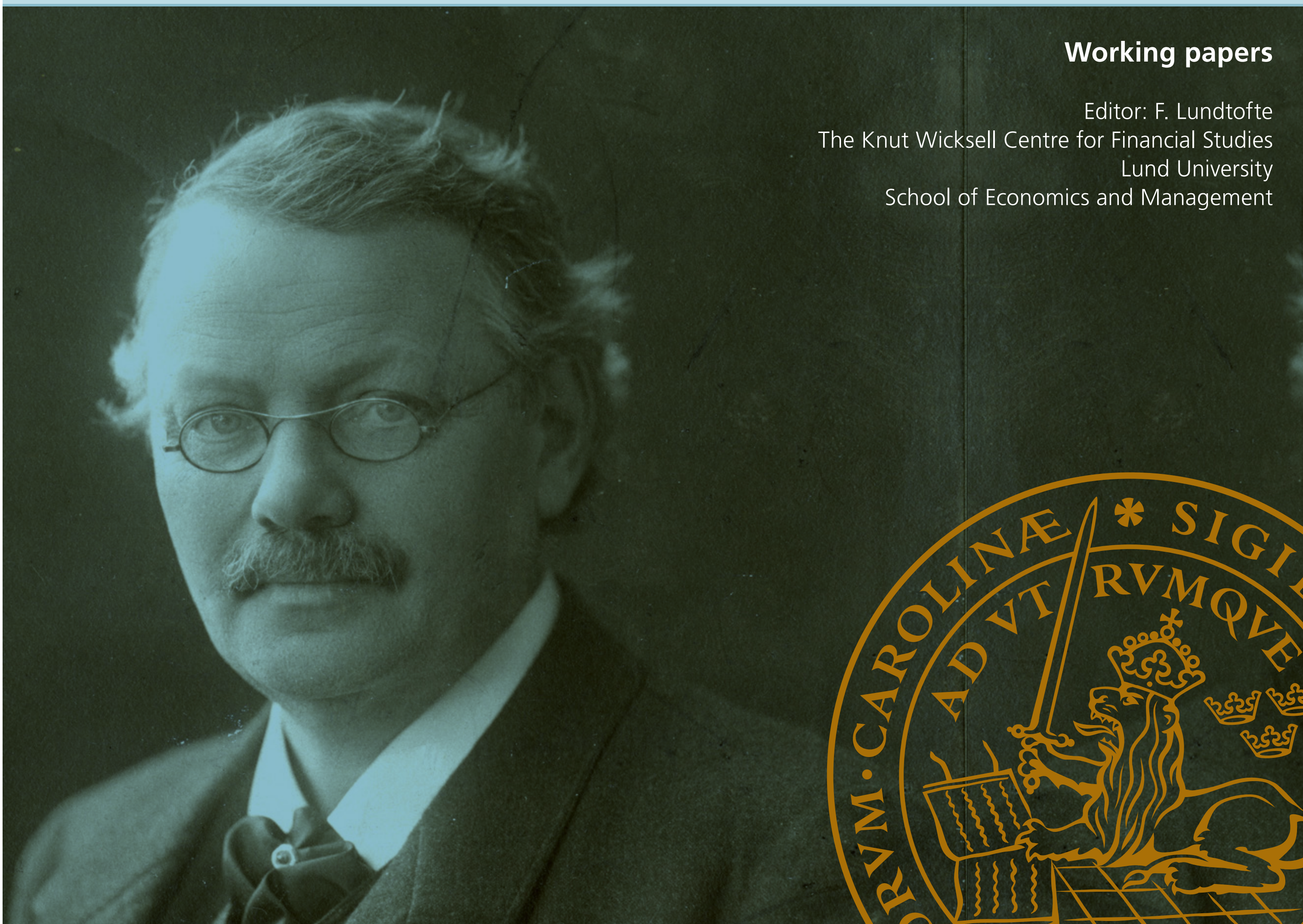
Ownership Determinants of Stock Return Volatility

HÅKAN JANKENSGÅRD | ANDERS VILHELMSSON

KNUT WICKSELL WORKING PAPER 2016:3



Working papers

Editor: F. Lundtofte
The Knut Wicksell Centre for Financial Studies
Lund University
School of Economics and Management

Ownership Determinants of Stock Return Volatility

Håkan Jankensgård[a], **Anders Vilhelmsson**[b]

Abstract

A conjecture in the literature holds that a large and diversified investor base leads to lower volatility by improving the quality of the price signal. In this paper this hypothesis is examined using unique Swedish ownership data. The data does not support the conjecture. Instead, volatility increases in the number of shareholders and in the size of the firm's micro-float (the fraction of shares held by investors with stakes below 0.1%). We also show that proxies for the portfolio concentration of the largest owners are important. We conclude that ownership structure has major implications for stock return volatility.

Key words: Volatility; ownership; investor base; portfolio concentration

JEL code: G1, G30, G32

[a] Department of Business Administration, Lund University. Address: P.O. Box 7080, 220 07 Lund, Sweden. Telephone: +46 46 222 4285. Email: hakan.jankensgard@fek.lu.se.

[b] Department of Business Administration, Lund University. Address: P.O. Box 7080, 220 07 Lund, Sweden. Telephone: +46 46 222 4648. Email: anders.vilhelmsson@fek.lu.se

Acknowledgements: The authors wish to thank Martin Holmén, Tom Aabo, Martin Strieborny, Ettore Croci, Björn Hagströmer and Frederik Lundtofte for useful suggestions. We also thank seminar participants at the Knut Wicksell Centre for Financial Studies, Lund University; School of Business Economics and Law, Gothenburg University; and School of Business and Social Sciences, Aarhus University. We are grateful to Sven-Ivan Sundqvist at SIS Ägarservice for supplying the ownership data. Jankensgård gratefully acknowledges the financial support of the Jan Wallander and Tom Hedelius foundation and the Tore Browaldh foundation. Vilhelmsson gratefully acknowledges the financial support of the Marianne and Marcus Wallenberg Foundation.

1. Introduction

There is great variation in the structure of corporate ownership. Whereas some firms have a small number of domestic owners, others have a more diversified structure with institutional, private equity, business spheres, and foreign owners as a significant part of the ownership. Some firms have a large fraction of small investors (ownership stakes below 0.1%), whereas others are dominated by a smaller number of relatively large ownership blocks. The questions addressed in this paper are if stock return volatility is determined by what kind of investors the firm has and how many they are. Previous literature has noted the central importance of stock return volatility to financial theory, as well as for practitioners in the investor community (e.g. Campbell et al 2001; Zhang, 2010). We contribute to this literature by examining ownership determinants of volatility.

Our inquiry is motivated by an intriguing conjecture in the literature which holds that volatility decreases in the size and heterogeneity of the firm's investor base. According to Wang (2007) the investor base-broadening effect occurs because each individual has only partial information about the firm, and the accuracy of the information available about the stock increases as the number of investors grows. The improved information content of the stock price in turn lowers volatility. While the importance of these factors is hinted at in several papers they have not yet, to our knowledge, been comprehensively investigated empirically (Merton, 1987; Wang, 2007; Rubin et al, 2009; Li, Nguyen, Pham, and Wei, 2011). This study fills this gap. Our research also provides novel evidence on the 'portfolio concentration' effect, i.e. the effect on volatility from having an under-diversified, and hence risk-averse, largest owner. Ownership matters not only through how the different categories of owners contribute to the firm's information and trading environment but also because they have different preferences for corporate governance and risk-taking. Previous research has linked measures of portfolio concentration with firm performance (Ekholm and Maury, 2014) and corporate policies (Faccio et al, 2011) but we are aware of no systematic analysis of its relation with stock return volatility.

In pursuing our analysis of the ownership determinants of stock return volatility we benefit from a database on corporate ownership with unique advantages. SIS Ägarservice collects detailed ownership data on publicly listed firms in Sweden, and provides the actual ownership lists of these firms. This allows us to characterize firms' ownership in terms of ownership type, their nationality, cash flow rights, voting rights, association with a business sphere, and so on. Furthermore, SIS arranges owners into larger groups that are likely to act in unison, for example based on kinship. This provides a much more accurate picture of where the ultimate control of the firm actually lies ('ultimate owners'). Importantly, this database also provides information on the degree to which an investor is under- or over-exposed to any particular firm in relation to their total share holdings. This information is very similar to the 'portfolio concentration'-measure used by Ekholm and Maury (2014). Finally, SIS Ägardata tracks and gives detailed information on the holdings of the 20 most influential business spheres in Sweden.[1] We construct a sample of ownership data spanning the years 2000 to 2013. Merging this database with financial data from Datastream yields around 1600 firm-year observations.

We find strong support for ownership structure as an important determinant of volatility. The evidence provides some support for the hypothesis that a more *diversified* ownership structure leads to lower volatility. Supporting Rubin et al's (2009) institutional sophistication hypothesis, we document a robust negative association between volatility and institutional ownership. Foreign ownership, on the other hand, has no significant impact on volatility. The

[1] Business spheres are supra-organizations, found in most economies around the world, consisting of various legal entities linked together by some mechanisms, such as equity ownership and cross-holdings (Collin, 1998). The spheres in Sweden are primarily built around successful industrialists.

data does not bear out the hypothesis that a *large* investor base is conducive to lower volatility. In fact, the evidence is overwhelmingly to the contrary. We show that volatility increases in the number of investors as well as in the size of the 'micro-float', (i.e. the fraction of shares held by small investors with stakes below 0.1%). These results are generally significant at the 1%-level and robust to various model specifications. Presumably these findings reflect the trading channel discussed in Zhang (2010): with a larger number of investors, trading volume increases, which in turn causes a higher volatility. In separate regressions with trading volume as dependent variable we are able to document relationships indicating that this indeed appears to be the case. Similar to volatility, trading volume is positively related to the number of shareholders and the size of the micro-float. A plausible interpretation is that theses variables, in particular the micro-float, capture the presence of noise trading.[2]

According to our data, the portfolio concentration of the largest owners has a significant influence on stock return volatility. We find that proxies for a low degree of owner diversification – the largest owner being either a family or belonging to a business sphere – are significantly and negatively related to stock return volatility. Importantly, the interaction term between our explicit portfolio concentration measure and a dummy signaling an institutional largest owner is negative and statistically significant.[3] Our paper is the first to document this relation, which adds to a growing literature that seeks to explore heterogeneity among institutional investors in terms of

[2] Already Black (1986) predicted a relation between noise trading and volatility: "Anything that changes the amount or character of noise trading will change the volatility of price".

[3] Admittedly, associations such as these above may indicate a preference for these investors to invest in firms that have low volatility already rather than a causal impact on corporate risk-taking. We analyze and partially refute such concerns later in this paper. The causality-interpretation of our finding is supported by evidence in Faccio et al (2011) who show, using approximate measures of portfolio concentration, a link between under-diversified owners and corporate risk-taking. Evidence that large under-diversified owners do in fact cause firms to have less risky policies is also provided in recent work by Sekerci (2014), who uses a sample that partly overlaps ours.

explaining the relationship between institutional ownership and volatility (Rubin et al, 2009; Chichernea et al, 2013; Ben-David et al, 2014).

While our focus is on ownership determinants of volatility, we also report the findings from a comprehensive evaluation of the cross-sectional determinants of stock return volatility. Previous papers in the literature typically focus on a small subset of hypotheses and use a limited number of control variables. In fact, the empirical inquiry into this phenomenon has devoted a great deal of attention to two salient features of stock return volatility: its varying level over time, and its apparent relation to the proportion of institutional owners (e.g. Campbell et al 2001; Zhang, 2010). In order to understand what drives time patterns in stock volatility over time, however, its cross-sectional determinants must first be thoroughly investigated. Our "horse-race" suggests that theories related to earnings uncertainty, information asymmetry, and leverage also have significant explanatory power. In terms of their economic significance three variables stand out: size, earnings, and the dividend dummy. We interpret the high R-SQR of our model (54%) to suggest that empirical models in the literature are generally under-specified.

The paper proceeds as follows. Section 2 reviews the prior literature and provides a synthesis of the theories that underpin research on volatility. Section 3 introduces the sample, variables, and empirical methodology. Section 4 contains the empirical analysis of the determinants of stock return volatility. Section 5 concludes the paper.

2. Prior literature and hypotheses

2.1 Ownership structure and stock return volatility

According to Merton (1987) there is, given incomplete information, a beneficial effect on the price of a stock when the number of investors is higher because each specializes in information-collection for a given firm, which reduces total information asymmetries. Wang (2007), extending on Merton, argues that increasing the size of a firm's investor base reduces volatility by improving the accuracy of the price signal, i.e. the degree to which the stock price reflect underlying fundamentals. Wang uses this argument to predict that the presence of foreign investors leads to lower volatility in emerging markets. Rubin et al (2009) make a similar argument in the context of institutional investors. In their institutional sophistication-hypothesis, institutional investors, by way of their relatively higher financial sophistication, improve the information content of market prices which in turn lowers the volatility of stock returns. The above outlined arguments suggest that a larger and more diversified investor base is associated with lower volatility. We will refer to this collectively as **the investor base-channel** of stock return volatility.

Ownership matters also because different owners have different preferences for corporate governance and risk-taking. This is discussed in Li, Nguyen, Pham, and Wei (2011), who suggest that large foreign owners in emerging markets represent improved corporate governance and monitoring, which lowers volatility. It is reasonable to expect that a preference for low-risk policies will be systematically related to the degree of diversification on part of the largest owners, or what Ekholm and Maury (2014) have labelled 'portfolio concentration'. According to this argument, then, the more of an investor's wealth that is concentrated to a given firm, the larger are her incentives to monitor managers and limit risk-taking in this firm. We will refer to this as **the portfolio concentration-channel**.

2.2 Other theories of stock return volatility

Our starting point in this section are the two broad theories of stock return volatility referred to by Zhang (2010) as 'fundamentals' and 'the trading channel'. **The trading channel** refers to the empirically observed connection between trading volumes and volatility. A higher trading volume implies a higher level of volatility, reflecting that prices tend to move when trades occur. The literature has identified certain factors that can be linked to 'excessive trading'. For example, institutional investors are more likely to trade frequently, thus impacting trading volumes, and have been associated with herding behavior (Rubin et al, 2009). Chichernea et al (2013) show that, in particular, institutional investors with a short investment horizon can be linked to higher stock return volatility.

In the terminology of Zhang (2010) 'fundamentals' refers to variables that impact uncertainty about future earnings. The literature has investigated several proxies that capture the extent of uncertainty about future free cash flows, henceforth referred to as **earnings uncertainty**.[4] Pástor and Veronesi (2003) and Wei and Zhang (2006) use the cross-sectional variation in earnings directly. Cao et al (2008) instead emphasize growth options, arguing that uncertainty is higher the larger the portion of a firm's value that derive from growth options (as opposed to earnings from assets-in-place). According to Schwert (2002) high-growth firms tend to be more recently listed and are over-represented in the technology-sector, characteristics that are associated with higher levels of fundamental uncertainty. Dennis and Strickland (2009) show

[4] Earnings can be viewed as a rough proxy for free cash flow to the extent that the depreciation included in earnings approximates the investment outlay that would be subtracted from operating cash flow to arrive at free cash flow.

that stock return volatility is positively related to firm focus, suggesting that diversified firms enjoy a mitigating effect on the volatility of their cash flows.

Uncertainty about fundamentals may be exacerbated by lack of information about the firm. To motivate **the information asymmetry channel** of volatility, consider that investors may have more difficulty predicting future states when information asymmetries are high.[5] A relative lack of information implies a potentially sharper revision about the firm's prospects when news arrive, leading to more volatility. The firm's information environment is likely to be impacted by the disclosure requirements of the particular exchange the firm is trading on, as well as the firm's age (Pástor and Veronesi, 2003) and size (Singhvi and Desai, 1971). The informational effect of dividends is discussed in Baskin (1989). This argument holds that dividends have a key role in the pricing of stocks, and that investors who rely on them for input in a valuation are less susceptible to irrational pricing. That is, in the psychology of investors dividends provide an "anchor" or reference point that partially replaces the need to collect information on other value indicators in the process of pricing a firm's stock.[6]

Volatility is furthermore determined by **leverage**. Since the firm's equity is a levered position in the firm's assets the volatility of equity returns will be amplified by leverage (Black, 1976). Previous papers have documented a strong association between financial leverage and stock return volatility (e.g. Dennis and Strickland, 2009; Rubin and Smith, 2009). The leverage-argument also transfers over to operating leverage which can be thought of as the ease with which

[5] Note that the information-asymmetry channel is highly related to the investor base-hypothesis in the sense that a larger and more diversified asset base leads to more information being produced and therefore fewer information asymmetries.
[6] Baskin (1989) also presents other arguments for a relation between stock return volatility and dividends. For example, according to the 'duration hypothesis' dividends are more near-term sources of value, as opposed to future earnings based on growth assessments, which are more volatile.

firms can adapt their cost structure when business conditions change.[7] A larger portion of fixed costs means that more of the volatility in the firm's output markets is transmitted to the firm's residual claimants.

3. Sample, model specification, and variables

3.1 Sample and data

The sample used in this study is the intersection of two databases: SIS Ägarservice (ownership data) and Datastream (financial data). The sample covers the period between 2000 and 2013. Merging these databases yields around 1600 firm-year observations. The industry composition is as follows: basic materials 6%; industrials 32%; consumer goods 11%; health care 13%; consumer services 13%; telecommunications 2%; technology 13%; and oil & gas 3%; financials 8%. There are no utility firms in the sample.

The ownership data is collected by SIS Ägarservice, a Stockholm-based firm specialized in providing and analyzing ownership information. They provide complete ownership lists for listed firms in Sweden, except for ownership stakes smaller than 0.1%. These are not published for integrity reasons, but rather summed up in a residual figure, which we refer to as 'the micro-float'. Typically an ownership list contains the 50-200 largest shareholders.[8] The ownership list shows the number of A, B and preference shares held by a particular individual or legal entity; the associated cash flow and voting rights; the owner's nationality; a flag indicating whether the owner is classified as an insider[9]; and the 'weight quota'. The weight quota is defined by SIS

[7] Formally operating leverage is the elasticity of a firm's earnings to a change in the units produced and sold (Mandelker and Rhee, 1983).
[8] The number is capped at 200, so even if there are more separate owners with stakes exceeding 1% only 200 would show in the list. The maximum of 200 occurs in 8% of cases.
[9] This classification is based on Finansinspektionen, the central authority for overseeing financial markets in Sweden. A person is considered an insider if he or she can be regarded to have a relationship with the company such that it is

Ägarservice as the focal firm's share of the owner's Swedish portfolio less the firm's share of the total Swedish stock index. A positive weight is interpreted as the owner being over-exposed in this firm relative to the exposure one would obtain from investing in a broad index. A negative weight is correspondingly interpreted as being under-exposed to the firm in comparison with the index. A value of zero means that the owner has an exposure to the focal firm that is equal to that obtained from investing in the index.

Another powerful feature of SIS Ägarservice is that they allow the user to view the ownership list organized according to spheres of influence. Activating this option means that individual owners who can be assumed to act in a synchronized way, based on e.g. kinship, are listed as a group. This reveals where the control of the firm ultimately lies ('ultimate ownership'). As an example consider the ownership of Clas Ohlson, a large-cap retailer, at year-end 2013. The raw ownership list would suggest that control lies with the single largest owner (at 17.3% of votes). However, the sphere view reveals that the members of the Haid-family (none of whom was the single largest owner) together controlled 37% of the votes and had ultimate control.

SIS Ägarservice also traces out and provides detailed information on the holdings of the 20 most influential spheres in Sweden. These spheres are typically built around the holdings of successful industrialists. One example is the Kinnevik-sphere, which originated in the various business ventures of the entrepreneur Jan Stenbeck. A salient feature about several of these spheres is that they use a complex web of controlling stakes and cross-holdings to achieve effective control, though cash flow rights are typically much smaller than control rights (see Collin, 1998).

---

likely to provide inside information about its affairs. Typically, but not limited to, this would be an executive officer, director of the board, or an owner with more than 10% of the votes.

3.2 Empirical model

Our empirical model is a straightforward OLS estimation of the determinants of volatility with unbalanced panel data. The general model is outlined in Equation 1:

$$\begin{aligned} Volatility_{j,t} = {} & \alpha_j + f_j + d_t + \beta_1 Earnings\ uncertainty_{j,t-1} \\ & + \beta_2 Information\ asymmetry_{j,t-1} + \beta_3 Leverage_{j,t-1} \\ & + \beta_4 Portfolio\ concentration_{j,t-1} + \beta_5 Investor\ base_{j,t-1} \\ & + v_{j,t} \end{aligned} \qquad (1)$$

where α_j is industry fixed effects, f_j is listing fixed effects, d_t is period fixed effects, and $v_{j,t}$ is an error term. Earnings uncertainty$_{j,t-1}$, Information asymmetry$_{j,t-1}$, Leverage$_{j,t-1}$, Portfolio concentration$_{j,t-1}$, and Investor base$_{,t-1}$ are arrays of variables related to the five theoretical dimensions reviewed in Section 2. The subscript t indexes time and j indexes firms. Robust errors clustered at the firm level are used throughout. In all estimations we lag the independent variables one period since volatility is estimated based on daily returns during the year, whereas the independents are measured at year-end.

3.3 Variables

3.3.1 Volatility

We compute volatility by first squaring daily stock returns and summing the squared terms over all trading days in the year. Our estimate of the annualized total volatility, *TOTALVOL*, is defined as the square root of this sum. As an alternative measure we also calculate idiosyncratic volatility by applying the same procedure to the standard errors from an estimation of the market model in which daily stock returns are regressed on the Swedish market index. Similar to other authors in the literature we find that the correlation is very high (0.98) and it does not matter to our results which of the volatility measures we use. We prefer to use total volatility because it captures also the extent to which our independent variables have a systemic component. We do not pursue other approaches to calculate idiosyncratic volatility, such as deriving it from an estimate of the Fama and French 3-factor model (1993). The factors in FF3 are instead included as independent variables in our regressions.

3.3.2 Investor base

To measure the size of the investor base we use *NRSHAREHOLDERS*, defined as the number of shareholders that appear on the SIS Ägarservice ownership list (covering those that have a stake larger than 0.1%). It thus captures the number of shareholders with relatively large ownership stakes. *MICROFLOAT* is defined as the fraction of shares held by investors whose ownership stake is smaller than 0.1%. It thus captures the relative importance of investors with very minor stakes, considered as a group. We argue that, since the individual ownership stakes are so small, this measure will correspond well also to the actual *number* of investors with stakes of this magnitude. We believe the distinction between these two categories of investors is meaningful in light of the hypothesis presented in section 2.1. Small investors are more incentivised to vote with their feet and less incentivised to contribute to producing information about the firm. To measure the diversity of the investor base we look at institutional and foreign ownership. We define *INSTITUTIONAL* as the sum of ownership stakes held by institutional investors. It is limited to the 15 largest owners of the firm. Typically the 15th largest ownership stake is well below 1% and summing stakes below this size has a negligible impact on the aggregate number. *FOREIGN* is the similarly defined ownership share of investors not domiciled in Sweden.

3.3.3 Portfolio concentration

The variables introduced in this section focus on the firm's largest owner, as they have both the means and incentives to influence corporate policy. *FAMILY* takes the value 1 if the largest owner is an individual or group of individuals. *SPHERE* takes the value one if the largest owner is on SIS Ägarservice's list of the 20 most influential spheres in Sweden. Both these variables can be considered to capture under-diversification as private individuals and spheres of influence tend to have more concentrated holdings compared to e.g. institutional investors. As a more explicit measure of the degree of over- or under-exposure we use the portfolio concentration measure computed by SIS Ägarservice. This variable is labeled *WEIGHT*. It is similar to but not identical to the portfolio concentration measure used in Ekholm and Maury (2014). These authors use the firm's share of the owner's portfolio without benchmarking against a broad index. A crucial difference is that we use the weight quota of the largest owner, whereas Ekholm and Maury use the average portfolio concentration of all the firm's shareholders. Our measure is not without caveats. It is only reported for legal entities. Individuals are not covered, and the value is by default zero for such investors. This problem is addressed by the inclusions of the indicator variable FAMILY, which captures non-legal entities (i.e. physical persons). Another caveat is that WEIGHT is unavailable for foreign legal entities. We deal with this by including an indicator variable that takes the value 1 if the largest owner is an investor not domiciled in Sweden (FOREIGNLARGE).

3.3.4 Earnings uncertainty

We introduce five variables that capture earnings uncertainty. *DIVERSIFICATION* is the number of product segments for which the firm reports revenue (Datastream code: WC19500). This definition differs from the firm focus-variable in Dennis and Strickland (2009) who construct a Herfindahl-index based on similar segment information. *GEOGRAPHICAL* is the number of geographical segments for which the firm reports revenue (WC19600). This variable measures the degree of diversification in terms of the firm's presence in various geographical markets. Being diversified geographically will tend to make cash flows more stable if international product markets are less than perfectly correlated over business cycles. *INTANGIBILITY* is intangible assets divided by total assets (WC02649/WC02999). Intangible assets are inherently more associated with uncertainty, in part because no market exists for such assets making them harder for analysts to value (Bart et al, 2001). *BOOKTOMARKET* is defined as the book value of equity divided by the market value of equity (WC03501/WC08001). This variable corresponds to the growth-option hypothesis in Cao et al (2008), according to which we would expect firms with more growth options to be more volatile. *EARNINGS* is defined as earnings divided by total assets (WC01706/WC02999). While ideally one would use the volatility of earnings, as in Pàstor and Veronesi (2003), this reduces to a single cross-sectional observation since the whole sample data of each firm is required for the calculation. Following Wei and Zhang (2006), we instead use actual earnings, the level of which tends to be correlated with earnings volatility. In addition to the five proxies introduced above, we include industry dummies, as certain sectors are likely to have fundamentally higher uncertainty about future earnings potential (Schwert, 2002).

3.3.5 Information asymmetry

BIDASK targets information asymmetries between different kinds of investors. It is defined as the average daily difference between the bid and ask-price of the firm's B-shares divided by the price, i.e. the relative spread (Datastream codes: PB and PA). A large spread is typically assumed to indicate the presence of traders who possess superior information about the firm. *DIVIDEND* is a dummy that takes the value one if the firm pays a common dividend in a given year (WC04551). *SIZE* is defined as the log of total assets (WC02999). Our model also contains listing fixed effects. We calculate dummies for the small cap, mid cap, and NGM lists (leaving large cap as the base category). These different listing options have different disclosure requirements which in turn is associated with volatility due to lower information asymmetries (Pàstor and Veronesi, 2003).

3.3.6 Leverage

We compute *FINLEVG* as the book value of debt divided by total assets (WC03255/WC02999). While formally operating leverage is the elasticity of a firms earnings to a change in the units produced and sold (Mandelker and Ghon Rhee, 1983) due to data constraints we use a simpler definition. *OPLEVG* is defined as the ratio of Salaries and benefits (WC01084) plus Selling, General, and Administrative expense (WC01101) to Sales (WC01001).[10]

4. Empirical analysis

4.1 Descriptive statistics

Table 1 reports the descriptive statistics for the variables introduced in Section 3.3. It can be seen that the variable WEIGHT has much smaller negative values than positive ones. This is no surprise because it targets the largest owner in the firm, who are very seldom under-exposed to the firm in question (in comparison with the market index). MICROFLOAT exhibits useful variation, ranging from a maximum of 92% of all outstanding shares to well below 1%. On average, 29.4% of a firm's total outstanding shares will consist of very small stakes (<0.1%). All except the ownership variables are winsorized at the 97.5% level to mitigate concerns about the impact of outliers. Table 2 shows the descriptive statistics for volatility on a yearly basis between

[10] Essentially, and imperfectly, this definition considers Cost of Goods Sold as the variable component of a firm's cost structure.

2000 and 2013.[11] It is clear from Table 2 that volatility displays a large variation over time. As expected, the volatility peaks in the years in which the economy went through turmoil (the IT-crash around 2001 and the financial crisis in 2008). Table 3 reports the Pearson correlations between a subset of variables used in this study. Volatility exhibits clear tendency to co-vary with several of the independent variables with the sign of the correlation largely consistent with the empirical predictions. Size (-), dividend (-), and earnings (-) stand out as highly correlated with volatility. Several of the independents are correlated but generally the coefficient does not exceed 0.6, which suggests that multicollinearity is not a problem in this sample.

[INSERT TABLE 1 ABOUT HERE]

[INSERT TABLE 2 ABOUT HERE]

[INSERT TABLE 3 ABOUT HERE]

4.2 Baseline regressions

Table 4 reports the results from the application of Equation 1 to our data. The model is estimated eight times. The first five times (Models 1-5) the regression is run including variables related to only one theoretical category at a time. We keep size and the listing dummies as controls in these regressions. We then include all variables in the model in a so-called "horse race", where the different theoretical dimensions are pitted against each other (Models 6-8). OPLEVG is initially excluded (Model 6) to avoid an unnecessarily large loss of observations due to data unavailability.[12] Model 7 includes OPLEVG. Model 8 takes the race one step further and presents Model 6 with the coefficients multiplied by the standard deviation of each independent variable.

[11] The reason why the Max-column shows 123.6 in all years is that the table reports the winsorized data.

[12] OPLEVG has a number of missing observations because one or more of the variables that make up its calculation are not coded in Datastream, sometimes because the firm does not report it separately in its annual report.

Model 6 is useful because it indicates the statistical significance of the independent variables in a ceteris-paribus setting, whereas Model 8 assesses their "economic" importance.

[INSERT TABLE 4 ABOUT HERE]

4.2.1 Ownership determinants of stock return volatility

The estimation of Equation 1 yields several interesting results. In Model 6, we first note that volatility increases in the number of investors (NRSHAREHOLDERS). Similarly, the relation between MICROFLOAT and volatility is positive. Both are highly significant (at the 1%-level). We interpret both these results as evidence against the conjecture that a large investor base has a dampening effect on volatility. Instead, they suggest a trading-volume effect, i.e. that the dominating influence of having more investors is an increase in trading volume, which in turn is conducive to more volatility. We analyze the connection between volatility and trading volumes more explicitly in section 4.4.

Our results do provide some support for the notion that a diversified, as opposed to large, investor base has a beneficial impact on volatility. The signs on both INSTITUTIONAL and FOREIGN are negative in Model 6, although only the former is significant. It is worth noting that the negative coefficient on institutional ownership is in contrast to most previous studies using US data, which generally find a positive relation (e.g. Campbell et al, 2001; Zhang, 2010). Chichernea et al (2013) show that institutional investors who have a short investment horizon are the main contributors to volatility. One possibility is therefore that Swedish institutional investors are more long-term investors than their US counterparts and therefore, on a net basis, have a stabilizing influence on volatility. We will come back to the issue of heterogeneity among institutional investors in section 4.5.

The proxies for portfolio concentration have the expected negative sign, but only FAMILY and SPHERE reach (weak) statistical significance. As discussed, the possibility that the main owners influence corporate risk-taking establishes a causal link. However, one must also consider that risk-averse large owners may invest in firms that already have a low-risk policy. This self-selection argument is, however, contradicted by the usually very long investment horizon of private investors and spheres. In a large fraction of cases they remain the largest owner throughout the sample period. There is thus ample opportunity for them to influence on the level of risk-taking. Furthermore, previous research has found a link between portfolio concentration and the riskiness of corporate policies. Faccio et al (2011), using various approximations of investor diversification, show that there is an economically significant impact of portfolio concentration on corporate investment and other measures of risk-taking.

Notwithstanding these arguments that self-selection is likely not a major concern we carry out regressions in which we include an indicator variable that takes the value 1 if any of the 2^{nd}-15^{th} largest firms belong to a sphere (SPHERE2). Since investors with stakes of this size are unlikely to influence policy at the firm level this dummy can be argued to represent self-selection only, whereas the original SPHERE variable picks up the policy-influence. In these regressions, which are untabulated, we find that SPHERE2 is negatively related to volatility and significant at the 1%-level. Admittedly this suggests that self-selection is indeed a problem, but the coefficient is much smaller compared to that of SPHERE. So, a reasonable conclusion is that self-selection does indeed occur, but even controlling for this there is an economically large impact from the largest owner belonging to a sphere that cannot be explained by self-selection alone.

Self-selection may also cause an endogeneity-concern regarding the result on the number of shareholders. It is possible that small shareholders self-select into high-volatility shares if they are prevented from using leverage because of financial constraints and therefore seek higher-risk assets (Frazzini and Pedersen, 2014). To address this potential self-selection we split the sample into high-volatility and low-volatility sub-samples. We focus on the high-volatility sample (containing firms with volatility above the sample median) on the argument that any preference for risk-seeking will be captured by the initial selection into the high-volatility sample. This should mitigate the problem, though admittedly the self-selection may still operate within this sample if the relation between the size of the equity stake and risk-seeking behavior is monotonically decreasing.[13] In this regression (unreported) we find that the results in Table 4 remain qualitatively unchanged.

4.2.2 Other determinants of stock return volatility

Table 4 shows that most of the independents are highly significant when each category is estimated separately. Most signs are consistent with expectations. For example, large firms; firms that pay dividends; have low leverage; are well diversified; and have a high earnings realization are associated with lower volatility. Also the listing dummies are generally significant with the expected signs. Most coefficients are significant even in the full specification (Model 6). We also note that the model explains variation in volatility well as indicated by the adjusted R-SQR of 54%, which compares favorably with previous studies.

While most empirical predictions find support, the coefficient on BOOKTOMARKET is positive, indicating that firms with more growth options have lower volatility.[14] This is at odds

[13] There is, to our knowledge, little in the literature to suggest such a monotonic relationship between the size of the stake and risk-seeking behaviour. Risk aversion is typically assumed to be a function of wealth and other state variables, or psychological factors such as whether the investor operates in the domain of losses (Kahneman and Tversky, 1979). Also, the Frazzini and Pedersen (2014) analysis concerns beta, not volatility. These variables are not highly correlated. We document a correlation coefficient of 0.15 in our sample.

[14] We can appreciate the economic intuition behind the positive sign on BOOKTOMARKET by recognizing another common interpretation of this variable in the literature, namely that it proxies for firm value, similar to how Tobin's Q is applied in many studies. Viewed this way, a low value for BOOKTOMARKET can be read as signaling a higher-valued firm with a successful and proven business model. Our result is then suggesting that this "business

with the finding reported in Cao et al (2008), who report that growth indicators are positively related to idiosyncratic risk. We attribute this difference to the empirical design rather than using different samples. Whereas they regress the volatility of a value-weighted portfolio of stocks on a time trend and a proxy for growth option, we estimate a panel regression without such a trend but with a rich set of control variables suggested by theory. Similar to us, but contradicting Cao et al (2008), Rubin et al (2009) also find a positive and statistically significant coefficient for the book-to-market ratio in their two sub-samples (dividend-payers and non-dividend payers).

4.3 Survivorship bias

An important aspect of our sample is that it contains data only for firms that are listed as per December 31, 2013. Firms that have been listed in the sample period but for some reason have made an exit prior to this date are not included. A potential critique against our analysis in Section 4.2 is therefore that it suffers from survivorship bias. This bias may be systematically related to the level of volatility *and* its relationship with the independent variables. It is not an unreasonable assumption that those firms that make an exit are fundamentally more risky (and therefore more volatile). For example, a firm may delist because it defaults on its debt and becomes bankrupt. To mitigate concerns about survivorship bias, we carry out two additional regressions in which we change the starting year. The results are reported in Table 5. For ease of comparison, Model 1 contains the result from the estimation using the full sample (and is thus identical with Model 6 in Table 4). In Model 2 the starting year is changed from 2000 to 2005, and in Model 3 it is set to 2010. The more recent the starting year, the more balanced and representative the sample becomes since new and presumably more risky firms enter the sample

success" has a stabilizing effect that dominates the higher uncertainty from having a relatively larger share of value coming from future growth options.

as we move along towards 2013. According to Table 5, the results with regard to the ownership variables are largely robust to narrowing in the starting year of the estimation, so survivorship bias appears not to be a major threat to the validity of our results.

[INSERT TABLE 5 ABOUT HERE]

4.4 Determinants of trading volume

The results in section 4.2 do not support the hypothesis that a large investor base leads to lower volatility. In fact, we find the opposite. A natural way to explain such a result is to argue that a large investor base is conducive to more trading, which previous literature has shown to be positively related to volatility. This is a testable proposition. We collect data on annual trading volumes (Datastream code: VO) and use it as dependent variable in Equation 1. That is, we simply substitute volume for volatility and use the same independent variables. Explaining volatility with trading volume is unsatisfactory since both are natural left-hand side variables that are determined by more fundamental ones. It is therefore more interesting, in our view, to examine the extent to which they have a common set of explanatory factors. Models 1 and 2 in Table 6 report the results from these regressions (Model 1 is identical with Model 6 in Table 4 and restated here for ease of comparison).

[INSERT TABLE 6 ABOUT HERE]

Table 6 (Model 2) shows that several of the variables that have a natural connection with volatility but less so with trading volume – notably LEVERAGE and DIVERSIFICATION – do not achieve significance. Also interesting is that SIZE contributes negatively to volatility but positively to trading volume. DIVIDEND, on the other hand, contributes negatively to both volume and volatility. Apparently paying a dividend has a "cooling" effect on a stock, perhaps because the price signal is more efficient for these firms (the anchor effect) and there is less chance to exploit private information. BOOKTOMARKET has a positive relation with trading volume, suggesting that so-called value stocks are less traded than growth firms.

Concerning the ownership determinants, Table 6 shows that MICROFLOAT and NRSHAREHOLDERS indeed are positively related to trading volumes and significant at the 1%-level, supporting the trading-channel interpretation. A plausible interpretation, at least concerning MICROFLOAT, is that it captures the presence of noise trading.[15] Noise trading has been characterized by Roll (1988) as frenzied trading unrelated to concrete information, carried out by small and uninformed traders. According to Shleifer and Summers (1990) noise traders are irrational and driven by beliefs and sentiments not fully justified by fundamentals. What is more, Kumar and Lee (2006) find evidence suggesting that the trades of retail traders tend to co-vary, which would reinforce the impact on volatility from having a large fraction of noise traders.

4.5 Institutional ownership – a closer look

According to the results in section 4.2.1 a higher share of institutional ownership leads to lower volatility. Most previous papers, using US data, have found a positive relationship. A recent development in this literature has been to explore heterogeneity among institutional investors, for example by focusing on specific types of institutional investors (Ben-David et al, 2014). Chichernea et al (2013) show that it is predominantly investors with a short investment horizon

[15] Of course far from all small stakeholders, or retail investors, will be noise traders. We find it a reasonable assumption, however, that the number of noise traders increases monotonically with the micro-float.

that causes the link between institutional investors and volatility. One potential explanation for the different result compared to US-based studies is therefore that the average investment horizon of Swedish institutional investors is higher than that of their US peers. While we lack suitable data to pursue this explanation, we will investigate another source of investor heterogeneity, namely the degree to which the institutional investor is over-exposed to the firm in question. One could argue that portfolio concentration and investment horizon are two sides of the same coin. Presumably investors who concentrate a larger fraction of their wealth to a firm also have a longer investment horizon.

Our focus in this analysis is on the largest institutional owner. We start by observing that an institutional owner is the largest owner in a large enough fraction of firm-years (19%) and that there is indeed a useful variation in portfolio concentration among these. The mean value for WEIGHT conditional on the largest owner being an institution is 4.67, suggesting significant exposure to the focal firm. Model 1 in Table 7 reports the results from a regressions in which we include a dummy that takes the value 1 if the largest owner is an institutional investor, labelled INSTLARGE, interacted with WEIGHT.[16] The interaction term turns out to be negative and statistically significant at the 10%-level. Consistent with our expectation, the more exposed the institution is to the firm in question, the lower the volatility. The effect is economically large. When the largest owner is an institution the average effect is to increase volatility by 3.705+4.67*-0.1181=3.17%.[17]

[INSERT TABLE 7 ABOUT HERE]

[16] It should be noted that we exclude PRIVATE in Table 7 in order to keep the model and its interaction terms interpretable. With both PRIVATE and INSTLARGE in the model the base category would consist of largest owners that are either private equity firms or other operating companies.
[17] 3.705 is the coefficient for INSTMAIN, 4.67 is the average WEIGHT given that the largest owner is an institution and -0.1181 is the coefficient for the interaction between WEIGHT and INSTMAIN.

It is important to recall that the original, negative, result on INSTITUTIONAL is consistent with the institutional sophistication-hypothesis of Rubin et al (2009). According to Rubin et al (2009) the effect from institutional ownership on volatility is positive in a sub-sample of dividend-paying firms, but negative for non-payers, which they put down to a difference in the level of information asymmetries between these two categories of firms (captured by the dividend dummy). One way to make sense of this is that the "certification" of the stock price provided by institutional investors is more important when these asymmetries are substantial. We follow this line of reasoning and interact INSTITUTIONAL with DIVIDEND. The results are reported in Table 7 (Model 2). The evidence supports this conjecture as the interaction term is positive and significant. By analysing the interaction term more closely, we find that institutional investors are in fact *contributing* to volatility if the firm is a dividend-payer *and* has an institutional ownership of around 50-55% or higher. Apparently, when the firm already pays a dividend, information asymmetries are already lower, and there is less need for the certification of the price provided by institutional investors through their financial sophistication. Also, at such high levels of institutional ownership the preconditions are there for the factors that are typically believed to destabilize stock prices (in particular, herding).

5. Conclusions

A major conclusion of this study is that ownership structure is important for understanding cross-sectional variation in stock return volatility. We document that proxies for under-diversified owners – a largest owner that is a family or has an affiliation with a business sphere – are associated with lower volatility. We find that when the largest owner is an institutional investor with a high degree of portfolio concentration, i.e. a large exposure to the firm in question, volatility is lower.

We have also investigated an intriguing but so far under-researched conjecture which holds that volatility decreases in the size and heterogeneity of the firm's investor base because these factors lead to a more effective price signal. We show that a larger investor base, measured as the number of investors with a stake exceeding 0.1%, as well as the micro-float (the fraction of shares held by investors with stakes below 0.1%) is in fact associated with higher volatility.

In separate regressions we are able to verify that the size of the investor base is positively related to trading volume, supporting a trading-channel interpretation. We have therefore identified some of the factors that appear to underlie the association between volume and volatility reported in the literature. We have proposed that the association between high volatility and having a large micro-float may be indicative of the presence of noise trading. Shedding light on this connection is an exciting avenue for future research.

References

Baskin, J. (1989). “Dividend policy and the volatility of common stock” Journal of Portfolio Management, Vol. 15, pp. 19-25.

Ben-David, I., Franzoni, F., and Moussawi, R. (2014). ”Do ETFs Increase Volatility?” NBER Working Paper No. 2007

Black, F. (1986), “Noise”, Journal of Finance, Vol. 41, pp. 529-543

Campbell, J. Y., et al. (2001). "Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk." Journal of Finance 56(1): 1-43.

Cao, C., et al. (2008). "Can Growth Options Explain the Trend in Idiosyncratic Risk?" Review of Financial Studies 21(6): 2599-2633.

Chichernea, D. C., et al. (2013). "Idiosyncratic Volatility, Institutional Ownership, and Investment Horizon." European Financial Management: n/a-n/a.

Collin, S.-O. (1998). "Why are these Islands of Conscious Power Found in the Ocean of Ownership? Institutional and Governance Hypotheses Explaining the Existence of Business Groups in Sweden." Journal of Management Studies 35(6): 719-746.

Copeland, T. E. and D. A. N. Galai (1983). "Information Effects on the Bid-Ask Spread." Journal of Finance 38(5): 1457-1469.

Dennis, P. and D. Strickland (2009). “The Determinants of Idiosyncratic Volatility,” Working Paper

Ekholm, A. and B. Maury (2014). "Portfolio concentration and firm performance", Journal of Financial and Quantitative Analysis 49, issue 4 (August)

Faccio, M., et al. (2011). "Large Shareholder Diversification and Corporate Risk-Taking." Review of Financial Studies 24(11): 3601-3641.

Fama, E. F. and K. R. French (1993). "Common risk factors in the returns on stocks and bonds." Journal of Financial Economics 33(1): 3-56.

Frazzini, A. and L. H. Pedersen (2014). "Betting against beta." Journal of Financial Economics 111: 1-25.

Kahneman, Daniel, and Amos Tversky (1979). “Prospect theory: An analysis of decision under risk, Econometrica 46: 171-185.

Kumar, A. and Lee, C. (2006), “Individual sentiment and return co-movements”, The Journal of Finance, Vol. 61, pp. 2451-2486.

Lee, S., and Park, S.B. (2014) “A Study on the Association between Operating Leverage and Risk: The Case of the Airline Industry” International Journal of Economics and Finance, 6 (3)

Li, D., et al. (2011). "Large Foreign Ownership and Firm-Level Stock Return Volatility in Emerging Markets." Journal of Financial & Quantitative Analysis 46 (4): 1127-1155.

Mandelker, G. N. and S. G. Rhee (1984). "The Impact of the Degrees of Operating and Financial Leverage on Systematic Risk of Common Stock." Journal of Financial & Quantitative Analysis 19(1): 45-57.

Merton, R. C. (1987). A Simple Model of Capital Market Equilibrium with Incomplete Information, American Finance Association: 483.

Pastor, Ľ. and V. Pietro (2003). "Stock Valuation and Learning about Profitability." Journal of Finance 58(5): 1749-1790.

Roll, R. (1988), "R-squared," Journal of Finance 43, 541-566.

Rubin, A. and D. R. Smith (2009). "Institutional ownership, volatility and dividends." Journal of Banking & Finance 33(4): 627-639.

Schwert, G. W. (2002). “Stock Volatility in the New Millennium: How Wacky Is NASDAQ?” Journal of Monetary Economics, 49, 3–26.
Sekerci, N. (2014). “Essays on Corporate Governance”. Doctoral dissertation, Lund University.
Singhvi, S. S. and H. B. Desai (1971). "An Empirical Analysis of the Quality of Corporate Financial Disclosure." The Accounting Review 46(1): 129-138.
Shleifer, A. and Summers, L. (1990), “The noise trader approach to finance”, Journal of Economic Perspectives, Vol. 4, 19-33.
Wang, J. (2007). "Foreign equity trading and emerging market volatility: Evidence from Indonesia and Thailand." Journal of Development Economics 84(2): 798-811.
Wei, S. X. and Z. Chu (2006). "Why Did Individual Stocks Become More Volatile?" Journal of Business 79(1): 259-292.
Xu, Y. and Burton G. Malkiel (2003). “Investigating the Behavior of Idiosyncratic Volatility”, The University of Chicago Press: 613.
Zhang, C. (2010). "A Reexamination of the Causes of Time-Varying Stock Return Volatilities." Journal of Financial & Quantitative Analysis 45(3): 663-684.

Table 1
Descriptive statistics 2000-2013

This table shows descriptive statistics for the full sample of firms from 2000-2013. SIZE is the natural log of total assets. NGM, SMALL, and MID are binary variables indicating which list the firm's share is trading on. BIDASK is the average daily difference between the bid and ask-price of the firm's B-shares divided by the price (relative spread). DIVDUM is a binary variable that takes the value 1 if the firm pays a dividend, zero otherwise. FINLEVG is the firm's interest-bearing debt divided by total assets. OPLEVG is the firm's fixed costs divided by cost of goods sold. GEOGRAPHICAL is the number of geographical segments for which the firm reports sales. DIVERSIFICATION is the number of product segments for which the firm reports revenue. EARNINGS is net income divided by total assets. BOOKTOMARK is book value of equity divided by market value of equity. INTANGIBLES is the ratio of intangible assets to total assets. SPHERE is a binary variable that takes the value 1 if the firm belongs to one of the 20 main spheres in Sweden, zero otherwise. FAMILY is a binary variable if the firm's largest owner is and individual or group of individuals. WEIGHT is a coefficient indicating the weight the firm has in the portfolio of the largest shareholder, in relation to the weight it has in a broad index. FOREIGNLARGE is a binary variable that takes the value 1 if the largest shareholder is a foreign investor. INSTITUTIONAL is the sum of the fraction of shares held by institutional investors among the 15 largest investors. FOREIGN is the sum of the fraction of shares held by foreign investors among the 15 largest investors. NRSHAREHOLDERS is the number of shareholders with an ownership stake exceeding 0.1%. MICROFLOAT is the sum of ownership stakes below 0.1% as a percentage of the total number of shares. FINLEVG, OPLEVG, EARNINGS, BOOKTOMARK, and INTANGIBLES are winsorized at the 2.5% and 97.5% percentiles. Stdev is the standard deviation and N is the number of firm-year observations.

	Mean	Median	Maximum	Minimum	Stdev	N
Information asymmetry						
SIZE	14.30	14.05	22.58	4.69	2.39	3119
NGM	0.03	0.00	1.00	0.00	0.18	3780
SMALL	0.41	0.00	1.00	0.00	0.49	3780
MID	0.31	0.00	1.00	0.00	0.46	3780
BIDASK	0.82	0.38	7.60	0.03	1.41	2867
DIVDUM	0.57	1.00	1.00	0.00	0.50	3181
Leverage						
FINLEVG	0.20	0.17	0.65	0.00	0.19	3106
OPLEVG	0.59	0.44	3.94	0.06	0.70	2464
Earnings uncertainty						
GEOGRAPHICAL	2.43	1.00	10.00	0.00	2.91	3780
DIVERSIFICATION	2.10	1.00	10.00	0.00	2.01	3780
EARNINGS	0.29	0.32	2.67	-1.92	0.72	3080
BOOKTOMARK	0.67	0.54	2.16	0.07	0.49	2904
INTANGIBLES	0.20	0.13	0.70	0.00	0.20	3093
Portfolio concentration						
SPHERE	0.25	0.00	1.00	0.00	0.43	2465
FAMILY	0.41	0.00	1.00	0.00	0.49	2465
WEIGHT	16.97	0.00	100.00	-0.30	32.39	2463
FOREIGNLARGE	0.14	0.00	1.00	0.00	0.34	2465
Investor base						
INSTITUTIONAL	14.60	4.30	91.70	0.00	19.47	2460
FOREIGN	7.52	3.20	76.50	0.00	10.93	2460
NRSHAREHOLDERS	161.19	185.00	200.00	6.00	47.53	2464
MICROFLOAT	29.42	27.00	92.30	0.2	14.80	2465

Table 2
Correlation matrix for selected variables

This table presents pearson correlation coefficients between selected variables used in this study. The estimates are based on a common sample of observations between 2000 and 2012. For variable definitions, see Table 1 or section 3.3.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1.VOLATILITY	1												
2.SIZE	-0.46	1											
3.FINLEVG	-0.11	0.43	1										
4.DIVDUM	-0.52	0.45	0.16	1									
5.EARNINGS	-0.53	0.32	0.02	0.44	1								
6.BOOKTOMARK	0.08	0.13	0.21	-0.04	-0.03	1							
7.SPHERE	-0.22	0.45	0.13	0.28	0.14	0.03	1						
8.FAMILY	0.05	-0.30	-0.07	-0.04	0.02	-0.02	-0.50	1					
9.WEIGHT	0.16	0.23	0.09	0.14	0.09	0.04	0.05	0.02	1				
10.INSTITUTIONAL	-0.24	0.26	0.00	0.17	0.15	-0.09	0.02	-0.33	0.01	1			
11.FOREIGN	0.04	-0.02	-0.06	-0.20	-0.08	0.01	-0.16	-0.15	-0.15	0.10	1		
12.NRSHAREHOLDERS	0.09	0.22	0.01	-0.07	-0.10	-0.11	0.07	-0.16	0.02	0.15	0.04	1	
13.MICROFLOAT	0.20	0.07	-0.09	-0.16	-0.17	-0.10	-0.06	-0.07	-0.12	-0.12	-0.01	0.29	1

Table 3
Descriptive stats for volatility by-year

This table shows the descriptive statistics for the total realized volatility (VOLATILITY) by year for the sample period 2000-2013. All data is winsorized at the 2.5% and 97.5% percentiles, q1, q2, and q3 are the first, second, and third quartiles, Stdev is the standard deviation and N is the number of firms each year. For variable definitions, see Table 1 or section 3.3.

	Mean	q1	q2	q3	Max	Min	Stdev	N
2000	61.88	37.07	52.73	81.94	123.60	20.70	29.79	139
2001	62.06	37.79	50.82	82.97	123.60	22.60	30.94	150
2002	63.87	38.10	56.09	82.58	123.60	23.16	30.16	161
2003	51.56	29.64	41.24	62.43	123.60	17.68	29.72	168
2004	40.16	23.62	32.22	48.06	123.60	17.68	24.01	170
2005	36.76	23.14	29.94	41.39	123.60	17.68	21.73	180
2006	39.06	27.90	34.30	42.79	123.60	17.68	17.18	189
2007	38.90	29.72	33.87	42.63	123.60	17.68	16.37	205
2008	56.72	45.98	53.23	64.38	123.60	24.41	16.96	222
2009	50.61	37.21	45.27	58.53	123.60	19.81	19.87	231
2010	40.19	29.57	33.64	43.47	123.60	17.68	19.60	231
2011	45.20	34.14	40.75	49.01	123.60	18.81	17.94	238
2012	40.93	27.47	35.41	45.79	123.60	17.68	21.29	247
2013	34.45	21.16	25.83	36.30	123.60	17.68	22.62	249

.

Table 4
Determinants of stock return volatility

This table presents estimates of slope coefficients in multivariate regressions of stock return volatility on various explanatory variables. The dependent variable is total stock return volatility (VOLATILITY). For definitions of the independent variables please see section 3.3. Models 1-5 contain only independent variables related to a certain theoretical aspect (see sections 2.1 and 2.2). Model 7 includes all independent variables. Model 6 repeats this estimation excluding the variable OPLEVG on account of the larger data shortfall of this variable. Model 8 reports the coefficient estimate (from Model 6) multiplied with the standard deviation of the variable and is a measure of its economic impact. All models contain period and industry fixed effects. T-statistics based on standard errors clustered at the firm level are reported in parenthesis. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. For variable definitions, see Table 1 or section 3.3.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	77.44***	82.55***	78.73***	91.89***	80.02***	67.28***	60.36***	
	(10.5)	(13.5)	(14.1)	(10.4)	(10.8)	(11.9)	(10.0)	
SIZE	-2.598***	-2.088***	-2.272***	-3.084***	-3.510***	-1.906***	-1.300***	-4.55
	(-5.80)	(-5.54)	(-5.64)	(-5.45)	(-6.64)	(-4.78)	(-3.38)	
NGM	16.01***	23.32***	13.99***	28.47***	24.77***	16.41***	12.67*	2.95
	(3.12)	(2.95)	(3.61)	(4.67)	(4.43)	(2.98)	(1.87)	
SMALL	1.365	-1.148	-0.391	0.934	1.662	0.475	0.755	0.23
	(0.79)	(-0.68)	(-0.27)	(0.48)	(0.97)	(0.32)	(0.50)	
MID	0.523	0.571	1.184	2.909	3.541*	1.837	0.884	0.84
	(0.30)	(0.34)	(0.83)	(1.46)	(1.93)	(1.17)	(0.56)	
FINLEVG	11.06***					10.51**	7.563*	1.99
	(2.64)					(2.49)	(1.72)	
OPLEVG	7.229***						0.668	
	(6.39)						(0.52)	
BIDASK		-14.01***				0.553	0.320	0.77
		(-10.2)				(1.28)	(0.74)	
DIVDUM		1.106**				-7.787***	-7.951***	-3.89
		(2.21)				(-6.25)	(-6.26)	
GEOGRAPHICAL			-0.452***			-0.116	-0.096	-0.33
			(-2.70)			(-0.68)	(-0.54)	
DIVERSIFICATION			-0.386			-0.550**	-0.482*	-1.10
			(-1.48)			(-2.09)	(-1.72)	
EARNINGS			-46.24***			-28.30***	-29.45***	-20.3
			(-11.0)			(-7.23)	(-6.98)	
BOOKTOMARK			2.777**			3.879***	4.831***	1.90
			(2.43)			(3.43)	(3.74)	
INTANGIBLES			7.610***			3.730	0.166	0.74
			(2.76)			(1.17)	(0.05)	

SPHERE				-4.104**		-2.320*	-2.092	-0.99
				(-2.25)		(-1.68)	(-1.43)	
FAMILY				-4.381***		-2.375*	-0.675	-1.16
				(-2.71)		(-1.71)	(-0.48)	
WEIGHT				-0.013		-0.008	-0.014	-0.25
				(-0.74)		(-0.55)	(-0.98)	
FOREIGNLARGE				1.001		-1.388	-1.534	-0.47
				(0.56)		(-0.52)	(-0.56)	
INSTITUTIONAL					-0.123***	-0.100**	-0.073*	-1.94
					(-2.61)	(-2.40)	(-1.65)	
FOREIGN					0.111*	-0.014	-0.024	-0.15
					(1.93)	(-0.19)	(-0.30)	
NRSHAREHOLDERS					0.059***	0.033***	0.025**	1.56
					(4.49)	(2.98)	(2.29)	
MICROFLOAT					0.196***	0.117***	0.108***	1.73
					(4.45)	(3.17)	(2.72)	
Period fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Industry fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Nr observations	2075	1947	2515	2076	2074	1631	1393	1631
R-SQR	0.450	0.416	0.422	0.545	0.490	0.539	0.517	

Table 5
Survivorship bias

This table presents estimates of slope coefficients in multivariate regressions of stock return volatility on various explanatory variables. The dependent variable is total stock return volatility (VOLATILITY). In contrast to Table 4, in these regressions we change the starting year to address the issue of survivorship bias. Model 1 has the year 2000 as starting year, whereas Models 2 and 3 have the years 2005 and 2010, respectively. As we shorten the time period the sample becomes less impacted by survivorship bias. All models contain period and industry fixed effects. T-statistics based on standard errors clustered at the firm level are reported in parenthesis. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. For variable definitions, see Table 1 or section 3.3.

	Model 1	Model 2	Model 3
Constant	67.28***	64.09***	75.49***
	(11.9)	(10.2)	(9.96)
SIZE	-1.906***	-1.613***	-2.362***
	(-4.78)	(-3.96)	(-4.89)
NGM	16.41***	20.40***	25.10**
	(2.98)	(3.18)	(2.40)
SMALL	0.475	0.073	-1.103
	(0.32)	(0.04)	(-0.59)
MID	1.837	2.383	2.225
	(1.17)	(1.38)	(1.15)
FINLEVG	10.51**	12.35***	14.47***
	(2.49)	(2.59)	(2.92)
BIDASK	0.553	0.463	0.247
	(1.28)	(0.91)	(0.29)
DIVDUM	-7.787***	-8.260***	-10.17***
	(-6.25)	(-6.02)	(-5.67)
GEOGRAPHICAL	-0.116	-0.034	0.236
	(-0.68)	(-0.17)	(1.00)
DIVERSIFICATION	-0.550**	-0.508*	-0.592
	(-2.09)	(-1.74)	(-1.64)
EARNINGS	-28.30***	-22.89***	-27.23***
	(-7.23)	(-4.75)	(-4.37)
BOOKTOMARK	3.879***	4.552***	4.394***
	(3.43)	(3.46)	(2.75)
INTANGIBLES	3.730	0.413	-3.824
	(1.17)	(0.12)	(-1.12)
SPHERE	-2.320*	-3.671**	-2.926*
	(-1.68)	(-2.48)	(-1.86)
FAMILY	-2.375*	-2.315	-1.153
	(-1.71)	(-1.59)	(-0.64)
WEIGHT	-0.008	-0.011	-0.000
	(-0.55)	(-0.78)	(-0.02)
FOREIGNLARGE	-1.388	0.015	-0.941
	(-0.52)	(0.00)	(-0.21)
INSTITUTIONAL	-0.100**	-0.088*	-0.154***
	(-2.40)	(-1.80)	(-2.77)
FOREIGN	-0.014	-0.027	-0.039
	(-0.19)	(-0.31)	(-0.35)
NRSHAREHOLDERS	0.033***	0.031**	0.027*
	(2.98)	(2.49)	(1.75)
MICROFLOAT	0.117***	0.086**	0.154***
	(3.17)	(2.03)	(2.96)
Period fixed	Yes	Yes	Yes
Industry fixed	Yes	Yes	Yes
Nr observations	1631	1336	625
R-SQR	0.550	0.505	0.558

Table 6
Determinants of volatility and trading volume

This table presents estimates of slope coefficients in multivariate regressions of stock return volatility on various explanatory variables. The dependent variables are total stock return volatility (VOLATILITY, Model 1) and the annualized trading volume (TRADINGVOLUME, Model 2). Models 1 and 2 contain the same independent variables as Model 6 in Table 4. All models contain period and industry fixed effects. T-statistics based on standard errors clustered at the firm level are reported in parenthesis. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. For variable definitions, see Table 1 or section 3.3.

Dependent variable	Model 1 Volatility	Model 2 Trading volume
Constant	67.28***	-1.308
	(11.9)	(-1.56)
SIZE	-1.906***	0.708***
	(-4.78)	(9.77)
NGM	16.41***	-0.427
	(2.98)	(-0.92)
SMALL	0.475	-0.088
	(0.32)	(-0.39)
MID	1.837	0.048
	(1.17)	(0.25)
FINLEVG	10.51**	-0.430
	(2.49)	(-0.80)
BIDASK	0.553	0.018
	(1.28)	(0.42)
DIVDUM	-7.787***	-0.686***
	(-6.25)	(-5.22)
GEOGRAPHICAL	-0.116	0.018
	(-0.68)	(0.67)
DIVERSIFICATION	-0.550**	-0.045
	(-2.09)	(-1.16)
EARNINGS	-28.30***	-0.505
	(-7.23)	(-1.53)
BOOKTOMARK	3.879***	-0.415***
	(3.43)	(-3.30)
INTANGIBLES	3.730	0.313
	(1.17)	(0.90)
SPHERE	-2.320*	-0.166
	(-1.68)	(-0.78)
FAMILY	-2.375*	0.038
	(-1.71)	(0.28)
WEIGHT	-0.008	0.002
	(-0.55)	(1.06)
FOREIGNLARGE	-1.388	0.104
	(-0.52)	(0.38)
INSTITUTIONAL	-0.100**	0.010**
	(-2.40)	(2.13)
FOREIGN	-0.014	0.013*
	(-0.19)	(1.67)
NRSHAREHOLDERS	0.033***	0.004***
	(2.98)	(2.69)
MICROFLOAT	0.117***	0.044***
	(3.17)	(6.37)
Period fixed	Yes	Yes
Industry fixed	Yes	Yes
Nr observations	1631	1700
R-SQR	0.539	0.614

Table 7
Interactions with institutional ownership

This table presents estimates of slope coefficients in multivariate regressions of stock return volatility on various explanatory variables. The dependent variable is total stock return volatility (VOLATILITY). In this table we add two interaction terms. WEIGHT is a measure of the portfolio concentration of the largest investor, and INSTLARGE is a dummy variable signaling that the largest owner is an institutional investor (Model 1). INSTITUTIONAL is the sum of ownership stakes held by the 15 largest institutional investors, and DIVDUM is a dummy variable signaling that the firm is a dividend-payer (Model 2). All models contain period and industry fixed effects. T-statistics based on standard errors clustered at the firm level are reported in parenthesis. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. For variable definitions, see Table 1 or section 3.3.

	Model 1	Model 2
Constant	64.47***	66.86***
	(11.3)	(11.8)
SIZE	-1.823***	-1.659***
	(-4.45)	(-4.13)
NGM	16.62***	16.03***
	(3.06)	(2.89)
SMALL	0.411	0.318
	(0.28)	(0.22)
MID	1.790	1.852
	(1.14)	(1.22)
FINLEVG	10.50**	9.732**
	(2.49)	(2.35)
BIDASK	0.542	0.580
	(1.25)	(1.39)
DIVDUM	-8.039***	-13.90***
	(-6.46)	(-6.90)
GEOGRAPHICAL	-0.121	-0.144
	(-0.70)	(-0.86)
DIVERSIFICATION	-0.525**	-0.581**
	(-2.02)	(-2.30)
EARNINGS	-28.65***	-28.43***
	(-7.30)	(-7.27)
BOOKTOMARK	3.951***	4.068***
	(3.49)	(3.67)
INTANGIBLES	3.722	2.540
	(1.16)	(0.80)
SPHERE	-0.108**	-0.256***
	(-2.29)	(-4.02)
INSTLARGE	-0.002	-0.021
	(-0.02)	(-0.29)
WEIGHT	-0.434	-0.119
	(-0.34)	(-0.09)
FOREIGNLARGE	2.825	2.840
	(1.45)	(1.53)
INSTITUTIONAL	0.000	-0.002
	(0.00)	(-0.14)
FOREIGN	-1.149	-0.556
	(-0.44)	(-0.21)
NRSHAREHOLDERS	0.033***	0.031***
	(2.98)	(2.88)
MICROFLOAT	0.111***	0.086**
	(2.93)	(2.25)
INSTLARGE*WEIGHT	-0.102*	
	(-1.81)	
INSTITUTIONAL*DIVDUM		0.251***
		(4.04)
Period fixed	Yes	Yes
Industry fixed	Yes	Yes
Nr observations	1631	1631
R-SQR	0.539	0.545

Ownership Determinants of Stock Return Volatility

HÅKAN JANKENSGÅRD | ANDERS VILHELMSSON

A conjecture in the literature holds that a large and diversified investor base leads to lower volatility by improving the quality of the price signal. In this paper this hypothesis is examined using unique Swedish ownership data. The data does not support the conjecture. Instead, volatility increases in the number of shareholders and in the size of the firm's micro-float (the fraction of shares held by investors with stakes below 0.1%). We also show that proxies for the portfolio concentration of the largest owners are important. We conclude that ownership structure has major implications for stock return volatility.

JEL Codes G1, G30, G32

Keywords: Volatility; ownership; investor base; portfolio concentration

THE KNUT WICKSELL CENTRE FOR FINANCIAL STUDIES

The Knut Wicksell Centre for Financial Studies conducts cutting-edge research in financial economics and related academic disciplines. Established in 2011, the Centre is a collaboration between Lund University School of Economics and Management and the Research Institute of Industrial Economics (IFN) in Stockholm. The Centre supports research projects, arranges seminars, and organizes conferences. A key goal of the Centre is to foster interaction between academics, practitioners and students to better understand current topics related to financial markets.

LUND UNIVERSITY
School of Economics and Management

LUND UNIVERSITY
SCHOOL OF ECONOMICS AND MANAGEMENT
Working paper 2016:3
The Knut Wicksell Centre for Financial Studies
Printed by Media-Tryck, Lund, Sweden 2016