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Portfolio Concentration and Firm Performance

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Abstract

This paper investigates the relation between shareholders' portfolio concentration and firm performance. Using data on more than 1.3 million unique shareholders, we create an index that measures how concentrated shareholder portfolios are in each firm. We posit that portfolio concentration will affect incentives when shareholders are resource constrained. We find that average shareholder portfolio concentration is positively related to future operational performance and valuation. We also find that portfolio concentration is positively correlated with abnormal stock returns. Our findings suggest that shareholders with concentrated portfolios are more informed and play a governance role through the stock market.

I. Introduction

This paper investigates the relation between shareholder portfolio concentration and firm performance. Previous literature has focused on shareholders' ownership in a stock as compared to the firm's number of shares outstanding ("blockholdings") as a proxy for incentives to gather information about firms and to monitor them (e.g., Shleifer and Vishny (1986)). We offer a new and complementary approach to measure shareholders' incentives to collect information and monitor: shareholders' ownership in a stock as compared to their total portfolio

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holdings ("portfolio concentration"). When investors are unable to scale up information collection due to resource constraints, investors' portfolio concentration becomes important. Especially for smaller shareholders, the investment process becomes a constrained optimization problem: the shareholder will compare her investment in the firm to the other holdings in her portfolio when deciding how much to analyze a firm. Our paper is the first to empirically explore the relation between shareholder portfolio concentration and future firm operational performance and valuation. We consider three sets of theories in which concentrated holdings cause superior performance: exit, learning, and voice. Furthermore, we examine the possibility of reverse causality due to superior information.

Previous corporate governance research has focused on the size of the holding. In this line of research (e.g., Edmans (2009)), investors with concentrated stakes have incentives to gather private information since they are able to trade on this information, that is, sell their holdings ("exit"). In contrast, an investor with no stake has few incentives to gather information, as she cannot sell if the information turns out to be negative (if there are short-selling constraints) while blockholders can. Informed investors can improve firm value through a market mechanism: trading. In this mechanism, informed blockholders' exit, or threat of exit, exerts downward pressure on stock price. Informed investors lead to greater price informativeness, which in turn may improve decision-making by managers as their compensation typically is tied to stock price (e.g., Edmans (2009), Admati and Pfleiderer (2009), and Edmans and Manso (2011)). In Edmans, trading by informed shareholders will induce managers to pursue investments that enhance long-term value instead of maximizing short-term profits. Edmans notes that without informed shareholder trading, stock prices will tend to reflect current earnings, while stock prices will reflect fundamental value more precisely when informed shareholders trade. Relatedly, Admati and Pfleiderer show that exit by blockholders can improve managerial effort. In sum, informed investors can improve firm value by affecting managerial incentives.

There is another financial market mechanism through which greater price informativeness can improve firm value: The manager learns from stock prices, and this helps him to make better decisions ("learning"). Khanna and Sonti (2004) and Subrahmanyam and Titman (2001) show that trading by informed shareholders should lead to more informative share prices, and this feedback effect could improve managerial investment decisions and, consequently, operational firm performance. More generally, informative prices enable better decision-making and thus promote real efficiency (see also Bond, Edmans, and Goldstein (2012)).

Firm value can also be related to blockholders' direct intervention ("voice"). In Shleifer and Vishny (1986), Burkart, Gromb, and Panunzi (1997), Maug (1998), Kahn and Winton (1998), and Bolton and Von Thadden (1998), a more informed blockholder is more able to engage in value improving intervention, such as correcting managerial inefficiency or implementing profitable investments, due to her control rights. A larger ownership stake means that the blockholder captures a greater share of the gains from intervention and that she has greater incentives to intervene. A blockholder need not have superior information to intervene. For example, it can be common knowledge what action to take (e.g., divest part of the

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firm) so the blockholder has no superior information, but she has the incentives to engage in intervention due to her stake.[1] Taken together, a larger stake should increase incentives to intervene.

So far we have considered three channels that can cause improved firm performance: two financial market channels (exit and learning) and one non-financial channel (voice). However, a correlation between portfolio concentration and firm value can arise due to causality in the other direction: investors will obtain more concentrated stakes today if they are better informed and expect superior future firm performance. To be more specific, there are two forms of reverse causality. The first considers investors with only public information. Profitable firms could attract investors to them (e.g., because these firms may be safer investments),[2] although the investors lack private information. The second form requires that blockholders have private information and assumes that they acquire stakes in advance of future improvements. Thus, higher performance or expectations of superior future performance will increase portfolio concentration (and not just lead to a larger ownership stake) if the investor has limited wealth, in which case she can increase her holding in a firm only by reallocating funds away from other investments. In both forms, this channel implies a causality that runs from financial performance to portfolio concentration.

We use a unique data set representing all the more than 1.3 million different shareholders active in the Finnish stock market during the years 1995–2006 in order to calculate each shareholder's year-end holdings in virtually every listed stock. To measure portfolio concentration, we calculate the average portfolio weight the shareholders have in each firm, which we refer to as the average weight index (AWI). In other words, AWI measures the fraction that the average shareholder has allocated into the firm out of her total equity portfolio. As a separate ownership concentration measure, we use a Herfindahl index (HFI) based on the holdings of the firm's 5% blockholders.

Our principal result is that the shareholders' portfolio concentration (AWI) is positively related to firm performance. More specifically, we find that shareholders' average portfolio concentration is positively related to firms' future operational performance and valuation. These findings are robust to the inclusion of firm-fixed effects, the use of lagged ownership variables, and the estimation of a dynamic model on the relation between firm performance and average shareholder portfolio concentration. We also find that the relation between portfolio concentration and future firm performance is stronger than the relation between ownership concentration (HFI) and future firm performance. Moreover, the positive relation between portfolio concentration and firm performance is stronger when our concentration measure includes smaller shareholders. This result is consistent with the idea that smaller shareholders are more likely to suffer from

[1] A blockholder with superior information can also inform an intervention decision, and this information gives her additional incentives to intervene, but such superior information is not necessary.

[2] In the United States, there are prudent man rules affecting money managers. In Finland, institutional constraints on money managers (e.g., diversification requirements) stem from various market regulations for which the Finnish Financial Supervisory Authority is responsible.

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time constraints (i.e., they cannot scale up their information acquisition). Further tests indicate that portfolio concentration also is positively related to price informativeness. Thus, our results indicate that the financial market mechanisms (exit and learning) dominate the direct intervention by shareholders (voice).

Furthermore, we relate shareholders' portfolio concentration to stock returns. We find that year-end portfolio concentration is positively related to Jensen (1968), Carhart (1997), and Daniel, Grinblatt, Titman, and Wermers (1997) alphas in the following year. Thus, we find support for the hypothesis that shareholders with more concentrated portfolios have private information and concentrate their portfolios in expectation of superior performance in the near term. We also test a trading strategy that each year takes a long position in the quartile of firms with the highest portfolio concentration and shorts firms in the lowest quartile concentration. With our data, this trading strategy yields positive abnormal returns using the Jensen (1968), Carhart (1997), and Daniel et al. (1997) models over the period 1996–2006.

Although previous research does not relate portfolio concentration to firm performance, our paper is primarily related to empirical research that links informed shareholdings to firm performance through the stock market. In support of the threat of exit, Gallagher, Gardner, and Swan (2013) report that an increase in the number of blockholders augments pricing efficiency. Moreover, they find that the threat of disciplinary trading by informed blockholders subsequently improves firm performance. Relatedly, Bharath, Jayaraman, and Nagar (2013) also find that the threat of exit by blockholders exerts a disciplinary effect on managers. In addition, Kandel, Massa, and Simonov (2011) show that multiple small shareholders trading in the same direction have a positive effect on firm performance. Their result indicates that similarity among small shareholders can discipline management. In support of the learning channel, Luo (2005), for example, shows that managers may learn from prices in making acquisition bids. Our paper is also related to a study by Faccio, Marchica, and Mura (2011) that measures the portfolio concentration of controlling shareholders. However, they focus on the relation between portfolio concentration and risk taking. Our paper is the first one to document a positive relation between shareholders' portfolio concentration and future firm performance.

The main contribution of this paper is our new portfolio concentration measure. We compare the portfolio concentration to the traditional measure of ownership concentration, and we find that our measure considering the portfolio dimension is more reliably related to firm performance than the traditional ownership concentration measure. We argue that there are some theoretical reasons why our portfolio measure may have advantages over previous measures; in particular, as (especially smaller) shareholders face time and wealth constraints, portfolio considerations become important. This dimension of ownership has not been captured in previous research.

The remainder of the paper proceeds as follows: Section II describes the data set and variable definitions. Section III presents hypotheses and empirical findings. Section IV provides further analysis and offers robustness tests. Section V concludes the paper.

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II. Data Sources and Definitions of Ownership Variables

Our main data source is the unique shareholder register of publicly listed Finnish firms, originally employed by Grinblatt and Keloharju (2000). Below, we provide a short description of the distinct characteristics of our data sample, whereas a comprehensive review of the general properties of the shareholder register can be found in Grinblatt and Keloharju.

A. The Finnish Central Securities Depository

The Finnish Central Securities Depository (FCSD) shareholder register contains entries of virtually all transactions in the shares of publicly traded Finnish firms from Jan. 2, 1995 onward, as well as the balance of the register as of Jan. 1, 1995. Grinblatt and Keloharju (2000) report that the register covers approximately 97% of the total market capitalization of all publicly traded Finnish firms as of the beginning of this time period. Our FCSD data sample consists of 121,888,418 entries registered during the time period from Jan. 1, 1995 to May 31, 2007, expanding the data set used by Grinblatt and Keloharju by more than 10 years and 115 million entries. More specifically, our FCSD data sample includes entries for 1,367,181 unique shareholders: 102,797,708 exchange transaction entries and 19,090,710 entries for mergers, splits, gifts, bankruptcies, initial public offerings (IPOs), and other transactions not executed over an exchange. Each entry consists of 18 data fields, including information about both the shareholder and the transaction itself. We restrict our sample to shares of publicly traded Finnish firms.[3] In addition, since our focus lies on outside shareholdings, we use ownership data from the low voting share class, which typically is the more traded class.

One advantage with using the Finnish data set is that it covers information needed to calculate portfolio concentrations for small shareholders (e.g., as compared to data from 13F filings provided by Thomson Financial, which cover institutional investors who manage more than $100 million). Since the portfolio concentration measure is particularly relevant for small investors who have constraints preventing them from scaling up information acquisition, the unique Finnish data set is used in this study.

B. The AWI (Portfolio Concentration)

We calculate an average weight index (AWI) for each share and year by first compiling the portfolio value in euros individually for each *investor* and year (as of Dec. 31):[4]

$$V = \sum_{i=1}^{M} H_i \times P_i, \tag{1}$$

where V equals the portfolio value in euros, H_i equals the number of firm i's shares in the portfolio, P_i equals the euro price of firm i's shares, and M equals

[3]The register includes a relatively small fraction of foreign securities, as well as securities other than shares.

[4]We calculate V for more than 1.3 million unique portfolios multiplied by 12 years, or in total more than 15 million individual portfolios.

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the number of different firms in the investor's portfolio. Next, we compile the AWI for each *firm* and year (as of Dec. 31):[5]

$$\text{AWI} = \frac{\sum_{j=1}^{N} \frac{H_j \times P}{V_j}}{N}, \tag{2}$$

where H_j equals the number of shares that investor j holds, P equals the euro price of the shares, V_j equals the value in euros of investor j's portfolio, and N equals the total number of shareholders in the firm.

The AWI equals the average weight of a certain stock in the shareholders' portfolios at a certain point in time. We expect the AWI to reflect how important a share is for its average shareholder. We calculate the AWI measure for categories of shareholders: all investors and investors with at least 0.1% of shares in a firm. In addition, we calculate the AWI for larger shareholders holding at least 1% and 5% of shares, respectively.

C. The HFI (Ownership Concentration)

We also use a Herfindahl index (HFI) of ownership concentration, because it is the traditional ownership concentration measure used, for example, in Demsetz and Lehn (1985). Our intention with this traditional ownership measure is to compare its explanatory power to our new portfolio concentration measure. To create the ownership concentration measure, we compile an HFI for each firm and year (as of Dec. 31):

$$\text{HFI} = \sum_{j=1}^{N} \left(\frac{H_j}{\sum_{j=1}^{N} H_j} \right)^2, \tag{3}$$

where H_j equals the number of shares that investor j holds, and N equals the total number of shareholders in the firm. Following previous research on blockholdings (e.g., McConnell and Servaes (1990)), we calculate the HFI for shareholders that hold at least 5% of the total number of shares in a firm at a certain date, respectively.[6] The HFI expresses ownership concentration, and we consequently expect it to correlate positively with the monitoring power of large shareholders in a firm.

D. Accounting, Valuation, and Return Data

Historical records of accounting and valuation data for Finnish publicly traded firms (excluding banks and insurance companies) for the fiscal years 1995–2007 are provided by Balance Consulting.[7] We use return on assets (ROA) as our

[5] P equals the volume-weighted average price (VWAP). We compile VWAP for each share and day from the FCSD securities register. Using the VWAPs instead of the closing prices arguably gives us more reliable estimates of the true value of the shares, especially for more illiquid shares, as we avoid problems known to be associated with closing prices, as reported, for instance, by Felixson and Pelli (1999).

[6] Our results are similar when smaller investors are included in the HFI measure.

[7] Balance Consulting is a part of Kauppalehti Ltd, which is the leading financial news provider in Finland.

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measure of operational firm performance.[8] ROA is defined as earnings before interest and taxes (EBIT) divided by average total assets. As our valuation measure, we use Tobin's *q* defined as the book value of total assets minus shareholders' equity plus the market value of the firm's equity all divided by the book value of total assets. We also include several firm- and year-level variables into our data set: incorporation year, industry group, long-term debt, sales, and tangible assets. The sample used in the main analysis consists of an unbalanced panel that combines the FCSD shareholder register and the Balance Consulting firm-level data.[9] Our final sample covers 132 Finnish nonfinancial firms with 1,126 firm-years over a 12-year period.[10] The (lagged) ownership and control variables cover the years 1995–2006, while the performance variables (ROA and Tobin's *q*) cover the years 1996–2007.

Dividend and split adjusted monthly stock and index returns for firms on the Main List of the NASDAQ OMX Helsinki Stock Exchange for the calendar years 1995–2006 are provided by the Department of Finance at Hanken School of Economics. We use the OMX Helsinki Cap index as our proxy for the market portfolio.[11] Furthermore, we retrieve monthly observations for the 1-month Euro Interbank Offered Rate (EURIBOR[12]) from 1999 to 2006 and the 1-month Helsinki Interbank Offered Rate (HELIBOR) from 1995 to 1998 from Kauppalehti Ltd. As an alternative to the 1-factor model, we use the Carhart (1997) factors available for euro countries from Kenneth French's Web page (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). The final sample that combines the FCSD register and stock returns data contains 164 nonfinancial and financial firms traded on the main list with 966 firm-years over the period 1996–2006.

III. Empirical Findings

A. Descriptive Statistics

Panels A and B of Table 1 display summary statistics for the ownership variables used in the analysis. Panel A shows that the AWI has a mean of 26.2% and a standard deviation of 12.8%. These figures mean that the average shareholder in the sample firms has about one quarter of his stock wealth in a single firm. Panel A also shows that the mean AWI is higher if it is computed for 0.1%, 1%, or 5% shareholder thresholds. Blockholders with larger stakes in a particular firm will have, ceteris paribus, higher stock portfolio concentration overall. However, further analysis shows that the average investor holding in euro terms is virtually

[8] As an alternative operational performance measure, we use return on investments (ROI), defined as net EBIT divided by invested capital. Since the results are very similar using ROA and ROI, we report only results based on ROA.

[9] Both data sets are generally free from survivorship bias.

[10] Of the original 185 firms with market data provided by Balance Consulting (banks and insurance companies excluded), we have financial information (to calculate all variables) and complete information to match with the FCSD data set for 132 firms. The final sample used in the main analysis represents about 82% of the original Balance Consulting sample in terms of the combined market capitalization of the firms over the period.

[11] The weight of each individual share is capped to 10% in this index, in order to account for the dominant position of Nokia Plc at OMX Helsinki.

[12] The EURIBOR was introduced on Jan. 4, 1999.

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TABLE 1

Summary Statistics

Table 1 presents summary statistics of variables for a sample of Finnish listed firms during 1995–2006. ROA and Tobin's q are summarized for the period 1996–2007 ($t+1$). The variables are as follows: the AWI, the average weight of shareholders in a firm at year-end; the HFI, using data on the firm's 5% shareholders at year-end; ROA, EBIT divided by total assets winsorized at the 1st and 99th percentiles, respectively; Tobin's q, defined as market value of equity plus book value of debt all divided by book value of total assets winsorized at the 1st and 99th percentiles, respectively; sales in thousands euros; total assets in thousands euros; firm age, years since incorporation; tangibility, tangible assets divided by total assets; leverage, long-term debt divided by total assets; Jensen (1968) alpha based on monthly returns for each firm, each year; Carhart (1997) 4-factor alpha, using monthly returns for each firm, each year; characteristics-adjusted alpha, in which the Daniel et al. (1997) benchmarks are subtracted from the firm's return before estimating Carhart 4-factor alphas; PIN, for each firm, each year; $(1-R^2)$, where R^2 is from CAPM regressions using daily data for each firm, each year; STDROA, the standard deviation of the ROA over the last 5 years; market cap, the market value of equity at year-end; trading volume, the yearly trading volume of the firm's common stock in euros; CEO ownership, the CEO shareholdings in percent if the CEO is among the firm's principal shareholders (typically the 20 largest shareholders), and 0 otherwise; CEO incentives, the stock option plan delta in euros based on the Black and Scholes (1973) formula plus the CEO's shareholdings in euros (based on the CEO ownership variable) all divided by the market capitalization of equity; and option data available, set to unity if data on CEO stock option plans are available, and 0 otherwise. The main sample consists of 132 firms (excluding banks and insurance companies), and the sample using stock returns consists of 164 firms traded on the main list.

Variable	No. of Obs.	Mean	Median	Standard Deviation	25th Percentile	75th Percentile
Panel A. Portfolio Concentration (by investor size)						
AWI (all)	1,126	0.262	0.229	0.128	0.176	0.310
AWI (0.1%)	1,126	0.268	0.219	0.181	0.131	0.357
AWI (1.0%)	1,126	0.347	0.285	0.244	0.155	0.525
AWI (5.0%)	1,114	0.429	0.390	0.321	0.139	0.667
ΔAWI	998	−0.006	−0.004	0.035	−0.024	0.014
Panel B. Ownership Concentration						
HFI	1,114	0.154	0.102	0.146	0.049	0.226
Panel C. Financial and Control Variables						
Return on assets % $(ROA)_{t+1}$	1,126	8.601	8.300	9.574	4.300	13.500
Tobin's q_{t+1}	1,126	1.568	1.245	0.944	1.013	1.755
Sales ('000 euros)	1,126	1,106,014	104,378	3,266,647	42,232	632,666
Total assets ('000 euros)	1,126	1,111,567	116,000	3,214,457	43,700	646,000
Firm age (years)	1,126	48.203	34.000	51.571	14.000	67.000
Tangibility	1,126	0.339	0.307	0.238	0.150	0.507
Leverage	1,126	0.168	0.154	0.135	0.052	0.251
Panel D. Stock Returns, Information-Related Variables, and Other Variables						
Jensen's alpha	966	0.000	0.001	0.032	−0.018	0.018
Carhart 4-factor alpha	966	−0.001	−0.003	0.046	−0.028	0.025
Characteristics-adj. alpha	737	0.00004	0.038	−0.022	−0.0004	0.021
PIN	647	0.207	0.165	0.156	0.105	0.257
$(1-R^2)$	804	0.898	0.950	0.128	0.857	0.987
Trading volume (MEuro)	804	1,754.572	51.945	1.30E+04	10.227	263.228
Market cap (MEuro)	804	1,781.226	203.651	1.30E+04	60.859	589.799
STDROA	804	4.994	3.283	5.918	1.794	5.831
CEO ownership	1,114	0.025	0.000	0.084	0.000	0.000
CEO incentives	1,114	0.025	0.000	0.085	0.000	0.000
Option data available	1,114	0.627	1.000	0.484	0.000	1.000

uncorrelated with portfolio concentration (AWI) in the typical firm.[13] In addition, Panel A displays descriptive statistics for yearly changes in the AWI using data on all investors. The standard deviation of changes in the AWI equals about 3.5%.

[13]The correlation between the average holdings by investors in euros and portfolio concentration (AWI) equals 0.155. Furthermore, it equals 0.021 when we exclude observations with HFI values below the 5th and above the 95th percentiles in order to adjust for the positive fourth standardized moment (kurtosis) in the HFI distribution. Finally, we correlate the average holdings by investors with portfolio concentration for a sample that excludes observations with ownership concentration (HFI) above the 75th percentile (90th percentile), a proxy for closely held firms, and find that the correlation now equals −0.050 (−0.017). Thus, we conclude that the level of portfolio concentration is virtually unrelated to investor size for the typical firm.

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The mean of the HFI equals 15.4%, and the standard deviation is 14.6%, as displayed in Panel B. Furthermore, the correlation between ln(AWI) and ln(HFI) equals only 0.11 (Appendix A), which indicates that the average portfolio concentration of shareholders and the corporate ownership concentration capture distinct dimensions of a firm's ownership structure. Summary statistics of financial, information, and control variables are displayed in Panels C and D of Table 1.

B. Portfolio Concentration and Firm Performance

There are two sources of endogeneity when estimating the relation between portfolio concentration and firm performance. One is omitted variables that drive both portfolio concentration and firm performance; the other is reverse causality (due to either public or private information). We approach the endogeneity problem in several ways. First, we include variables to control for observable joint determinants of portfolio concentration and firm performance.[14] Second, we use firm-fixed effects and a dynamic model to control for unobservable, time-invariant joint determinants of portfolio concentration and firm performance.[15] Third, we use lagged independent variables to reduce endogeneity problems. We report robust standard errors that control for firm-level clustering.[16] Generally, our results are robust to using both random effects and pooled ordinary least squares (OLS) models (see Appendix B). The firm-fixed effects performance model we employ can be expressed as follows:

$$\begin{aligned}(4)\qquad \text{Firm Performance}_{i,t} \;=\; & \alpha_i + \beta_1 \ln(\text{AWI})_{i,t-1} + \beta_2 \ln(\text{HFI})_{i,t-1} \\ & + \gamma\ \text{Control variables}_{i,t-1} + \delta\ \text{Year dummy variables}_t + \varepsilon_{i,t},\end{aligned}$$

where α_i represents the firm-specific intercept and $\varepsilon_{i,t}$ is the error term. Firm performance is measured by ROA and Tobin's q, respectively. In the main model, we include both the AWI and the HFI variables. However, we also consider the two ownership variables in separate models. We take the natural logarithm of AWI and HFI to reduce skewness.[17] We use common firm-level control variables including firm size, defined as the natural logarithm of sales; firm age, number of years since incorporation; leverage, measured as long-term debt divided by total assets; and tangibility, defined as tangible assets to total assets. Our set of control variables is based on Laeven and Levine (2008) with the addition of firm age that is used in, for example, Gompers, Ishii, and Metrick (2003).[18] Year dummies and firm effects are included in the model to control for time- and firm-fixed effects.

[14] For example, Tobin's q_{t-1} could cause both portfolio concentration $(\text{AWI})_{t-1}$ (as good performance may attract investors) and Tobin's q_t (as Tobin's q is likely to be persistent). Hence, a regression of Tobin's q_t on portfolio concentration $(\text{AWI})_{t-1}$ may yield a positive correlation. However, since we use several control variables in the regression, the problem with omitted variables may be limited.

[15] The Hausman test rejects the null hypothesis that the fixed effects and the random effects models are equal, indicating that only the firm-fixed effects model is valid.

[16] We follow Petersen (2009) who suggests using firm clustering (but not time clusters) in corporate finance settings since the dependent variable is typically persistent (i.e., firm performance in our model).

[17] We obtain similar results in the regressions when we use unlogged ownership variables.

[18] Our results in the Tobin's q regression are robust to the inclusion of ROA as a control variable.

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Our first hypothesis is consistent with all four theories discussed in Section I: voice, exit, learning, and reverse causality. The aim of the subsequent hypotheses (2–5) is to distinguish between the different theories. We state Hypothesis 1 as follows:

Hypothesis 1. Portfolio concentration is positively related to future firm performance.

Table 2 shows the results of the relation between ownership variables and firm performance using the firm-fixed effects specification. AWI, measuring the average portfolio weight of shareholders, is positively and statistically significantly related to ROA and Tobin's q for all investors (AWI) as well as 0.1% holdings (AWI_0.1%). The coefficient for the natural logarithm of the AWI measure for all investors implies that a, say, 10% increase in portfolio concentration is associated with a 0.58% higher ROA ($6.13 \times \ln(1.1) = 0.58$) and, respectively, Tobin's q by 0.09. HFI is positively related to firm performance, but statistically significant at the 5% level only for Tobin's q. Taken together, the results in Table 2 support Hypothesis 1 by showing that the shareholders' average portfolio weight is positive and significantly related to future operational performance and valuation.

Columns 2, 3, and 5 of Panel A in Table 2 show results for ROA regressions when the HFI and AWI measures are included separately, whereas columns 7, 8, and 10 of Panel B show the corresponding results for Tobin's q models. Coefficients and significance levels increase for both the HFI measure of ownership concentration and the AWI measure of portfolio concentration when they are included in separate models. It is noteworthy that AWI drives out the significance of the HFI measure in the ROA regression in model 1 of Table 2. Overall, Table 2 shows that the HFI and AWI measures are positively related to firm performance, but also that the portfolio concentration measure has a larger coefficient and is statistically more strongly related to firm performance than ownership concentration.

We now consider the dynamics of the relation between portfolio concentration and firm performance by relating yearly changes in Tobin's q and ROA to lagged yearly changes in AWI and other control variables.[19] In addition, we include lagged stock returns in the model following Fahlenbrach and Stulz (2009). The regression model is estimated using the firm-fixed effects specification. As Fahlenbrach and Stulz note in their analysis of the impact of managerial ownership on subsequent firm performance, such a firm-fixed effects model in a dynamic setting reduces the endogeneity problems when estimating the relation between ownership structure and firm performance.[20] Our final sample used with the dynamic model covers 120 nonfinancial firms traded on the main list.[21]

[19]We also run models with changes in the AWI and HFI measures in separate models. Since the coefficients and significance levels for AWI and HFI are qualitatively similar for the separate models and the models including both ownership variables, we do not include the separate models in Table 3.

[20]An alternative to the dynamic fixed-effects model would be to use an instrumental variables regression model. The potential instrument should predict skilled investors who tend to concentrate their holdings in certain stocks (but should not predict higher future firm performance). We have not been able to find a good instrument for the average shareholder portfolio concentration measure; therefore, we base our analysis on the firm-fixed effects model.

[21]The number of firm-years in the dynamic model is smaller because the first year is needed to calculate yearly changes in variables (reducing the sample to 986 firm-years). Furthermore, we restrict

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TABLE 2

Portfolio Concentration and Firm Performance

Table 2 presents firm-level fixed-effects regressions of firm performance on measures of ownership structure for a sample of 132 Finnish listed firms (excluding banks and insurance companies) during 1995–2007. The dependent variable is the ROA, defined as EBIT divided by total assets winsorized at the 1st and 99th percentiles, respectively, in Panel A, whereas the dependent variable is Tobin's *q*, defined as market value of equity plus book value of debt all divided by book value of total assets winsorized at the 1st and 99th percentiles, respectively, in Panel B. The independent variables are as follows: the HFI using data on the firm's 5% shareholders at year-end; the AWI, the average weight of the shareholders in a firm at year-end (using data on all investors or 0.1% investors); ln(Sales), the natural log of sales in thousand euros; firm age, years since incorporation; tangibility, tangible assets divided by total assets; and leverage, long-term debt divided by total assets. *t*-statistics, based on standard errors that control for clustering at the firm level, are in parentheses below the coefficient estimates. The numbers of observations vary depending on whether the firm has 5% blockholders to calculate the HFI measure. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Panel A. ROA_t					*Panel B. Tobin's q_t*				
Variable	1	2	3	4	5	6	7	8	9	10
$\ln(HFI)_{t-1}$	0.5445	0.8989*		0.8304*		0.1212**	0.1752***		0.1686***	
	(1.25)	(1.88)		(1.77)		(2.13)	(3.11)		(2.95)	
$\ln(AWI)_{t-1}$	6.1308***		6.3696***			0.9352***		0.9883***		
	(3.86)		(3.98)			(4.09)		(4.33)		
$\ln(AWI_0.1\%)_{t-1}$				2.4188***	2.5062***				0.2319**	0.2423**
				(2.63)	(2.70)				(2.17)	(2.24)
$\ln(Sales)_{t-1}$	0.9270	1.1989	0.9660	1.1629	1.2214	−0.0903	−0.0488	−0.0809	−0.0523	−0.0388
	(1.00)	(1.17)	(1.06)	(1.15)	(1.23)	(−1.57)	(−0.94)	(−1.35)	(−1.02)	(−0.73)
Firm age_{t-1}	0.1393	−0.0512	0.1324	−0.0296	−0.0458	0.0411***	0.0121	0.0416***	0.0141	0.0126
	(0.93)	(−0.35)	(0.88)	(−0.21)	(−0.32)	(3.71)	(1.33)	(3.69)	(1.53)	(1.30)
Tangibility_{t-1}	−6.8189	−7.6074	−6.7292	−7.0986	−6.5130	−0.7660*	−0.8863*	−0.5915	−0.8375*	−0.5842
	(−1.29)	(−1.38)	(−1.28)	(−1.31)	(−1.18)	(−1.83)	(−1.92)	(−1.36)	(−1.74)	(−1.15)
Leverage_{t-1}	−3.9462	−5.0736	−3.6709	−4.2026	−4.1189	−0.5720*	−0.7439**	−0.5461*	−0.6604**	−0.6707**
	(−1.03)	(−1.27)	(−0.97)	(−1.11)	−(1.09)	(−1.88)	(−2.20)	(−1.82)	(−2.01)	(−2.03)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.148	0.125	0.142	0.136	0.128	0.181	0.120	0.169	0.132	0.112
No. of obs.	1,114	1,114	1,126	1,114	1,126	1,114	1,114	1,126	1,114	1,126

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Table 3 shows that increases in the AWI variable are positively related to changes in firms' operational performance and valuation. Panel A of Table 3 shows that changes in the AWI variable in the previous year are positively and statistically significantly (at the 5% level) related to future changes in ROA. The coefficient of the AWI variable calculated using data on 0.1% shareholdings is also positive but not statistically significant at conventional levels. Panel B of Table 3 shows that changes in the AWI variable are positively and significantly related to changes in Tobin's q. For 0.1% holdings, the coefficient is also positive though not statistically significant (t=1.59). Furthermore, Table 3 shows that the HFI variable measuring ownership concentration is statistically insignificant in the Tobin's q regressions (when AWI is included), while it is positive and significant in the ROA model. Taken together, the results from the dynamic model between portfolio concentration and subsequent firm performance give further support to Hypothesis 1.

TABLE 3

Changes in Portfolio Concentration and Changes in Firm Performance

Table 3 presents firm-level fixed-effects regressions of yearly changes in firm performance on measures of changes in lagged ownership variables for a sample of 120 Finnish firms on the main list (excluding banks and insurance companies) during 1995–2007. The dependent variable is the ROA, defined as EBIT divided by total assets winsorized at the 1st and 99th percentiles, respectively, in Panel A, whereas the dependent variable is Tobin's q, defined as market value of equity plus book value of debt all divided by book value of total assets winsorized at the 1st and 99th percentiles, respectively, in Panel B. The independent variables are as follows: the HFI using data on the firm's 5% shareholders at year-end; the AWI, the average weight of the shareholders in a firm at year-end (for all or 0.1% investors); ln(Sales), the natural log of sales in thousand euros; tangibility, tangible assets divided by total assets; leverage, long-term debt divided by total assets; and stock return, the 12-month past return on the stock. t-statistics, based on standard errors that control for clustering at the firm level, are in parentheses below the coefficient estimates. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Panel A. Change in ROA ($t-1$ to t)		*Panel B. Change in Tobin's q ($t-1$ to t)*	
Variable	1	2	3	4
Change in $HFI_{t-2 \text{ to } t-1}$	12.6491***	12.1736***	0.5083	0.4104
	(3.94)	(3.58)	(0.94)	(0.71)
Change in $AWI_{t-2 \text{ to } t-1}$	24.3301**		4.5104**	
	(2.46)		(2.56)	
Change in $AWI_0.1\%_{t-2 \text{ to } t-1}$		6.3090		1.2978
		(1.14)		(1.59)
Change in $\ln(Sales)_{t-2 \text{ to } t-1}$	−0.3094	−0.3328	0.0104	0.0066
	(−0.56)	(−0.60)	(0.42)	(0.26)
Change in $tangibility_{t-2 \text{ to } t-1}$	4.0385	3.8979	−0.1740	−0.2173
	(0.80)	(0.78)	(−0.56)	(−0.69)
Change in $leverage_{t-2 \text{ to } t-1}$	−5.4097	−5.3404	−0.8351*	−0.8153*
	(−1.38)	(−1.34)	(−1.91)	(−1.77)
Stock $return_{t-2 \text{ to } t-1}$	−2.4087***	−1.4188**	−0.3819***	−0.2020**
	(−3.41)	(−2.58)	(−2.79)	(−2.00)
Year dummies	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.121	0.111	0.222	0.193
No. of obs.	728	728	728	728

C. Portfolio Concentration by Level of Ownership Concentration

In Table 4, we distinguish between the voice channel and the market channels (exit and learning). If the voice channel dominates our main relation between

the sample to firm-years with data on stock returns available (main list firms), which yields a final sample of 728 firm-years.

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TABLE 4

Portfolio Concentration and Firm Performance by Level of Ownership Concentration

Table 4 presents firm-level fixed-effects regressions of firm performance on measures of ownership structure for a sample of 132 Finnish listed firms (excluding banks and insurance companies) during 1995–2007. In Panel A, the AWI is calculated for shareholders that hold either $\geq$1% or $\geq$5% of outstanding shares. In Panel B, the effect of AWI is estimated based on the level (high/low) of ownership concentration (HFI). The dependent variable is either ROA, defined as EBIT divided by total assets winsorized at the 1st and 99th percentiles, respectively, in Panel A, or Tobin's *q*, defined as market value of equity plus book value of debt all divided by book value of total assets winsorized at the 1st and 99th percentiles, respectively, in Panel B. The column Low HFI includes observations for which the HFI using data on the firm's 5% shareholders at year-end is below the sample median, whereas the High HFI includes observations for which the HFI is above or equal to the sample median. The independent variables are as follows: AWI, the average weight of the shareholders in a firm at year-end; ln(Sales), the natural log of sales in thousands euros; firm age, years since incorporation; tangibility, tangible assets divided by total assets; and leverage, long-term debt divided by total assets. *t*-statistics, based on standard errors that control for clustering at the firm level, are in parentheses below the coefficient estimates. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Shareholder Size

	ROA_t				Tobin's q_t			
	Shareholders							
	1%	1%	5%	5%	1%	1%	5%	5%
Variable	1	2	3	4	5	6	7	8
$\ln(HFI)_{t-1}$	0.8710*		0.9944**		0.1564***		0.1649***	
	(1.85)		(2.07)		(2.79)		(3.01)	
$\ln(AWI_{1\% \text{ or } 5\% \text{ shareholders}})_{t-1}$	0.2427	0.4175	−0.3455	−0.2649	0.1637**	0.1824**	0.0373	0.0507
	(0.39)	(0.66)	(−1.30)	(−0.98)	(2.35)	(2.59)	(0.99)	(1.28)
$\ln(Sales)_{t-1}$	1.2009	1.2636	1.1720	1.2259	−0.0475	−0.0344	−0.0459	−0.0370
	(1.17)	(1.26)	(1.14)	(1.21)	(−0.93)	(−0.64)	(−0.89)	(−0.68)
Firm age_{t-1}	−0.0477	−0.0632	−0.0617	−0.0695	0.0144	0.0131	0.0132	0.0119
	(−0.32)	(−0.43)	(−0.42)	(−0.47)	(1.58)	(1.39)	(1.49)	(1.30)
$Tangibility_{t-1}$	−7.4321	−6.7195	−7.8295	−6.4806	−0.7680	−0.5215	−0.8623*	−0.6387
	(−1.36)	(−1.20)	(−1.44)	(−1.15)	(−1.64)	(−1.04)	(−1.85)	(−1.24)
$Leverage_{t-1}$	−4.9940	−4.9166	−5.3441	−5.6020	−0.6902**	−0.6984**	−0.7147**	−0.7575**
	(−1.25)	(−1.23)	(−1.34)	(−1.37)	(−2.03)	(−2.05)	(−2.02)	(−2.05)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.125	0.117	0.127	0.121	0.136	0.119	0.123	0.105
No. of obs.	1,114	1,126	1,114	1,114	1,114	1,126	1,114	1,114

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TABLE 4 (continued)

Portfolio Concentration and Firm Performance by Level of Ownership Concentration

Panel B. Low and High HFIs

	ROA_t		Tobin's q_t	
	Low HFI	High HFI	Low HFI	High HFI
Variable	1	2	3	4
$\ln(AWI)_{t-1}$	4.0705*	9.7499***	0.7024***	1.3763***
	(1.99)	(3.77)	(2.68)	(3.13)
$\ln(Sales)_{t-1}$	0.4097	1.1275	−0.0825	−0.1793**
	(0.37)	(0.70)	(−0.96)	(−2.09)
Firm age_{t-1}	−0.0191	0.4514	0.0215*	0.0827***
	(−0.10)	(1.59)	(1.67)	(3.88)
$Tangibility_{t-1}$	0.6718	−9.4832	−0.6690	−0.8384
	(0.09)	(−1.25)	(−0.92)	(−1.66)
$Leverage_{t-1}$	0.2428	−3.7344	−0.9650*	0.0232
	(0.03)	(−0.83)	(−1.89)	(0.09)
Year dummies	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.118	0.187	0.187	0.186
No. of obs.	557	569	557	569

portfolio concentration and firm performance, then we should expect to see a stronger relation for large shareholders, as these large shareholders can use their control rights to engage in direct value-enhancing intervention. In contrast, if the market-based channels dominate, then we would expect portfolio concentration to become more important for smaller investors that have time constraints and that are unable to scale up their information acquisition. Thus, the voice and financial market channels predict the opposite effects with respect to investor size. We can state Hypotheses 2A and 2B as follows:

Hypothesis 2A. The positive relation between portfolio concentration and future firm performance is stronger for smaller shareholders.

Hypothesis 2B. The positive relation between portfolio concentration and future firm performance is stronger for larger shareholders.

Table 4 shows how the correlation between shareholder portfolio concentration, measured by AWI, and firm performance is influenced by i) shareholder size and ii) the level of ownership concentration. Using data on shareholders with at least 1% of outstanding shares, Panel A of Table 4 shows that the coefficient for AWI is positive and significant in the Tobin's q model, but statistically insignificant in the ROA model. Interestingly, when the AWI measure is calculated for 5% blockholders alone, the coefficient is negative but insignificant in the ROA model and positive but insignificant in the Tobin's q model, while the HFI measure is positive and significantly related to ROA and Tobin's q. This finding indicates that the HFI measure may capture incentive effects better than the AWI measure for large shareholders, which supports traditional voice theories through ownership concentration. We also run the models in Panel A of Table 4 without the HFI measure. As shown in columns 2, 4, 6, and 8 of Panel A, omitting the HFI variable from the models does not alter the interpretations of the AWI measure. The results

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in Panel A of Table 4 viewed together with the main results in Tables 2 and 3 indicate that smaller shareholders with concentrated portfolios play a governance role that differs from that of large blockholders. Taken as a whole, our results for portfolio concentration support Hypothesis 2A but not Hypothesis 2B.[22] Hence, the positive relation between portfolio concentration and future firm performance when smaller shareholders are included is likely to be explained by the financial market channels (exit and learning) rather than by intervention (voice).

Panel B of Table 4 shows that the AWI measure is positively and statistically significantly related to firm performance when HFI is below the median (columns 1 and 3) as well as when ownership concentration is above or equal to the median level (columns 2 and 4).[23] Hence, we do not find evidence that would indicate that the effect of shareholder portfolio concentration would be stronger in firms with lower control concentration, as found in Kandel et al. (2011) in the context of shareholder similarity. Instead, the results in Panel B of Table 4 indicate that the effect of portfolio concentration is rather independent of the level of ownership concentration, which again supports the argument that the effect of smaller holdings by concentrated shareholders is different from that of large blockholders with significant control rights.

D. Portfolio Concentration, Information Advantages, and Stock Returns

If shareholders with concentrated portfolios only have public information, portfolio concentration should not be significantly related to future stock returns, since any public information that these concentrated shareholders have should already be in the current stock price. However, if shareholders with concentrated portfolios have information unavailable to the public (private information), portfolio concentration could be positively related to stock returns. This argument nests two cases. One is reverse causality from performance to portfolio concentration: Shareholders have private information that the firm will perform well, so they concentrate their portfolios in advance. The other case is causality from portfolio concentration to performance: Shareholders with concentrated stakes have incentives to gather information, which improves performance through either the exit or learning channel (if the market does not capitalize these benefits immediately, which is why they may show up in long-run stock returns). Moreover, using stock return as the performance variable helps address the endogeneity issue, as stock returns should not be persistent (which can be the case for ROA and Tobin's *q*). We can now state the following hypotheses:

Hypothesis 3A. If shareholders with concentrated portfolios only have public information, portfolio concentration should be unrelated to future stock returns.

Hypothesis 3B. If shareholders with concentrated portfolios have private information, portfolio concentration should be positively related to future stock returns.

[22] Our results for the HFI and AWI variables are similar if we run the regressions on a sample of firms that do not have multiple traded share classes.

[23] The conclusions do not change if we group the HFIs based on quartiles.

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To empirically explore the potential information advantages that investors with high portfolio concentration may have, we relate the year-end AWI $(t-1)$ and yearly changes in the AWI measure from year-end $t-2$ to $t-1$ to stock returns in year t. We measure stock returns by the Jensen (1968) alpha, the Carhart (1997) 4-factor alpha, and the Daniel et al. (1997) 4-factor alpha using characteristics-adjusted returns. We estimate Jensen (1968) alphas for each share and year:

$$R_t - R_f = \alpha + \beta_t(R_m - R_f) + \varepsilon_t, \tag{5}$$

where R_t is the return on a firm's share in month t, R_f is the risk-free rate in month t, and R_m is the market portfolio return.

The Carhart (1997) 4 factors are returns to zero investment portfolios that capture market, book-to-market, size, and momentum effects, respectively, and can be expressed as follows:

$$\begin{aligned} R_t - R_f = {} & \alpha + \beta_{\text{MKT}}\text{MKT}_t + \beta_{\text{HML}}\text{HML}_t \\ & + \beta_{\text{SMB}}\text{SMB}_t + \beta_{\text{MOM}}\text{MOM}_t + \varepsilon_t, \end{aligned} \tag{6}$$

where R_t is the return on a firm's share in month t and R_f is the risk-free rate in month t. MKT, HML, SMB, and MOM are the returns on the market, value, size, and momentum factors.

We also calculate alphas based on the Daniel et al. (1997) characteristics-sorted benchmark portfolios. We place every listed firm into portfolios based on a triple-sort on each firm's market value of equity (firm size), book-to-market ratio, and momentum (past 12-month stock return). Each formation date at year-end, firms are sorted into two equal size portfolios. The firms within each size portfolio are then sorted into two portfolios based on their book-to-market ratios. Furthermore, the firms in each of the four size/book-to-market portfolios are sorted into two portfolios based on each firm's past 12-month stock returns.[24] Equal-weighted returns for each benchmark portfolio are calculated for each year. Each firm is then assigned to a benchmark portfolio according to its size, book-to-market, and momentum rank. Finally, we calculate alphas by regressing each firm's returns on the returns of the assigned benchmark portfolio each year using monthly data. As characteristics can be important even when controlling for covariances using Carhart (1997) 4 factors (see Daniel and Titman (1997)), we calculate returns in excess of the benchmark portfolio return using:

$$\begin{aligned} R_t - \text{BP}_t = {} & \alpha + \beta_{\text{MKT}}\text{MKT}_t + \beta_{\text{HML}}\text{HML}_t \\ & + \beta_{\text{SMB}}\text{SMB}_t + \beta_{\text{MOM}}\text{MOM}_t + \varepsilon_t, \end{aligned} \tag{7}$$

where R_t is the return on a firm's share in month t and BP_t is the benchmark portfolio return in month t. MKT, HML, SMB, and MOM are the returns on the market, value, size, and momentum factors.

Panel A of Table 5 shows that the AWI measure is positively related to abnormal risk-adjusted stock returns. The relation between AWI and the 4-factor

[24]To maintain sample size, we follow Daniel et al. (1997) and include firms with at least 6 monthly returns available in the 12 months preceding the formation date.

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alpha is statistically significant at the 1% level (column 1). The change in AWI is statistically significantly related to the Jensen (1968) alpha (column 6). The relation between AWI and the Daniel et al. (1997) alpha is positive but statistically insignificant. Overall, the results indicate that shareholders with concentrated portfolios are more informed and have private information compared with those who hold less concentrated portfolios, which gives support to Hypothesis 3B but not Hypothesis 3A. This positive correlation between portfolio concentration and stock returns is consistent with the argument that shareholders may concentrate their portfolios in anticipation of superior returns in the near

TABLE 5

Portfolio Concentration and Stock Returns

Table 5 presents OLS regressions of abnormal stock returns on measures of shareholder portfolio concentration using data on 164 nonfinancial and financial firms' ordinary (typically most traded) share class listed in the Main List of the OMX Helsinki Stock Exchange. Returns cover the period 1996–2006. In columns 1 and 2, the dependent variable is the Carhart (1997) 4-factor alpha using monthly returns for each firm, each calendar year. The 4 factors are returns to zero investment portfolios that capture market, size, book-to-market, and momentum effects, respectively. In columns 3 and 4, the dependent variable is the Daniel et al. (1997) characteristics-adjusted 4-factor alpha. The returns on the Daniel et al. benchmarks are subtracted from the firm's return before estimating 4-factor alphas. In columns 5 and 6, the dependent variable is Jensen (1968) alpha using monthly returns for each firm, each calendar year. The independent variables are as follows: the AWI (the average portfolio weight of the shareholders in the firm) at year-end and the yearly changes in the AWI measure. *t*-statistics based on robust standard errors are in parentheses below the coefficient estimates. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Carhart Alpha		Daniel et al. Alpha		Jensen Alpha	
	1	2	3	4	5	6
Panel A. Short-Term Abnormal Returns (1st year)						
AWI_{t-1}	0.0341***		0.0150		0.0041	
	(3.24)		(1.44)		(0.57)	
Change in $AWI_{t-2 \text{ to } t-1}$		0.0681*		0.0170		0.1588***
		(1.67)		(0.42)		(5.41)
Constant	−0.0101***	−0.0029*	−0.0039	−0.0001	−0.0016	−0.0004
	(−3.03)	(−1.81)	(−1.23)	(−0.08)	(−0.66)	(−0.40)
R^2	0.009	0.003	0.003	0.0003	0.0003	0.036
No. of obs.	966	856	737	667	966	856
Panel B. Long-Term Abnormal Returns (2nd year)						
AWI_{t-1}	0.0248**		0.0146		−0.0069	
	(2.16)		(1.32)		(−0.93)	
Change in $AWI_{t-2 \text{ to } t-1}$		−0.0434		−0.0123		0.0347
		(−1.00)		(−0.29)		(1.13)
Constant	−0.0100***	−0.0051***	−0.0042	−0.0007	0.0003	−0.0005
	(−2.72)	(−3.02)	(−1.20)	(−0.44)	(0.13)	(−0.49)
R^2	0.005	0.001	0.002	0.0002	0.001	0.002
No. of obs.	855	748	666	582	855	748

term (next year). The positive correlation between portfolio concentration and abnormal stock returns is also consistent with the argument that shareholders with concentrated portfolios may influence firm value through their monitoring role.

While it is plausible that some investors may have superior information on a firm's performance, it is less likely that they would be able to predict performance far into the future. Panel B of Table 5 shows results on the relation between portfolio concentration and abnormal stock returns during the second year ($t + 1$). Portfolio concentration is not significantly related to long-term stock returns in five of six models. In column 1, the AWI measure is positively and significantly related to the Carhart (1997) 4-factor alpha. Taken as a whole, our results suggest

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that concentrated investors are less able to forecast returns 2 years into the future, whereas firms with focused investors show positive returns more consistently in the short term (next year).

We now turn to whether our findings on stock returns can be used to create a profitable investment strategy. We note that the direction of causality is not of particular interest here, since the focus is on whether information on portfolio concentration can be used to create profitable investment strategies. We calculate stock returns obtained from a long-short portfolio that buys stocks in the highest quartile of portfolio concentration and shorts stocks in the lowest quartile. We then calculate Jensen (1968), Carhart (1997), and Daniel et al. (1997) alphas. To ensure that the information on year-end portfolio holdings will be available to investors before stock returns are calculated, we measure alphas for the 12-month period starting Feb. 1 in the next year.[25]

Table 6 shows the returns to a long-short portfolio. Panel A shows that buying the high-quartile and shorting the low-quartile stocks based on year-end portfolio concentration (in the previous year) yield a 5.2% Jensen (1968) alpha for the average year. Panel B shows that the long-short Carhart (1997) alpha amounts to 7.5% for the average year. Using the Daniel et al. (1997) alpha (Panel C), the mean of the long-short portfolio equals 2.6%.[26]

TABLE 6

Investment Strategies Using Data on Portfolio Concentration

Table 6 shows abnormal stock returns for quartiles formed based on levels of portfolio concentration. Data on 164 nonfinancial and financial firms' ordinary (typically most traded) share class listed in the Main List of the OMX Helsinki Stock Exchange are used to form the quartiles. Returns cover the period Feb. 1996–Jan. 2007. In Panel A, stock performance is measured by the Jensen (1968) alpha using monthly returns for each firm, each year (Feb. 1–Jan. 31). In Panel B, stock performance is measured by the Carhart (1997) 4-factor alpha using monthly returns for each firm, each year (Feb. 1–Jan. 31). In Panel C, stock performance is measured by the Daniel et al. (1997) characteristics-matched portfolio returns estimated using monthly returns for each firm, each year excluding banks and insurance companies (Feb. 1–Jan. 31). Portfolio concentration quartiles are measured by the AWI (the average weight of the shareholders in the firm) at year-end before the return period.

	Mean Quartile 1 (highest AWI)	Mean Quartile 4 (lowest AWI)	Difference (1 − 4) (monthly)	Difference (12 months)
Year	1	2	3	4
Panel A. Jensen Alpha				
1996	0.002	0.015	−0.014	−0.165
1997	0.002	0.002	0.000	−0.001
1998	−0.001	−0.028	0.027	0.325
1999	−0.006	−0.003	−0.002	−0.030
2000	0.012	−0.004	0.017	0.199
2001	0.004	0.004	0.001	0.009
2002	−0.001	−0.014	0.013	0.160
2003	0.001	0.022	−0.020	−0.245
2004	0.004	−0.017	0.020	0.245
2005	−0.001	−0.006	0.005	0.058
2006	0.001	0.000	0.002	0.020
Mean (1996–2006)	0.002	−0.003	0.004	0.052

(continued on next page)

[25]The year-end information on portfolio holdings derived from individual investors' transactions is available with a few days lag in the beginning of January.

[26]For example, a 100-dollar investment in the long-short portfolio in the first year would have yielded $152.77, $200.04, and $119.32 (excess returns) over the period Feb. 1996–Jan. 2007 using the Jensen (1968), Carhart (1997), and Daniel et al. (1997) alphas, respectively.

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TABLE 6 (continued)

Investment Strategies Using Data on Portfolio Concentration

Year	Mean Quartile 1 (highest AWI) 1	Mean Quartile 4 (lowest AWI) 2	Difference (1 − 4) (monthly) 3	Difference (12 months) 4
Panel B. Carhart Alpha				
1996	0.020	0.003	0.017	0.203
1997	0.003	0.007	−0.003	−0.040
1998	−0.022	−0.052	0.030	0.365
1999	−0.003	0.000	−0.003	−0.031
2000	−0.009	−0.008	−0.001	−0.010
2001	0.025	0.033	−0.008	−0.098
2002	0.011	0.011	0.000	0.006
2003	−0.001	−0.004	0.003	0.033
2004	0.003	−0.019	0.022	0.262
2005	0.003	−0.015	0.018	0.221
2006	−0.014	−0.007	−0.007	−0.083
Mean (1996–2006)	0.002	−0.005	0.006	0.075
Panel C. Daniel et al. Alpha				
1996	−0.007	−0.005	−0.002	−0.025
1997	−0.001	0.003	−0.004	−0.049
1998	0.012	−0.009	0.021	0.256
1999	0.011	−0.004	0.015	0.183
2000	−0.010	0.002	−0.012	−0.144
2001	−0.002	−0.002	0.000	0.004
2002	−0.007	0.010	−0.017	−0.200
2003	0.009	−0.003	0.011	0.137
2004	0.009	−0.005	0.014	0.172
2005	0.009	0.004	0.005	0.058
2006	0.003	0.012	−0.009	−0.107
Mean (1996–2006)	0.002	0.000	0.002	0.026

E. Portfolio Concentration and Price Informativeness

To further separate between the financial market channels (exit and learning), on the one hand, and the reverse causality argument (anticipation of superior future performance) as well as voice theories, on the other hand, we explore whether portfolio concentration (AWI) is related to private (or nonmarket) information in stock prices. We can state our hypothesis as follows:

Hypothesis 4. Portfolio concentration is positively related to price informativeness.

We use two measures of price informativeness that have been used in previous research: the probability of informed trading (PIN) and the $(1 - R^2)$ from capital asset pricing model (CAPM) regressions. The PIN measure captures the amount of private information in the stock price and is measured as the ratio of expected informed order flows to expected total order flows (see Easley, Hvidkjaer, and O'Hara (2002)).[27] Our PIN variable is the average of monthly PIN estimates

[27] More specifically, the PIN measure can be expressed as $au/(au + 2e)$, where a is the probability of an information event, u is the order arrival of informed traders, and e denotes the order arrival of uninformed traders (for further details, see Easley et al. (2002)).

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for each firm, each year and covers the years 1999–2006.[28] The $(1 - R^2)$ is obtained from CAPM regressions using daily data for each firm, each year (1996–2006).[29] Similar measures have been used as a proxy for nonmarket information in previous research (see, e.g., Durnev, Morck, and Yeung (2004)).[30] Following previous research (Piotroski and Roulstone (2004), Brockman and Yan (2009)), we include the natural logarithm of market value of common stock at year-end, the natural logarithm of the yearly trading volume of the firm's common stock in euros, and the natural logarithm of the standard deviation of the ROA (STDROA) over the last 5 years ($t - 4$ to t), or available years,[31] as firm-specific control variables. The final sample using the PIN variable covers 118 firms with 647 firm-years, while the sample using $(1 - R^2)$ includes 130 firms with 804 firm-years. The regression model can be expressed as follows:

$$\begin{aligned}(8)\qquad \text{Price informativeness}_{i,t} \;=\; & \alpha_i + \beta_{1\,\text{average}}(\text{AWI})_{i,t-1\text{ to }t} \\ & + \beta_{2\,\text{average}}(\text{HFI})_{i,t-1\text{ to }t} + \gamma\,\text{Control variables}_{i,t} \\ & + \delta\,\text{Year dummy variables}_t + \varepsilon_{i,t},\end{aligned}$$

where α_i represents the firm-specific intercept and $\varepsilon_{i,t}$ is the error term.

We define portfolio concentration as the average of year-end data over the period $t - 1$ to t. We run regressions with firm- and time-fixed effects.[32] Panel A of Table 7 shows that portfolio concentration is positive and significantly related to the PIN using data on all investors as well as 0.1% investors. Thus, portfolio concentration is positive and significantly related to private information. Relatedly, Panel B shows that portfolio concentration for investors with at least 0.1% holdings is positive and significantly related to $(1 - R^2)$, while the portfolio concentration using data on all investors is not statistically significantly related to $(1 - R^2)$. The results for $(1 - R^2)$ indicate that more significant shareholders with concentrated portfolios are associated with more nonmarket information.[33] Overall, the results on price informativeness (especially private information) support Hypothesis 4, and thereby they support the market-based channels exit and learning, but not the voice channel or reverse causality.

[28]Prior to year 1999, lower stock liquidity puts limitations on the PIN measure. We require that at least 10 months of PIN estimates be available to calculate the yearly average. We are grateful to Joakim Westerholm for sharing PIN data assembled for Berkman, Koch, and Westerholm (2014).

[29]The R^2 of the CAPM regressions measures the amount of the firm's stock returns that can be explained with the returns of the market portfolio. Since total risk in this setting equals market risk plus idiosyncratic risk, a lower R^2 implies a higher level of idiosyncratic firm risk.

[30]We do not separately include industry returns in the regressions as in, for example, Durnev et al. (2004) due to the small sample size. Thus, our information measure $(1 - R^2)$ is a measure of both firm-specific and industry-related return variation.

[31]For firms that have limited historical data on profitability, we require at least 2 years of data to calculate the standard deviation. In addition, since our data set covers historical data from 1992 onward, STDROA is calculated for a 4-year period (1992–1995) for firms included in year 1995 in Panel B of Table 7.

[32]We obtain similar results using a random effects regression specification.

[33]In unreported regression models, we also included the HFI variable. The coefficient for HFI was positive but statistically insignificant. The inclusion of the HFI variable did not change the effects of the AWI variable.

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TABLE 7

Portfolio Concentration and Private Information

Table 7 presents firm-level fixed-effects regressions of price informativeness on investors' portfolio concentration for Finnish listed firms (excluding banks and insurance companies). In Panel A, the dependent variable is the PIN measure, as defined in Easley et al. (2002). In Panel B, the dependent variable is $(1 - R^2)$ from CAPM regressions using daily data for each firm, each year. The main independent variables are as follows: AWI, the average weight of the shareholders in a firm at year-end, measured for all investors and 0.1% investors, respectively; ln(Market cap), the natural log of market value of equity; ln(Trading volume), the natural log of trading volume in euros during the year; and ln(STDROA), the natural log of standard deviation of the ROA during the past 5 years. Panel A covers PIN values for the years 1999–2006, while Panel B covers $(1 - R^2)$ for the years 1996–2006. *t*-statistics, based on standard errors that control for clustering at the firm level, are in parentheses below the coefficient estimates. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Panel A. PIN		*Panel B.* $(1 - R^2)$	
	1	2	3	4
$Av_AWI_{t-1 \text{ to } t}$	0.6903***		−0.0127	
	(2.77)		(−0.16)	
$Av_AWI_0.1\%_{t-1 \text{ to } t}$		0.2594*		0.1397***
		(1.73)		(2.75)
$\ln(\text{Market cap})_{t-1}$	0.0112	0.0180	−0.0395***	−0.0424***
	(0.80)	(1.23)	(−4.88)	(−4.99)
$\ln(\text{Trading volume})_{t-1 \text{ to } t}$	−0.0199*	−0.0158	−0.0168***	−0.0160***
	(−1.87)	(−1.55)	(−4.04)	(−4.19)
$\ln(\text{STDROA})_{t-4 \text{ to } t}$	−0.0037	−0.0084	−0.0072	−0.0083
	(−0.21)	(−0.47)	(−1.20)	(−1.43)
Year dummies	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.174	0.165	0.417	0.427
Firms	118	118	130	130
No. of obs.	647	647	804	804

F. Portfolio Concentration and Managerial Equity Incentives

In this section, we attempt to distinguish between the exit and learning theories. In previous sections, we established that portfolio concentration is associated with higher price efficiency and that the performance consequences are driven by financial market channels rather than voice. One way to separate between the exit and learning hypotheses is to explore whether the portfolio concentration/performance relation is stronger in firms in which managers' equity incentives are higher. When managers have high equity incentives, we would expect higher price efficiency, consistent with the exit model, to induce managers to make decisions that are better aligned with outside shareholder interests. We can now state the next hypothesis:

Hypothesis 5. The relation between portfolio concentration and firm performance is stronger in firms with higher managerial incentives.

To test this hypothesis, we collect data on chief executive officer's (CEO) equity ownership and CEO stock option plans. The variable CEO ownership equals the equity ownership (cash-flow rights) by the CEO if the CEO is among the 20 largest shareholders, as reported in the corporate yearbook Pörssitieto (1995–2007), and 0 otherwise.[34] The CEO is reported to be a principal owner in about

[34]One benefit of this ownership variable definition is the comparability over the entire sample period (1995–2006). There are some exceptions to the definition and sources of CEO ownership. First, in a few cases, Pörssitieto contains only data on the 10 largest shareholders (often for smaller

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20% of the firm-years. The average (median) CEO holding equals 13.75% (7.1%) if the CEO is among the principal shareholders.

We use the stock option delta from the Black and Scholes (1973) formula, which measures the sensitivity of the option to the stock price (i.e., incentives from the stock option plan). The option delta data are available for the period 2002–2005 and contain 331 observations.[35] As a measure of incentives, we use the euro value of the CEO's shareholdings plus the stock option delta in euros. We scale the CEO's incentives by the firm's market value of equity.[36] We also include in the regression a dummy variable equal to 1 if option data are available in a year, and 0 otherwise.[37]

The results on how managerial equity incentives are related to the portfolio concentration/performance relation are displayed in Table 8. Panel A shows that the interaction between portfolio concentration (AWI) and CEO ownership is

TABLE 8

Portfolio Concentration, Managerial Equity Incentives, and Firm Performance

Table 8 presents firm-level fixed effects of firm performance on measures of ownership structure for a sample of 132 Finnish listed firms (excluding banks and insurance companies) during 1995–2007. The dependent variable is either ROA, defined as EBIT divided by total assets winsorized at the 1st and 99th percentiles, respectively, in Panel A, or Tobin's *q*, defined as market value of equity plus book value of debt all divided by book value of total assets winsorized at the 1st and 99th percentiles, respectively, in Panel B. The independent variables are as follows: AWI, the average weight of the shareholders in a firm at year-end; the HFI using data on the firm's 5% shareholders at year-end; CEO ownership, equals the CEO shareholdings in percent if the CEO is among the firm's principal shareholders (typically the 20 largest shareholders) and 0 otherwise; CEO incentives, the stock option plan delta in euros based on the Black and Scholes (1973) formula plus the CEO's shareholdings in euros (based on the CEO ownership variable) all divided by the market capitalization of equity; option data available, set to unity if data on CEO stock option plans are available and 0 otherwise; ln(Sales), the natural log of sales in thousands euros; firm age, years since incorporation; leverage, long-term debt divided by total assets; and tangibility, tangible assets divided by total assets. *t*-statistics, based on standard errors that control for clustering at the firm level, are in parentheses below the coefficient estimates. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Panel A. ROA_t		*Panel B. Tobin's q_t*	
Variable	1	2	3	4
HFI_{t-1}	6.6850*	7.0495*	1.0833**	1.1025**
	(1.80)	(1.92)	(2.20)	(2.26)
AWI_{t-1}	18.9563***	19.3897***	3.3411***	3.3368***
	(2.80)	(2.86)	(3.35)	(3.34)
AWI × CEO $ownership_{t-1}$	74.9674*		2.5295	
	(1.73)		(0.77)	
CEO $ownership_{t-1}$	−19.4784*		−0.4442	
	(−1.68)		(−0.42)	
AWI × CEO $incentives_{t-1}$		55.8821		2.8607
		(1.22)		(0.88)

(continued on next page)

firms). Second, if the firm is not included in Pörssitieto, we collect data from annual reports. Finally, since Pörssitieto does not contain ownership data for the year 2001, we use data from year 2000 for year 2001. If a firm in year 2001 was not covered by Pörssitieto in year 2000, we collect ownership data from annual reports.

[35]The average (median) CEO option delta value equals 184,574 (51,697) euros for observations with nonzero values. We are grateful to Daniel Pasternack and Eva Liljeblom for sharing their data on values of CEO stock option plans. See Liljeblom, Pasternack, and Rosenberg (2011) for details on stock option programs in Finnish listed firms.

[36]Scaling by annual salary (though unavailable to us) would lead to an incentive measure that is independent of firm size (see Edmans, Gabaix, and Landier (2009)). As an alternative, we also used an unscaled CEO incentives variable. This specification yielded results in line with the scaled variable.

[37]The dummy is set equal to 0 if a firm's annual report indicates that the CEO has stock options in a given year but we lack information on the details of the option plan.

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TABLE 8 (continued)

Portfolio Concentration, Managerial Equity Incentives, and Firm Performance

	Panel A. ROA_t (continued)		*Panel B. Tobin's q_t (continued)*	
Variable	1	2	3	4
CEO incentives$_{t-1}$		−13.4111 (−0.97)		−0.5536 (−0.55)
Option data available (1/0)$_{t-1}$		0.9789 (1.36)		0.0701 (0.94)
ln(Sales)$_{t-1}$	1.0648 (1.08)	1.0914 (1.10)	−0.0692 (−1.23)	−0.0667 (−1.18)
Firm age$_{t-1}$	0.1127 (0.74)	0.1279 (0.83)	0.0407*** (3.55)	0.0414*** (3.56)
Leverage$_{t-1}$	−3.8435 (−0.99)	−3.5963 (−0.92)	−0.5804* (−1.89)	−0.5615* (−1.81)
Tangibility$_{t-1}$	−9.0060 (−1.65)	−8.9354 (−1.65)	−0.9233** (−2.21)	−0.9329** (−2.23)
Year dummies	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.150	0.151	0.176	0.178
No. of obs.	1,114	1,114	1,114	1,114

positive and statistically weakly significant (at the 10% level) using operational performance (ROA) as the outcome variable, while the interaction is positive but statistically insignificant using Tobin's q. The interaction of the AWI and CEO incentives is positive but statistically insignificant in both the ROA and Tobin's q models.[38] Taken together, the results in Table 8 appear to support more the exit channel (Hypothesis 5) than the learning channel, by showing that the relation between portfolio concentration and future performance tends to be stronger when managers have significant equity incentives.

IV. Further Analysis and Robustness Tests

A. Alternative Specifications of Ownership Variables

To further explore the relation between shareholder incentives and firm performance, we calculate the AWI and the HFI using a subsample of private investors (physical persons). On the one hand, private investors should be more effective due to their better incentives arising from their direct holdings as principals. Also, the information acquisition by private investors is less likely to be scalable (compared to institutional investors), so portfolio concentration should matter more for these private investors. On the other hand, individual investors are likely to be less sophisticated than institutions, so their monitoring effect may be weaker. Empirically, we find that the coefficients of the AWI and HFI variables for private investors (not reported in a table) are similar to the coefficients for all investors reported in Table 2. The findings suggest that the AWI and the HFI

[38] If we do not scale the CEO incentives by market capitalization, the coefficient of the interaction term is positive with a t-statistic of 1.81 and 1.29 for ROA and Tobin's q, respectively.

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indices capture the portfolio and ownership concentration effects across shareholder types.

Furthermore, we address the potential nonlinearity in the relation between shareholder concentration and firm performance. Morck, Shleifer, and Vishny (1988), McConnell and Servaes (1990), and McConnell, Servaes, and Lins (2008) find a roof-shaped relation between ownership concentration and firm performance, which they interpret as an incentive effect for low levels and an entrenchment effect for high levels of ownership concentration. High levels of portfolio concentration may also be associated with risk aversion, as in Faccio et al. (2011); they find that blockholders with higher portfolio concentration are risk averse.

In Table 9, we include squared terms of the AWI and HFI, respectively, to allow for a nonlinear effect in the firm-fixed effects regression specification. We find a weakly significant nonlinear effect for the AWI using Tobin's q as the outcome variable, with an inflection point at about 0.65. Since the median AWI is about 0.23 and the 95th percentile is about 0.52, the performance effect of portfolio concentration appears to be typically linear, being nonlinear only in the case of very large changes in ownership. Moreover, Appendix C displays averages of performance variables in different AWI quartiles. Appendix C confirms the linear relation for ROA and AWI as well as the weakly nonlinear relation for Tobin's q and AWI.

TABLE 9

Nonlinearity in Ownership Variables

Table 9 presents firm-level fixed-effects regressions of firm performance on measures of ownership structure for a sample of 132 Finnish listed firms (excluding banks and insurance companies) during 1995–2007. The dependent variable is the ROA, defined as EBIT divided by total assets winsorized at the 1st and 99th percentiles, respectively, in Panel A, whereas the dependent variable is Tobin's q, defined as market value of equity plus book value of debt all divided by book value of total assets winsorized at the 1st and 99th percentiles, respectively, in Panel B. The independent variables are as follows: the HFI using data on the firm's 5% shareholders at year-end; the AWI, the average weight of the shareholders in a firm at year-end; ln(Sales), the natural log of sales in thousands euros; firm age, years since incorporation; tangibility, tangible assets divided by total assets; and leverage, long-term debt divided by total assets. t-statistics, based on standard errors that control for clustering at the firm level, are in parentheses below the coefficient estimates. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	ROA_t	Tobin's q_t
Variable	1	2
HFI_{t-1}	0.8542	−0.2623
	(0.10)	(−0.17)
$(HFI_{t-1})^2$	10.7019	2.3075
	(0.80)	(0.83)
AWI_{t-1}	37.4709**	6.6609***
	(2.45)	(3.20)
$(AWI_{t-1})^2$	−26.3850	−5.1242*
	(−1.31)	(−1.96)
$\ln(Sales)_{t-1}$	1.0355	−0.0754
	(1.09)	(−1.33)
Firm age_{t-1}	0.1290	0.0412***
	(0.83)	(3.42)
$Tangibility_{t-1}$	−7.3632	−0.7875*
	(−1.40)	(−1.88)
$Leverage_{t-1}$	−4.2687	−0.6267**
	(−1.12)	(−1.99)
Year dummies	Yes	Yes
Firm effects	Yes	Yes
R^2	0.149	0.189
No. of obs.	1,114	1,114

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We focus on the role of outside shareholders and thus analyze the more traded low-voting share class in the main empirical analysis. However, we reestimate the main results in Table 2 using a sample of firms with only a single share class traded in order to test if dual-class firms ($N = 20$) affect our results. Though not reported in a table, we find that the results for firms with a single share class traded ($N = 112$) are effectively equal to those for the full sample ($N = 132$).[39] A more detailed analysis of ownership and control structures by large shareholders can be found in Maury and Pajuste (2005).

B. Robustness Analysis

We also explore the robustness of our main results with respect to influential observations. Although we use winsorized ROA and Tobin's q measures at the 1st and 99th percentiles to reduce the impact of outliers in the main analysis, we also consider winsorizing the performance measures using the 5th and 95th percentiles as well as using unwinsorized performance variables, and find similar results as in the main analysis. As another robustness check, we omit observations that exhibit large yearly changes (more than $\pm$ 0.05) in the AWI from the main fixed-effects regression analysis, and find that the results are not driven by the largest changes in AWI.

V. Conclusions

In this paper, we investigate the relation between shareholder portfolio concentration and firm performance. While prior research investigated the incentives for blockholders to become informed and studied whether they can be value-enhancing due to their trading (exit and learning effects) or direct intervention (voice), our paper is the first to investigate how portfolio concentration may affect shareholders' incentives to become informed and their potential governance role. We argue that when shareholders have resource constraints and cannot scale up their information acquisition, which is the case for smaller shareholders, portfolio concentration becomes an important determinant for their incentives to become informed and perform a governance role. While the size of the holding in a firm still matters (as ownership concentration affects incentives to trade and collect information), this paper argues that portfolio concentration becomes especially important for shareholders that are smaller. Our main hypothesis is that portfolio concentration should be positively related to future firm performance.

We use data on more than 1.3 million unique shareholders to calculate a measure of the average shareholder portfolio concentration, which we call the AWI, for virtually every Finnish publicly listed firm. Using an extensive sample of listed firms over a 12-year period, we find a positive and significant relation between shareholders' average portfolio concentration and future operational performance and valuation. We find that the relation between the average portfolio concentration and firm performance for all shareholders is stronger than the

[39] Our main results (Table 2) are also similar when we use ownership data from the high voting share class instead of the low voting share class for firms with multiple traded share classes.

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relation between ownership concentration by blockholders and firm performance. The relation between portfolio concentration and performance is stronger when smaller holdings are included in our measure. This finding supports the interpretation that portfolio concentration becomes important when investors are unable to scale up their information acquisition, as is the case for shareholders of smaller size. Thus, our results also indicate that the financial market mechanisms (exit and learning) dominate direct intervention (voice) by shareholders. Further analysis shows that portfolio concentration is positively related to price informativeness, which gives support to the two market-based channels, exit and learning. In addition, we find evidence that portfolio concentration is positively related to abnormal stock returns in the next year, which indicates that shareholders who hold concentrated portfolios may have superior information on a firm's near-term performance.

Our analysis does not allow us to make strong claims about causality. However, overall, our tests indicate that portfolio concentration is positively related to future firm performance. Furthermore, our results are also consistent with the argument that shareholders may concentrate their portfolios in anticipation of superior future stock returns in the near term. These two explanations are not mutually exclusive. However, regardless of the direction of causality, the correlation between portfolio concentration and stock returns implies a potentially profitable trading strategy that investors could exploit.

Taken together, we interpret the results as evidence of a form of monitoring role played by smaller shareholders who hold concentrated portfolios but who typically lack significant control rights. Finally, our study suggests that more attention should be given to the role of smaller shareholders that hold concentrated portfolios in the corporate governance literature.

Appendix A. Correlations

Table A1 shows correlations between performance, ownership, and control variables used in the main analysis in Section III.B. The correlations between the traditional measure of ownership concentration (HFI) and our portfolio concentration measure (AWI) for various investor sizes indicate that these two measures (HFI and AWI) capture different

TABLE A1

Correlation Table

Table A1 presents correlations between the main variables for the 132 Finnish listed firms over the period 1995–2007 as used in the regression tables. Variables 3–12 are lagged 1 year. Variables are defined in Table 1.

	Variable	1	2	3	4	5	6	7	8	9	10	11	12
1	ROA	1.00											
2	Tobin's *q*	0.42	1.00										
3	ln(HFI)	0.03	0.05	1.00									
4	ln(AWI)	0.20	0.06	0.11	1.00								
5	ln(AWI_0.1%)	0.03	0.16	−0.18	0.27	1.00							
6	ln(AWI_1.0%)	0.01	0.15	−0.01	0.15	0.73	1.00						
7	ln(AWI_5.0%)	0.02	0.11	0.15	0.03	0.38	0.62	1.00					
8	ln(Sales)	0.13	−0.02	0.11	0.20	−0.41	−0.36	−0.29	1.00				
9	Firm age	0.06	−0.10	−0.29	0.11	0.00	−0.11	−0.22	0.27	1.00			
10	Leverage	−0.08	−0.27	0.12	0.01	−0.14	−0.08	−0.05	0.07	−0.03	1.00		
11	Tangibility	0.02	−0.31	0.15	0.15	−0.13	−0.11	−0.07	0.05	0.02	0.54	1.00	
12	ln(Total assets)	0.07	−0.11	0.18	0.24	−0.44	−0.39	−0.32	0.92	0.24	0.18	0.22	1.00

but complementary effects of firms' ownership structures. In addition, Table A1 does not indicate concerns with multicollinearity regarding our main variables.

Appendix B. Alternative Regression Techniques

Table B1 shows results on the relation between our ownership variables and future firm performance using alternative econometric techniques: the random effects model and a time-series–cross-sectional OLS model. Panel A shows that the results using the random effects specification that controls for industry and year effects are in line with the firm-fixed effects model. The results from the time-series–cross-sectional pooled OLS model that controls for firm clusters (Panel B) are also in line with the firm-fixed effects and the random effects models. We conclude that the positive relation between the AWI and firm performance holds using alternative panel data regression methods.

TABLE B1

Portfolio Concentration and Firm Performance Using Alternative Regression Techniques

Table B1 presents random effects regressions (Panel A) and pooled OLS regressions (Panel B) of firm performance on measures of ownership structure for a sample of 132 Finnish listed firms (excluding banks and insurance companies) during 1995–2007. The dependent variable is either ROA, defined as EBIT divided by total assets winsorized at the 1st and 99th percentiles, respectively, or Tobin's *q*, defined as market value of equity plus book value of debt all divided by book value of total assets winsorized at the 1st and 99th percentiles, respectively. The independent variables are as follows: the HFI using data on the firm's 5% shareholders at year-end; the AWI, the average weight of the shareholders in a firm at year-end; ln(Sales), the natural logarithm of sales in thousands euros; firm age, years since incorporation; tangibility, tangible assets divided by total assets; and leverage, long-term debt divided by total assets. Industry dummies based on the OMX Helsinki Stock Exchange classification are included in the models but not displayed. *t*-statistics, based on standard errors that control for clustering at the firm level, are in parentheses below the coefficient estimates. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Panel A. Random Effects		*Panel B. OLS*	
	ROA_t	Tobin's q_t	ROA_t	Tobin's q_t
Variable	1	2	3	4
$\ln(HFI)_{t-1}$	0.4087 (1.13)	0.1093** (2.43)	0.0973 (0.18)	0.0777 (1.48)
$\ln(AWI)_{t-1}$	5.8421*** (5.20)	0.7630*** (4.71)	4.3428*** (3.14)	0.3726** (2.20)
$\ln(Sales)_{t-1}$	0.9859* (1.93)	−0.0295 (−0.95)	0.8697** (1.98)	0.0156 (0.38)
Firm age_{t-1}	−0.0038 (−0.35)	−0.0015 (−1.25)	−0.0022 (−0.25)	−0.0009 (−1.02)
$Tangibility_{t-1}$	−2.9596 (−1.01)	−0.8213*** (−3.19)	2.1031 (0.69)	−0.6434** (−2.60)
$Leverage_{t-1}$	−4.9569 (−1.51)	−0.6251** (−2.37)	−9.0265** (−2.44)	−0.5432* (−1.70)
Constant	11.2840* (1.69)	3.6683*** (6.64)	7.7644 (1.41)	2.2947*** (4.25)
R^2	0.150	0.223	0.166	0.253
No. of obs.	1,114	1,114	1,114	1,114

Appendix C. AWI Quartiles and Firm Performance

In Appendix C, we consider the nonlinearity in the relation between firm performance and degrees of portfolio concentration (AWI) by grouping observations into quartiles based on the level of portfolio concentration. Quartile 1 represents observations with the lowest portfolio concentration, while quartile 4 contains observations with the highest portfolio concentration. Table C1 confirms the linear relation between ROA and portfolio concentration as well as the weakly nonlinear relation between Tobin's *q* and portfolio concentration discussed in Section IV.A.

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TABLE C1

AWI Quartiles and Firm Performance

Table C1 displays means for performance variables for different degrees of portfolio concentration. Quartile 1 covers the 25% of observations with the lowest AWI, while quartile 4 covers observations with the highest AWI. The sample covers 132 Finnish listed firms over the period 1995–2007. The AWI variable is lagged 1 year. The performance variables are winsorized at the 1st and 99th percentiles.

	Quartile 1	Quartile 2	Quartile 3	Quartile 4
ROA	5.41	9.03	9.50	10.47
Tobin's *q*	1.45	1.60	1.63	1.59
No. of obs.	282	281	282	281

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